APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0242

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Trane

Manufacturer's Technical Representative: Dean Risley

Mailing Address: 9900 Aire Circle, Fort Smith, Arkansas 72916

Telephone: (479) 648-7480 Email: dean.risley@trane.com

Product Information

Product Name: Air Conditioning Units

Product Type: Air Conditioning Units - Custom

Product Model Number: PV (Custom Class A)

General Description: Custom sized air conditioning units that can be made in multiple sizes and configurations.

Mounting Description: Rigid, Base Mounted

Tested Seismic Enhancements: Seismic enhancements made to the test units and/or modifications required to address anomalies during the tests shall be incorporated into the production units.

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

Title: President

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

Company Name: THE VMC GROUP

Name: Kenneth Tarlow California License Number: S2851

Mailing Address: 980 9th Street, 16th Floor, Sacramento, CA 95814

Telephone: (832) 627-2214 Email: ken.tarlow@thevmcgroup.com

Certification Method

☐ GR-63-Core ☒ ICC-ES AC156 ☐ IEEE 344 ☐ IEEE 693 ☐ NEBS 3

☐ Other (Please Specify):

Testing Laboratory

Company Name: CLARK TESTING LABORATORY, INC.

Contact Person: JR Antenucci

Mailing Address: 1801 Route 51, Jefferson Hills PA 15025

Telephone: (417) 387-1001 Email: jrantenucci@clarktesting.com

Company Name: UNIVERSITY OF CALIFORNIA, BERKELEY (PEER)

Contact Person: Clement Barthes

Mailing Address: 325 Davis Hall, Berkeley CA 94720-1729

Telephone: (510) 665-3414 Email: clementbarthes@berkeley.edu

Company Name: QUALTECH/CURTISS WRIGHT/TRENTEC

Contact Person: Timothy Geers

Mailing Address: 4600 East Tech Drive, Cincinnati OH 45245

Telephone: (513) 528-7900 Email: tgeers@curtisswright.com

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 4.16

S_{DS} (Design spectral response acceleration at short period, g) = 1.85

a_p (Amplification factor) = 2.5

R_p (Response modification factor) = 2.0

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height ratio factor) = 1

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

HCAI Approval (For Office Use Only) - Approval Expires on 04/12/2028

Date: 4/12/2022

Name: Mohammad Karim Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: S_{DS} (g) = 1.85 z/h = 1

Condition of Approval (if applicable):

Table 1 - Unit Sizes

Max Weight / Area [lb/sq.ft.]		Overall Unit Width [ft]*																							UUT
		4'	6'	8'	10'	12'	14'	16'	18'	20'	22'	24'	26'	28'	30'	32'	34'	36'	38'	40'	42'	44'	46'	48'	50'	
Overall Unit Height [ft]*	3'	X	X	X	X	X	X																			Extrapolated
	4'	X	X	X	X	X	X	X																		Extrapolated
	5'	X	X	X	X	X	X	X	X	X																Extrapolated
	6'	X	X	X	X	X	X	X	X	X	X	X														Extrapolated
	7'	X	X	X	X	X	X	X	X	X	X	X	X	X												Extrapolated
	8'	X	X	1	X	X	X	X	X	X	X	X	X	X	X	X										1 (82.3 lb/sq.ft.)
	9'		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								Interpolated
	10'		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						Interpolated
	11'		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated
	12'		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated
	12' 6"			X	X	X	2,3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2 (70.5 lb/sq.ft.) 3 (94 lb/sq.ft.)

Notes: * Max. floor loading is 94 lb/sq.ft.
Unit height and width can vary between sizes shown in table.
Unit casings made from 2", 3" or 4" thick panels with optional steel, stainless steel or aluminum panels.
Unit length up to 90 feet.
Double interior septum wall required for units greater than 14'-0" wide and at 14'-0" o.c. thereafter.
This OSP is good for in-line configurations only; (No T Shapes or L Shapes).

Table 2A - Hydronic Coils

		Fin Length [in]																			UUT	MFR
		12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	
* Fin Height [in]	12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	Trane and Heatcraft
	15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	24	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	27	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	30	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	33	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	36	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	39	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	42	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	45	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	48	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Interpolated	
	51	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	

Notes: Trane and Heatcraft manufactured one of each 12x12 and 51x126.

* Single Coil Size (51" x 126" Max.)

** Multi-Coil Stacked Configuration With Intermediate Supports max 3 coils stacked at 45 x 126 each coil

Table 2B - Hydronic Coil Components

Item	Available	UUT1	UUT1	UUT3	UUT3
Manufacturer	Trane/Heatcraft	Trane	Heatcraft	Trane	Heatcraft
Tube Rows	1 - 10	1	1	10	10
Tube Diameter	1/2" - 5/8"	0.625"	0.625"	0.625"	0.625"
Tube Wall Thickness	0.020" - 0.035"	0.035"	0.035"	0.020"	0.020"
Tube Material	Copper	Copper	Copper	Copper	Copper
Fin Material	Copper, Alum	Copper	Copper	Aluminum	Aluminum
Fin Thickness	0.006" - 0.008"	0.006"	0.006"	0.008"	0.008"
Fins Per Foot	80 - 144	120	120	100	120
Casing Material	Galv CS, St Steel	Galvanized CS	Galvanized CS	Stainless Steel	Stainless Steel

Note: Max Unsupported Tube Length=48".

Table 3 - SDDP - Direct Drive Plenum Fan Array Components

	HP	1	1.5	2	3	5	7.5	10	15	20	UUT	Fan/Motor MFR
	Weight [lb]	40	50	55	72	95	146	158	255	286		
Size	22	X	X	X	X	X	X	X	X	X	3	Trane / Baldor
Weight [lb]	377											
Size	25	X	X	X	X	X	X	X	X	X	2	
Weight [lb]	433											

Note: Fans shall be constructed of Carbon Steel Housings and Wheels, with 208-230/460 Motors.

Table 4 - Housed Fan Components - Belt Drive

	HP	200	UUT	Fan/Motor MFR
	Weight [lb]	2,460		
Size	5	X	5	Twin City / Baldor
Weight [lb]	3,649			

Note: Fan shall be constructed of Carbon Steel Housing and Wheel, with a 208-230/460 Motor.

Table 5A - Plenum Fan Components - Belt Drive, with 208-230/460 Motors - CARBON STEEL MATRIX ONLY

Plenum Fan	HP	25	30	40	50	60	75	100	125	150	200	UUT	Fan/Motor MFR
	Weight [lb]	492	417	578	634	782	832	1,169	1,672	1,662	2,460		
Size	60	X	X	X	X	X	X	X	4	X	5	4	Twin City / Baldor
Weight [lbs]	2,200											5	

Note: Two different large fan assemblies and wheels were tested.

Table 5B - Plenum Fan Components - Belt Drive

Plenum Fan	HP	3	UUT	Fan/Motor MFR
	Weight [lb]	72		
Size	12	X	1	Twin City / Baldor
Weight [lbs]	83			

Note: Fan shall be constructed of Carbon Steel Housing and Aluminum Wheel, with 208-230/460 Motors.

Table 6A - Plenum Fan Components - Direct Drive

Plenum Fan	HP	5	UUT	Fan/Motor MFR
	Weight [lb]	95		
Size	12	X	1	Twin City / Baldor
Weight [lbs]	83			

Note: Fan shall be constructed of Carbon Steel Housings and Aluminum Wheel, with 208-230/460 Motors.

Table 6B - Plenum Fan Components - Direct Drive

Plenum Fan	HP	125	UUT	Fan/Motor MFR
	Weight [lb]	1,672		
Size	60	X	4	Twin City / Baldor
Weight [lbs]	2,200			

Note: Fan shall be constructed of Carbon Steel Housing and Carbon Steel Wheel, with 208-230/460 Motors.

