APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0301

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Haakon Industries, Ltd.

Manufacturer's Technical Representative: Wade Gomer

Mailing Address: 11851 Dyke Road, Richmond, BC V7A4X8

Telephone: (604) 273-0161 Email: wade@haakon.com

Product Information

Product Name: Haakon Custom Air Conditioning Units

Product Type: Custom Air Conditioning Units

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

General Description: Air conditioning unit cabinets with internal and external components as outline in the Product Matrices. Seismic enhancements made to test units before/during test and modifications made to address anomalies observed during test shall be incorporated into the production units.

Mounting Description: Base mounted rigid

Applicant Information

Applicant Company Name: TRU Compliance, by Structural Integrity Associates, Inc

Contact Person: Andy Coughlin, SE

Mailing Address: 5215 Hellyer Ave, Suite 210, San Jose, CA 94608

Telephone: 844-878-0200 Email: acoughlin@structint.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: 12/31/2019

Title: Director Company Name: TRU Compliance, by Structural Integrity Associates, Inc

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

Company Name: TRU Compliance, by Structural Integrity Associates, Inc

Name: Derrick Watkins, PhD, SE California License Number: S5257

Mailing Address: 5215 Hellyer Ave, Suite 210, San Jose, CA 94608

Telephone: 844-878-0200 Email: dwatkins@structint.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): _____

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Testing Laboratory

Company Name: Environmental Testing Laboratory

Contact Name: Jeremy Lange

Mailing Address: 11034 Indian Trail, Dallas, TX 75229

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

Company Name: Pacific Earthquake Engineering Research Center (PEER)

Contact Name: Amarnath Kasalanati, PhD

Mailing Address: 1301 South 46th St., Bldg. 420, Richmond, CA 94804

Telephone: (510) 642-6475 Email: peer_center@berkeley.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 (z/h = 1), 1.13 (z/h = 0)

S_{DS} (Design spectral response acceleration at short period, g) = 2.00 (z/h = 1), 2.50 (z/h = 0)

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

R_p (Equipment or component response modification factor) = 6.0

Ω_0 (System overstrength factor) = 2

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) =

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

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List of Attachments Supporting Special Seismic Certification

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

☒ Other(s) (Please Specify): Product Matrices

OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2025

Signature: Date: April 29, 2021

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):

SPECIAL SEISMIC CERTIFICATION CERTIFIED COMPONENT MATRIX

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units

TABLE 1

Certified Product Construction Summary:

Units shall be constructed in accordance with Haakon typical seismic details. 2”-4” deep 16ga-12ga insulated panels constructed of stainless steel(SS), galv. carbon steel(CS), or aluminum(AL). 22ga to 18ga solid or perforated wall liners (SS,GS,AL). 14ga to 10ga floor (SS,CS,AL). 22ga to 18ga floor liner (SS,CS,AL). 3.0-6.0 lb fiber board or pour foam insulation. 4” to 12” deep base framing perimeter c-channel. See table 2.

Certified Options Summary:

With or without splits. Optional vestibule, casing cladding, or evaporative humidifier.
Units within dimensions listed below certified for interior section, end section, or enclosed section.
See representative unit drawings for more information on dimensional restrictions.

Mounting Configuration:

Base mounted - rigid

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

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS}= ***2.0 g*** ***z/h=1.0*** S_{DS}= ***2.5 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model	Dimensions (in)			Weight[1] (lb)	Notes	UUT[2]
		Depth	Width	Height			
Custom Air Handling Units	Enclosures - 4 walls (No walls removed)	96.0	96.0	96.0	5,440	UUT: 85 psf; stainless steel, carbon steel	1
		…	…	…	…		Interp.
		118.0	120.0	144.0	13,810	UUT: 140 psf, carbon steel	4
		…	…	…	…		Interp.
		115.0	144.5	156.0	13,100	UUT: 114 psf; stainless steel, carbon steel, aluminum	2a
		…	…	…	…		Interp.
		120.0	240.0	156.0	13,100	UUT: 66 psf; stainless steel, carbon steel, aluminum	3a
	Enclosures - 3 walls (Inlet or outlet wall removed)	115.0	144.5	156.0	13,100	UUT: 114 psf; stainless steel, carbon steel, aluminum	2b
		…	…	…	…		Interp.
		104.25	165.5	110.25	8,124	UUT: 68 psf; carbon steel	11
		…	…	…	…		Interp.
		113.5	240.0	152.0	15,554	UUT: 82 psf; carbon steel	10
		…	…	…	…		Interp.
		120.0	240.0	156.0	13,100	UUT: 66 psf; stainless steel, carbon steel, aluminum	3b

Additional Notes:
1. Max loading of 140 psf for all interpolated and extrapolated sizes.
2. References to UUT2a, 2b, 2c, 3a, 3b and 3c indicate the component was tested in that configuration only. References to UUT2 or UUT3 indicate the component was tested in all configurations of that test unit.

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SPECIAL SEISMIC CERTIFICATION CERTIFIED COMPONENT MATRIX

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units

TABLE 1

Certified Product Construction Summary:

Units shall be constructed in accordance with Haakon typical seismic details. 2”-4” deep 16ga-12ga insulated panels constructed of stainless steel(SS), galv. carbon steel(CS), or aluminum(AL). 22ga to 18ga solid or perforated wall liners (SS,GS,AL). 14ga to 10ga floor (SS,CS,AL). 22ga to 18ga floor liner (SS,CS,AL). 3.0-6.0 lb fiber board or pour foam insulation. 4” to 12” deep base framing perimeter c-channel. See table 2.

