



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

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

OFFICE USE ONLY

APPLICATION #: **OSP – 0379 – 10**

OSHPD Special Seismic Certification Preapproval (OSP)

Type: New Renewal

Manufacturer Information

Manufacturer: Johnson Controls, Incorporated

Manufacturer's Technical Representative: Kenton Hawkins, Regional Equipment Distribution Manager,
Building Efficiency – Western Region

Mailing Address: 5770 Warland Drive, Suite A, Cypress, CA 90630-5030

Telephone: (562) 594-3234 Email: Kenton.L.Hawkins@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

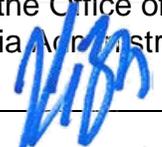
Applicant Company Name: DYNAMIC CERTIFICATION LABORATORIES

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

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

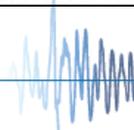
Telephone: (775) 358-5085 Email: LABRIE@MAKEITRIGHT.NET

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: 1/2/14

Title: MANAGING PARTNER Company Name: DYNAMIC CERTIFICATION LABORATORIES

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





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

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

Company Name: DYNAMIC CERTIFICATION LABORATORIES

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

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

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

Supports and Attachments Preapproval

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

Certification Method

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

Testing Laboratory

Company Name: DYNAMIC CERTIFICATION LABORATORIES

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

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

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





**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
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Seismic Parameters

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

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

S_{DS} (Design spectral response acceleration at short period, g) = 2.5

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) = 2.5

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): _____

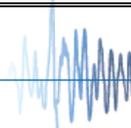
OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2019

Signature:  Date: 1/14/14

Print Name: M. R. Karim Title: SHFR

Special Seismic Certification Valid Up to : S_{DS} (g) = 2.5 z/h = 1.0

Condition of Approval (if applicable): _____



Special Seismic Certification Tested Units



Manufacturer: Johnson Controls, Incorporated

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.

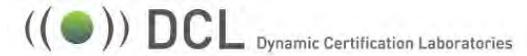
Tested Mounting Description: Ceiling suspended

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*	Width**	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

*Note: 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.

**Note: Dimension width is based on VAV casting + hydronic unit (piping).

Special Seismic Certification Certified Units



Manufacturer: Johnson Controls, Incorporated

Product Line: VRU (VAV ready unit with piping)

Certified 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.

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

Certified Mounting Description: Ceiling suspended

Product Line	Tag	Model Number	VAV Box Dimensions (in)			Max. Operating Weight (lb)	Optional Coils	Optional Sound Attenuator	Mount	Sds (g), z/h=1	Unit
			Max. Length*	Width**	Height						
VRU (Single Duct)	VAV-04	JH3046040xxx	67.0	19.5	10.0	87	Yes	Yes	Ceiling suspended	2.5	UUT1
	VAV-05	JHx0560x0xxx	67.0	19.5	10.0	87 to 220	Yes	Yes	Ceiling suspended	2.5	Interpolated
	VAV-06	JHx0660x0xxx	63.0	19.5	10.0		Yes	Yes	Ceiling suspended	2.5	Interpolated
	VAV-08	JHx0860x0xxx	63.0	21.5	10.0		Yes	Yes	Ceiling suspended	2.5	Interpolated
	VAV-10	JHx1060x0xxx	63.0	23.5	12.5		Yes	Yes	Ceiling suspended	2.5	Interpolated
	VAV-12	JHx1260x0xxx	63.0	25.5	15.0		Yes	Yes	Ceiling suspended	2.5	Interpolated
	VAV-14	JHx1460x0xxx	63.0	29.5	17.5		Yes	Yes	Ceiling suspended	2.5	Interpolated
	VAV-16	JHx1660x0xxx	63.0	33.5	17.5		Yes	Yes	Ceiling suspended	2.5	Interpolated
	VAV-19	JHx1960x0xxx	64.5	39.5	17.5		Yes	Yes	Ceiling suspended	2.5	Interpolated
	VAV-22	JH3226040xxx	64.5	43.5	17.5		220	Yes	Yes	Ceiling suspended	2.5
VRU (Dual Duct)	VAV-04-04	JHD0410x00xx	41.0	35.5	10.0	82	Yes	No	Ceiling suspended	2.5	Extrapolated
	VAV-05-05	JHD0510x00xx	41.0	35.5	10.0	82	Yes	No	Ceiling suspended	2.5	Extrapolated
	VAV-06-06	JHD0610x00xx	37.0	35.5	10.0	82	Yes	No	Ceiling suspended	2.5	UUT3
	VAV-08-08	JHD0810x00xx	37.0	39.5	10.0	82 to 163	Yes	No	Ceiling suspended	2.5	Interpolated
	VAV-10-10	JHD1010x00xx	43.0	43.5	12.5		Yes	No	Ceiling suspended	2.5	Interpolated
	VAV-12-12	JHD1210x00xx	43.0	47.5	15.0		Yes	No	Ceiling suspended	2.5	Interpolated
	VAV-14-14	JHD1410x00xx	49.0	53.5	17.5		Yes	No	Ceiling suspended	2.5	Interpolated
	VAV-16-16	JHD1610x00xx	49.0	63.5	17.5	163	Yes	No	Ceiling suspended	2.5	UUT4

*Note: 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.

