APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0503 – 10

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☒ New ☐ Renewal

Manufacturer Information

Manufacturer: Greenheck Fan Corporation

Manufacturer's Technical Representative: Mark Vanderkooy

Mailing Address: 1100 Greenheck Drive, Schofield, WI 54476

Telephone: (715) 841-8538 Email: mark.vanderkooy@greenheck.com

Product Information

Product Name: CSW/Vektor-CH/Vektor-CS/USF/FJC/Sure-Aire/VGN Control Boxes

Product Type: Centrifugal Fans and control boxes

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

General Description: Centrifugal fans with optional active and non-active nozzles.

Mounting Description: Fans are base mounted on spring isolators. Sure-Aire and control boxes are rigid wall mounted.

Applicant Information

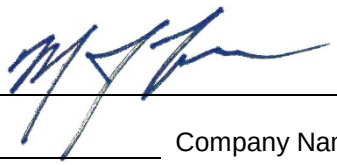
Applicant Company Name: TRU Compliance, LLC

Contact Person: Matthew J. Tobolski, PhD, SE

Mailing Address: 960 SW Disk Drive, Suite 104, Bend, OR 97702

Telephone: (541) 205-4064 Email: mtobolski@trucompliance.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: 1/19/2017

Title: President Company Name: TRU Compliance, LLC

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

Company Name: TRU Compliance, LLC

Name: Matthew J. Tobolski, PhD, SE California License Number: S5648

Mailing Address: 960 SW Disk Drive, Suite 104, Bend, OR 97702

Telephone: (541) 205-4064 Email: mtobolski@trucompliance.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: Environmental Testing Laboratory (ETL)

Contact Name: Paul E. Little

Mailing Address: 11034 Indian Trail, Dallas, TX 75229

Telephone: (972) 247-9657 Email: paul@etldallas.com

Seismic Parameters

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

Design Basis of Equipment or Components (F_p/W_p) = 4.5 (S_{DS} = 2.0g); 2.4 (S_{DS} = 3.2g)

S_{DS} (Design spectral response acceleration at short period, g) = 2.0 (z/h = 1.0); 3.2 (z/h = 0.0)

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) = 2.0

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1.0 (S_{DS} = 2.0g); 0.0 (S_{DS} = 3.2g)

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, 2015: ☐ Yes ☐ No

List of Attachments Supporting Special Seismic Certification

☒ Test Report(s) ☐ Drawings ☐ Calculations ☒ Manufacturer's Catalog

☒ Other(s) (Please Specify): Attachment A

OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2022

Signature: Date: April 10, 2017

Print Name: Ali Sumer Title: DSE

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

Condition of Approval (if applicable):

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer:	Greenheck Fan Corporation
Model Line:	CSW, Vektor-CH, Vektor-CS

TABLE 1

Certified Product Construction Summary:

UL-705; UL-762; Class II construction; Belt Drive; Spark C construction (carbon steel wheel); Carbon steel housing; Carbon steel shaft; Welded scroll

Certified Options Summary:

Arrangement 10; Bolted access door; Weather hood; Isolation base (height saving); Upblast and Top Horizontal scroll discharge; Drain connection; Shaft seal; Nylon & Copper extended lube lines; Clockwise and Counterclockwise rotation; 80k and 200k hour bearings

Mounting Configuration:

Base mounted - isolated

Note: Installed mounting configuration must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2016 ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h=1.0 S_{DS} = 3.2 g z/h=0.0 I_P = 1.5

