APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0382

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Trane

Manufacturer's Technical Representative: Joe Wells

Mailing Address: 1515 Mercer Road, Lexington, KY 40511-1080

Telephone: 859-288-2618 Email: joe.wells@trane.com

Product Information

Product Name: Blower Coil Air Handlers (BCxD)

Product Type: Air Terminal Device

Product Model Number: BCHD (Horizontal) Sizes 12 to 90 & BCVD (Vertical) Sizes 24 to 90
(List all unique product identification numbers and/or part numbers)

General Description: Cataloged Air Handling Units manufactured in sizes 12-90 in horizontal and sizes 24-90 in vertical configurations. Units are offered with single & three phase fan motors and electric heat. Seismic enhancement made to the test units and modifications required to address anomalies observed during the tests shall be incorporated into the production units.

Mounting Description: BCHDs can be suspended with spring isolators and seismic cable restraints.

BCHDs and BCVDs can be base mounted with or without neoprene pads.

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: 9/9/19

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: Ken Tarlow California License Number: SE2851

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: PEER, University of California Berkley

Contact Name: Amarnath Kasalanati

Mailing Address: 1302 South 46th Street, Building 420, Richmond, CA 94084

Telephone: 510-665-3409 Email: amarnath1@berkley.edu

Seismic Parameters

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

Design Basis of Equipment or Components (F_p/W_p) = 1.50 (S_{DS} = 2.00, R_P = 6.0, z/h = 1); 3.60 (S_{DS} = 2.00, R_P = 2.5, z/h = 1) 1.02 (S_{DS} = 2.27, R_P = 6.0, z/h = 0); 1.36 (S_{DS} = 2.27, R_P = 2.5, z/h = 0)

S_{DS} (Design spectral response acceleration at short period, g) = 2.00 (z/h = 1); 2.27 (z/h = 0)

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

R_p (Equipment or component response modification factor) = 2.5 (Suspended Isolated); 6.0 (Floor mounted); 2.5 (Floor mounted with neoprene pads)

Ω_0 (System overstrength factor) = 2

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1 and 0

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: March 17, 2020

Print Name: Timothy J Piland Title: SSE

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

Condition of Approval (if applicable):

Table 1 - Certified BCxD Cabinet Sizes

Model	Unit Size	Standard Basic Modules				Shake Tested Units				Permitted Support Conditions		Roof level		Ground Level	
		Max. Weight [lbs]	Max. Length [in]	Width [in]	Height [in]	Max. Weight [lbs]	Max. Length [in]	Width [in]	Height [in]	Suspended w/ Spring Isolators	Rigid Base Mounted (1)	S_{DS}	z/h	S_{DS}	z/h
BCHD (Horizontal)	12	116.4	31.20	24.00	14.00	160.00	59.40	24.00	14.00	Extrapolated	UUT 7	2.00	1.0	2.27	0.0
						170.00	53.20	24.00	14.00	UUT 1	Interpolated	2.00	1.0	2.27	0.0
						200.00	74.20	24.00	14.00	UUT 2		2.00	1.0	2.27	0.0
	18	126.2	31.20	28.00	14.00					Interpolated		2.00	1.0	2.27	0.0
	24	160.4	33.72	28.00	18.00							2.00	1.0	2.27	0.0
	36	195.2	33.72	40.00	18.00							2.00	1.0	2.27	0.0
	54	316.9	41.57	40.00	22.00	178.00	47.00	40.00	22.00	UUT 9		2.00	1.0	2.27	0.0
						198.00	47.00	40.00	28.00	Interpolated	UUT 11	2.00	1.0	2.27	0.0
	72	354.1	41.57	48.00	22.00						Interpolated	2.00	1.0	2.27	0.0
	90	416.4	43.94	48.00	28.00	299.00	52.50	48.50	28.00	UUT 10		2.00	1.0	2.27	0.0
						380.00	78.70	48.00	28.00	UUT 4A		2.00	1.0	2.27	0.0
						450.00	65.00	48.00	28.00	UUT 3A		2.00	1.0	2.27	0.0
						380.00	71.50	48.00	28.00	Interpolated	UUT 8 (Note 2)	2.00	1.0	2.27	0.0
BCVD (Vertical)	24	211.9	28.00	28.00	51.72	250.00	56.20	28.00	51.70	N/A	UUT 6	2.00	1.0	2.27	0.0
	36	259.5	28.00	40.00	51.72					N/A	Interpolated	2.00	1.0	2.27	0.0
	54	385.3	30.00	40.00	63.57					N/A		2.00	1.0	2.27	0.0
	72	458.5	30.00	48.00	63.57					N/A		2.00	1.0	2.27	0.0
	90	512.0	30.00	48.00	71.94	398.00	31.00	48.00	86.5	N/A	UUT 12	2.00	1.0	2.27	0.0
						610.00	78.60	48.00	71.90	N/A	UUT5 (Note 2)	2.00	1.0	2.27	0.0