Certified Options Summary:

With or without splits. Optional vestibule, casing cladding, or evaporative humidifier.
Units within dimensions listed below certified for interior section, end section, or enclosed section.
See representative unit drawings for more information on dimensional restrictions.

Mounting Configuration:

Base mounted - rigid

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

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS}= ***2.0 g*** ***z/h=1.0*** S_{DS}= ***2.5 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model	Dimensions (in)			Weight[1] (lb)	Notes	UUT[2]
		Depth	Width	Height			
Custom Air Handling Units	Enclosures - 2 walls (Inlet and outlet wall removed)	120	120	129	3,500	UUT: 35 psf; carbon steel	9
		…	…	…	…		Interp.
		115.0	144.5	156.0	13,100	UUT: 114 psf; stainless steel, carbon steel, aluminum	2c
		…	…	…	…		Interp.
		120.0	240.0	156.0	13,100	UUT: 66 psf; stainless steel, carbon steel, aluminum	3c

Additional Notes:
1. Max loading of 140 psf for all interpolated and extrapolated sizes.
2. References to UUT2a, 2b, 2c, 3a, 3b and 3c indicate the component was tested in that configuration only. References to UUT2 or UUT3 indicate the component was tested in all configurations of that test unit.

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SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Table Description: AHU Construction/Materials

TABLE 2

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** $S_{DS} = 2.0g$ $z/h = 1.0$; $S_{DS} = 2.5g$ $z/h = 0.0$ $I_P = 1.5$

Component Type	Manufacturer	Model	Description	Notes	UUT[1]
Wall and Roof Casing	Haakon	Standard (2"-4" depth)	Carbon Steel	UUT: 2" depth; 16 ga.	2,9,10,11
				UUT: 4" depth; 16 ga.	4
			Stainless Steel	UUT: 2" depth; 16 ga.	1
			Aluminum	UUT: 2" depth; 12 ga.	3
Wall and Roof Liners	Haakon	Standard	Galv. Carbon Steel	UUT: 18, 20, 22 ga.	2,3,10,11
			Stainless Steel	UUT: 18, 20, 22 ga.	1
			Aluminum	UUT: 18 ga.	2, 3
		Washdown / Thermal	Galv. Carbon Steel	UUT: 18, 20, 22 ga.	2, 3
			Stainless Steel	UUT: 18, 20, 22 ga.	1, 2, 3
			Aluminum	UUT: 18 ga.	2, 3
Bracing	Haakon	Standard	Carbon Steel	Constructed using 2"x2"x1/4" angles	2b, 2c, 3b, 3c
			Aluminum	Constructed using 2"x2"x1/4" angles	3c
Floor	Haakon	Standard	Carbon Steel	UUT: 14 ga.	2, 3
			Stainless Steel	UUT: 10, 12 ga.	1
		Checkerplate	Carbon Steel	UUT: 12 ga., 0.125"	2,3,10,11
			Aluminum	UUT: 0.125", 0.1875"	2, 3
Floor Liner	Haakon	Standard	Galv. Carbon Steel	UUT: 22 ga.	2,3,10,11
			Stainless Steel	UUT: 22 ga.	1
			Aluminum	UUT: 18 ga.	2, 3

Additional Notes:
1. References to UUT2a, 2b, 2c, 3a, 3b and 3c indicate the component was tested in that configuration only. References to UUT2 or UUT3 indicate the component was tested in all configurations of that test unit.

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** AHU Construction/Materials	**TABLE 2**
Model Line:	Custom Air Handling Units		

Building Code: *CBC 2019* ***Seismic Certification Limits:*** $S_{DS} = 2.0g$ $z/h = 1.0$ $I_P = 1.5$
$S_{DS} = 2.5g$ $z/h = 0.0$

Component Type	Manufacturer	Model	Description	Notes	UUT[1]
Base Rail	Haakon	4" Height	Carbon Steel	C4x5.4	1
		…		…	Interp.
		6" Height		C6x8.2	4, 9, 10
		…		…	Interp.
		8" Height		C8x11.5	2, 11
		…		…	Interp.
		12" Height		C12x20.7	3

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Additional Notes:
1. References to UUT2a, 2b, 2c, 3a, 3b and 3c indicate the component was tested in that configuration only. References to UUT2 or UUT3 indicate the component was tested in all configurations of that test unit.

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer: Haakon Industries, Ltd. ***Table Description:*** Plenum Fans (Horizontal Belt Drive)

Model Line: Custom Air Handling Units

TABLE 3

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0 I_P = 1.5

Component Type	Manufacturer	Model	Weight (lb)	Notes	UUT
EPF(9-Bladed Wheel), EPQ(12-Bladed Wheel)	Haakon	122	94	Arrangement: 3, 3HA; Classes I & II available.	5 [1]
		150	117		Interp.
		165	135		Interp.
		182	188	Arrangement: 3, 3HA, 3SM; Classes I, II & III available.	Interp.
		200	213		Interp.
		222	272		Interp.
		245	317		Interp.
		270	478		Interp.
		300	587		Interp.
		330	732		Interp.
		365	923		Interp.
		402	1096		Interp.
		445	1551		Interp.
		490	1776		Interp.
		542	2183		Interp.
		600	2365	Arrangement: 3, 3SM; Classes I, II & III available.	Interp.
		660	2932		6 [2]

Additional Notes:
1. UUT: EPF, arrangement 3HA, class I, carbon steel wheel.
2. UUT: EPQ, arrangement 3SM, class III, carbon steel wheel.
3. Carbon steel airfoil wheels. Continuously welded carbon steel frames.
4. All plenum fans to be mounted on 1, 2, or 4" spring vibration isolators to AHU floor (see UUT summaries for tested configurations).
5. Additional Options: Variable inlet vanes, inlet screen, inlet collar, belt guard, protective enclosure, piezometer ring.