**Note: Dimension width is based on VAV casting + hydronic unit (piping).

Nomenclature Chart

	1	2	3	4	5	6	7	8	9
VRU Control Part #	JH	VAV Type	Inlet Size	Liner	Fan Case Size	HW Rows	Fan Voltage	Options	LL/LR RR/RL
JH = JCI - VRU									
Single Duct 1 = TSS 3 = TSS-WC	FP Parallel 4 = TVS 5 = TVS-WC	FP Series 7 = TVC 8 = TVC-WC	Other D = TDS - Dual Duct E = TSX - Exhaust						
04 = 4"	08 = 8"	14 = 14"	19 = 20" × 16"						
05 = 5"	10 = 10"	16 = 16"	22 = 24" × 16"						
06 = 6"	12 = 12"								
0 = 0.5" Fiberglass	4 = 0.5" Closed Cell (EPFI)	G = Galvanized							
1 = 1" Fiberglass	5 = 1" Closed Cell (EPFI)	S = Stainless Steel							
2 = 0.5" Foil Face	6 = Metal W/1" Fiberglass								
3 = 1" Foil Face	7 = 0.75" Closed Cell (EPFI)								
0 = None	2 = 06	4 = 18	6 = 24						
1 = 04	3 = 11	5 = 21							
0 = None	1 = 1 Row HW Coil	2 = 2 Row HW Coil	3 = 3 Row HW Coil	4 = 4 Row HW Coil					
0 = None	3 = 120/1 ECM	6 = 208/1 ECM							
1 = 120/1 PSC	4 = 277/1 ECM	7 = 230/1 PSC							
2 = 277/1 PSC	5 = 208/1 PSC	8 = 230/1 ECM							
0 = None	3 = Attenuator & Access doors	S&D	D = Duct Seal W/SA & AD						
1 = Sound Attenuator *	4 = Duct Extension *	B = Duct Seal W/SA	E = Duct Seal W/DE						
2 = Access Door	5 = Duct Extension & Access Door	C = Duct Seal W/AD	F = Duct Seal W/DE & AD						
Control Location is 1st Letter - Piping Location is 2nd Letter									
RR = Right Hand Controls / Right Hand Piping *					RL = Right Hand Controls / Left Hand Piping				
LL = Left Hand Controls / Left Hand Piping *					LR = Left Hand Controls / Right Hand Piping				
* LL or RR - Is Not Available Without an Optional Sound Attenuator or Optional Duct Extension *									
Control / Piping Location is Determined by: Looking at the VAV Inlet - Air Hitting You in the Back of the Head									

DES 12/2013

Special Seismic Certification Certified Components



Manufacturer: Johnson Controls, Incorporated

Product Line: VRU (VAV ready unit with piping)

Certified Mounting Description: Ceiling suspended

COILS

Component No.	Component Mfg.	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

Component No.	Component Mfg.	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

Component No.	Component Mfg.	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 Mfg.	Description	Unit
TE-636GV-2	Johnson Controls	Flange Mount, 4" length, 10k ohm thermistor	UUT1, UUT2, UUT3, UUT4

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*	Width**	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	z/h	Ip	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2013	2012 ICC-ES AC156	2.5	1.0	1.5	4.00	3.00	1.67	0.67

*Note: Tested length and operating weight includes coils and sound attenuator. Dimension length is based on inlet collar + VAV casting + 6 1/2" water coil outlet casting.

**Note: Dimension width is based on VAV casting + hydronic unit (piping).

Unit Mounting Description:



The unit was ceiling-suspended from the DCL shake table interface frame using 1/2-inch diameter all-thread rod and four manufacturer-provided 12-gage 90-degree brackets, each attached to the unit with four #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 four #14 sheet metal screws each. Lateral bracing consisted of 3/16-inch diameter steel cable and Mason SCBH-2/SSB-2 brackets. The Mason brackets were attached to the interface frame with 1/2-inch diameter Grade 5 bolts. The interface frame was attached to the shake table with M12 threaded rod, spaced approximately 8-inches on-center.

