APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0387

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Johnson Controls Inc.

Manufacturer's Technical Representative: Mike Lanning, Sustaining Engineering Manager

Mailing Address: 8575 Largo Lakes, Largo, FL, 33773

Telephone: 727-547-7456 Email: michael.s.lanning@jci.com

Product Information

Product Name: VAV terminal units: TCS, TCL, TVS, TVL, TSS(WC/EH/SA)

Product Type: Mechanical Equipment

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

General Description: VAV terminal units containing coils, fans, motors, dampers, electric heat, and controls. Seismic enhancements made to the test units required to address the anomalies observed during the tests shall be incorporated into the production units.

Mounting Description: Rigid ceiling suspended

Applicant Information

Applicant Company Name: The VMC Group

Contact Person: John Giuliano

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: 6/14/19

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-2351

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 Labs

Contact Name: Josh Sailer, Lab Manager

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

Telephone: (775) 385-5085 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) = 1.45

S_{DS} (Design spectral response acceleration at short period, g) = 1.93

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) = See Attachments

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

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

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

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

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

R (Response modification coefficient) =

Ω_0 (System overstrength factor) =

C_d (Deflection amplification factor) =

I_p (Importance factor) = 1.5

Height to Center of Gravity above base =

Equipment or Component Natural Frequencies (Hz) =

Overall dimensions and weight (or range thereof) =

Tank(s) designed in accordance with ASME BPVC, 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: Date: February 24, 2021

Print Name: Timothy J. Piland Title: SSE

Special Seismic Certification Valid Up to: S_{DS} (g) = 1.93 z/h = 1

Condition of Approval (if applicable):

Table 1
Certified Components - VAV Terminal Units

Manufacturer: Johnson Controls

Product Family: VAV Terminal Units

Certified Product Construction: Galvanized carbon steel cabinet

Mounting Description: Ceiling suspended

Product Family	Enviro-Tec Model Number	JCI Model Number	Dimensions (in)			Max. Weight (lb)	Sds (g), z/h=1	Unit
			Length	Width	Height			
VAV Terminals, TCS	CFR 0404	TCS 0404	40.0	26.0	12.0	68	1.93	UUT15
	CFR 0504	TCS 0504	40.0	26.0	12.0	68 - 260		Interpolated
	CFR 0604	TCS 0604	36.0	26.0	12.0			Interpolated
	CFR 0506	TCS 0506	47.0	31.4	14.0			Interpolated
	CFR 0606	TCS 0606	43.0	31.4	14.0			Interpolated
	CFR 0806	TCS 0806	43.0	31.4	14.0			Interpolated
	CFR 0611	TCS 0611	43.0	31.4	14.0			Interpolated
	CFR 0811	TCS 0811	43.0	31.4	14.0			Interpolated
	CFR 1011	TCS 1011	43.0	31.4	14.0			Interpolated
	CFR 0818	TCS 0818	48.0	37.4	17.0			Interpolated
	CFR 1018	TCS 1018	48.0	37.4	17.0			Interpolated
	CFR 1218	TCS 1218	48.0	37.4	17.0			Interpolated
	CFR 1021	TCS 1021	48.0	37.4	17.0			Interpolated
	CFR 1221	TCS 1221	48.0	37.4	17.0			Interpolated
	CFR 1421	TCS 1421	48.0	37.4	17.0			Interpolated
	CFR 1224	TCS 1224	62.0	46.0	19.0			Interpolated
	CFR 1424	TCS 1424	62.0	46.0	19.0			Interpolated
	CFR 1230	TCS 1230	70.0	60.0	19.0			Interpolated
	CFR 1430	TCS 1430	70.0	60.0	19.0			Interpolated
	CFR 1630	TCS 1630	70.0	60.0	19.0			Interpolated
	CFR 1440	TCS 1440	70.0	60.0	19.0			Interpolated
	CFR 1640	TCS 1640	70.0	60.0	19.0			Interpolated
	CFR 1644	TCS 1644	70.0	60.0	19.0			Interpolated
	CFR 1844	TCS 1844	70.0	60.0	19.0	260		UUT25
VAV Terminals, TCL	CFL 0406	TCL 0406	47.5	25.0	11.0	78	1.93	UUT16
	CFL 0606	TCL 0606	43.7	25.0	11.0	78 - 150		Interpolated
	CFL 0806	TCL 0806	43.7	25.0	11.0			Interpolated
	CFL 0608	TCL 0608	43.7	32.0	11.0			Interpolated
	CFL 0808	TCL 0808	43.7	32.0	11.0			Interpolated
	CFL 1008	TCL 1008	43.7	32.0	11.0			Interpolated
	CFL 1011	TCL 1011	47.7	36.0	12.0			Interpolated
	CFL 1211	TCL 1211	47.7	36.0	12.0			Interpolated
	CFL 1019	TCL 1019	47.5	50.0	11.0			Interpolated
	CFL 1219	TCL 1219	47.5	50.0	11.0			Interpolated
	CFL 1319	TCL 1319	47.5	50.0	11.0	150		UUT20

Note: The first two digits of the model number represent the inlet diameter (in inches), and the second two digit represent the approximate airflow capability of the fan (x100).

Table 1 Continued 1
Certified Components - VAV Terminal Units (Cont.)