Table 7 - Variable Frequency Drives

Model	Weight [lb]	UUT	MFR
TR200 Large*	420	3	Trane
TR200 Medium*	145	Interpolated	Trane
TR200 Small*	35	1	Trane
ACH 550 Medium**	121	1	ABB

Note: Trane VFD is Galvanized Carbon Steel with plastic front cover

Table 8 - Electrical Control Panel

Height [in]	Width [in]	Weight [lb]	UUT	MFR
36	30	100	3	Trane

Notes: All Panels are Galvanized Carbon Steel.
208/230/460VAC

Table 9 - Starter Panel Components

Item	Weight [lb]	Dimensions [in]	UUT	MFR	Part Numbers
Gasketed NEMA 3R/12 Enclosure			1	Hoffman	NF,CH, LP & SSLP
Non-Automatic Circuit Breaker Switch With Flange Mounted Disconnect Handle			1	Square D	Class 9422, CGJ, CFA & CKA
Type 4X "Hand-Off-Auto" Switch			1		Class 9001, K & SK
Magnetic NEMA Size Starter With 3 Phase			1		Class 8502 & 8538(combo)
Overload Panel			1		MOTORLOGIC
N.O. And N.C. Auxiliary Contacts			1		Class 9999, Type R & TC
120 Volt Control Transformer With Primary			1		Class 9070, Type TF
Dual Element Motor Fusing			1	Ferraz Shawmut	TR & TRS Class RK5
And Secondary Fusing			1		ATDR Class CC
Control Terminal Strip			1,2,3	Entrelec	Eneterlec Type M4/6
Ground Lugs			1,2,3	NSI	OT #1/0 - 14
Stranded Copper, THHN Wiring			1,2,3	Southwire	#12 - 500Kcmil
Misc Relay Panel	6	12x12x8	2	Idec	RH
TRAQ VCM	8	9x6x4	2	Trane	495100930001
120V Load Center	10	10x12x8	1	Square D	Class 1130, QO
TCACS Panel	12	12x7x7	2	Trane	NF,CH, LP & SSLP
3Ph MMS OL	12	20x20x5	2	ABB	ABB MS325, 450 & 490
3Ph Motor Term	15	20x20x5	2	Square D	Class 9080, Type LBA
1kva xfr	22	9x7x6	1		Class7400, S1
Switching Electrical Panel	75	36x30x12	3	Hoffman	NF,CH,LP & SSLP
7.5kva xfr	125	15x10x12	1	Square D	Class7400, S1

Table 10 - Heavy Duty Safety Switches (Disconnects)

Amps	Height [in]	Width [in]	Weight [lb]	UUT	MFR
30	15	21	18	2	Square D
60	18	21	20	Interpolated	
70	17	46	52	Interpolated	
100	80	46	52	Interpolated	
200	19	46	55	Interpolated	
225	17	46	55	Interpolated	
400	34	51	181	Interpolated	
600	34	51	250	2	

Table 11 - MP 581 Controller with Expansion Modules

Height [in]	Width [in]	Weight [lb]	UUT	MFR
24	24	30	1	Trane

Table 12 - Other Components

Description	UUT	MFR
Fixed Blade Horizontal Louver	2	Ruskin
Fixed Blade Vertical Louver	2	
Moveable Blade Horizontal Damper	1,2	
Moveable Blade Vertical Damper	2	
Traq Damper with VCM	2	Trane
Moveable Blade Backdraft Damper	3	Ruskin
Sound Attenuator	3	VibroAcoustics
Filter Rack - Type 8	3	AAF
Filter Frames - HEPA	1	
Filter Media - Cartridge Type	3	
Filter Media - HEPA Type	1	
TCACS Air Cleaning System	1,2	Trane
Fixed Blade Air Mixer (Blender)	1	Blender Products
Humidifier Grids	1	DriSteem
J-Box - Motor	1	Hoffman
Light - Fluorescent	1	Lithonia, RAB
Light Switch	1	Leviton
GFCI Receptacle	1	
Lighting Transformer	1	Square D
Temperature Sensors	1	ACI
Humidity Sensors	1	
Airflow Sensors	1	Dwyer
Airflow Measuring Devices	1	
Pressure Switches	1	Kele AFS
Damper Actuators	1,2	Belimo
Access Doors	1,2,3	ITM4

Table 13 - CDQ Wheels

Height [in]	Width [in]	Weight [lb]	UUT	MFR
21	21	90	1	Trane
24	24	110	Interpolated	
26	26	130	Interpolated	
29	29	150	Interpolated	
36	36	220	Interpolated	
43	43	290	Interpolated	
48	48	330	Interpolated	
54	54	410	Interpolated	
69	69	790	Interpolated	
77	77	1,020	Interpolated	
85	85	1,370	Interpolated	
96	96	1,730	Interpolated	
106	106	2,000	Interpolated	
122	122	2,740	3	

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-1

Q1132.0 Rev01, Q1132-01-01-01

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	AHU Cabinet (All 4 Walls) Model Number (TCPAID001V2M1702F0)	Trane

Product Construction Summary

Carbon Steel Base Frame, Aluminum Panels, Stainless Steel Panels, and Galvanized Carbon Steel Panels.
0.048" Thick Galvanized Carbon Steel Outer Wall.
0.036" Thick Galvanized Carbon Steel, 0.036" Thick Stainless Steel and 0.05" Thick Aluminum Inner Wall.
6" High Base Rail

Options / Subcomponent Summary

Plenum Fan (Belt): Twin City ; Plenum Fan (Direct): Twin City ; Controller (MP581): Trane ; Damper (CD50): Ruskin ; Damper (CD60): Ruskin ; Heating Coil: Trane ; Heating Coil: Heatcraft ; VFD: Trane ; VFD: ABB ; CDQ Wheel: Trane; Filter: AAF ; TCACS: Trane ; Humidifier: DriSteam ; Blender: Blender Products

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
5269	96	96	96	19.71	21.9	10.58

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

Rigid Base Mount. Qty (12) 5/8" dia SAE Grade 8 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-2A

PEER STI 2011-14, UUT2A

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	AHU Cabinet (All 4 Walls) Model Number (TCPAID000V3M3700F0)	Trane

Product Construction Summary

Carbon Steel Base Frame, Galvanized Carbon Steel Panels.
0.048" Thick Galvanized Carbon Steel Outer Wall.
0.036" Thick Galvanized Carbon Steel Inner Wall.
8" High Base Rail

Options / Subcomponent Summary

Plenum Fan Array: Trane ; Traq Damper: Trane ; VFD: Trane ; TCACS: Trane ; Louvers: Ruskin

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
12340	96	168	150	7	5.5	4.3

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

UUT 2 base rail is bolted to (6) 3" x 3" x 0.375" angle clips using (12) 5/8" dia SAE Grade 8 bolts. Angle clips are attached to fixture using (12) 5/8" dia SAE Grade 8 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-2B

PEER STI 2011-14, UUT2B

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	AHU Cabinet (Endwall Removed) Model Number (TCPAID000V3M3700F0)	Trane

Product Construction Summary

Carbon Steel Base Frame, Galvanized Carbon Steel Panels.
0.048" Thick Galvanized Carbon Steel Outer Wall.
0.036" Thick Galvanized Carbon Steel Inner Wall.
8" High Base Rail

Options / Subcomponent Summary

Plenum Fan Array: Trane ; Traq Damper: Trane ; VFD: Trane ; TCACS: Trane ; Louvers: Ruskin