Notes

1) Rigid base mounted units permitted to be installed with or without neoprene pads

2) UUT5 & UUT8 were tested on neoprene pads

Table 2 - Certified BCxD Base Frame Construction

Use	Size	Base Construction	Material	MFR	UUT
BCHD	12	Base Panel	22 Gauge Galv CS	Trane	1, 2, 7
	18-36				Interpolated
	54				**9**, **11**
	72				Interpolated
	90				3A, 4A, 8, **10**
BCVD	24	16 Gauge Legs	22 Gauge Galv CS		6
	36-72				Interpolated
	90				5, **12**

Table 3 - Certified BCxD Enclosure Construction: Wall/Roof Exterior Panels

Skin	Insulation	Panel Nominal Thickness	Wall/Roof Panel Material	Wall/Roof Panel Type	Unit Size	MFR	UUT	
							Base Mounted	Suspended
Motor Access Panel	Matte Faced Fiberglass	1"	18 Gauge Galvanized CS	Single Wall	24-90	Trane	6, 8, 11, 12	4A, 9, 10
Motor Access Panel	Foil-Faced Fiberglass	1"	18 Gauge Galvanized CS	Single Wall	24-90		5	3A
Motor Access Panel	Matte Faced Fiberglass	1"	22 Gauge Galvanized CS	Single Wall	12 & 18		Interpolated	2
Motor Access Panel	Foil-Faced Fiberglass	1"	22 Gauge Galvanized CS	Single Wall	12 & 18		7	1
Coil Access Panel	Matte Faced Fiberglass	1"	18 Gauge Galvanized CS	Single Wall	24-90		6, 8, 11, 12	4A, 9, 10
Coil Access Panel	Foil-Faced Fiberglass	1"	18 Gauge Galvanized CS	Single Wall	24-90		5	3A
Coil Access Panel	Matte Faced Fiberglass	1"	22 Gauge Galvanized CS	Single Wall	12 & 18		Interpolated	2
Coil Access Panel	Foil-Faced Fiberglass	1"	22 Gauge Galvanized CS	Single Wall	12 & 18		7	1
Front Panel	Matte Faced Fiberglass	1"	22 Gauge Galvanized CS	Single Wall	12-90		11, 12	2, 4, 9, 10
Front Panel	Foil-Faced Fiberglass	1"	22 Gauge Galvanized CS	Single Wall	12-90		7	1, 3A
Inlet Side Panel	Matte Faced Fiberglass	1"	18 Gauge Galvanized CS	Single Wall	12-90		6, 8, 11, 12	2, 4A, 9, 10
Inlet Side Panel	Foil-Faced Fiberglass	1"	18 Gauge Galvanized CS	Single Wall	12-90		5, 7	1, 3A
Filter Access Door	Matte Faced Fiberglass	1"	22 Gauge Galvanized CS	Single Wall	12-90		6, 8, 11, 12	2, 4A, 9, 10
Filter Access Door	Foil-Faced Fiberglass	1"	22 Gauge Galvanized CS	Single Wall	12-90		5, 7	1, 3A
Coil Side Panel	Matte Faced Fiberglass	1"	18 Gauge Galvanized CS	Single Wall	12-90		6, 8, 11, 12	2, 4A, 9, 10
Coil Side Panel	Foil-Faced Fiberglass	1"	18 Gauge Galvanized CS	Single Wall	12-90		5, 7	1, 3A
Top Panel	Matte Faced Fiberglass	1"	22 Gauge Galvanized CS	Single Wall	12-90		6, 8, 11, 12	2, 4A, 9, 10
Top Panel	Foil-Faced Fiberglass	1"	22 Gauge Galvanized CS	Single Wall	12-90		5, 7	1, 3A