Manufacturer: Johnson Controls

Product Family: VAV Terminal Units

Certified Product Construction: Galvanized carbon steel cabinet

Mounting Description: Ceiling suspended

Product Family	Enviro-Tec Model Number	JCI Model Number	Dimensions (in)			Max. Weight (lb)	Sds (g), z/h=1	Unit
			Length	Width	Height			
VAV Terminals, TVS	VFR 0404	TVS 0404	34.0	37.0	14.0	54	1.93	UUT17
	VFR 0504	TVS 0504	34.0	37.0	14.0	54 - 118		Interpolated
	VFR 0604	TVS 0604	30.0	37.0	14.0			Interpolated
	VFR 0606	TVS 0606	30.0	37.0	14.0			Interpolated
	VFR 0804	TVS 0804	30.0	37.0	14.0			Interpolated
	VFR 0806	TVS 0806	30.0	37.0	14.0			Interpolated
	VFR 0811	TVS 0811	30.0	37.0	14.0			Interpolated
	VFR 1006	TVS 1006	36.0	45.0	17.0			Interpolated
	VFR 1011	TVS 1011	36.0	45.0	17.0			Interpolated
	VFR 1018	TVS 1018	36.0	45.0	17.0			Interpolated
	VFR1211	TVS 1211	36.0	45.0	17.0			Interpolated
	VFR 1218	TVS 1218	36.0	45.0	17.0			Interpolated
	VFR 1221	TVS 1221	36.0	45.0	17.0			Interpolated
	VFR 1411	TVS 1411	36.0	53.0	19.0			Interpolated
	VFR 1418	TVS 1418	36.0	53.0	19.0			Interpolated
	VFR 1421	TVS 1421	36.0	53.0	19.0			Interpolated
	VFR 1424	TVS 1424	36.0	57.0	19.0			Interpolated
	VFR 1621	TVS 1621	36.0	53.0	19.0			Interpolated
	VFR 1624	TVS 1624	36.0	57.0	19.0	118		UUT19
VAV Terminals, TVL	VFL 0405	TVL 0405	34.0	36.0	10.6	63	1.93	UUT18
	VFL 0505	TVL 0505	34.0	36.0	10.6	63 - 113		Interpolated
	VFL 0605	TVL 0605	30.0	36.0	10.6			Interpolated
	VFL 0805	TVL 0805	30.0	36.0	10.6			Interpolated
	VFL 1009	TVL 1009	42.5	43.0	10.6			Interpolated
	VFL 1209	TVL 1209	42.5	43.0	10.6			Interpolated
	VFL 1215	TVL 1215	46.5	47.0	12.0			Interpolated
	VFL 1415	TCL 1415	46.5	47.0	12.0	113		UUT21

Note: The first two digits of the model number represent the inlet diameter (in inches), and the second two digit represent the approximate airflow capability of the fan (x100).

Table 1 Continued 2

Certified Components - VAV Terminal Units (Cont.)

Manufacturer: Johnson Controls

Product Family: VAV Terminal Units

Certified Product Construction: Galvanized carbon steel cabinet

Mounting Description: Ceiling suspended

Product Family	Enviro-Tec Model Number	JCI Model Number	Dimensions (in)			Max. Weight (lb)	Sds (g), z/h=1	Unit
			Length	Width	Height			
VAV Terminals, TSS	SDR 04	TSS 04	21.5	16.0	10.0	23	1.93	UUT37
	SDR 05	TSS 05	21.5	16.0	10.0	23 - 54		Interpolated
	SDR 06	TSS 06	17.5	16.0	10.0			Interpolated
	SDR 08	TSS 08	17.5	18.0	10.0			Interpolated
	SDR 10	TSS 10	19.5	20.0	12.5			Interpolated
	SDR 12	TSS 12	19.5	22.0	15.0			Interpolated
	SDR 14	TSS 14	24.0	26.0	17.5			Interpolated
	SDR 16	TSS 16	24.0	30.0	17.5	54		UUT38
	SDR 19	TSS 19	29.0	36.0	17.5	65		Extrapolated*
	SDR 22	TSS 22	29.0	40.0	17.5	70		Extrapolated*
VAV Terminals, TSSWC	SDRWC 04	TSSWC 04	26.0	16.0	10.0	38	1.93	UUT35
	SDRWC 05	TSSWC 05	26.0	16.0	10.0	38 - 92		Interpolated
	SDRWC 06	TSSWC 06	22.0	16.0	10.0			Interpolated
	SDRWC 08	TSSWC 08	22.0	18.0	10.0			Interpolated
	SDRWC 10	TSSWC 10	24.0	20.0	12.5			Interpolated
	SDRWC 12	TSSWC 12	24.0	22.0	15.0			Interpolated
	SDRWC 14	TSSWC 14	28.0	26.0	17.5			Interpolated
	SDRWC 16	TSSWC 16	28.0	30.0	17.5	92		UUT36
	SDRWC 19	TSSWC 19	23.5	36.0	17.5	97		Extrapolated*
	SDRWC 22	TSSWC 22	23.5	40.0	17.5	105		Extrapolated*
VAV Terminals, TSSEH	SDREH 04	TSSEH 04	51.5	18.0	10.0	60	1.93	UUT39
	SDREH 05	TSSEH 05	51.5	18.0	10.0	60 - 122		Interpolated
	SDREH 06	TSSEH 06	47.5	18.0	10.0			Interpolated
	SDREH 08	TSSEH 08	47.5	20.0	10.0			Interpolated
	SDREH 10	TSSEH 10	47.5	22.0	12.5			Interpolated
	SDREH 12	TSSEH 12	47.5	24.0	15.0			Interpolated
	SDREH 14	TSSEH 14	47.5	28.0	17.5			Interpolated
	SDREH 16	TSSEH 16	47.5	32.0	17.5	122		UUT40
	SDREH 19	TSSEH 19	46.0	38.0	17.5	122 - 128		Interpolated
	SDREH 22	TSSEH 22	46.0	42.0	17.5	128		UUT41
VAV Terminals, TSSSA	SDRSA 16	TSSSA 16	56.5	30.0	17.5	114	1.93	Extrapolated*
	SDRSA 19	TSSSA 19	58.0	36.0	17.5	148		Extrapolated*
	SDRSA 22	TSSSA 22	58.0	40.0	17.5	161		Extrapolated*
VAV Terminals, TSSSAWC	SDRSAWC 16	TSSSAWC 16	61.0	30.0	17.5	141	1.93	UUT42
	SDRSAWC 19	TSSSAWC 19	63.0	36.0	17.5	141 - 196		Interpolated
	SDRSAWC 22	TSSSAWC 22	63.0	40.0	17.5	196		UUT43

*Extrapolated units certified based on UUT42 and UUT43 tests.

Table 2
Certified Subcomponents

Manufacturer: Johnson Controls, Inc.

Product Line: VAV Terminal Units

Certified Subcomponent: Coils

Coils (TSS)								
Unit Size	Manufacturer	Dimensions (in)		Max Row Qty (Heat)	Max Row Qty (Water)	Weight (lb)	Sds (g), z/h=1	Unit
		Height	Width					
4	JCI	10	10	4	NA	9	1.93	UUT35
05 - 14	JCI	10-17.5	10-20	4	NA	9-24	1.93	Interpolated
16	JCI	17.5	24	4	NA	27	1.93	UUT36, UUT42
19	JCI	17.5	30	4	NA	32	1.93	Interpolated
22	JCI	17.5	34	4	NA	35	1.93	UUT43

Coil Variables

1. Fin Material: Aluminum
2. Coil Casing: Galvanized Carbon Steel
3. Fin Shape: Corrugated
4. Tube diameter: 0.5"
5. Tube thickness: 0.016"
6. Fins Per Inch: 10

Table 3
Certified Subcomponents

Manufacturer: Johnson Controls, Inc.