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
11820	96	168	150	7	5.5	4.3

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

UUT 2 base rail is bolted to (6) 3" x 3" x 0.375" angle clips using (12) 5/8" dia SAE Grade 8 bolts. Angle clips are attached to fixture using (12) 5/8" dia SAE Grade 8 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-2C

PEER STI 2011-14, UUT2C

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	AHU Cabinet (Endwall & Sidewall Removed) Model Number (TCPAID000V3M3700F0)	Trane

Product Construction Summary

Carbon Steel Base Frame, Galvanized Carbon Steel Panels.
0.048" Thick Galvanized Carbon Steel Outer Wall.
0.036" Thick Galvanized Carbon Steel Inner Wall.
8" High Base Rail

Options / Subcomponent Summary

Plenum Fan Array: Trane ; Traq Damper: Trane ; VFD: Trane ; TCACS: Trane ; Louvers: Ruskin

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
11030	96	168	150	7	5.5	4.3

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

UUT 2 base rail is bolted to (6) 3" x 3" x 0.375" angle clips using (12) 5/8" dia SAE Grade 8 bolts. Angle clips are attached to fixture using (12) 5/8" dia SAE Grade 8 bolts.

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 2011-14, UUT3A

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	AHU Cabinet (All 4 Walls) Model Number (TCPAID044V4M1720F0)	Trane

Product Construction Summary

Carbon Steel Base Frame, Galvanized Carbon Steel Panels
0.048" Thick Galvanized Carbon Steel Outer Wall.
0.036" Thick Galvanized Carbon Steel Inner Wall.
8" High Base Rail

Options / Subcomponent Summary

Plenum Fan Array: Trane ; Backdraft Damper: Ruskin ; Cooling Coil: Trane ; Cooling Coil: Heatcraft ; VFD: Trane ; CDQ Wheel: Trane ; Filter: AAF ; Sound Attenuator: Vibro-Acoustics ; Control Panel: Trane

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
16450	144	168	150	5.7	5.9	8.3

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

UUT 3 base rails are bolted to (8) 3" x 3" x 0.375" angle clips using (16) 5/8" dia SAE Grade 8 bolts. Angle clips are attached to fixture using (16) 5/8" dia SAE Grade 8 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-3B

PEER STI 2011-14, UUT3B

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	AHU Cabinet (Inlet Wall Removed) Model Number (TCPAID044V4M1720F0)	Trane

Product Construction Summary

Carbon Steel Base Frame, Galvanized Carbon Steel Panels
0.048" Thick Galvanized Carbon Steel Outer Wall.
0.036" Thick Galvanized Carbon Steel Inner Wall.
8" High Base Rail

Options / Subcomponent Summary

Plenum Fan Array: Trane ; Backdraft Damper: Ruskin ; Cooling Coil: Trane ; Cooling Coil: Heatcraft ; VFD: Trane ; CDQ Wheel: Trane ; Filter: AAF ; Sound Attenuator: Vibro-Acoustics ; Control Panel: Trane

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
15660	144	168	150	5.7	5.9	8.3

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

UUT 3 base rails are bolted to (8) 3" x 3" x 0.375" angle clips using (16) 5/8" dia SAE Grade 8 bolts. Angle clips are attached to fixture using (16) 5/8" dia SAE Grade 8 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-3C

PEER STI 2011-14, UUT3C

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	AHU Cabinet (Inlet & Outlet Walls Removed) Model Number (TCPAID044V4M1720F0)	Trane

Product Construction Summary

Carbon Steel Base Frame, Galvanized Carbon Steel Panels
0.048" Thick Galvanized Carbon Steel Outer Wall.
0.036" Thick Galvanized Carbon Steel Inner Wall.
8" High Base Rail

Options / Subcomponent Summary

Plenum Fan Array: Trane ; Backdraft Damper: Ruskin ; Cooling Coil: Trane ; Cooling Coil: Heatcraft ; VFD: Trane ; CDQ Wheel: Trane ; Filter: AAF ; Sound Attenuator: Vibro-Acoustics ; Control Panel: Trane

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
14850	144	168	150	5.7	5.9	8.3

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

UUT 3 base rails are bolted to (8) 3" x 3" x 0.375" angle clips using (16) 5/8" dia SAE Grade 8 bolts. Angle clips are attached to fixture using (16) 5/8" dia SAE Grade 8 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-3C

PEER STI 2011-14, UUT3C

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	AHU Cabinet (Inlet, Outlet and 1 Sidewall Removed) Model Number (TCPAID044V4M1720F0)	Trane

Product Construction Summary

Carbon Steel Base Frame, Galvanized Carbon Steel Panels
0.048" Thick Galvanized Carbon Steel Outer Wall.
0.036" Thick Galvanized Carbon Steel Inner Wall.
8" High Base Rail

Options / Subcomponent Summary

Plenum Fan Array: Trane ; Backdraft Damper: Ruskin ; Cooling Coil: Trane ; Cooling Coil: Heatcraft ; VFD: Trane ; CDQ Wheel: Trane ; Filter: AAF ; Sound Attenuator: Vibro-Acoustics ; Control Panel: Trane

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
14080	144	168	150	5.7	5.9	8.3

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

UUT 3 base rails are bolted to (8) 3" x 3" x 0.375" angle clips using (16) 5/8" dia SAE Grade 8 bolts. Angle clips are attached to fixture using (16) 5/8" dia SAE Grade 8 bolts.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-4A

Q1132.0 Rev01, Q1132-03-01-01

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	Twin City EPFN 600	Trane

Product Construction Summary

Carbon Steel Base Frame, Carbon Steel Housing, Carbon Steel Wheel

Options / Subcomponent Summary

Direct Drive Plenum Fan: Twin City

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
9171	144	144	48	3.23	2.66	2.68

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

Qty (6) VMC M2SS-2E Spring Isolators, Qty (12) 5/8" dia SAE Grade 8 bolts, Base Mounted.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-4B

Q1132.0 Rev01, Q1132-02-01-01

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	Twin City EPFN 600	Trane

Product Construction Summary

Carbon Steel Base Frame, Carbon Steel Housing, Carbon Steel Wheel

Options / Subcomponent Summary

Belt Drive Plenum Fan: Twin City

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
9171	144	144	48	3.41	2.79	4.32

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

Qty (6) VMC M2SS-2E Spring Isolators, Qty (12) 5/8" dia SAE Grade 8 bolts, Base Mounted.

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

IBC® CERTIFIED
VMC GROUP

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-5

EL:8975, PV TYPE EPF-SW FAN

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	Trane PV Fan type EPF-SW	Trane

Product Construction Summary

Carbon Steel Housing, Carbon Steel Wheel

Options / Subcomponent Summary

Belt Drive Housed Fan: Twin City

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
6015	112	135	117	3	2.4	4.1

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 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

Qty (6) VMC AMSR-2D Spring Isolators, Qty (36) 1" Long Welds, Base Mounted.