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Plenum Fans (Horizontal Direct Drive)	**TABLE 4**
Model Line:	Custom Air Handling Units		

Building Code: *CBC 2019* ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0; I_P = 1.5

Component Type	Manufacturer	Model	Weight (lb)	Notes	UUT
EPFN(9-Bladed Wheel), EPQN(12-Bladed Wheel)	Haakon	122	94	Arrangement: 4; Classes I & II available.	4 [1]
		150	117		Interp.
		165	135		Interp.
		182	188	Arrangement: 4; Classes I, II & III available.	Interp.
		200	213		Interp.
		222	272		Interp.
		245	317		Interp.
		270	478		Interp.
		300	587		Interp.
		330	732		Interp.
		365	923		Interp.
		402	1096		4 [2]

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Additional Notes:
1. EPQN, arrangement 4, class I, aluminum wheel, stacked three (3) High.
2. EPFN, arrangement 4, class III, aluminum wheel, stacked two (2) High.
3. Aluminum airfoil wheels. Continuously welded carbon steel frame.
4. All plenum fans to be mounted on 1, 2, or 4" spring vibration isolators to AHU floor (see UUT summaries for tested configurations).
5. Additional Options: Variable inlet vanes, inlet screen, inlet collar, belt guard, protective enclosure, piezometer ring.

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Plenum Fans (Vertical Direct Drive)	**TABLE 5**
Model Line:	Custom Air Handling Units		

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0; I_P = 1.5

Component Type	Manufacturer	Model	Weight (lb)	Notes	UUT
EPQN(12-Bladed Wheel)	Haakon	122	94	Arrangement: 4; Classes I & II available.	1 [1]
		150	117		Interp.
		165	135		Interp.
		182	188	Arrangement: 4; Classes I, II & III available.	Interp.
		200	213		Interp.
		222	272		Interp.
		245	317		Interp.
		270	478		Interp.
		300	587		Interp.
		330	732		Interp.
		365	923		Interp.
		402	1096		Interp.
		445	1551		Interp.
		490	1776		Interp.
		542	2183		7 [2]

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Additional Notes:
1. EPQN, mounted on top of stand on isolators, aluminum wheel, class II
2. EPQN, mounted on top of stand on isolators, aluminum wheel, class III
3. Aluminum airfoil wheels. Continuously welded carbon steel frame.
4. All plenum fans to be mounted on 1, 2, or 4" spring vibration isolators to AHU floor (see UUT summaries for tested configurations).
5. Additional Options: Variable inlet vanes, inlet screen, inlet collar, belt guard, protective enclosure, piezometer ring.

SPECIAL SEISMIC CERTIFICATION
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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Table Description: MPQN Fans

TABLE 6

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** $S_{DS} = 2.0g$ $z/h = 1.0$; $S_{DS} = 2.5g$ $z/h = 0.0$ $I_P = 1.5$

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT[1]
		Depth	Width	Height				
MPQN (Twin City Fan)	122	23.25	23.25	22	149	Carbon steel inlet cone; aluminum airfoil wheel; carbon steel structural frame.	UUT: 4 Stack (class II)	2
	150	25.63	25.63	27.63	173			Interp.
	165	28.25	28.25	28.76	250			Interp.
	182	32	32	36.69	373			Interp.
	200	34.63	34.63	38	467			Interp.
	222	38	38	39.63	555			Interp.
	245	43.38	43.38	44.43	748			Interp.
	270	47.13	47.13	46.38	944			Interp.
	300	51.63	51.63	52.06	1164			Interp.
	330	56.13	56.13	54.56	1397			Interp.
	365	61.38	61.38	64.25	1738		UUT: 2 Stack (class I)	2b, 2c

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Additional Notes:
1. References to UUT2a, 2b, 2c, 3a, 3b and 3c indicate the component was tested in that configuration only. References to UUT2 or UUT3 indicate the component was tested in all configurations of that test unit.
2. Floor mounted on spring isolators.
3. Additional Options: Direct drive motor, 4-stack MPQN-122, triple stack configuration for up to MPQN-245, double stack up to MPQN-365, class I fan, class II fan, inlet screen, isolation gasket, shaft grounding ring, piezometer ring.