Model Line	Model	Dimensions (in)			Weight (lb)	Notes	UUT
		Depth	Width	Height			
CSW, Vektor-CH, Vektor-CS	7-CSW	35	37.2	33.4	245		Interp.
	8-CSW	35	37.2	31	245		Interp.
	9-CSW	35	37.2	31	254		Interp.
	10-CSW	35	37.2	31	260		Interp.
	12-CSW	37.6	39.2	37	393		Interp.
	Vektor-CH-12	35.6	39.3	120.2	406		Interp.
	Vektor-CS-12	35.6	39.3	120.2	499		Interp.
	13-CSW	38.6	39.2	39.3	403		Interp.
	15-CSW	42.8	43.6	43.8	467		Interp.
	Vektor-CH-15	40.6	43.6	120	565		Interp.
	Vektor-CS-15	40.6	43.6	120	620		Interp.
	16-CSW	44	43.6	45.4	515		Interp.
	18-CSW	45.3	43.6	43.6	532		Interp.
	Vektor-CH-18	43.1	43.6	120.1	650	UUT: UB Discharge	51
	Vektor-CS-18	43.1	43.6	120.1	759	UUT: UB Discharge	52
	20-CSW	51.7	48.9	54.8	756		Interp.
	22-CSW	53.5	48.9	57.2	836		Interp.
	Vektor-CH-22	50.7	48.9	120.2	934		Interp.
	Vektor-CS-22	50.7	48.9	120.2	1120		Interp.
	24-CSW	57.5	52.0	63.2	982		Interp.
	Vektor-CH-24	54.3	52.0	120.1	1019		Interp.
	Vektor-CS-24	54.3	52.0	120.1	1241		Interp.
	27-CSW	62	55.3	68.9	1055		Interp.
	Vektor-CH-27	58.4	55.3	120.2	1183		Interp.

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: CSW, Vektor-CH, Vektor-CS

TABLE 1

Certified Product Construction Summary:
UL-705; UL-762; Class II construction; Belt Drive; Spark C construction (carbon steel wheel); Carbon steel housing; Carbon steel shaft; Welded scroll

Certified Options Summary:
Arrangement 10; Bolted access door; Weather hood; Isolation base (height saving); Upblast and Top Horizontal scroll discharge; Drain connection; Shaft seal; Nylon & Copper extended lube lines; Clockwise and Counterclockwise rotation; 80k and 200k hour bearings

Mounting Configuration:
Base mounted - isolated

Note: Installed mounting configuration must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2016 ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h=1.0; S_{DS} = 3.2 g z/h=0.0 I_P = 1.5

Model Line	Model	Dimensions (in)			Weight (lb)	Notes	UUT
		Depth	Width	Height			
CSW, Vektor-CH, Vektor-CS	Vektor-CS-27	58.4	55.3	120.2	1405		Interp.
	30-CSW	59.3	67.3	75.6	1305		Interp.
	Vektor-CH-30	63.3	59.3	120.0	1191	UUT: UB Discharge	53
	Vektor-CS-30	63.3	59.3	120.0	1554	UUT: UB Discharge	54
	33-CSW	76.5	64.5	73.8	1971		Interp.
	36-CSW	79.3	68.1	80.1	2290		Interp.
	40-CSW	83.7	72.1	86.9	2687		Interp.
	44-CSW	89.8	76.5	96.7	3106		Interp.
	49-CSW	93.3	81.2	104.9	3744		Interp.
	54-CSW	99.3	86.7	115.1	4902		Interp.
	60-CSW	109.5	92.7	127.6	5868		Interp.
	66-CSW	115.2	99.0	138.5	6598	UUT: TH Discharge	55

SPECIAL SEISMIC CERTIFICATION
MODEL LINE NUMBERING

TRU PROJECT NO. 16028

Manufacturer: Greenheck Fan Corporation ***Model Line:*** CSW		**TABLE 1**
Columns 1-3	Model	CSW
Columns 4-5	Size	07 - 66
Columns 6-7	Blade	BI = Backward inclined
		AF = Airfoil
Columns 8-9	Housing	41 = Welded
Columns 10-11	Arrangement	10 = Arrangement 10
Columns 12-13	Wheel Rotation	CW = Clockwise
		CCW = Counterclockwise
Columns 14-15	Discharge	UB = Upblast
		TH = Top Horizontal
Columns 16-17	Fan Class	II - Class II
Columns 18-19	Motor HP	4 = 1/4
		3 = 1/3
		5 = 1/2
		7 = 3/4
		10 = 1
		15 = 1 1/2
		20 = 2
		30 = 3
		50 = 5
		75 = 7 1/2
		100 = 10
		150 = 15
		200 = 20
		300 = 30
		400 = 40
		500 = 50
		600 = 60
		750 = 75
		1000 = 100
		1250 = 125
		1500 = 150
Column 20	Certification	X = UL/cUL 705 Listed (Electrical)
		G = UL/cUL 762 Listed (Grease exhaust)
		HTUL = UL/cUL HT Listed (Emergency smoke)