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

UNIT UNDER TEST (UUT)
Summary Sheet

UUT-6

EL:8975, PV TYPE BAE-DW FAN

Model Line	Model Number	Manufacturer
PV Custom Air Handling Unit (Custom Class A)	Trane PV Fan type BAE-DW	Trane

Product Construction Summary

Carbon Steel Housing, Carbon Steel Wheel

Options / Subcomponent Summary

Belt Drive Plenum Fan: Twin City

UUT Properties

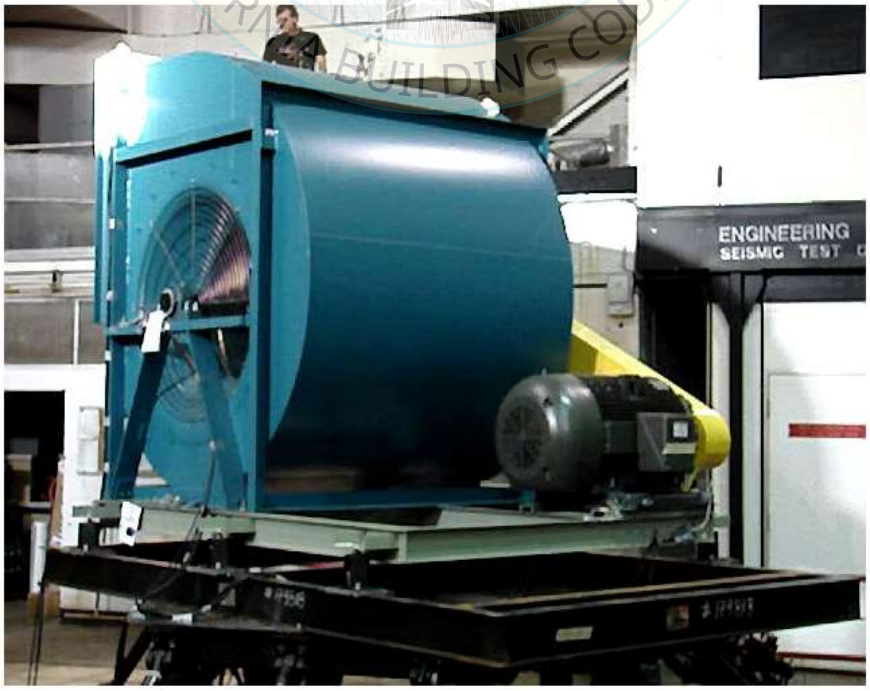
Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Length	Width	Height	F-B	S-S	V
7250	72	125	93	2	2.6	4

UUT Highest Passed Seismic Run Information

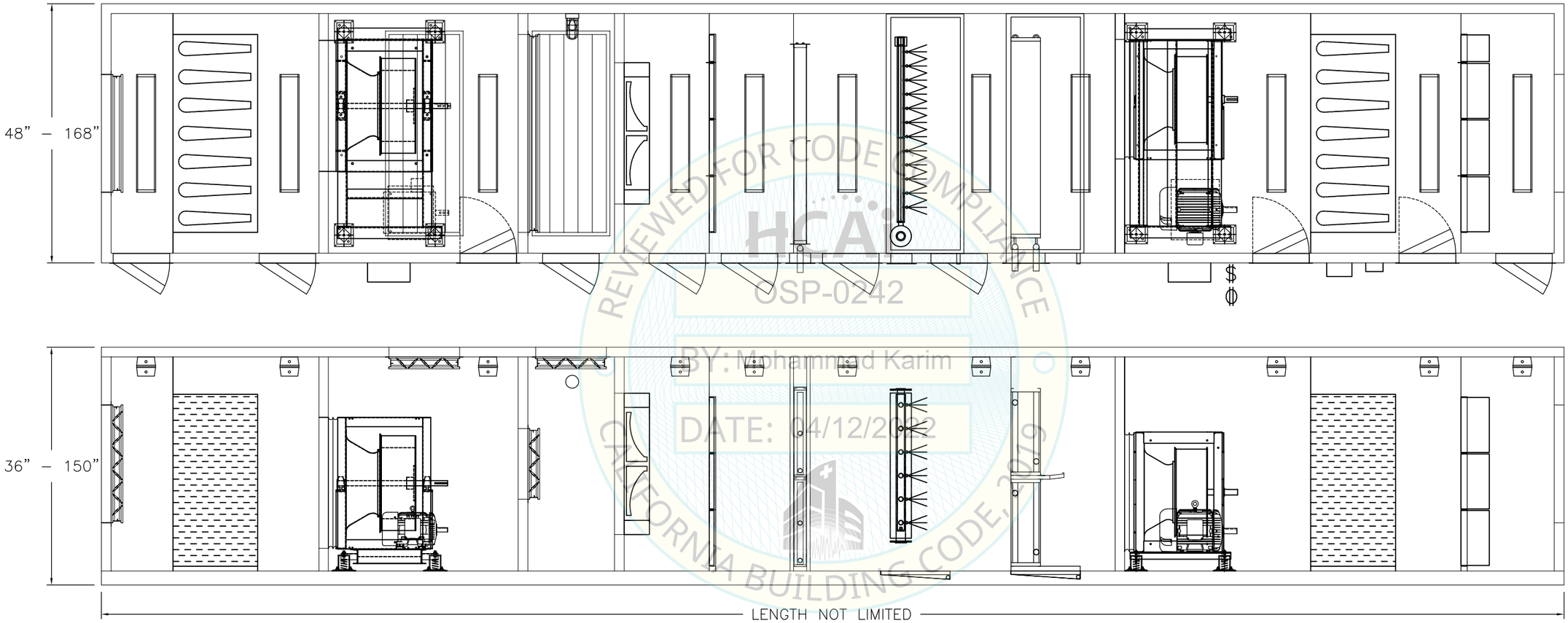
Building Code	Test Criteria	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
CBC 2019	ICC-ES AC156	1.85	1	1.5	2.96	2.22		
		2.28	0	1.5			1.53	0.61

Test Mounting Details

Qty (6) VMC AMSR-2D Spring Isolators, Qty (36) 1" Long Welds, Base Mounted.



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



PLAN VIEW

SIDE VIEW

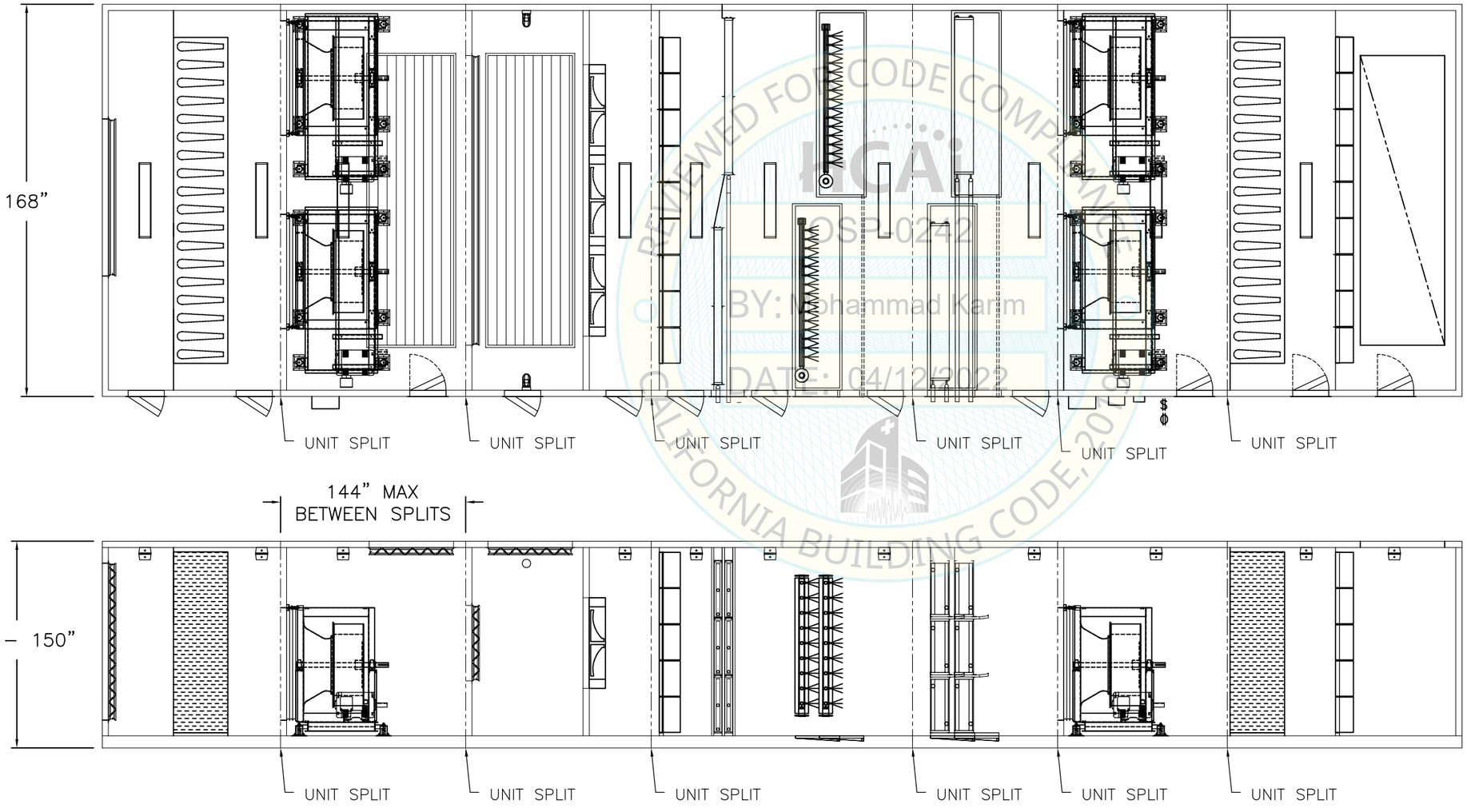
NOTES:

1. WALL AND ROOF MAY BE 2", 3", OR 4" THICK FOAM–INSULATED PANEL WITH MIN 16 GA STEEL EXTERIOR, MIN 20 GA STEEL INTERIOR. OPTIONAL ALUMINUM AND STAINLESS STEEL INTERIOR. UNIT BASE HEIGHT MAY BE 6" OR 8" WITH MIN 14 GA STEEL FLOOR.
2. THIRD LAYER PERFORATED LINER WITH FIBERGLASS INSULATION ALLOWED.
3. ANY APPROVED COMPONENTS MAY BE USED IN THIS CONFIGURATION, IN ANY ORDER IN DIRECTION OF AIRFLOW.
4. INTERNAL SEISMIC BRACING REQUIRED PER SHEETS "INTERNAL BRACING REQUIREMENTS".
5. UNIT MAY SHIP IN ANY NUMBER OF PIECES AS REQUIRED BY SHIPPING OR JOB SPECIFIC REQUIREMENTS.
6. STRUCTURAL CONTINUITY MUST BE MAINTAINED AT ALL SHIPPING SPLITS.
7. DOUBLE SIDE BY SIDE SEISMIC ROD BRACES ARE REQUIRED @144" O.C.

TRANE CUSTOM AIR HANDLERS	All dimensions are in inches unless otherwise noted. Tolerance for all dimensions are ±1/8" unless otherwise noted. Tolerance for all angular dimensions are ±0°1'0" unless otherwise specified.	REVISION NUMBER	REVISION DESCRIPTION	REVISION DATE	REVISION BY:	CHECKED BY:	APPROVED BY:
		1	Added revision bar and changed notes	10–11–17	Martin	DER	DER
TITLE: SINGLE WIDE, ONE PIECE							
JOB NUMBER: / EQ NUMBER: / TAGGING:			OSP-0242				
DRW'G NAME: 04/12/2022 / DATE: 10–11–17 / DRW'G BY: MARTIN / ENGINEER: DEAN							

NOTES:

1. WALL AND ROOF MAY BE 2", 3", OR 4" THICK FOAM-INSULATED PANEL WITH MIN 16 GA STEEL EXTERIOR, MIN 20 GA STEEL INTERIOR. OPTIONAL ALUMINUM AND STAINLESS STEEL INTERIOR. UNIT BASE HEIGHT MAY BE 6" OR 8" WITH MIN 14 GA STEEL FLOOR.
2. THIRD LAYER PERFORATED LINER WITH FIBERGLASS INSULATION ALLOWED.
3. ANY APPROVED COMPONENTS MAY BE USED IN THIS CONFIGURATION, IN ANY ORDER IN DIRECTION OF AIRFLOW.
4. INTERNAL SEISMIC BRACING REQUIRED PER SHEETS "INTERNAL BRACING REQUIREMENTS"
5. UNIT MAY SHIP IN ANY NUMBER OF PIECES AS REQUIRED BY SHIPPING OR JOB SPECIFIC REQUIREMENTS.
6. STRUCTURAL CONTINUITY MUST BE MAINTAINED AT ALL SHIPPING SPLITS.
7. DOUBLE SIDE BY SIDE SEISMIC ROD BRACES ARE REQUIRED @144" O.C.