Table 4a - Certified BCxD Hydronic Coils

Dimensions		Width (inches)				MFR	UUT	
		16	20	32	40		Base Mounted	Suspended
Height (inches)	8	Size 12	Size 18			Trane	7	2
	12		Size 24	Size 36			Interpolated	Interpolated
	17.5			Size 54	Size 72		11	9
	22.5				Size 90		5, 12	3A, 10

Table 4b - Certified BCxD Hydronic Coil Options

		UUT	
		Base Mounted	Suspended
Casing Material	16 Gauge Galv Steel	5, 7, 11, 12	2, 3A, 9, 10
Tube Material	Copper		
Tube Outer Diameter	0.375 or 0.5		
Tube Wall Thickness	0.012 or 0.016		
Permitted Fin Material	Aluminum		
Permitted Fin Pitch	12		
Permitted Tube Rows	1 (Heating)	Extrapolated	Extrapolated
	2 (Heating)		
	4 (Heating/Cooling)	7, 11, 12	9, 10
	6 (Heating/Cooling)	5	2, 3A
Header Type	Copper	5, 7, 11, 12	2, 3A, 9, 10

Table 4c - Certified BCxD Direct Expansion/Heat Pump Coils

Dimensions		Width (inches)				MFR	UUT	
		16	20	32	40		Base Mounted	Suspended
Height (inches)	8	Size 12	Size 18			Trane	Extrapolated	1
	12		Size 24	Size 36			6	Interpolated
	18			Size 54	Size 72		Interpolated	
	24				Size 90		8	4A

Table 4d - Certified BCxD Direct Expansion Coil Options

		UUT	
		Base Mounted	Suspended
Casing Material	16 Gauge; Galv Steel	6, 8	1, 4A
Tube Material	Copper		
Tube Outer Diameter	0.375"		
Tube Wall Thickness	0.012"		
Permitted Fin Material	Aluminum		
Permitted Fin Pitch	12		
Permitted Tube Rows	3	6	4A
	4	Interpolated	Interpolated
	6	8	1
Header Type	Copper	6, 8	1, 4A

Table 4e - Certified BCxD Steam Coils (Preheat)

Dimensions		Width (inches)				MFR	UUT	
		17	21	33	41		Base Mounted	Suspended
Height (inches)	6	Size 12	Size 18			Trane	7	2
	12		Size 24	Size 36			Interpolated	Interpolated
	18			Size 54	Size 72			
	24				Size 90		5	3A

Table 4f - Certified BCxD Steam Coil Options

		UUT
Casing Material	16 Gauge; Galv CS	2, 3A, 5, 7
Tube Material	Copper	
Tube Outer Diameter	1"	
Tube Wall Thickness	0.031"	
Permitted Fin Material	Aluminum	
Permitted Fin Pitch	6	
Permitted Tube Rows	1	
Header Type	Gray Cast Iron	

Table 5 - Certified BCxD Fan Motor

Model	Phase	Rating [HP]	Voltage Rating	Trane PN	UUT	
					Base Mounted	Suspended
Variable Speed Motor	1-Phase	0.5	115/208-230/277	X70660685	7	2, 1
		1.0	115/208-230/277	X70660684	1, 5, 6, 8	3A, 4A
	3-Phase	0.5	208-230	X70660693010	11	9
		0.5	460	X70660693030	Interpolated	Interpolated
		1.0	208-230	X70660693020		
		1.0	460	X70660693040		
		1.5	208-230	X70660696040		
		1.5	460	X70660696030		
		3.0	208-230	X70660696020		
		3.0	460	X70660696010	12	10
Variable Speed Driver	3-Phase	1.5	208-230	X13612048040	11	9
		1.5	460	X13612048030	Interpolated	Interpolated
		3.0	208-230	X13612048020		
		3.0	460	X13612048010	12	10