Product Line: VAV Terminal Units

Certified Subcomponent: Fans

Fans (TCL)											
Unit Size	**Manufacturer**	**Shaft Material**	**Blade Material**	**Type**	**Drive**	**Number of Fans**	**Fan Wheel Diam. (in.)**	**Motor Frame**	**Fan + Motor Weight (lb)**	**Sds (g), z/h=1**	**Unit**
0406	Morrison	Stainless steel	Galvanized carbon steel	DWDI, Forward Curve	Direct	1	9	42, 48	19	1.93	UUT 16
0606 - 1219						1	9 - 10		19 - 38	1.93	Interpolated
1319						1	10		38	1.93	UUT20

Fans (TCS)											
Unit Size	**Manufacturer**	**Shaft Material**	**Blade Material**	**Type**	**Drive**	**Number of Fans**	**Fan Wheel Diam. (in.)**	**Fan Wheel Width (in.)**	**Motor Frame**	**Weight (lb**	**Sds (g), z/h=1**	**Unit**
0404	Morrison	Stainless steel	Galvanized carbon steel	DWDI, Forward Curve	Direct	1	5	7	42, 48	11	1.93	UUT 15
0504 - 1644						1, 2	5 - 10	7 - 9		11 - 38	1.93	Interpolated
1844						2	10	9		38	1.93	UUT 25

Fans (TVL)												
Unit Size	**Manufacturer**	**Shaft Material**	**Blade Material**	**Type**	**Drive**	**Number of Fans**	**Fan Wheel Diam. (in.)**	**Fan Wheel Width (in.)**	**Motor Frame**	**Weight (lb**	**Sds (g), z/h=1**	**Unit**
0405	Morrison	Stainless steel	Galvanized carbon steel	DWDI, Forward Curve	Direct	1	9	4	42, 48	15	1.93	UUT 18
0505 - 1215						1	9	4 - 6		15 - 20	1.93	Interpolated
1415						1	9	6		20	1.93	UUT 21

Fans (TVS)												
Unit Size	**Manufacturer**	**Shaft Material**	**Blade Material**	**Type**	**Drive**	**Number of Fans**	**Fan Wheel Diam. (in.)**	**Fan Wheel Width (in.)**	**Motor Frame**	**Weight (lb**	**Sds (g), z/h=1**	**Unit**
0404	Morrison	Stainless steel	Galvanized carbon steel	DWDI, Forward Curve	Direct	1	5	7	42, 48	13	1.93	UUT 17
0504 - 1621						1	5 - 10	7 - 9		13 - 28	1.93	Interpolated
1624						1	10	9		28	1.93	UUT 19

Table 4
Certified Subcomponents

Manufacturer: Johnson Controls, Inc.

Product Line: VAV Terminal Units

Certified Subcomponent: Motors

Motors						
Manufacturer	**Drive**	**Voltage**	**HP**	**Material**	**Sds (g), z/h=1**	**Unit**
FASCO	Direct	277	1/12	Painted Carbon Steel	1.93	UUT 17
FASCO	Direct	277	1/10			Interpolated
FASCO	Direct	277	1/8			UUT 18
FASCO	Direct	277	1/6			UUT 16
FASCO	Direct	277	1/5			Interpolated
FASCO	Direct	277	1/4			UUT20
FASCO	Direct	277	1/3			Interpolated
FASCO	Direct	277	1/2			UUT 21
FASCO	Direct	277	3/4			Interpolated
FASCO	Direct	277	1			UUT 19

Table 5
Certified Subcomponents

Manufacturer: Johnson Controls, Inc.

Product Line: VAV Terminal Units

Certified Subcomponent: Dampers

Dampers (TCL)									
Unit Size	**Manufacturer**	**Construction**	**Qty**	**Diameter (in)**	**Height (in)**	**Width (in)**	**Weight (lb)**	**Sds (g), z/h=1**	**Unit**
0406	JCI	14 gauge, galvanized carbon steel	1	3.9	N/A	N/A	0.1	1.93	UUT16
0606, 0608			1	5.9	N/A	N/A	0.1 - 0.6	1.93	Interpolated
0806, 0808			1	7.9	N/A	N/A		1.93	Interpolated
1008, 1011, 1019			1	N/A	8.0	10.0		1.93	Interpolated
1211, 1219			1	N/A	8.0	14.0		1.93	Interpolated
1319			1	N/A	8.0	16.0	0.6	1.93	UUT20

Dampers (TCS)									
Unit Size	**Manufacturer**	**Construction**	**Qty**	**Diameter (in)**	**Height (in)**	**Width (in)**	**Weight (lb)**	**Sds (g), z/h=1**	**Unit**
0404	JCI	14 gauge, galvanized carbon steel	1	3.9	N/A	N/A	0.1	1.93	UUT15
0504, 0506			1	4.9	N/A	N/A	0.1 - 0.6	1.93	Interpolated
0604, 0606, 0611			1	5.9	N/A	N/A		1.93	Interpolated
0806, 0811, 0818			1	7.9	N/A	N/A		1.93	Interpolated
1011, 1018, 1021			1	9.9	N/A	N/A		1.93	Interpolated
1218, 1221, 1224, 1230			1	11.9	N/A	N/A		1.93	Interpolated
1421, 1424, 1430, 1440			1	13.9	N/A	N/A		1.93	Interpolated
1630, 1640, 1644			1	15.9	N/A	N/A		1.93	Interpolated
1844			1	N/A	15.9	15.0	0.6	1.93	UUT25

Dampers (TVL)									
Unit Size	**Manufacturer**	**Construction**	**Qty**	**Diameter (in)**	**Height (in)**	**Width (in)**	**Weight (lb)**	**Sds (g), z/h=1**	**Unit**
0405	JCI	14 gauge, galvanized carbon steel	1	3.9	N/A	N/A	0.8	1.93	UUT18
0505			1	4.9	N/A	N/A	0.8 - 0.9	1.93	Interpolated
0605			1	5.9	N/A	N/A		1.93	Interpolated
0805			1	7.9	N/A	N/A		1.93	Interpolated
1009			1	N/A	8.0	10.0		1.93	Interpolated
1209, 1215			1	N/A	8.0	14.0		1.93	Interpolated
1415			1	N/A	10.0	14.0	0.9	1.93	UUT21

Special Seismic Certification
Certified Subcomponents

Manufacturer: Johnson Controls, Inc.