SPECIAL SEISMIC CERTIFICATION
MODEL LINE NUMBERING

TRU PROJECT NO. 16028

Manufacturer:	Greenheck Fan Corporation	**TABLE 1**
Model Line:	Vektor-CH	
Columns 1-6	Model	Vektor
Columns 7-8	Nozzle type	CH = High Plume
Columns 9-10	Fan Size	12-30
Column 11-12	Drive	10 = Belt Drive
Columns 13-14	Nozzle size	7-28

SPECIAL SEISMIC CERTIFICATION
MODEL LINE NUMBERING

TRU PROJECT NO. 16028

Manufacturer:	Greenheck Fan Corporation	**TABLE 1**
Model Line:	Vektor-CS	
Columns 1-6	Model	Vektor
Columns 7-8	Nozzle type	CS = High Plume/Variable geometry
Columns 9-10	Fan Size	12-30
Column 11-12	Drive	10 = Belt Drive

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: USF/FJC

TABLE 2

Certified Product Construction Summary:
Bolted steel frame; Carbon steel housing; Welded steel wheel; Belt drive

Certified Options Summary:
Upblast or Top horizontal scroll discharge; Slip fit inlet/outlet connection; Bolted access door; Motor cover; Drain Connection; Nylon and copper extended lube lines; Shaft Seal; Clockwise and Counterclockwise rotation; Flanged inlet/outlet connection.

Mounting Configuration:
Base mounted - isolated
Note: Installed mounting configuration must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2016 ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h=1.0; S_{DS} = 3.2 g z/h=0.0 I_P = 1.5

Model Line	Model	Dimensions (in)			Weight (lb)	Notes	UUT
		Depth	Width	Height			
USF/FJC	USF-306	30.8	20.8	25.9	148		Interp.
	FJC-306	30.8	19.8	84.0	179		Interp.
	USF-307	30.8	20.8	25.9	148		Interp.
	FJC-307	30.8	19.8	84.0	179		Interp.
	USF-308	30.8	20.8	25.9	148		Interp.
	FJC-308	30.8	19.8	84.0	179		Interp.
	USF-309	30.8	20.8	25.9	148		Interp.
	FJC-309	30.8	19.8	84.0	179		Interp.
	USF-310	30.8	20.8	25.9	151		Interp.
	FJC-310	30.8	19.8	84.0	184	UUT: UB Discharge	56
	USF-312	30.9	23.5	27.7	164		Interp.
	FJC-312	30.9	23.0	84.0	195		Interp.
	USF-313	32.8	25.5	30.5	180		Interp.
	USF-315	35.0	27.8	33.9	240		Interp.
	FJC-315	35.0	28.0	84	274		Interp.
	USF-316	37.2	30.1	37.23	267		Interp.
	USF-318	40.1	32.8	41.2	390		Interp.
	USF-320	43.0	35.5	45.1	424		Interp.
	USF-322	46.6	39.0	50.1	473		Interp.
	USF-324	50.3	42.5	55.2	546	UUT: TH Discharge	58
	FJC-324	50.3	45.3	84	656	UUT: UB Discharge	57

SPECIAL SEISMIC CERTIFICATION
MODEL LINE NUMBERING

TRU PROJECT NO. 16028

Manufacturer:	Greenheck Fan Corporation	**TABLE 2**
Model Line:	USF	
Columns 1-3	Model	USF
Column 4	Series	2 = 200
		3 = 300
Columns 5-6	Fan Size	6-24
Columns 7-8	Blade	BI = Backward inclined
		AF = Airfoil

SPECIAL SEISMIC CERTIFICATION
MODEL LINE NUMBERING

TRU PROJECT NO. 16028

Manufacturer:	Greenheck Fan Corporation	**TABLE 2**
Model Line:	FJC	
Columns 1-3	Model	FJC
Column 4	Series	2 = 200
		3 = 300
Columns 5-6	Fan Size	06-24

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF

TABLE 3

Certified Product Construction Summary:
Sure-Aire: Polymer enclosure with IP56 rating
VGN Control boxes: 14 gauge carbon steel, NEMA 3R enclosures

Certified Options Summary:

Mounting Configuration:
Wall mounted - rigid
Note: Installed mounting configuration must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2016 ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h=1.0; S_{DS} = 3.2 g z/h=0.0 I_P = 1.5