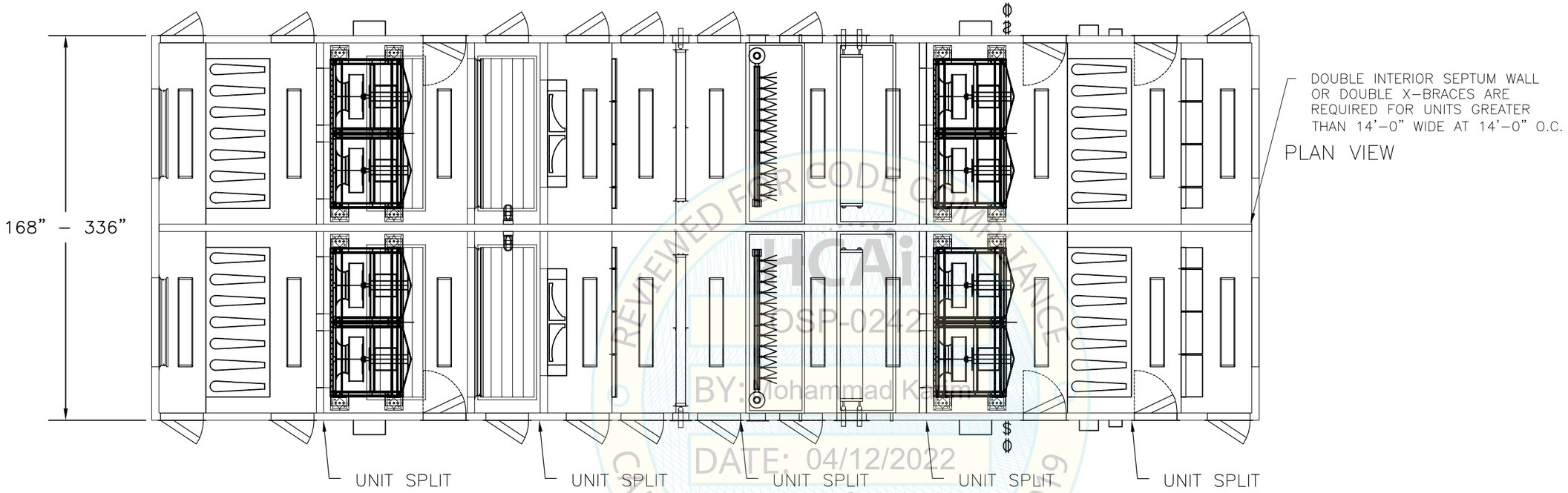
PLAN VIEW

SIDE VIEW

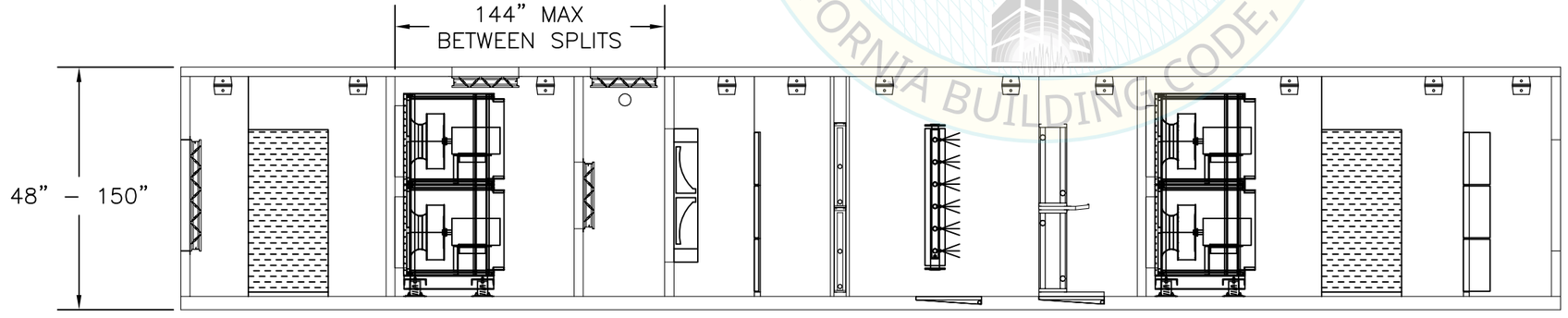
TRANE CUSTOM AIR HANDLERS				All dimensions are in inches unless otherwise noted. Tolerance for all dimensions are ±1/8" unless otherwise noted. Tolerance for all angular dimensions are ±0°1'0" unless otherwise specified.	REVISION NUMBER	REVISION DESCRIPTION	REVISION DATE	REVISION BY:	CHECKED BY:	APPROVED BY:
					1	Added revision bar and changed notes	10-11-17	Martin		
TITLE: DOUBLE WIDE, SINGLE AIR TUNNEL										
JOB NUMBER:	EQ NUMBER:	TAGGING:								
DRW'G NAME: 04/12/2022	DATE: 10-11-17	DRW'G BY: MARTIN	ENGINEER: DEAN			OSP-0242				

NOTES:

1. WALL AND ROOF MAY BE 2", 3", OR 4" THICK FOAM–INSULATED PANEL WITH MIN 16 GA STEEL EXTERIOR, MIN 20 GA STEEL INTERIOR. OPTIONAL ALUMINUM AND STAINLESS STEEL INTERIOR. UNIT BASE HEIGHT MAY BE 6" OR 8" WITH MIN 14 GA STEEL FLOOR.
2. THIRD LAYER PERFORATED LINER WITH FIBERGLASS INSULATION ALLOWED.
3. ANY APPROVED COMPONENTS MAY BE USED IN THIS CONFIGURATION, IN ANY ORDER IN DIRECTION OF AIRFLOW.
4. INTERNAL SEISMIC BRACING REQUIRED PER SHEETS "INTERNAL BRACING REQUIREMENTS"
5. UNIT MAY SHIP IN ANY NUMBER OF PIECES AS REQUIRED BY SHIPPING OR JOB SPECIFIC REQUIREMENTS.
6. STRUCTURAL CONTINUITY MUST BE MAINTAINED AT ALL SHIPPING SPLITS.
7. DOUBLE SIDE BY SIDE SEISMIC ROD BRACES ARE REQUIRED @144" O.C.