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** BC SWSI Fans	**TABLE 7**
Model Line:	Custom Air Handling Units		

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0 I_P = 1.5

Component Type	Manufacturer	Model	Weight (lb)	Notes	UUT
BC SWSI	Twin City Fan	122	236	UUT: Arrangement 9, Class IV, BC	5
		135	268		Interp.
		150	315		Interp.
		165	349		Interp.
		182	436		Interp.
		200	498		Interp.
		222	617		Interp.
		245	818		Interp.
		270	941		Interp.
		300	1180		Interp.
		330	1412		Interp.
		365	1678		Interp.
		402	2056		Interp.
		445	2620		Interp.
		490	3037		Interp.
		542	4186		Interp.
		600	5235	UUT: Arrangement 9, Class I, BC	5

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Additional Notes:
1. Carbon steel wheel with flat single thickness blades, solid welded to the rim and back plate. Fan housing constructed of carbon steel sheet metal.
2. Floor mounted on spring isolators.
3. Additional Options: Horizontal fan; up, down, and horizontal discharge rotations; belt drive motor; duct outlet connection; slip-on outlet joint connection; SWSI arrangement 9; expansion bearing for high temperature airstreams; parallel and opposed blade dampers; class I, II, III and IV wheel.

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** BC / BAF DWDI Fans	**TABLE 8**
Model Line:	Custom Air Handling Units		

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0 I_P = 1.5

Component Type	Manufacturer	Model	Weight (lb)	Notes	UUT
BC / BAF DWDI	Twin City Fan	122	139	Airfoil, downblast, class I, BAF.	7
		135	159		Interp.
		150	193		Interp.
		165	222		Interp.
		182	248		Interp.
		200	344		Interp.
		222	451		Interp.
		245	509		Interp.
		270	639		Interp.
		300	895		Interp.
		330	1015		Interp.
		365	1352		Interp.
		402	1690		Interp.
		445	2100		Interp.
		490	2310		Interp.
		542	2946		Interp.
		600	4150		Interp.
		660	5300	Airfoil, top, horizontal, arrangement 3, class II, BC.	8

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Additional Notes:

1. Carbon steel wheel with flat single thickness blades, solid welded to the rim and back plate. Fan housing constructed of carbon steel sheet metal.
2. Floor mounted on spring isolators.
3. Additional Options: Horizontal fan; up, down, and horizontal discharge rotations; belt drive motor; duct outlet connection; slip-on outlet joint connection; DWDI arrangement 3; expansion bearing for high temperature airstreams; parallel and opposed blade dampers; class I or II wheel.

SPECIAL SEISMIC CERTIFICATION
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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** 686q Fans	**TABLE 9**
Model Line:	Custom Air Handling Units		

Building Code: *CBC 2019* ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0 I_P = 1.5

Component Type	Manufacturer	Model	Weight (lb)	Notes	UUT
686q Fans	AcoustiFLO	1000	350		Extrap.
		…	…		Extrap.
		1532	410	9 blade wheel, 50% width, ICV, EGV	11
		…	…		Interp.
		1852	485	9 blade wheel, 80% width, ICV, IFC, EGV	10
		…	…		Interp.
		2042	497	12 blade wheel, 100% width, ICV, IS, EGV	11
		…	…		Interp.
		2052	487	12 blade wheel, 100% width, ICV, IFC, EGV	11
		…	…		Interp.
		2500	345	12 blade wheel, 50% width	11
		…	…		Interp.
		2502	405	12 blade wheel, 50% width, EGV	10
		…	…		Interp.
		2530	350	12 blade wheel, 50% width, ICV	10
		…	…		Interp.
		2812	490	12 blade wheel, 80% width, IS, EGV	11
		…	…		Interp.
		2942	495	12 blade wheel, 90% width, ICV, IS, EGV	10

Additional Notes:
1. Aluminum fan wheel, carbon steel fan housing.
2. UUT10 fans tested in a four fan array (2Wx2H). UUT11 fans tested in a five fan array (3 bottom, 2 top).
3. Options: 9 or 12 blade fan wheels, 50-100% wheel width, inlet silencer(IS), inlet check valve(ICV), exit guide vanes(EGV), oulet check valve(OCV).

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer: Haakon Industries, Ltd.	***Table Description:*** Fan Motors	**TABLE 10**
Model Line: Custom Air Handling Units		

Building Code: *CBC 2019* ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0 I_P = 1.5

Component Type	Manufacturer	Model	Weight (lb)	Notes	UUT
Fan Motor	Baldor	0.33 HP	20	Dual voltage motors. Motor voltage to match overall unit voltage (208/460V). ODP.	4
		…	…		Interp.
		10 HP	255		4
		…	…		Interp.
		30 HP	335		10, 11
		…	…		Interp.
		150 HP	1775		6
	TECO/Westinghouse	1 HP	53	Dual voltage motors. Motor voltage to match overall unit voltage (208/460V). ODP.	5
		…	…		Interp.
		10 HP	287		4
		…	…		Interp.
		150 HP	1320		8
	NIDEC Motor Corporation	1 HP	35	Dual voltage motors. Motor voltage to match overall unit voltage (208/460V). TEFC.	Extrap.
		…	…		Extrap.
		5 HP	70		11
		…	…		Interp.
		30 HP	300		11

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer: Haakon Industries, Ltd.	***Table Description:*** Fan Motors	**TABLE 10**
Model Line: Custom Air Handling Units		

Building Code: *CBC 2019* ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0 I_P = 1.5

Component Type	Manufacturer	Model	Weight (lb)	Notes	UUT
Fan Motor	WEG	5 HP	95	Dual voltage motors. Motor voltage to match overall unit voltage (208/460V). TEFC.	10
		…	…		Interp.
		7.5 HP	120		11
		…	…		Interp.
		10 HP	179		10, 11
		…	…		Interp.
		25 HP	388		10