Product Line: Fan Coil Units

Certified Subcomponent: Dampers

Dampers (TVS)									
Unit Size	**Manufacturer**	**Construction**	**Qty**	**Diameter (in)**	**Height (in)**	**Width (in)**	**Weight (lb)**	**Sds (g), z/h=1**	**Unit**
0404	JCI	14 gauge, galvanized carbon steel	1	3.9	N/A	N/A	0.8	1.93	UUT17
0504			1	4.9	N/A	N/A	0.8 - 0.9	1.93	Interpolated
0604, 0606			1	5.9	N/A	N/A		1.93	Interpolated
0804, 0806, 0811			1	7.9	N/A	N/A		1.93	Interpolated
1006, 1011, 1018			1	9.9	N/A	N/A		1.93	Interpolated
1211, 1218, 1221			1	11.9	N/A	N/A		1.93	Interpolated
1411, 1418, 1421, 1424			1	13.9	N/A	N/A		1.93	Interpolated
1621, 1624			1	15.9	N/A	N/A	0.9	1.93	UUT19

Dampers (TSS)									
Unit Size	**Manufacturer**	**Construction**	**Qty**	**Diameter (in)**	**Height (in)**	**Width (in)**	**Weight (lb)**	**Sds (g), z/h=1**	**Unit**
04	JCI	14 gauge, galvanized carbon steel	1	3.9	N/A	N/A	0.3	1.93	UUT35, UUT37, UUT39
05			1	4.9	N/A	N/A	0.3 - 4.0	1.93	Interpolated
06			1	5.9	N/A	N/A		1.93	Interpolated
08			1	7.9	N/A	N/A		1.93	Interpolated
10			1	9.9	N/A	N/A		1.93	Interpolated
12			1	11.9	N/A	N/A		1.93	Interpolated
14			1	13.9	N/A	N/A		1.93	Interpolated
16			1	15.9	N/A	N/A		1.93	UUT36, UUT38, UUT40, UUT42
19			1	N/A	13.9	28.3		1.93	Interpolated
22			1	N/A	13.9	32.3	4.0	1.93	UUT41, UUT43

Table 6
Certified Subcomponents

Manufacturer: Johnson Controls, Inc.

Product Line: VAV Terminal Units

Certified Subcomponent: Electric Heat

Electric Heat (TSS)							
Unit Size	**Manufacturer**	**Construction**	**Qty**	**kW Output**	**Voltage**	**Sds (g), z/h=1**	**Test Unit**
4	JCI	Stainless steel frame, galvanized steel plates, internal wiring rated at 105°C	1	1.5	277	1.93	UUT39
5, 6, 8, 10, 12, 14			1	1.5 - 10.0	277	1.93	Interpolated
16			1	10.0	277	1.93	UUT40
19			1	10.0	277	1.93	Interpolated
22			1	10.0	277	1.93	UUT41

Table 7
Certified Subcomponents

Manufacturer: Johnson Controls, Inc.

Product Line: VAV Terminal Units

Certified Subcomponent: Controls

Controls					
Component Number	**Manufacturer**	**Description**	**Material**	**Sds (g), z/h=1**	**Unit**
MS-VMA1610	Johnson Controls	VAV Controller	Plastic cover	1.93	UUT37,UUT38
MS-VMA1615	Johnson Controls	VAV Controller	Plastic cover	1.93	UUT39
MS-VMA1620	Johnson Controls	VAV Controller	Plastic cover	1.93	UUT16-UUT18, UUT20-UUT21
MS-VMA1630	Johnson Controls	VAV Controller	Plastic cover	1.93	UUT41
B00-04-275	Johnson Controls	Flowstar airflow probe assembly 04	Stainless steel	1.93	UUT16-UUT18, UUT35,UUT37, UUT39
B00-16/22-276	Johnson Controls	Flowstar airflow probe assembly 16/22	Stainless steel	1.93	UUT36,UUT38, UUT40-UUT43
66-004-1000	Johnson Controls	Fanspeed control assembly	Plastic and fiberglass	1.93	UUT16
66-005-1000	Johnson Controls	Fanspeed control assembly	Plastic and fiberglass	1.93	UUT20,UUT25
66-006-1000	Johnson Controls	Fanspeed control assembly	Plastic and fiberglass	1.93	UUT18
66-007-1000	Johnson Controls	Fanspeed control assembly	Plastic and fiberglass	1.93	UUT19, UUT21
66-014-1000	Johnson Controls	Fanspeed control assembly	Plastic and fiberglass	1.93	UUT15,UUT17
DFS-221-198	Cleveland Controls	Airflow switch	Stainless steel housing	1.93	UUT39,UUT40,UUT41
OT80F3/B	ABB	Disconnect switch 3P 80A 600V	Plastic cover	1.93	UUT40,UUT41
HCC-1NQ04GG111	Hartland	Contactor 1P 50A 24VAC 9VA 1HP	Silver cadmium oxide contacts	1.93	UUT40,UUT41
HCT-01DOBB06111	Hartland	Transformer 120/24VAC 50VA	130deg C Class B insulation	1.93	UUT35,UUT36,UUT37,UUT38, UUT42,UUT43
HCT-03DOBB06111	Hartland	Transformer 277/24VAC 50VA	130deg C Class B insulation	1.93	UUT16-UUT21, UUT25, UUT39-UUT41

Table 8
Tested Components - VAV Terminal Units

Manufacturer: Johnson Controls

Product Family: VAV Terminal Units

Tested Product Construction: Galvanized carbon steel cabinet

Tested Mounting Description: Ceiling suspended

Model	Dimensions (in)			Weight (lb)	Mounting	Sds (g), z/h=1	Unit
	Length	Width	Height				
TCS 0404	40.0	26.0	12.0	68	Ceiling Suspended	1.93	UUT15
TCS 1844	70.0	60.0	19.0	260		1.93	UUT25
TCL 0406	47.5	25.0	11.0	78		2.5	UUT16
TCL 1319	47.5	50.0	11.0	150		2.5	UUT20
TVS 0404	34.0	37.0	14.0	54		2.5	UUT17
TVS 1624	36.0	57.0	19.0	118		2.5	UUT19
TVL 0405	34.0	36.0	10.6	63		2.5	UUT18
TVL 1415	46.5	47.0	12.0	113		2.5	UUT21
TSS 04	21.5	16.0	10.0	23		2.5	UUT37
TSSWC 04	26.0	16.0	10.0	38		2.5	UUT35
TSSWC 16	28.0	30.0	17.5	92		2.5	UUT36
TSS 16	24.0	30.0	17.5	54		2.5	UUT38
TSSEH 04	51.5	18.0	10.0	60		2.5	UUT39
TSSEH 16	47.5	32.0	17.5	122		2.5	UUT40
TSSEH 22	46.0	42.0	17.5	128		2.5	UUT41
TSSSAWC 16	61.0	30.0	17.5	141		2.5	UUT42
TSSSAWC 22	63.0	40.0	17.5	196		2.5	UUT43