Model Line	Model	Dimensions (in)			Weight (lb)	Notes	UUT
		Depth	Width	Height			
Sure-Aire (100-240 VAC)	384799	3	6	6	5	Max 8.3 inches W.C.	59
	384800	3	6	6	5	Max 22.14 inches W.C.	Interp.
	384801	3	6	6	5	Max 41.52 inches W.C.	Interp.
	384802	3	6	6	5	Max 83.04 inches W.C.	Interp.
	384803	3	6	6	5	Max 138.40 inches W.C.	Interp.
Sure-Aire (24 VAC/VDC)	384986	3	6	6	5	Max 8.3 inches W.C.	Interp.
	384987	3	6	6	5	Max 22.14 inches W.C.	Interp.
	384988	3	6	6	5	Max 41.52 inches W.C.	Interp.
	384989	3	6	6	5	Max 83.04 inches W.C.	Interp.
	384990	3	6	6	5	Max 138.40 inches W.C.	60
VGN Control Boxes	878792	6	16	16	45	For Single fan	61
	878793	6	20	20	55	For Multiple fans	62

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Table Description: Fan Motors

TABLE 4

Building Code: CBC 2016
Seismic Certification Limits: S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 3.2 g z/h = 0.0
I_P = 1.5

Component Type	Manufacturer	Model	Description	Notes	UUT
Motor	Baldor	48	1/3 Hp; 115-600V; Fan sizes 7-10		Interp.
		56	2hp; 115-600V; Fan sizes 7-30		Interp.
		143T	0.5-1.5 hp; 115-600V; Fan sizes 9-36		Interp.
		145T	0.75-3 hp; 115-600V; Fan sizes 9-36	UUT: 2 hp; 115/230V	56
		182T	1-5 hp; 115-600V; Fan sizes 9-40		Interp.
		184T	1.5-7.5 hp; 115-600V; Fan sizes 9-40		Interp.
		213T	2-10 hp; 115-600V; Fan sizes 15-44		Interp.
		215T	3-15 hp; 115-600V; Fan sizes 15-54	UUT: 10 hp; 230/460V	51,52,57,58
		254T	5-20 hp; 115-600V; Fan sizes 18-60		Interp.
		256T	7.5-25 hp; 115-600V; Fan sizes 22-60	UUT: 20 hp; 575/600V	53,54
		284T	10-30 hp; 115-600V; Fan sizes 24-60		Interp.
		286T	15-40 hp; 208-600V; Fan sizes 27-60		Interp.
		324T	20-50 hp; 208-600V; Fan sizes 30-60		Interp.
		326T	25-60 hp; 208-600V; Fan sizes 36-60		Interp.
		364T	30-75 hp; 208-600V; Fan sizes 40-60		Interp.
		365T	50-100 hp; 208-600V; Fan sizes 44-60		Interp.
		404T	50-125 hp; 208-600V; Fan sizes 49-60		Interp.
		405T	60-150 hp; 208-600V; Fan sizes 49-60		Interp.
		444T	125hp; 208-600V; Fan sizes 60-66		Interp.
		445T	150hp; 208-600V; Fan size 66	UUT: 150 hp; 460V	55

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF

Table Description: Fan Wheels

TABLE 5

Building Code: CBC 2016

Seismic Certification Limits: S_{DS} = *2.0 g* *z/h = 1.0*; S_{DS} = *3.2 g* *z/h = 0.0*; I_P = *1.5*

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Airfoil Welded Steel (Greenheck)	AF-18.25		18.25		43	Carbon Steel		51
	AF-20		20		49	Carbon Steel		Interp.
	AF-22.25		22.25		68	Carbon Steel		Interp.
	AF-24.5		24.5		77	Carbon Steel		Interp.
	AF-27		27		88	Carbon Steel		Interp.
	AF-30		30		156	Carbon Steel		53,54
	AF-33		33		188	Carbon Steel		Interp.
	AF-36.5		36.5		220	Carbon Steel		Interp.
	AF-40.25		40.25		285	Carbon Steel		Interp.
	AF-44.5		44.5		332	Carbon Steel		Interp.
	AF-49		49		456	Carbon Steel		Interp.
	AF-54.25		54.25		564	Carbon Steel		Interp.
	AF-60		60		745	Carbon Steel		Interp.
	AF-66		66		858	Carbon Steel		Interp.
Backward Inclined Welded Steel (Greenheck)	BI-10.5		10.5		11	Carbon Steel		Interp.
	BI-12.25		12.25		19	Carbon Steel		Interp.
	BI-13.5		13.5		21	Carbon Steel		Interp.
	BI-15		15		24	Carbon Steel		Interp.
	BI-16.5		16.5		36	Carbon Steel		Interp.
	BI-18.25		18.25		41	Carbon Steel		Interp.
	BI-20		20		47	Carbon Steel		Interp.
	BI-22.25		22.25		65	Carbon Steel		Interp.
	BI-24.5		24.5		77	Carbon Steel		Interp.