Table 6 - Certified BCxD Fans

• Forward Curved Centrifugal Fan • Direct Drive

	HP	0.50	1.00	1.50	3.00	Fan MFR	UUT	
	Weight	14	19	40	56		Base Mounted	Suspended
Size (Dia - Width)	9" - 4"	UUT 1, 2	UUT 7	NA	NA	Lau Industries	7	1, 2
Impeller Weight	3.8							
Size (Dia - Width)	9" - 6"	X	UUT 6	NA	NA		6	Interpolated
Impeller Weight	4							
Size (Dia - Width)	12" - 9"	UUT 9, 11	UUT 3A, 4A, 5, 8	X	UUT 10, 12		5, 8, 11, 12	3A, 4A, 9, 10
Impeller Weight	7.2							

Wheel Material	Fan Diameter	UUT	
		Base Mounted	Suspended
Galv Steel; 22 Gauge	9"	6, 7	1, 2
Galv Steel; 20 Gauge	12"	5, 8, 11, 12	3A, 4A, 9, 10

Housing Material	UUT
Galv Steel	1, 2, 3A, 4A, 5, 6, 7, 8, 9, 10, 11, 12

Motor Mount Configuration	HP Range	Material	UUT	
			Base Mounted	Suspended
Horizontal Shaft FanSide Mount	0.50	Galvanized Steel	11	1, 2, 9
	1.00		5, 6, 7, 8	3A, 4A
	1.50		Interpolated	Interpolated
	3.00		12	10

Table 7 - Certified BCxD Flat Filter (1" TA, 2" MERV 8, or 2" MERV 13)

Unit	Cartridge Quantity	Frame Material Options	Dimensions [in]		MFR	UUT	
			Width	Height		Base Mounted	Suspended
Size 12	x1	Galvanized Steel	24	12	Trane	Extrapolated	1, 2, 7
Size 18	x1	Galvanized Steel	24	12			Interpolated
Size 24	x1	Galvanized Steel	25	16		6	
Size 36	x2	Galvanized Steel	20	16		Interpolated	
Size 54	x2	Galvanized Steel	20	20			
Size 72	x1	Galvanized Steel	20	20			
Size 72	x1	Galvanized Steel	25	20			
Size 90	x3	Galvanized Steel	16	25		5, 8	3A, 4A

Table 8 - Certified BCxD Angle Filter (Accessory Section; 2" MERV 8 or 2" MERV 13)

Unit	Cartridge Quantity	Frame Material Options	Dimensions [in]		MFR	UUT	
			Width	Height		Base Mounted	Suspended
Size 12	x 2	Galvanized Steel	24	12	Trane	Extrapolated	2
Size 18	x 2	Galvanized Steel	24	12			Extrapolated
Size 24	x 2	Galvanized Steel	24	12			
Size 36	x 2	Galvanized Steel	20	20			
Size 54	x 4	Galvanized Steel	20	16			
Size 72 (mixing box + angle filter)	x 3 bottom	Galvanized Steel	16	16			
	x 2 top	Galvanized Steel	20	16			
Size 72	x 6	Galvanized Steel	16	16			
Size 90	x 6	Galvanized Steel	20	16		5	

Table 9 - Certified BCxD Top or Bottom Filter (Accessory Section; 2" MERV 8 or 2" MERV 13)

Type		Frame Material Options	Dimensions [in]		MFR	UUT	
			Width	Height		Base Mounted	Suspended
Size 12	x1	Galvanized Steel	20	12	Trane	7	Extrapolated
Size 18	x1	Galvanized Steel	24	12		Interpolated	
Size 24	x1	Galvanized Steel	25	16		6	
Size 36	x1	Galvanized Steel	20	16		Extrapolated	
Size 36	x1	Galvanized Steel	16	16			
Size 54	x1	Galvanized Steel	16	20			
Size 54	x1	Galvanized Steel	20	20			
Size 72	x1	Galvanized Steel	20 / 25	20			
Size 90	x1	Galvanized Steel	16	25			4A
	x2	Galvanized Steel	14	25			