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*	Width**	Height	Front-Back	Side-Side	Vertical
220	UUT2	64.5	43.5	17.5	N/A	N/A	N/A

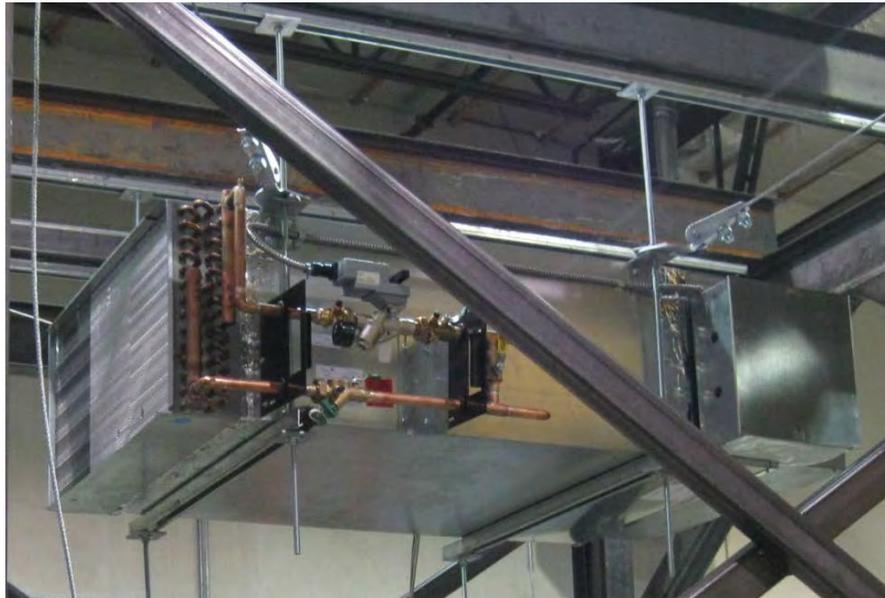
Seismic Test Parameters

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

*Note: Tested length and operating weight includes coils and sound attenuator. Dimension length is based on inlet collar + VAV casting + 6 1/2" water coil outlet casting.

**Note: Dimension width is based on VAV casting + hydronic unit (piping).

Unit Mounting Description:



The unit was ceiling-suspended from the DCL shake table interface frame using 1/2-inch diameter all-thread rod and four manufacturer-provided 12-gage 90-degree brackets, each attached to the unit with four #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 four #14 sheet metal screws each. Lateral bracing consisted of 3/16-inch diameter steel cable and Mason SCBH-2/SSB-2 brackets. The Mason brackets were attached to the interface frame with 1/2-inch diameter Grade 5 bolts. The interface frame was attached to the shake table with M12 threaded rod, spaced approximately 8-inches on-center.

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*	Width**	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	z/h	Ip	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2013	2012 ICC-ES AC156	2.5	1.0	1.5	4.00	3.00	1.67	0.67

*Note: Tested length and operating weight includes coils. Dimension length is based on inlet collar + VAV casting + 6 1/2" water coil outlet casting.

**Note: Dimension width is based on VAV casting + hydronic unit (piping).

Unit Mounting Description:



The unit was ceiling-suspended from the DCL shake table interface frame using 1/2-inch diameter all-thread rod and four manufacturer-provided 12-gage 90-degree brackets, each attached to the unit with four #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 four #14 sheet metal screws each. Lateral bracing consisted of 3/16-inch diameter steel cable and Mason SCBH-2/SSB-2 brackets. The Mason brackets were attached to the interface frame with 1/2-inch diameter Grade 5 bolts. The interface frame was attached to the shake table with M12 threaded rod, spaced approximately 8-inches on-center.

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*	Width**	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	z/h	Ip	Aflx-H	Arig-H	Aflx-V	Arig-V
CBC 2013	2012 ICC-ES AC156	2.5	1.0	1.5	4.00	3.00	1.67	0.67

*Note: Tested length and operating weight includes coils. Dimension length is based on inlet collar + VAV casting + 6 1/2" water coil outlet casting.

**Note: Dimension width is based on VAV casting + hydronic unit (piping).

Unit Mounting Description:



The unit was ceiling-suspended from the DCL shake table interface frame using 1/2-inch diameter all-thread rod and four manufacturer-provided 12-gage 90-degree brackets, each attached to the unit with four #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 four #14 sheet metal screws each. Lateral bracing consisted of 3/16-inch diameter steel cable and Mason SCBH-2/SSB-2 brackets. The Mason brackets were attached to the interface frame with 1/2-inch diameter Grade 5 bolts. The interface frame was attached to the shake table with M12 threaded rod, spaced approximately 8-inches on-center.