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Table Description: Fan Wheels

TABLE 5

Building Code: CBC 2016
Seismic Certification Limits: S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 3.2 g z/h = 0.0; I_P = 1.5

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Backward Inclined Welded Steel (Greenheck)	BI-27		27		88	Carbon Steel		Interp.
	BI-30		30		154	Carbon Steel		Interp.
	BI-33		33		174	Carbon Steel		Interp.
	BI-36.5		36.5		202	Carbon Steel		Interp.
	BI-40.25		40.25		266	Carbon Steel		Interp.
	BI-44.5		44.5		332	Carbon Steel		Interp.
	BI-49		49		456	Carbon Steel		Interp.
	BI-54.25		54.25		564	Carbon Steel		Interp.
	BI-60		60		775	Carbon Steel		Interp.
	BI-66		66		894	Carbon Steel		55
Backward Inclined Riveted Steel (Greenheck)	BI-11.19		11.19		10	Carbon Steel		56
	BI-12.25		12.25		19	Carbon Steel		Interp.
	BI-13.5		13.5		21	Carbon Steel		Interp.
	BI-15		15		24	Carbon Steel		Interp.
	BI-16.5		16.5		36	Carbon Steel		Interp.
	BI-18.25		18.25		41	Carbon Steel		52
	BI-20		20		47	Carbon Steel		Interp.
	BI-22.25		22		65	Carbon Steel		Interp.
	BI-24		24		77	Carbon Steel		57
Backward Inclined Welded Aluminum (Greenheck)	BI-11.19		11.19		3	Aluminum		Interp.
	BI-12.25		12.25		6	Aluminum		Interp.
	BI-13.5		13.5		7	Aluminum		Interp.
	BI-15		15		8	Aluminum		Interp.

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Table Description: Fan Wheels

TABLE 5

Building Code: CBC 2016
Seismic Certification Limits: S_{DS} = *2.0 g* *z/h = 1.0*; S_{DS} = *3.2 g* *z/h = 0.0*
I_P = *1.5*

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Backward Inclined Welded Aluminum (Greenheck)	BI-16.5		16.5		12	Aluminum		Interp.
	BI-18.25		18.25		14	Aluminum		Interp.
	BI-20		20		16	Aluminum		Interp.
	BI-22.25		22.25		22	Aluminum		Interp.
	BI-24		24		26	Aluminum		58

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Table Description: Nozzles

TABLE 6

Building Code: CBC 2016
Seismic Certification Limits: S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 3.2 g z/h = 0.0
I_P = 1.5

Component Type	Manufacturer	Model	Description	Notes	UUT
Vektor-CH	Greenheck	Vektor-CH-12-nozzle	High plume nozzle size 12, 59 lbs		Interp.
		Vektor-CH-15-nozzle	High plume nozzle size 15, 67 lbs		Interp.
		Vektor-CH-18-nozzle	High plume nozzle size 18, 77 lbs		51
		Vektor-CH-22-nozzle	High plume nozzle size 22, 87 lbs		Interp.
		Vektor-CH-24-nozzle	High plume nozzle size 24, 90 lbs		Interp.
		Vektor-CH-27-nozzle	High plume nozzle size 27, 120 lbs		Interp.
		Vektor-CH-30-nozzle	High plume nozzle size 30, 131 lbs		53
Vektor-CS	Greenheck	Vektor-CS-12-nozzle	Var. Geom. nozzle size 12, 206 lbs		Extrap.
		Vektor-CS-15-nozzle	Var. Geom. nozzle size 15, 204 lbs		Extrap.
		Vektor-CS-18-nozzle	Var. Geom. nozzle size 18, 225 lbs		52
		Vektor-CS-22-nozzle	Var. Geom. nozzle size 22, 246 lbs		Interp.
		Vektor-CS-24-nozzle	Var. Geom. nozzle size 24, 265 lbs		Interp.
		Vektor-CS-27-nozzle	Var. Geom. nozzle size 27, 280 lbs		Interp.
		Vektor-CS-30-nozzle	Var. Geom. nozzle size 30, 275 lbs		54
FJC	Greenheck	FJC-306-nozzle	FumeJet nozzle size 306, 28 lbs		Interp.
		FJC-307-nozzle	FumeJet nozzle size 307, 28 lbs		Interp.
		FJC-308-nozzle	FumeJet nozzle size 308, 28 lbs		Interp.
		FJC-309-nozzle	FumeJet nozzle size 309, 28 lbs		Interp.
		FJC-310-nozzle	FumeJet nozzle size 310, 28 lbs		56
		FJC-312-nozzle	FumeJet nozzle size 312, 29 lbs		Interp.
		FJC-315-nozzle	FumeJet nozzle size 315, 29 lbs		Interp.
		FJC-324-nozzle	FumeJet nozzle size 324, 43 lbs		57