Table 10 - Certified BCxD Flat Media Options

Type	Filter Material	MFR	UUT	
			Base Mounted	Suspended
1" Standard Efficiency Throw Away	Fiberglass	Air Guard Industries	Extrapolated	1, 3A
2" MERV 8	Pleated	Air Guard Industries	6, 8	4A
2" MERV 13	Pleated	Air Guard Industries	5	2

Table 11a - Certified BCxD Electric Heat

Model	Stage	Output (kW)	Dimensions [in]			Weight	MFR	UUT	
			H	W	D	[lbs]		Base Mounted	Suspended
Size 12	1 & 2	1.0 - 4.0	14.06	17.88	6.83	10.0	Tutco	Extrapolated	1
Size 18	1 & 2	1.0 - 6.0	14.06	19.88	6.83	10.8			Interpolated
Size 24	1 & 2	1.0 - 8.0	18.06	21.25	6.83	11.3		6	
Size 36	1 & 2	1.0 - 11.0	18.06	27.25	6.83	12.8		Interpolated	
Size 54	1 & 2	1.0 - 16.0	18.06	27.25	6.83	16.0			
Size 72	1 & 2	1.0 - 21.0	18.06	27.25	6.83	17.4			
Size 90	1 & 2	1.0 - 30.0	18.06	27.25	6.83	19.2		8, 12	4A, 10

Table 11b - Certified BCxD Electric Heat

Electrical Heat (kW)	Voltage							MFR	UUT	
	115/60/1	208/60/1	230/60/1	277/60/1	208/60/3	230/60/3	460/60/3		Base Mounted	Suspended
1.0	UUT 6	X	X	X	X	X		Tutco	6	Extrapolated
1.5	X	UUT 1	X	X	X	X	X		Interpolated	1
2.0	X	X	X	X	X	X	X			Interpolated
2.5	X	X	X	X	X	X	X			
3.0	X	X	X	X	X	X	X			
3.5		X	X	X	X	X	X			
4.0		X	X	X	X	X	X			
4.5		X	X	X	X	X	X			
5.0		X	X	X	X	X	X			
5.5		X	X	X	X	X	X			
6.0		X	X	X	X	X	X			
6.5		X	X	X	X	X	X			
7.0		X	X	X	X	X	X			
7.5		X	X	X	X	X	X			
8.0		X	UUT 8	X	X	X	X		8	
9.0				X	X	X	X		Interpolated	
10.0				X	X	X	X			
11.0				UUT 4A	X	X	X			4A
12.0					X	X	X			Interpolated
13.0							X			
14.0							X			
15.0							X			
16.0							X			
17.0							X			
18.0							X			
19.0							X			
20.0							X			
21.0							X			
22.0							X			
24.0							X			
26.0							X			
28.0							X			
30.0							UUT 10, 12		12	10

Table 12 - Certified BCxD Control Panel

Model	Height [in]	Width [in]	Depth [in]	MFR	UUT	
					Base Mounted	Suspended
Fan Speed Switch	11.5	6.8	3.75	Trane	7*	Extrapolated
CSTI	11.5	6.8	3.75	Trane	8, 11, 12	1, 4A, 9, 10
ZN010	11.5	6.8	3.75	Trane	Interpolated	2*
ZN510	11.5	6.8	3.75	Trane		3A*
ZN520	11.5	6.8	3.75	Trane	6, 7	2, 3A
UC400	11.5	6.8	3.75	Trane	5	Extrapolated

*Two control boxes

Table 13 - Certified BCxD Dampers

Unit Size	Height	Width	Qty	MFR	UUT	
					Base Mounted	Suspended
12	9	17.5	2	Don Park Inc	Extrapolated	1
18	9	21.5	2			Interpolated
24	9	21.5	2		6	
36	9	33.5	2		Interpolated	
54	14.75	33.5	2			
72	14.75	33.5	2			
90	14.75	33.5	2		8	4A

Damper Material		Blade Orientation	MFR	UUT
Frame	Blades			
Aluminum	Aluminum	Horizontal	Don Park Inc	1, 4A, 6, 8