PLAN VIEW

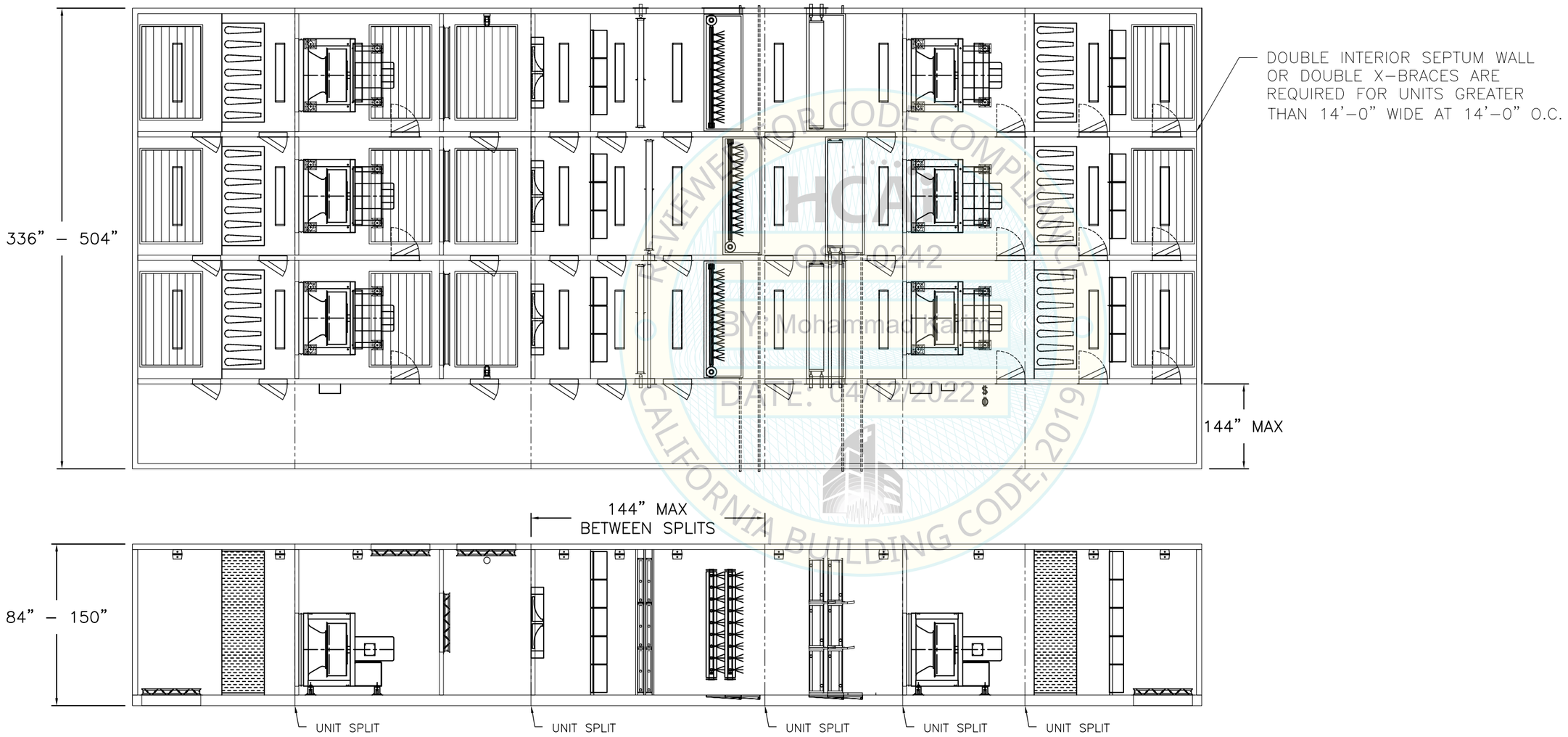


SIDE VIEW

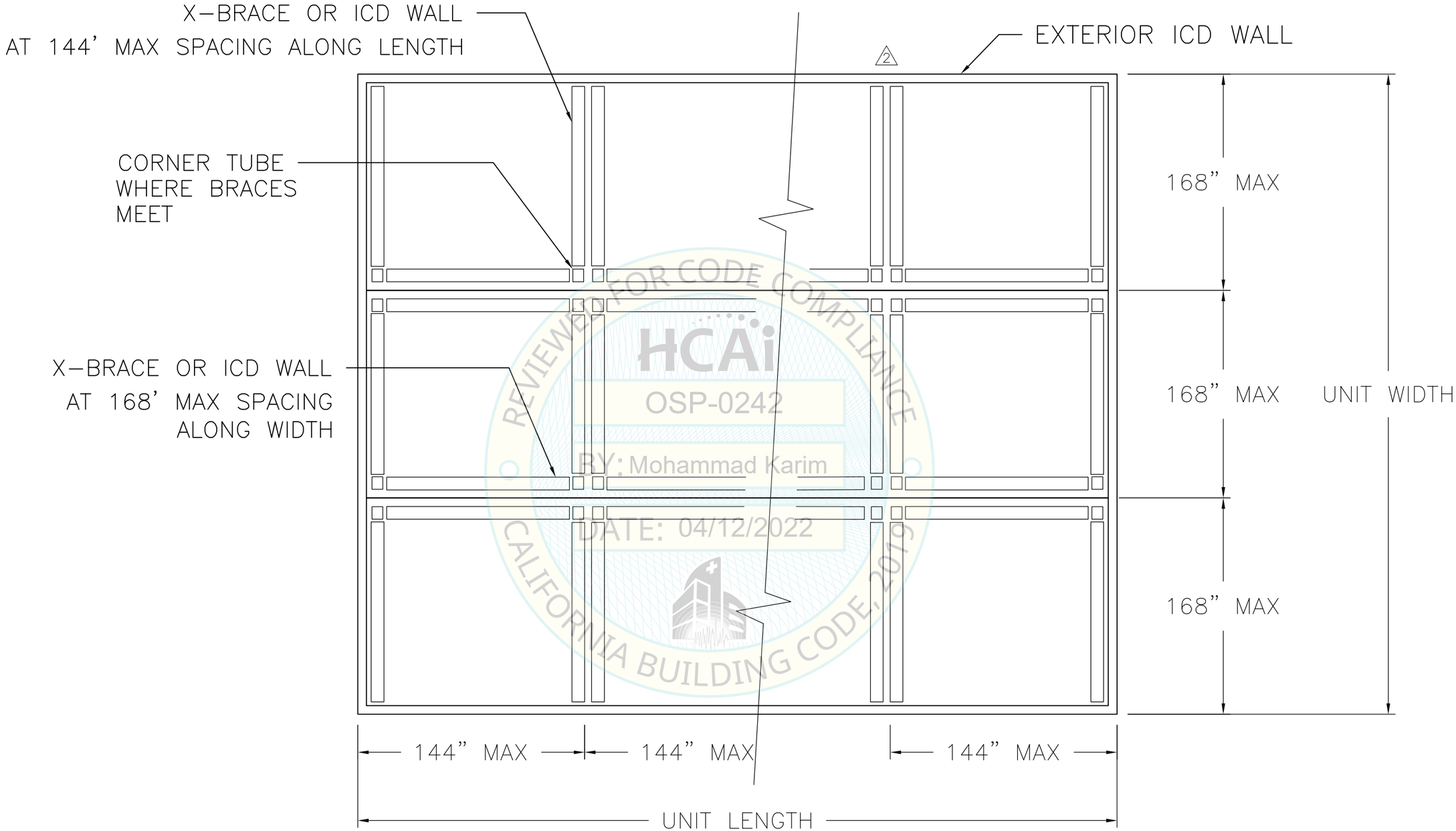
TRANE CUSTOM AIR HANDLERS	All dimensions are in inches unless otherwise noted. Tolerance for all dimensions are ±1/8" unless otherwise noted. Tolerance for all angular dimensions are ±0°1'0" unless otherwise specified.	REVISION NUMBER	REVISION DESCRIPTION	REVISION DATE	REVISION BY:	CHECKED BY:	APPROVED BY:
		1	Added revision bar and changed notes	10–11–17	Martin	DER	DER
TITLE: DOUBLE WIDE, DUAL AIR TUNNEL							
JOB NUMBER: / EQ NUMBER: / TAGGING:			OSP-0242				
DRW'G NAME: 04/12/2022 / DATE: 10–11–17 / DRW'G BY: MARTIN / ENGINEER: DEAN							

NOTES:

1. WALL AND ROOF MAY BE 2", 3", OR 4" THICK FOAM–INSULATED PANEL WITH MIN 16 GA STEEL EXTERIOR, MIN 20 GA STEEL INTERIOR. OPTIONAL ALUMINUM AND STAINLESS STEEL INTERIOR. UNIT BASE HEIGHT MAY BE 6" OR 8" WITH MIN 14 GA STEEL FLOOR.
2. THIRD LAYER PERFORATED LINER WITH FIBERGLASS INSULATION ALLOWED.
3. ANY APPROVED COMPONENTS MAY BE USED IN THIS CONFIGURATION, IN ANY ORDER IN DIRECTION OF AIRFLOW.
4. INTERNAL SEISMIC BRACING REQUIRED PER SHEETS "INTERNAL BRACING REQUIREMENTS"
5. UNIT MAY SHIP IN ANY NUMBER OF PIECES AS REQUIRED BY SHIPPING OR JOB SPECIFIC REQUIREMENTS.
6. STRUCTURAL CONTINUITY MUST BE MAINTAINED AT ALL SHIPPING SPLITS.
7. DOUBLE SIDE BY SIDE SEISMIC ROD BRACES ARE REQUIRED @144" O.C.



TRANE CUSTOM AIR HANDLERS				All dimensions are in inches unless otherwise noted. Tolerance for all dimensions are ±1/8" unless otherwise noted. Tolerance for all angular dimensions are ±0°1'0" unless otherwise specified.	REVISION NUMBER	REVISION DESCRIPTION	REVISION DATE	REVISION BY:	CHECKED BY:	APPROVED BY:
					1	Added revision bar and changed notes	10–11–17	Martin	DER	DER
TITLE: ULTRA WIDE, SINGLE AIR TUNNEL, SIDE CORRIDOR										
JOB NUMBER:	EQ NUMBER:	TAGGING:								
DRW'G NAME: 04/12/2022	DATE: 10–11–17	DRW'G BY: MARTIN	ENGINEER: DEAN			OSP-0242				



SEE SHEET 2 FOR X–BRACE/ ICD WALL DETAILS

NOTE:
ICD WALLS ARE INTERIOR OR EXTERIOR STRUCTURAL WALLS THAT ARE INSULATED

TRANE CUSTOM AIR HANDLERS

All dimensions are in inches unless otherwise noted.
Tolerance for all dimensions are ±1/8" unless otherwise noted.
Tolerance for all angular dimensions are ±0°1'0" unless otherwise specified.