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Table Description: Options/Accessories

TABLE 7

Building Code: CBC 2016
Seismic Certification Limits: S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 3.2 g z/h = 0.0
I_P = 1.5

Component Type	Manufacturer	Model	Description	Notes	UUT
Sure-Aire (100-240 VAC)	Greenheck	384799	Max pressure - 8.30 inches W.C.		52
		384800	Max pressure - 22.14 inches W.C.		Interp.
		384801	Max pressure - 41.52 inches W.C.		Interp.
		384802	Max pressure - 83.04 inches W.C.		Interp.
		384803	Max pressure - 138.40 inches W.C.		Interp.
Sure-Aire (24 VAC/VDC)	Greenheck	384986	Max pressure - 8.30 inches W.C.		Interp.
		384987	Max pressure - 22.14 inches W.C.		Interp.
		384988	Max pressure - 41.52 inches W.C.		Interp.
		384989	Max pressure - 83.04 inches W.C.		Interp.
		384990	Max pressure - 138.40 inches W.C.		55
Disconnect Switch (NEMA 3R)	Square D	HU361 RB	30 A Disconnect Switch		52
		HU362 RB	60 A Disconnect Switch		Interp.
		HU363 RB	100 A Disconnect Switch		Interp.
		HU364 RB	200 A Disconnect Switch		55
Toggle Switch (NEMA 3R)	ABB	KITABB6P	25 A Toggle switch		52
		EOT45U3M3-S	60 A Toggle switch		Interp.
		EOT63U3M3-S	80 A Toggle switch		Interp.
		EOT100U3M3-P	100 A Toggle switch		Interp.
		NF1253 - 3PB6A	125 A Toggle switch		55
		EOT45U3M3-S+ OTPS80FP	60 A Toggle switch		Interp.
		NF323 - 6PB6A	40 A Toggle switch		Interp.
		NF453 - 6PB6B	60 A Toggle switch		Interp.
		NF633 - 6PB6A	80 A Toggle switch		Interp.

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 16028

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF

Table Description: Options/Accessories

TABLE 7

Building Code: CBC 2016

Seismic Certification Limits: S_{DS} = *2.0 g* *z/h = 1.0*; S_{DS} = *3.2 g* *z/h = 0.0*; I_P = *1.5*

Component Type	Manufacturer	Model	Description	Notes	UUT
Toggle Switch (NEMA 3R)	ABB	NF1003 - 6PB6B	100 A Toggle switch		52
Pressure Transducer	Greenheck	878791	Pressure Transducer Box		55
Actuator	Belimo	GMB24-SR	Actuator		52

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 51

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: Vektor-CH-18 ***Serial Number:*** N/A

Product Construction Summary:
UL-705; UL-762; Class II construction; Belt Drive; Spark C construction (carbon steel wheel); Carbon steel housing; Carbon steel shaft; Welded scroll

Options/Subcomponent Summary:
10 hp, 230/460V motor; Welded steel airfoil wheel; High plume nozzle size 18;

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
650	43.1	43.6	120.1	5.2	4.1	10.6

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\,(g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:

Floor mounted - isolated using (4) VMC MSH-1E-400 isolators w/ (1) 1/2" Grade 8 bolt attaching Isolator to unit & (2) 5/8" Grade 8 bolts attaching isolator to table.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 52