Actuator MFR	Trane PN	UUT
Honeywell	X13610243010	1, 4A, 6, 8

Table 14 - Certified BCxD Non-Active Components

Description	Availability	Manufacturer	Material	UUT	
				Base Mounted	Suspended
Mixing Box	All Sizes	Trane	Galvanized Steel	6, 8	1, 4A
Angle Filter Box	All Sizes	Trane	Galvanized Steel	5	Extrapolated
Bottom or Top Hinged Filter Access Box	All Sizes	Trane	Galvanized Steel	6,7	4A
Hinged Motor Access Panel	All Sizes	Trane	Galvanized Steel	All	All
Factory Provide Piping Package (field installed external to unit)	All Sizes	Trane	Copper	7	2, 3A
Polymer Drain Pan	All Sizes	Trane	Polymer	6, 8, 11, 12	2, 4A, 9, 10
Stainless Steel Drain Pan	All Sizes	Trane	Stainless Steel	5, 7	1, 3A

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-1

PEER STI 2014_03

Model Line	Model Number	Manufacturer
BCxD	BCHD - 12	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 & 22 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Direct Expansion Coil: Trane; 1 Phase fan motor: Trane (Part#: X70660685); 0.5 HP Fan: Lau Industries; Flat Filter: Trane; 1-4 kW e phase electric heat: Tutco; CSTI Control panel: Trane; Damper: Don Park Inc.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
170	53.20	24.00	14.00	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

Vibration Isolated Suspended unit on (4) 5/8" ASTM-A307 rods, with (4) VMC HRSA-1C-50 Vibration Isolator Hangers, (4) SB-250 (1/4") Seismic Cable Kits and (3 per rod) and SRBC-1 Rod Stiffening Clamps. SB-250's are attached to structure using 5/8" hardware. SRBC-1s are fastened to L1x1x1/4 ASTM-A36 angle.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-2

PEER STI 2014_03

Model Line	Model Number	Manufacturer
BCxD	BCHD - 12	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 & 22 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Hydronic Coil: Trane; Steam Coil: Trane;1 Phase fan motor: Trane (Part#: X70660685); 0.5 HP Fan: Lau Industries; Flat Filter: Trane; ZN010 Control panel: Trane.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
200	74.20	24.00	14.00	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

Vibration Isolated Suspended unit on (4) 5/8" ASTM-A307 rods, with (4) VMC HRSA-1C-50 Vibration Isolator Hangers, (4) SB-250 (1/4") Seismic Cable Kits and (3 per rod) and SRBC-1 Rod Stiffening Clamps. SB-250's are attached to structure using 5/8" hardware. SRBC-1s are fastened to L1x1x1/4 ASTM-A36 angle.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-3A

PEER STI 2014_03

Model Line	Model Number	Manufacturer
BCxD	BCHD - 90	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 & 22 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Hydronic Coil: Trane; Steam Coil: Trane;1 Phase fan motor: Trane (Part#: X70660684); 1.0 HP Fan: Lau Industries; Flat Filter: Trane; ZN510 & ZN520 Control panel: Trane.