UUT15 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TCS 0404

Options: Direct drive fan, 277V, 1/12 HP motor, damper, VAV controller, Flowstar airflow probe assembly, fanspeed control assembly, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), 1/2" Dual Density (interior)

Electrical Enclosure: Standard 20 gauge galvanized steel enclosure with hinged door

Dampers : 3 7/8" Diameter

SDS Level Passed: 1.93 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
68	UUT15	40.0	26.0	12.0	N/A	N/A	N/A

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

UUT 15 was ceiling mounted using (4) 90 deg. 12 gage brackets on the side of the four corners. Each bracket attached to unit using four #12 sheet metal screws. A 3/8" diameter threaded rod was attached through each and up into the fixture frame and fastened using 3/8" nuts and washers. Rods were spaced at approximately 38'' in length and 27'' in width. Lateral bracing consisted of 14 gage 45 degree brackets provided by JCI, 3/16" steel cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT16 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TCL 0406

Options: Direct drive fan, 277V, 1/6 HP motor, damper, VAV controller, Flowstar airflow probe assembly, fanspeed control assembly, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), 1/2" Dual Density (interior)

Electrical Enclosure: Standard 20 gauge galvanized steel enclosure with hinged door

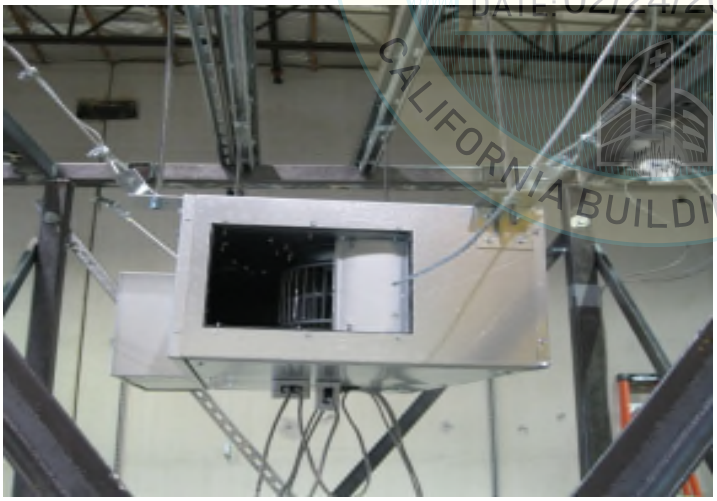
Dampers : 3 7/8" Diameter

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
78	UUT16	47.5	25.0	11.0	N/A	N/A	N/A

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



UUT 16 was ceiling mounted using (4) 90 deg. 12 gage brackets on the side of the four corners. Each bracket attached to unit using four #12 sheet metal screws. A 3/8" diameter threaded rod was attached through each and up into the fixture frame and fastened using 3/8" nuts and washers. Rods were spaced at approximately 46'' in length and 26'' in width. Lateral bracing consisted of 14 gage 45 degree brackets provided by JCI, 3/16" steel cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT17 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TVS 0404

Options: Direct drive fan, 277V, 1/12 HP motor, damper, VAV controller, Flowstar airflow probe assembly, fanspeed control assembly, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), 1/2" Dual Density (interior)

Electrical Enclosure: Standard 20 gauge galvanized steel enclosure with hinged door

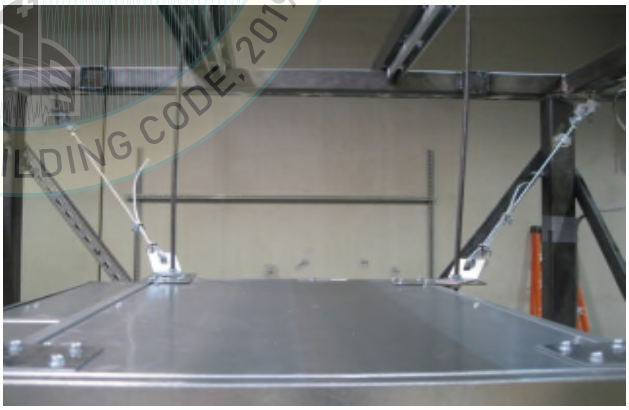
Dampers : 3 7/8" Diameter

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
54	UUT17	34.0	37.0	14.0	N/A	N/A	N/A

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



UUT 17 was ceiling mounted using (4) 90 deg. 12 gage brackets on the side of the four corners. Each bracket attached to unit using four #12 sheet metal screws. A 3/8" diameter threaded rod was attached through each and up into the fixture frame and fastened using 3/8" nuts and washers. Rods were spaced at approximately 33'' in length and 38'' in width. Lateral bracing consisted of 14 gage 45 degree brackets provided by JCI, 3/16" steel cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT18 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TVL 0405

Options: Direct drive fan, 277V 1/8HP motor, damper, VAV controller, Flowstar airflow probe assembly, fan controller, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), 1/2" Dual Density (interior)

Electrical Enclosure: Standard 20 gauge galvanized steel enclosure with hinged door

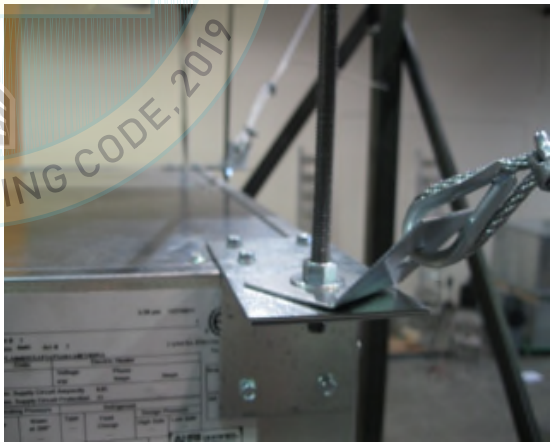
Dampers : 3 7/8" diameter

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
63	UUT18	34.0	36.0	10.6	N/A	N/A	N/A

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



UUT 18 was ceiling mounted using (4) 90 deg. 12 gage brackets on the side of the four corners. Each bracket attached to unit using four #12 sheet metal screws. A 3/8" diameter threaded rod was attached through each and up into the fixture frame and fastened using 3/8" nuts and washers. Rods were spaced at approximately 33'' in length and 37'' in width. Lateral bracing consisted of 14 gage 45 degree brackets provided by JCI, 3/16" steel cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT19 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TVS 1624

Options: Direct drive fan, 277V 1HP motor, damper, fanspeed control assembly, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 22 Gauge Galvanized Steel (exterior), 1/2" Dual Density (interior)

Electrical Enclosure: Standard 22 gauge galvanized steel enclosure with hinged door