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: Vektor-CS-18 ***Serial Number:*** N/A

Product Construction Summary:
UL-705; UL-762; Class II construction; Belt Drive; Spark C construction (carbon steel wheel); Carbon steel housing; Carbon steel shaft; Welded scroll

Options/Subcomponent Summary:
10 hp, 230/460V motor; Backward inclined steel riveted wheel; Var. Geom. nozzle size 18; Sure-Aire 100-240 VAC; 30 A Disconnect Switch; 25 A Toggle switch; 100 A Toggle switch; GMB24-SR Actuator

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
759	43.1	43.6	120.1	9.8	11.8	8.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\ (g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:

Floor mounted - isolated using (4) VMC MSH-1E-400 isolators w/ (1) 1/2" Grade 8 bolt attaching Isolator to unit & (2) 5/8" Grade 8 bolts attaching isolator to table.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 53

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: Vektor-CH-30 ***Serial Number:*** N/A

Product Construction Summary:
UL-705; UL-762; Class II construction; Belt Drive; Spark C construction (carbon steel wheel); Carbon steel housing; Carbon steel shaft; Welded scroll

Options/Subcomponent Summary:
20 hp, 575/600V motor; Welded steel airfoil wheel; High plume nozzle size 30;

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1191	63.3	59.3	120	4.6	5.3	8.7

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\ (g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:

Floor mounted - isolated using (4) VMC MSH-1E-530N isolators w/ (1) 1/2" Grade 8 bolt attaching Isolator to unit & (2) 5/8" Grade 8 bolts attaching isolator to table.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 54

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: Vektor-CS-30 ***Serial Number:*** N/A

Product Construction Summary:
UL-705; UL-762; Class II construction; Belt Drive; Spark C construction (carbon steel wheel); Carbon steel housing; Carbon steel shaft; Welded scroll

Options/Subcomponent Summary:
20 hp, 575/600V motor; Welded steel airfoil wheel; Var. Geom. nozzle size 30

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1554	63.3	59.3	120	3.5	3.4	9.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\ (g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:

Floor mounted - isolated using (4) VMC MSH-1E-530N isolators w/ (1) 1/2" Grade 8 bolt attaching Isolator to unit & (2) 5/8" Grade 8 bolts attaching isolator to table.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 55

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: 66-CSW ***Serial Number:*** N/A

Product Construction Summary:
UL-705; UL-762; Class II construction; Belt Drive; Spark C construction (carbon steel wheel); Carbon steel housing; Carbon steel shaft; Welded scroll

Options/Subcomponent Summary:
150 hp 460V motor; Backward inclined welded steel wheel; Sure-Aire 24 VAC/VDC; 200 A Disconnect Switch; 125 A Toggle switch; Pressure Transducer Box

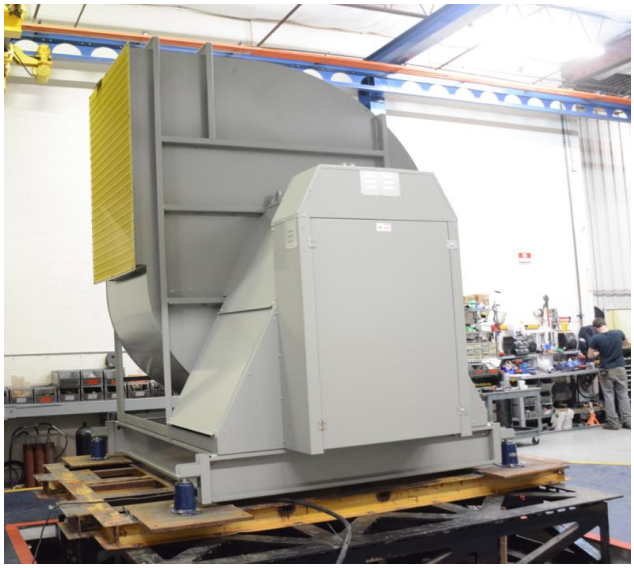
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
6598	115.2	99	138.5	2.7	5.0	4.2

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\ (g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:



Floor mounted - isolated using (4) Mason SSLFH-C-1750 isolators w/ (1) 1/2" Grade 8 bolt attaching Isolator to unit & (4) 5/8" Grade 8 bolts attaching isolator to table.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 56