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Coils	**TABLE 11**
Model Line:	Custom Air Handling Units		

Building Code: *CBC 2019* ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0 I_P = 1.5

Model Line (Manufacturer)	Model	Dimension (in)[1]			Weight[2] (lb)	Material	Notes	UUT
		Depth	Width	Height				
Water Coils (Haakon)	1-6 rows, 0.02”-0.035” tube wall thickness, 0.006”-0.0095” fin thickness, 12 FPI max, stacked 1-3 high	6	24	24	63	Copper tube w/ aluminum or copper fins, galv. carbon steel or aluminum casing.		Extrap.
		…	…	…	…			Extrap.
		10	113	43.5	775		UUT: QTY. 3, tested in (2) 3-high stacks with mixed coil types. 6 rows, 0.0075" aluminum fins, 12 fpi, 0.625" Ø copper tubes, 0.020" tube wall thickness.	3
		…	…	…	…			Interp.
		10	113	43.5	898		UUT: tested in 3-high stack with mixed coil types. 6 rows, 0.0095" aluminum fins, 12 fpi, 0.625" Ø copper tubes, 0.020" tube wall thickness.	3
		…	…	…	…			Interp.
		10	113	43.5	1393		UUT: tested in 3-high stack with mixed coil types. 6 rows, 0.0075" copper fins, 12 fpi, 0.625" Ø copper tubes, 0.020" tube wall thickness.	3
		…	…	…	…			Interp.

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Additional Notes:
1. Dimensions represent individual (non-stacked) coils and include casing.
2. Weights represent operating weights of individual coils including water weight.
3. All certified coils available with extended headers (tested on (1) of the (2) triple stacks in UUT3).

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Coils	**TABLE 11**
Model Line:	Custom Air Handling Units		

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0; I_P = 1.5

Model Line (Manufacturer)	Model	Dimension (in)[1]			Weight[2] (lb)	Material	Notes	UUT
		Depth	Width	Height				
Water Coils (Haakon)	1-6 rows, 0.02”-0.035” tube wall thickness, 0.006”-0.0095” fin thickness, 12 FPI max, stacked 1-3 high	10	113	43.5	1857	Copper tube w/ aluminum or copper fins, galv. carbon steel or aluminum casing.	UUT: tested in 3-high stack with mixed coil types. 6 rows, 0.0095" copper fins, 12 fpi, 0.625" Ø copper tubes, 0.035" tube wall thickness.	3
	8-12 rows, 0.02” tube wall thickness, 0.006”-0.0075” fin thickness, 6 FPI max, stacked 1 high	12.5	24	24	280			Interp.
		…	…	…	…			Interp.
		18	63	24	696		UUT: 12 rows, 0.0075" copper fins, 6 fpi, 0.625" Ø copper tubes, 0.020" tube wall thickness, stacked 1 high.	1

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Additional Notes:
1. Dimensions represent individual (non-stacked) coils and include casing.
2. Weights represent operating weights of individual coils including water weight.
3. All certified coils available with extended headers (tested on (1) of the (2) triple stacks in UUT3).

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Table Description: Dampers & Louvers

TABLE 12

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** $S_{DS} = 2.0g$ $z/h = 1.0$; $S_{DS} = 2.5g$ $z/h = 0.0$ $I_P = 1.5$

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT[1]
		Depth	Width	Height				
Dampers (Tamco)	1000 / 9000	4	12	12	8	Aluminum	UUT2: model 9000; UUT10: model 1000	2, 10
		…	…	…	…			Interp.
		4	48	48	90		UUT: model 9000	2
		…	…	…	…			Interp.
		4	60	60	127		UUT: model 1000	10
Airflow Measuring Dampers (Tamco/Ebtron)	Air IQ	18	13.5	12	22	Aluminum		10
		…	…	…	…			Interp.
		18	60	60	200		UUT1: Tested with 3 inlet hoods	1, 10
Air Monitoring Dampers (Greenheck)	AMD-42	12	12	12	25	Galv. Carbon Steel		2
		…	…	…	…			Interp.
		12	46	46	98			2a, 2b
Dampers (Greenheck)	VCD / SMD	5	12	12	17	Galv. Carbon Steel or Stainless Steel		2
		…	…	…	…			Interp.
		5	48	48	91		UUT: VCD-33 (control damper)	2a, 2b
		5	48	50	71.5		UUT: SMD-401 (smoke damper)	2a, 2b
		…	…	…	…			Interp.
		5	60	60	140		UUT: VCD-23-304SS (control damper, stainless steel)	10

Additional Notes:
1. References to UUT2a, 2b, 2c, 3a, 3b and 3c indicate the component was tested in that configuration only. References to UUT2 or UUT3 indicate the component was tested in all configurations of that test unit.

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HAAKON INDUSTRIES

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Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Table Description: Dampers & Louvers

TABLE 12

Building Code: *CBC 2019*
Seismic Certification Limits: S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0; I_P = 1.5

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT[1]
		Depth	Width	Height				
Louvers (Haakon)	Standard / Storm	2	12	12	2	Aluminum	Standard	Extrap.
		2	12	12	13		Storm	Extrap.
		…	…	…	…			Extrap.
		4	47	48	34		UUT: Standard	2a, 2b
		4	48	50	122		UUT: Storm	2a, 2b
		…	…	…	…			Interp.
		4	60	58	52		UUT: Standard	10
		4	61	60	181		UUT: Storm	10

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Additional Notes:
1. References to UUT2a, 2b, 2c, 3a, 3b and 3c indicate the component was tested in that configuration only. References to UUT2 or UUT3 indicate the component was tested in all configurations of that test unit.