Dampers : 15 7/8" diameter

Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
118	UUT19	36.0	57.0	19.0	N/A	N/A	N/A

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

UUT 19 was ceiling mounted using (4) 90 deg. 12 gage brackets on the side of the four corners. Each bracket attached to unit using four #12 sheet metal screws. A 3/8" diameter threaded rod was attached through each and up into the fixture frame and fastened using 3/8" nuts and washers. Rods were spaced at approximately 37'' in length and 56'' in width. Lateral bracing consisted of 14 gage 45 degree brackets provided by JCI, 3/16" steel cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT20 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TCL 1319

Options: Direct drive fan, 277V 1/4HP motor, damper, VAV controller, fanspeed control assembly, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), 1/2" Dual Density (interior)

Electrical Enclosure: Standard 20 gauge galvanized steel enclosure with hinged door

Dampers : 8" x 16"

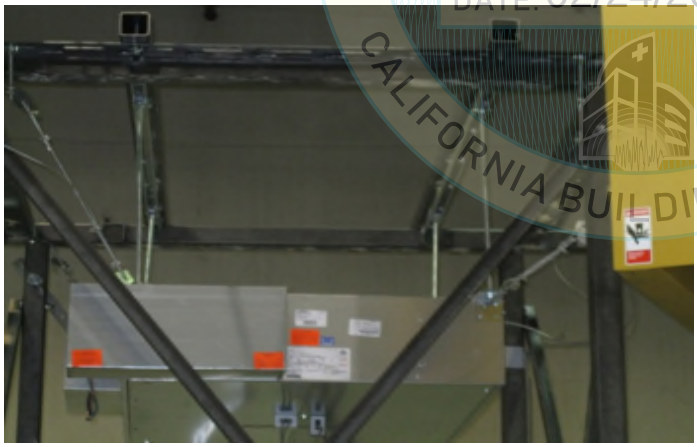
Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
150	UUT20	47.5	50.0	11.0	N/A	N/A	N/A

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



UUT 19 was ceiling mounted using (4) 90 deg. 12 gage brackets on the side of the four corners. Each bracket attached to unit using four #12 sheet metal screws. A 3/8" diameter threaded rod was attached through each and up into the fixture frame and fastened using 3/8" nuts and washers. Rods were spaced at approximately 46'' in length and 51'' in width. Lateral bracing consisted of 14 gage 45 degree brackets provided by JCI, 3/16" steel cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT21 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TVL 1415

Options: Direct drive fan, 277V 1/2HP motor, damper, VAV controller, fanspeed control assembly, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), 1/2" Dual Density (interior)

Electrical Enclosure: Standard 20 gauge galvanized steel enclosure with hinged door

Dampers : 10" x 14"

Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
113	UUT21	46.5	47.0	12.0	N/A	N/A	N/A

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

attached to unit using four #12 sheet metal screws. Each flat bracket overlaped the 90 deg. bracket, and a 1/2" diameter threaded rod was attached through each and up into the fixture frame. Each threaded rod was stiffened using a length of unistrut and three B-line 1/2-inch clips, placed two inches from the top and bottom of the unistrut, and one at the approximate middle of the unistrut. Rod was spaced at approxiamtely 45'' in length and 48'' in width. The unit was braced latterally with 14 gage 45 degree brackets provided by JCI, 3/16" cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT25 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TCS 1844

Options: Direct drive fan, 277V 1HP motor, damper, VAV controller, Flowstar airflow probe assembly, fanspeed control assembly, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), 1/2" Dual Density (interior)

Electrical Enclosure: Standard 20 gauge galvanized steel enclosure with hinged door

Dampers : 15 7/8" x 15"

Doors: None

SDS Level Passed: 1.93 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
260	UUT25	70.0	60.0	19.0	N/A	N/A	N/A

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

UUT 25 was ceiling-mounted using (4) 90 deg. 12 gage brackets on the side and 4 flat brackets on the top of each of the four corners. Each bracket attached to unit using four #12 sheet metal screws. Each flat bracket overlaped the 90 deg. bracket, and a 1/2" diameter threaded rod was attached through each and up into the fixture frame. Each threaded rod was stiffened using a length of unistrut and three B-line 1/2-inch clips, placed two inches from the top and bottom of the unistrut, and one at the approximate middle of the unistrut. Rod was spaced at approxiamtely 72'' in length and 58'' in width. The unit was braced latterally with 14 gage 45 degree brackets provided by JCI, 3/16" cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT35 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TSSWC 04

Options: 4 row heating coils, damper, Flowstar airflow probe assembly, 120/24VAC transformer

Cabinet Construction Summary

Panel Construction: 22 Gauge Galvanized Steel (exterior), Fiberglass (interior)

Electrical Enclosure: Standard 22 gauge galvanized steel enclosure with hinged door

Dampers : 3 7/8" diameter

Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
38	UUT35	26.0	16.0	10.0	N/A	N/A	N/A

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

UUT 35 was ceiling-suspended from the DCL shake table interface frame using 3/8-inch diameter threaded 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. Rod was spaced at approximately 18'' in length and 10'' in width. Lateral bracing consisted of 3/16-inch diameter steel cable, saddle clamps, and manufacturer-provided 12-gage 45-degree brackets.

UUT36 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TSSWC 16

Options: 4 row heating coils, damper, Flowstar airflow probe assembly, 120/24VAC transformer

Cabinet Construction Summary

Panel Construction: 22 Gauge Galvanized Steel (exterior), Fiberglass (interior)

Electrical Enclosure: Standard 22 gauge galvanized steel enclosure with hinged door

Dampers : 15 7/8" diameter

Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
92	UUT36	28.0	30.0	17.5	N/A	N/A	N/A

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

UUT 36 was ceiling-suspended from the DCL shake table interface frame using 3/8-inch diameter threaded 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. Rod was spaced at approximately 18'' in length and 10'' in width. Lateral bracing consisted of 3/16-inch diameter steel cable, saddle clamps, and manufacturer-provided 12-gage 45-degree brackets.