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: FJC-310 ***Serial Number:*** N/A

Product Construction Summary:
Bolted steel frame; Carbon steel housing; Welded steel wheel; Belt drive

Options/Subcomponent Summary:
2 hp 115/230V motor; Backward inclined riveted steel wheel; FumeJet nozzle size 310;

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
184	30.8	19.8	84	1.6	2.3	5.0

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\ (g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:

Floor mounted - isolated using (4) VMC AMSR-1C-100 isolators w/ (1) 1/2" Grade 8 bolt attaching Isolator to unit & (2) 5/8" Grade 8 bolts attaching isolator to table.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 57

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: FJC-324 ***Serial Number:*** N/A

Product Construction Summary:
Bolted steel frame; Carbon steel housing; Welded steel wheel; Belt drive

Options/Subcomponent Summary:
10 hp, 230/460V motor; Backward inclined riveted steel wheel; FumeJet nozzle size 324

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
656	50.3	45.3	84	2.4	2.6	4.9

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\ (g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:

Floor mounted - isolated using (4) VMC AMSR-1C-250 isolators w/ (1) 1/2" Grade 8 bolt attaching Isolator to unit & (2) 5/8" Grade 8 bolts attaching isolator to table.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 58

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: USF-324 ***Serial Number:*** N/A

Product Construction Summary:
Bolted steel frame; Carbon steel housing; Welded steel wheel; Belt drive

Options/Subcomponent Summary:
10 hp, 230/460V motor; Backward inclined welded aluminum wheel;

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
546	50.3	42.5	55.2	2.7	3.0	5.1

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\ (g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:

Floor mounted - isolated using (4) VMC AMSR-1C-250 isolators w/ (1) 1/2" Grade 8 bolt attaching Isolator to unit & (2) 5/8" Grade 8 bolts attaching isolator to table.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 59

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: Sure-Aire 384799 ***Serial Number:*** N/A

Product Construction Summary:
100-240 VAC; Max 8.3 inches water column

Options/Subcomponent Summary:

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5	3	6	6	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\ (g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:

Wall mounted - rigid using 4 #8 screws into a plywood covered test fixture.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 60

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: Sure-Aire 384990 ***Serial Number:*** N/A

Product Construction Summary:
24 VAC/VDC; Max 138.40 inches water column

Options/Subcomponent Summary:

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5	3	6	6	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\,(g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:

Wall mounted - rigid using 4 #8 screws into a plywood covered test fixture.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 61

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: 878792 - Single Fan Control Box ***Serial Number:*** N/A

Product Construction Summary:

Options/Subcomponent Summary:

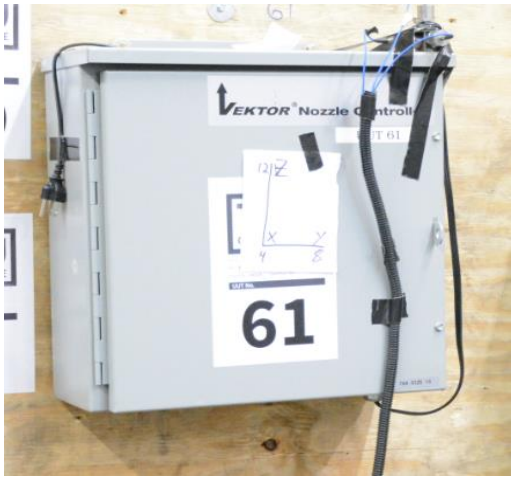
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
45	6	16	16	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\ (g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:



Wall mounted - rigid using (4) 1/4" lag screws into a plywood covered test fixture.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 16028

UUT 62

Manufacturer: Greenheck Fan Corporation
Model Line: CSW/USF
Model Number: 878793 - Multiple Fan Control Box ***Serial Number:*** N/A

Product Construction Summary:

Options/Subcomponent Summary:

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
55	6	20	20	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	$S_{DS\ (g)}$	z/h	I_P	$A_{FLX\text{-}H}$ (g)	$A_{RIG\text{-}H}$ (g)	$A_{FLX\text{-}V}$ (g)	$A_{RIG\text{-}V}$ (g)
CBC 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:

Wall mounted - rigid using (6) 1/4" lag screws into a plywood covered test fixture.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.