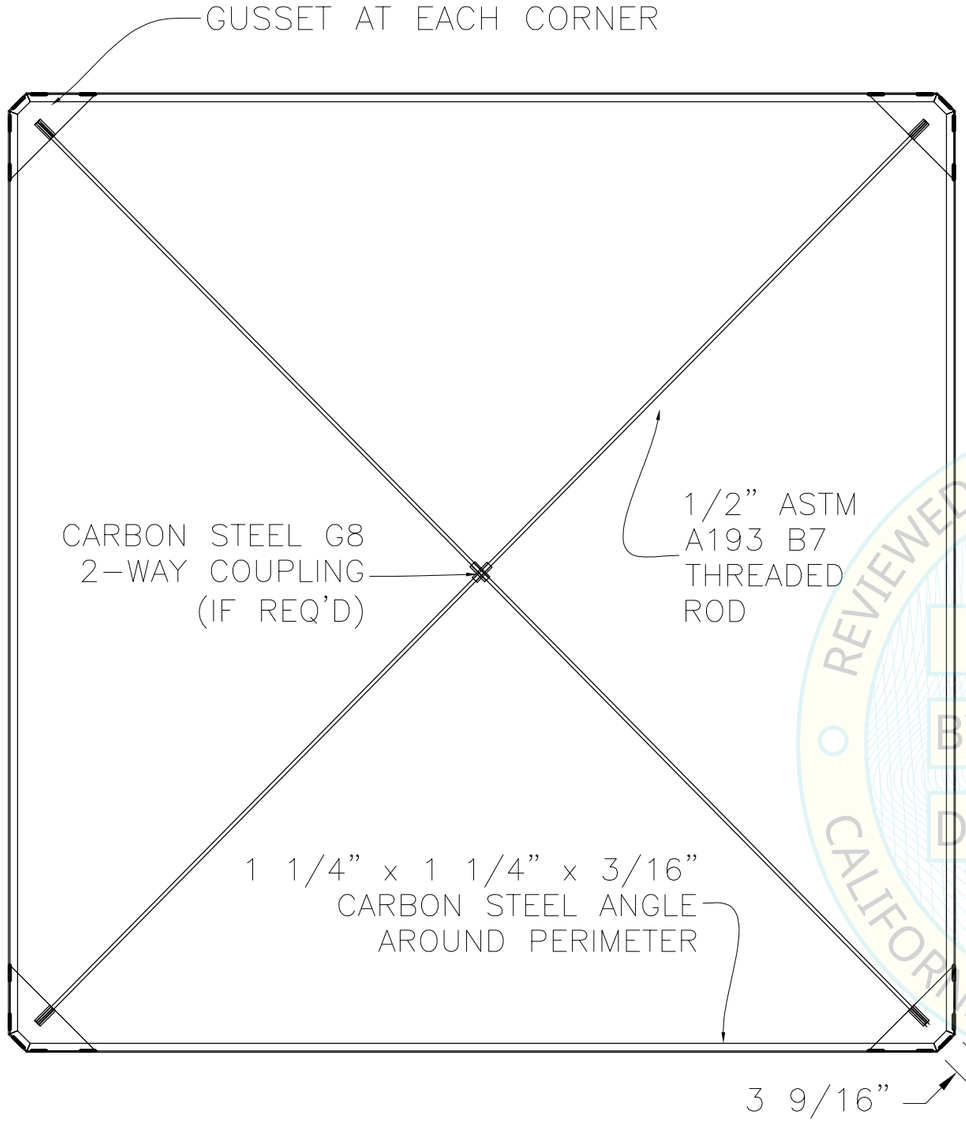
REVISION NUMBER	REVISION DESCRIPTION	REVISION DATE	REVISION BY:	CHECKED BY:	APPROVED BY:
1	Added revision bar and changed notes	10–11–17	Martin	DER	DER
2	ADDED DBL WALL BRACE TO DRAWING	12/21/17	DER	DER	DER

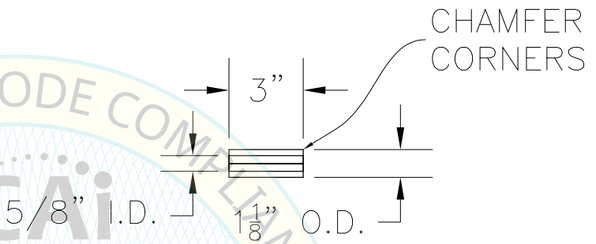
TITLE: INTERNAL BRACING REQUIREMENTS SHEET 1 OF 2

JOB NUMBER: | EQ NUMBER: | TAGGING:

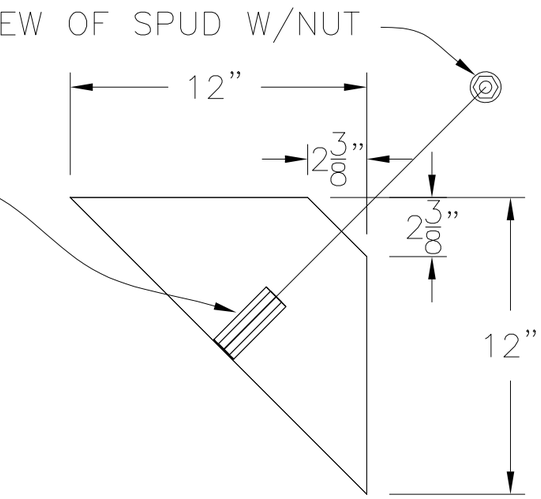
DRW'G NAME: 04/12/2022 | DATE: 10–11–17 | DRW'G BY: MARTIN | ENGINEER: DEAN

OSP-0242

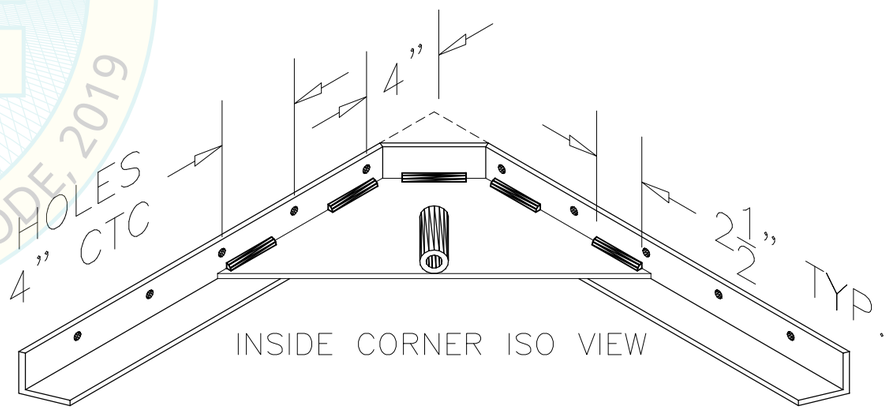




SPUD DETAIL
CARBON STEEL
TUBING



GUSSET DETAIL
5/16" THICK CARBON
STEEL PLATE
4 REQ'D



INSIDE CORNER ISO VIEW

3/16" FILLET WELDS, 2-1/2" LONG; AS SHOWN
(MUST BE WELDED)

NOTES:
1. X-BRACES TO BE FULL WIDTH AND HEIGHT OF UNIT
2. X-BRACE PERIMETER ANGLES ATTACHED TO UNIT FRAME WALL, FLOOR AND ROOF WITH 1/4" SELF-DRILLING SCREWS ON 4" CENTERS (MUST USE SCREWS)
3. WHERE TWO BRACES MEET, 2x2x1/8" CARBON STEEL TUBING TO BE INSTALLED AT JOINT BETWEEN BRACES (SEE PAGE 1)

TRANE CUSTOM AIR HANDLERS

All dimensions are in inches unless otherwise noted.
Tolerance for all dimensions are ±1/8" unless otherwise noted.
Tolerance for all angular dimensions are ±0°1'0" unless otherwise specified.

REVISION NUMBER	REVISION DESCRIPTION	REVISION DATE	REVISION BY:	CHECKED BY:	APPROVED BY:
1	Added revision bar	10-11-17	Martin	DER	DER
2	CORRECTED NOTES	12/21/17	DER	DER	DER

TITLE: INTERNAL BRACING REQUIREMENTS SHEET 2 OF 2

JOB NUMBER:	EQ NUMBER:	TAGGING:	
DRW'G NAME: 04/12/2022	DATE: 10-11-17	DRW'G BY: MARTIN	ENGINEER: DEAN

OSP-0242