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Table Description: Filters

TABLE 13

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0; I_P = 1.5

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Filter Rack [1] (Haakon)	Angled Filter Rack		240	156	232	Stainless Steel or Galv. Carbon Steel	UUT: Stainless steel and galv. carbon steel	3
	HEPA Filter Rack		240	156	165		UUT: Stainless steel and galv. carbon steel	3
	Type 8 Filter Rack		240	156	148		UUT: Stainless steel and galv. carbon steel	3
Filter - Front Load (American Air)	Biocell VXL	12	24	12				3
		…	…	…				Interp.
		12	24	24				3
	DriPak 2000	12	12	20				3
		…	…	…				Interp.
		36	24	24				3
	Varicel	12	12	20				3
		…	…	…				Interp.
		36	24	24				3
	Megacel I	12	12	20				3
		…	…	…				Interp.
		36	24	24				3
	AmAir 1100	1	10	10				3
		…	…	…				Interp.
		4	25	29				3
	Perfect Pleat Ultra	0.75	9.5	9.5				3
		…	…	…				Interp.
		2	24.5	24.5				3

Additional Notes:
1. Maximum dimensions listed, smaller sizes available. Total depth matches installed filter.

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Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Filters	**TABLE 13**
Model Line:	Custom Air Handling Units		

Building Code: *CBC 2019* ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0 I_P = 1.5

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Filter - Front Load (Camfil Farr)	Hi-Flo ES	12	20	12				3
		…	…	…				Interp.
		30	24	24				3
	Durafil ES	12	12	20				3
		…	…	…				Interp.
		12	12	24				3
	Riga-Flo ph	12	12	12				3
		…	…	…				Interp.
		12	24	12				3
	30/30	1	10	10				3
		…	…	…				Interp.
		4	25	29				3
	AP-Eleven	1	16	12				3
		…	…	…				Interp.
		4	24.5	24.5				3
	AP-Thirteen	1.75	19.38	15.38				3
		…	…	…				Interp.
		3.75	25	25				3

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer: Haakon Industries, Ltd. ***Table Description:*** Humidifier Grid

Model Line: Custom Air Handling Units

TABLE 14

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0 I_P = 1.5

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Humidifier (Condair)	SAM-e	9	140	125	172	Stainless Steel		2
Humidifier (DriSteem)	UltraSorb LV	5	140	125	537	Stainless Steel		2
Humidifier (Armstrong)	Humidipack	8.5	10	14	12	Stainless Steel	UUT: 4" header	10
		…	…	…	…			Interp.
		8.5	144	134	490		UUT: 4" headers	10

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Sound Attenuators	**TABLE 15**
Model Line:	Custom Air Handling Units		

Building Code: *CBC 2019* ***Seismic Certification Limits:*** $S_{DS} = 2.0g$ $z/h = 1.0$ $I_P = 1.5$

$S_{DS} = 2.5g$ $z/h = 0.0$

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Sound Attenuators (Haakon)	Standard	36	6	12	36	Stainless Steel or Galv. Carbon Steel		Extrap.
		…	…	…	…			Extrap.
		36	18	96	140		UUT: galv. carbon steel	1
		…	…	…	…			Interp.
		84	6	156	340		UUT: stainless steel	3

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** UV Lights	**TABLE 16**
Model Line:	Custom Air Handling Units		

Building Code: *CBC 2019* ***Seismic Certification Limits:*** $S_{DS} = 2.0g$ $z/h = 1.0$ $I_P = 1.5$

$S_{DS} = 2.5g$ $z/h = 0.0$

Component Type	Manufacturer	Model	Description	Notes	UUT
UV Lights	Steril-Aire	18"	Double Ended Fixture & Emitter	Stainless steel 16ga rack tested.	3
		24"			3
		30"			3
		36"			3
		42"			3

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TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Heaters	**TABLE 17**
Model Line:	Custom Air Handling Units		

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 2.5 g z/h = 0.0 I_P = 1.5

Component Type	Manufacturer	Model	Description	Notes	UUT
Baseboard Heater	King Electric	500W		UUT: 6.3 lbs	2
		…			Interp.
		1,500W		UUT: 14 lbs	2
Unit Heater	King Electric	3kW		UUT: 40 lbs	2
		…			Interp.
		5kW		UUT: 40 lbs	2
Thermostat	King Electric	BKT1 Thermostat			2
		1-Pole Unit Mounted Thermostat			2

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Electrical Enclosures	**TABLE 18**
Model Line:	Custom Air Handling Units		

Building Code: *CBC 2019* ***Seismic Certification Limits:*** $S_{DS} = 2.0\,g$ $z/h = 1.0$ $I_P = 1.5$

$S_{DS} = 2.5\,g$ $z/h = 0.0$

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Enclosures (Hoffman)	Electrical Enclosures	6	12	12	12	16ga Carbon Steel	NEMA 1 or NEMA 4	Extrap.
		…	…	…	…			Extrap.
		8	12	16	16			11
		…	…	…	…			Interp.
		12	36	60	165			2,3,4,11

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HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Electrical & Miscellaneous Components	**TABLE 19**
Model Line:	Custom Air Handling Units		