UUT Properties

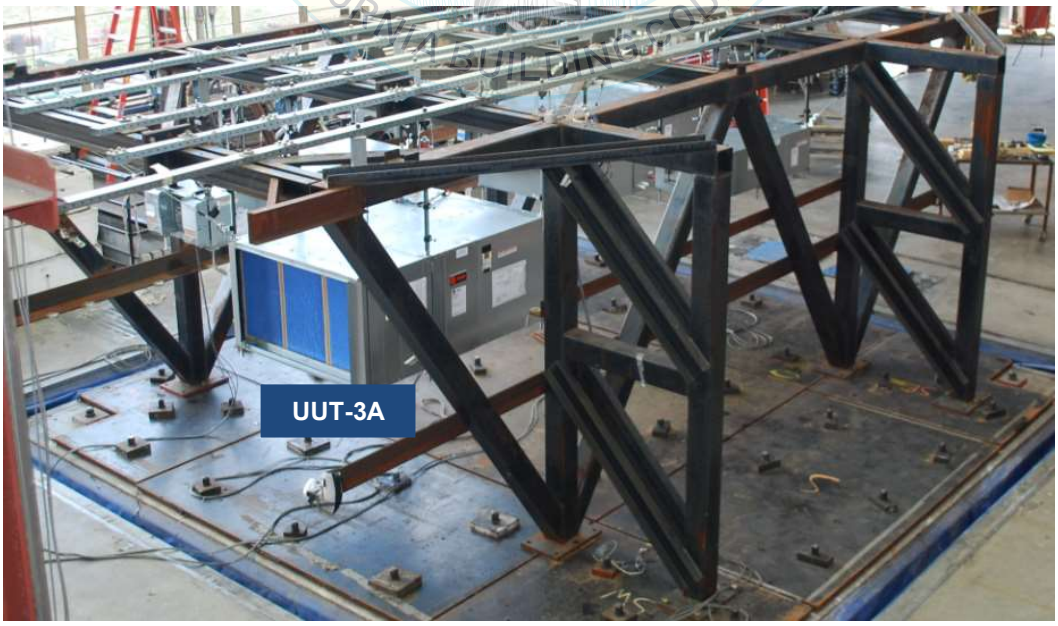
Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
450	64.90	48.00	28.00	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

Vibration Isolated Suspended unit on (4) 5/8" ASTM-A307 rods, with (4) VMC HRSA-1C-150 Vibration Isolator Hangers, (4) SB-250 (1/4") Seismic Cable Kits and (3 per rod) SRBC-1 Rod Stiffening Clamps. SB-250's are attached to structure using 5/8" hardware. SRBC-1s are fastened to L1x1x1/4 ASTM-A36 angle.



All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-4A

PEER STI 2014_03

Model Line	Model Number	Manufacturer
BCxD	BCHD - 90	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 & 22 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Direct Expansion Coil: Trane; 1 Phase fan motor: Trane (Part#: X70660684); 1.0 HP Fan: Lau Industries; Flat Filter: Trane; 1-30kW, 1 phase electric heat: Tutco; CSTI Control panel: Trane; Damper: Don Park Inc.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
380	78.70	48.00	28.00	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

Vibration Isolated Suspended unit on (4) 5/8" ASTM-A307 rods, with (4) VMC HRSA-1C-150 Vibration Isolator Hangers, (4) SB-250 (1/4") Seismic Cable Kits and (3 per rod) SRBC-1 Rod Stiffening Clamps. SB-250's are attached to structure using 5/8" hardware. SRBC-1s are fastened to L1x1x1/4 ASTM-A36 angle.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-5

PEER STI 2014_03

Model Line	Model Number	Manufacturer
BCxD	BCVD - 90	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 & 22 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Hydronic Coil: Trane; Steam Coil: Trane;1 Phase fan motor: Trane (Part#: X70660684); 1.0 HP Fan: Lau Industries; Flat Filter: Trane; Angle Filter: Trane; UC400 Control panel: Trane.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
610	78.60	48.00	71.90	5.7	7.4	13.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

UUT was floor-mounted to the base plate with neoprene pads using qty (24) 1/4" Grade 8 bolts in the manufacturer-provided mounting bracket holes.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-6

PEER STI 2014_03

Model Line	Model Number	Manufacturer
BCxD	BCVD - 24	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 & 22 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Direct Expansion Coil: Trane; 1 Phase fan motor: Trane (Part#: X70660684); 1.0 HP Fan: Lau Industries; Flat Filter: Trane; 1-8kW, 1 phase electric heat: Tutco; ZN520 Control panel: Trane; Damper: Don Park Inc.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
250	56.20	28.00	51.70	7.0	7.6	21.1

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

UUT was floor-mounted to the base plate using qty (24) 1/4" Grade 8 bolts in the manufacturer-provided mounting bracket holes.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-7

PEER STI 2014_03

Model Line	Model Number	Manufacturer
BCxD	BCHD - 12	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 & 22 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Hydronic Coil: Trane; Steam Coil: Trane;1 Phase fan motor: Trane (Part#: X70660685); 1.0 HP Fan: Lau Industries; Flat Filter: Trane; ZN520 Control panel: Trane.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
160	59.40	24.00	14.00	19.5	20.9	19.7