UUT37 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TSS 04

Options: Damper, VAV controller, Flowstar airflow probe assembly, 120/24VAC transformer

Cabinet Construction Summary

Panel Construction: 22 Gauge Galvanized Steel (exterior), Fiberglass (interior)

Electrical Enclosure: Standard 22 gauge galvanized steel enclosure with hinged door

Dampers : 3 7/8" diameter

Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
23	UUT37	21.5	16.0	10.0	N/A	N/A	N/A

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

UUT 37 was ceiling mounted using (4) 90 deg. 12 gage brackets on the side of the four corners. Each bracket attached to unit using four #12 sheet metal screws. A 3/8" diameter threaded rod was attached through each and up into the fixture frame and fastened using 3/8" nuts and washers. Rods were spaced at approximately 5'' in length and 18'' in width. Lateral bracing consisted of 14 gage 45 degree brackets provided by JCI, 3/16" steel cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT38 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TSS 16

Options: Damper, VAV controller, Flowstar airflow probe assembly, 120/24VAC transformer

Cabinet Construction Summary

Panel Construction: 22 Gauge Galvanized Steel (exterior), Fiberglass (interior)

Electrical Enclosure: Standard 22 gauge galvanized steel enclosure with hinged door

Dampers : 15 7/8" diameter

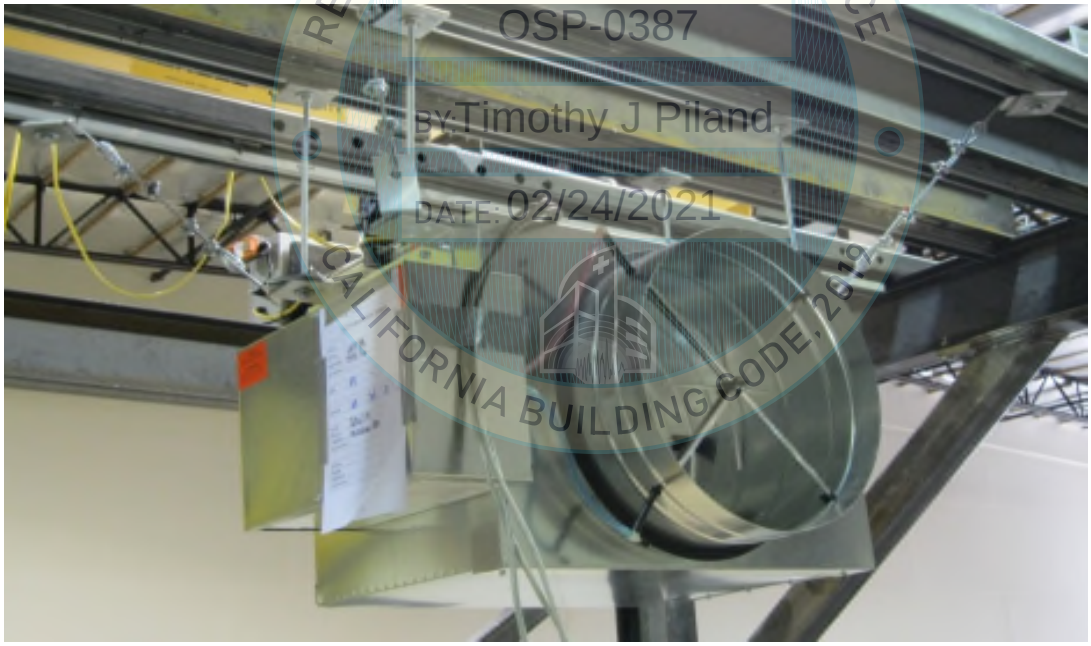
Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
54	UUT38	24.0	30.0	17.5	N/A	N/A	N/A

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



UUT 38 was ceiling mounted using (4) 90 deg. 12 gage brackets on the side of the four corners. Each bracket attached to unit using four #12 sheet metal screws. A 3/8" diameter threaded rod was attached through each and up into the fixture frame and fastened using 3/8" nuts and washers. Rods were spaced at approximately 16'' in length and 26'' in width. Lateral bracing consisted of 14 gage 45 degree brackets provided by JCI, 3/16" steel cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT39 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TSSEH 04

Options: Damper, 1.5 kW electric heat, VAV controller, Flowstar airflow probe assembly, airflow switch, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 22 Gauge Galvanized Steel (exterior), Fiberglass (interior)

Electrical Enclosure: Standard 22 gauge galvanized steel enclosure with hinged door

Dampers : 3 7/8" diameter

Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
60	UUT39	51.5	18.0	10.0	N/A	N/A	N/A

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

UUT 39 was ceiling-mounted using (4) 90 deg. 12 gage brackets on the side and 4 flat brackets on the top of each of the four corners. Each bracket attached to unit using four #12 sheet metal screws. Each flat bracket overlaped the 90 deg. bracket, and a 1/2" diameter threaded rod was attached through each and up into the fixture frame. Rod was spaced at approxiamtely 53'' in length and 17'' in width. The unit was braced latterally with 14 gage 45 degree brackets provided by JCI, 3/16" cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT40 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TSSEH 16

Options: Damper, 10 kW electric heat, Flowstar airflow probe assembly, airflow switch, disconnect switch, contactor, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 22 Gauge Galvanized Steel (exterior), Fiberglass (interior)

Electrical Enclosure: Standard 22 gauge galvanized steel enclosure with hinged door

Dampers: 15 7/8" diameter

Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
122	UUT40	47.5	32.0	17.5	N/A	N/A	N/A

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

UUT 39 was ceiling-mounted using (4) 90 deg. 12 gage brackets on the side and 4 flat brackets on the top of each of the four corners. Each bracket attached to unit using four #12 sheet metal screws. Each flat bracket overlaped the 90 deg. bracket, and a 1/2" diameter threaded rod was attached through each and up into the fixture frame. Rod was spaced at approxiamtely 48'' in length and 31'' in width. The unit was braced latterally with 14 gage 45 degree brackets provided by JCI, 3/16" cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT41 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TSSEH 22

Options: Damper, 10 kW electric heat, VAV controller, Flowstar airflow probe assembly, airflow switch, disconnect switch, contactor, 277/24VAC transformer

Cabinet Construction Summary

Panel Construction: 22 Gauge Galvanized Steel (exterior), Fiberglass (interior)

Electrical Enclosure: Standard 22 gauge galvanized steel enclosure with hinged door

Dampers : 15 7/8" x 32 1/4"

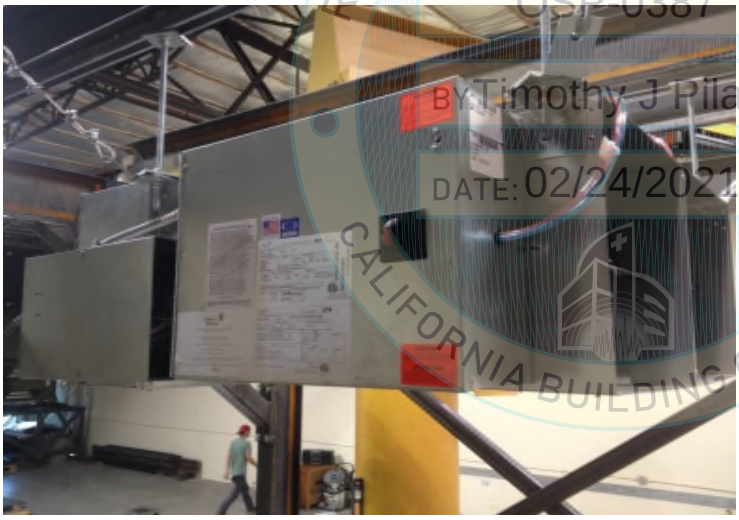
Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
128	UUT41	46.0	42.0	17.5	N/A	N/A	N/A