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** $S_{DS} = 2.0\,g$ $z/h = 1.0$ $I_P = 1.5$

$S_{DS} = 2.5\,g$ $z/h = 0.0$

Component Type	Manufacturer	Model	Description	Notes	UUT
Disconnect	ABB	16A			2
		…			Interp.
		400A			2
Contactor	ABB	9A			2
		…			Interp.
		110A			2
Overload	ABB	1A			2
		…			Interp.
		110A			2
MPP	ABB	1A			2
		…			Interp.
		110A			2
Fuses	Feraz Shawmut/ Mersen	1A			2
		…			Interp.
		400A			2
Distribution Blocks	Feraz Shawmut/ Mersen	175A			2
		…			Interp.
		380A			2
Transformers	Square D	75VA			2
		…			Interp.
		2kVA			2

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TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Electrical & Miscellaneous Components	**TABLE 19**
Model Line:	Custom Air Handling Units		

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** $S_{DS} = 2.0g$ $z/h = 1.0$ $S_{DS} = 2.5g$ $z/h = 0.0$ $I_P = 1.5$

Component Type	Manufacturer	Model	Description	Notes	UUT
Circuit Breaker	Square D	15A			2
		…			Interp.
		20A			2
Relays	Eaton / Cutler Hammer	6V			2
		…			Interp.
		240V			2
Light Switch	Leviton	CSB1-20L			2
Receptacle	Leviton	011-7599-I			2
Controller	Carel	PCO3			2
Actuators	Belimo	AF-24			2
		NF-24			2
		LF-24			2
		FSNF-120-S US		UUT: Qty 5 actuators	10
ACH550 VFD	ABB	1HP			2
		…			Interp.
		150HP			2
ACH580 VFD	ABB	5 HP			10
		…			Interp.
		25 HP			10
		…			Interp.
		60 HP			11
ACS150 VFD	ABB	1HP			2

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TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Electrical & Miscellaneous Components	**TABLE 19**
Model Line:	Custom Air Handling Units		

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** $S_{DS} = 2.0\,g$ $z/h = 1.0$ $S_{DS} = 2.5\,g$ $z/h = 0.0$ $I_P = 1.5$

Component Type	Manufacturer	Model	Description	Notes	UUT
Current Switches	Greystone	CS	500 mA		2
			…		Interp.
			1 A		2
		SC	500 mA		2
Transducer	Greystone	ETP-9500	20 mA		2
CO2 Detector	Greystone	CDD1A			2
Current Sensor	Greystone	CS			2
		SC			2
Freezestat	Greystone	LC300			2
Humidity Transducer	Greystone	RH200			2
Humidity Transmitter	Greystone	RH110			2
		RH210			2
		RH310			2
Pressure Switch	Greystone	AFS-222			2
		AFS-262			2
		AFS460			2
Pressure Transducer	Greystone	LP2			2
Room Sensor	Greystone	TE500AE			2
Smoke Detector	Greystone	SL-2000			2
Probe Temperature Sensors/ Transducers	Greystone	TE200			2
		TE500			2
		TE511			2
		TE512			2

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DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	***Table Description:*** Electrical & Miscellaneous Components	**TABLE 19**
Model Line:	Custom Air Handling Units		

Building Code: ***CBC 2019*** ***Seismic Certification Limits:*** $S_{DS} = 2.0g$ $z/h = 1.0$ $S_{DS} = 2.5g$ $z/h = 0.0$ $I_P = 1.5$

Component Type	Manufacturer	Model	Description	Notes	UUT
Temp. Transmitter	Greystone	TE500B			2
Ultra Low Pressure Transducer	Greystone	ULP			2
Ionization Bar	Active Air Solutions / Global Plasma Solutions	AAS-AirRailx8	Aluminum rail, stainless steel needles, 0.5lbs/ft		Extrap.
		…			Extrap.
		AAS-AirRailx36		UUT: 36" length	10
		…			Interp.
		AAS-AirRailx143		UUT: 143" length	10
Power Transformer	Active Air Solutions / Global Plasma Solutions	AAS-7504	High output power supply transformer	120/230VAC input, 24W, 6lbs	10
Stratification Eliminator	Haakon	Standard		UUT: 60" diameter	3a
Bellmouth Transition	Haakon	Standard		UUT: 60"W x 60"H	3a

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CALIFORNIA BUILDING CODE: 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units

UUT	Unit Description	Report Number	Testing Laboratory	S_{DS}	z/h	I_P
1	AHU Cabinet (0 Walls Removed)*	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
2a	AHU Cabinet (0 Walls Removed)*	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
2b	AHU Cabinet (1 Wall Removed)*	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
2c	AHU Cabinet (2 Walls Removed)*	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
3a	AHU Cabinet (0 Walls Removed)*	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
3b	AHU Cabinet (1 Wall Removed)*	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
3c	AHU Cabinet (2 Walls Removed)*	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
4	AHU Cabinet (0 Walls Removed)*	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
5	Fan Skid	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
6	Fan Skid	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
7	Fan Skid	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
8	Fan Skid	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
9	AHU Cabinet (2 Walls Removed)*	12346, Rev. 0	Environmental Testing Laboratory (ETL)	2.5	1.0 0.0	1.5
10	AHU Cabinet (1 Wall Removed)*	1800711-TR-001 R0	Pacific Earthquake Engineering Research Center (PEER)	2.0 3.1	1.0 0.0	1.5
11	AHU Cabinet (1 Wall Removed)*	1800711-TR-001 R0	Pacific Earthquake Engineering Research Center (PEER)	2.0 2.7	1.0 0.0	1.5

Notes: *******Wall removal certifies units for use in configurations shown in the attached drawings. The removed walls are the inlet and outlet walls.