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

UUT was floor-mounted to the base plate using qty (24) 1/4" Grade 8 bolts in the manufacturer-provided mounting bracket holes.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-8

PEER STI 2014_03

Model Line	Model Number	Manufacturer
BCxD	BCHD - 90	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 & 22 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Direct Expansion Coil: Trane; 1 Phase fan motor: Trane (Part#: X70660684); 1.0 HP Fan: Lau Industries; Flat Filter: Trane; 1-8kW, 1 phase electric heat: Tutco; CSTI Control panel: Trane; Damper: Don Park Inc.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
380.0	71.50	48.00	28.00	10.9	11.1	12.1

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

UUT was floor-mounted to the base plate with neoprene pads using qty (24) 1/4" Grade 8 bolts in the manufacturer-provided mounting bracket holes.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-9

97462-1501

Model Line	Model Number	Manufacturer
BCxD	BCHD - 54	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Hydronic Coil: Trane; 3 Phase fan motor: Trane (Part#: X70660693010); Variable Speed Driver: Trane (Part#: X13612048040); 0.5 HP Fan: Lau Industries; CSTI Control panel: Trane

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
178	47.00	40.00	22.00	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

Vibration Isolated Suspended unit on (4) 5/8" ASTM-A307 rods, with (4) VMC HRSA-1C-100 Vibration Isolator Hangers, (4) SB-250 (1/4") Seismic Cable Kits and (3 per rod) SRBC-1 Rod Stiffening Clamps. SB-250's are attached to structure using 5/8" hardware. SRBC-1s are fastened to L1x1x1/4 ASTM-A36 angle.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-10

97462-1501

Model Line	Model Number	Manufacturer
BCxD	BCHD - 90	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Hydronic Coil: Trane; 3 Phase fan motor: Trane (Part#: X70660696010); Variable Speed Driver: Trane (Part#: X13612048010); 3 HP Fan: Lau Industries; 1-30 kW 3 phase electric heat: Tutco; CSTI Control panel: Trane.

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
299	52.50	48.50	28.00	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

Vibration Isolated Suspended unit on (4) 5/8" ASTM-A307 rods, with (4) VMC HRSA-1C-100 Vibration Isolator Hangers, (4) SB-250 (1/4") Seismic Cable Kits and (3 per rod) SRBC-1 Rod Stiffening Clamps. SB-250's are attached to structure using 5/8" hardware. SRBC-1s are fastened to L1x1x1/4 ASTM-A36 angle.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-11

97462-1501

Model Line	Model Number	Manufacturer
BCxD	BCHD - 54	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel Base Frame, 18 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Hydronic Coil: Trane; 3 Phase fan motor: Trane (Part#: X70660693010); Variable Speed Driver: Trane (Part#: X13612048040); 0.5 HP Fan: Lau Industries; CSTI Control panel: Trane

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
198	47.00	40.00	28.00	12.5	13.5	14.0

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

UUT was floor-mounted to the base plate using qty (16) 1/4" Grade 8 bolts in the manufacturer-provided mounting bracket holes.

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-12

97462-1501

Model Line	Model Number	Manufacturer
BCxD	BCVD - 90	Trane

Product Construction Summary

22 Gauge Galvanized Carbon Steel with Ribs Base Frame, 18 Gauge Galvanized Carbon Steel Enclosure

Options / Subcomponent Summary

Hydronic Coil: Trane; 3 Phase fan motor: Trane (Part#: X70660696010); Variable Speed Driver: Trane (Part#: X13612048010); 3 HP Fan: Lau Industries; 1-30 kW 3 phase electric heat: Tutco; CSTI Control panel: Trane

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
398	31.00	48.00	86.50	3.3	3.0	11.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2016	ICC-ES AC156	2.00	1.0	1.5	3.2	2.4	1.33	0.52
		2.27	0.0	1.5	2.27	0.91	1.52	0.61

Test Mounting Details

UUT was floor-mounted to the base plate using qty (16) 1/4" Grade 8 bolts in the manufacturer-provided mounting bracket holes. .

All units were filled with contents and maintained structural integrity and functionality after AC-156 test.