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



UUT 39 was ceiling-mounted using (4) 90 deg. 12 gage brackets on the side and 4 flat brackets on the top of each of the four corners. Each bracket attached to unit using four #12 sheet metal screws. Each flat bracket overlaped the 90 deg. bracket, and a 1/2" diameter threaded rod was attached through each and up into the fixture frame. Rod was spaced at approxiamtely 40'' in length and 41'' in width. The unit was braced latterally with 14 gage 45 degree brackets provided by JCI, 3/16" cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT42 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TSSSAWC 16

Options: 4 row heating coils, damper, Flowstar airflow probe assembly, 120/24VAC transformer

Cabinet Construction Summary

Panel Construction: 22 Gauge Galvanized Steel (exterior), Fiberglass (interior)

Electrical Enclosure: Standard 22 gauge galvanized steel enclosure with hinged door

Dampers : 15 7/8" diameter

Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
141	UUT42	61.0	30.0	17.5	N/A	N/A	N/A

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

UUT 39 was ceiling-mounted using (4) 90 deg. 12 gage brackets on the side and 4 flat brackets on the top of each of the four corners. Each bracket attached to unit using four #12 sheet metal screws. Each flat bracket overlaped the 90 deg. bracket, and a 1/2" diameter threaded rod was attached through each and up into the fixture frame. Rod was spaced at approxiamtely 58'' in length and 31'' in width. The unit was braced latterally with 14 gage 45 degree brackets provided by JCI, 3/16" cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT43 Unit Under Test Summary Sheet

Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line

Model Number: TSSSAWC 22

Options: 4 row heating coils, damper, Flowstar airflow probe assembly, 120/24VAC transformer

Cabinet Construction Summary

Panel Construction: 22 Gauge Galvanized Steel (exterior), Fiberglass (interior)

Electrical Enclosure: Standard 22 gauge galvanized steel enclosure with hinged door

Dampers : 15 7/8" x 32 1/4"

Doors: None

SDS Level Passed: 2.5 g (z/h = 1.0, Ip = 1.5)

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
196	UUT43	63.0	40.0	17.5	N/A	N/A	N/A

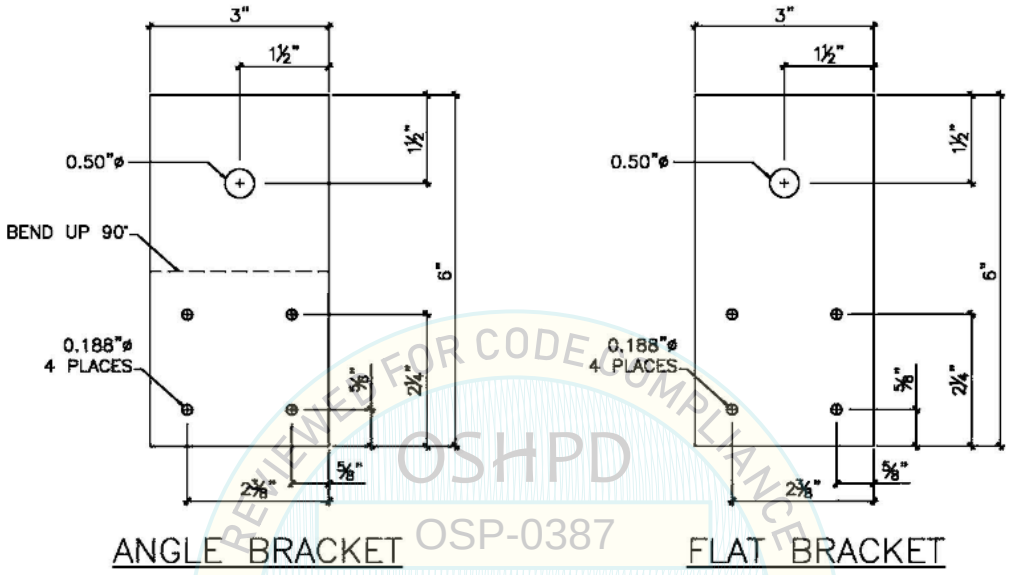
Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT 39 was ceiling-mounted using (4) 90 deg. 12 gage brackets on the side and 4 flat brackets on the top of each of the four corners. Each bracket attached to unit using four #12 sheet metal screws. Each flat bracket overlaped the 90 deg. bracket, and a 1/2" diameter threaded rod was attached through each and up into the fixture frame. Rod was spaced at approxiamtely 61'' in length and 39'' in width. The unit was braced latterally with 14 gage 45 degree brackets provided by JCI, 3/16" cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

Angle and Flat Bracket Details

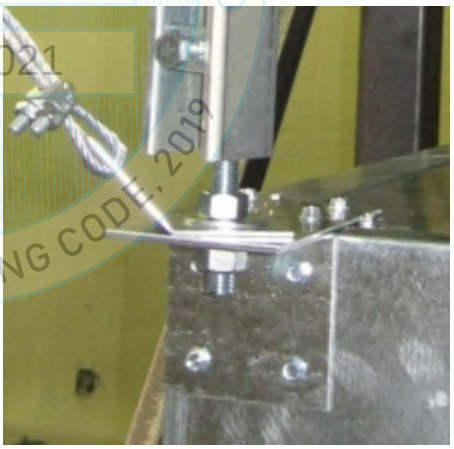
Manufacturer: Johnson Controls Incorporated

Product Line: Commercial Product Line



Note: Bracket material is 16 gage G60 galvanized steel.

Photograph showing typical angle bracket mounting for UUT15.



Photograph showing typical angle and flat bracket mounting for UUT16-UUT21, UUT25, and UUT35-UUT43.

For UUT15, the unit was ceiling-mounted using angle brackets attached to the top corner-sides of the unit. Each bracket was attached to unit using four #12 3/4" SMS as shown in the above photograph.

For UUT16-UUT21, UUT25, and UUT35-UUT43, each unit was ceiling-mounted using (4) angle brackets on the side and 4 flat brackets on the top of each of the four corners. Each bracket was attached to unit using four #12 3/4" SMS as shown in the above photograph.