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UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 1

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:
Tested with four (4) walls in place.
2" 16 ga stainless steel(SS) casing. 22, 20, 18 ga SS standard and thermal/washdown liners. 3-lb insulation. 10, 12 ga SS floor. 22 ga SS floor liner. Carbon steel(CS) C4x5.4 base rail.

Options/Subcomponent Summary:
Model 122 EPQN fan (2" spring isolators), 24x60 cooling coil, 36" sound attenuator, three inlet hoods, 60x60 Tamco/Ebtron inlet damper.
Please refer to Product Matrix for component details.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5,440	96.0	96.0	96.0	6.6	8.1	7.2

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

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UNIT UNDER TEST (UUT) SUMMARY SHEET

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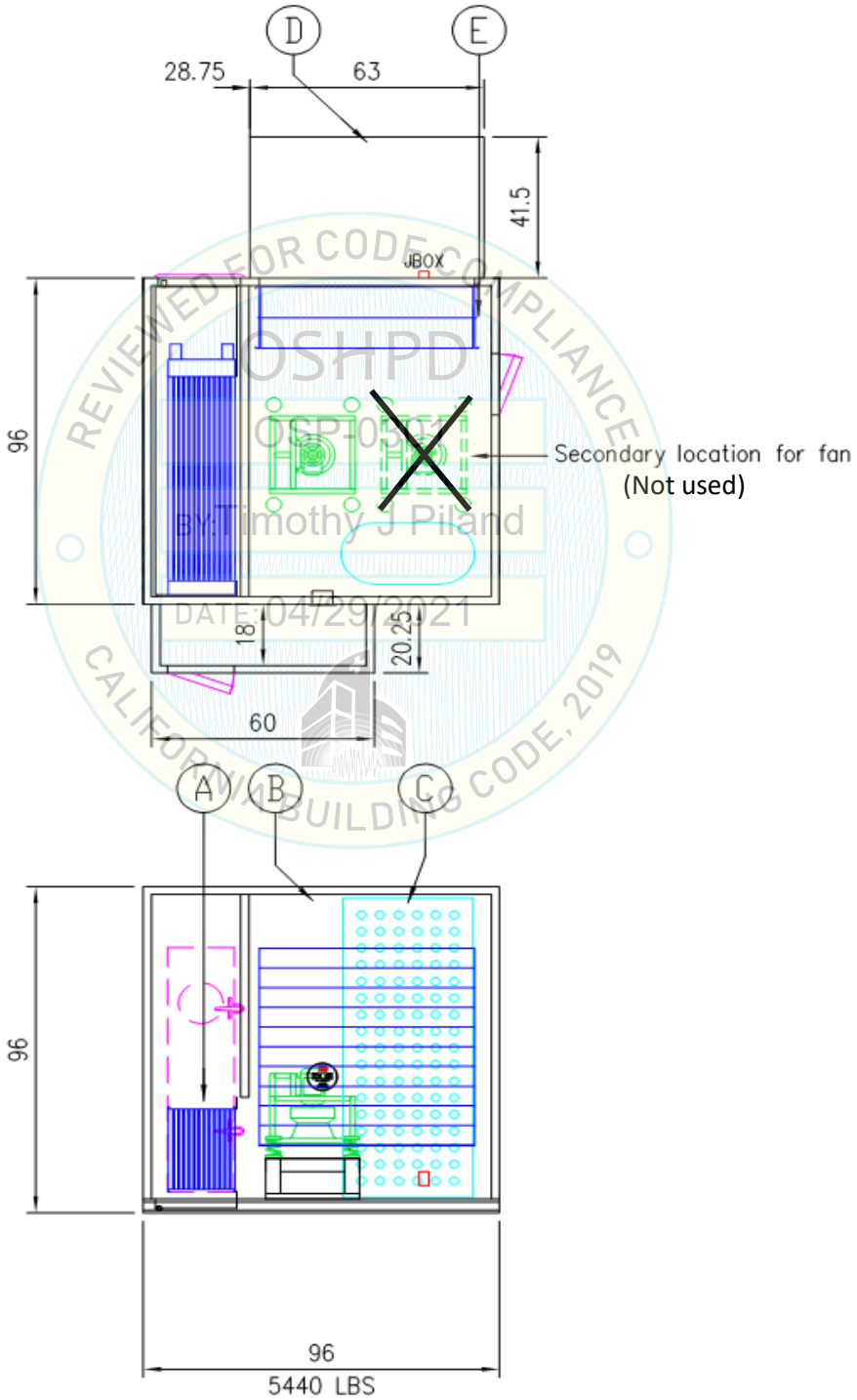
Manufacturer:	Haakon Industries, Ltd.	**UUT 1**
Model Line:	Custom Air Handling Units	
Model Number:	Test Prototype	***Serial Number:*** N/A

Unit Drawings:



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UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.		**UUT 2a**
Model Line:	Custom Air Handling Units		
Model Number:	Test Prototype	***Serial Number:*** N/A	

Product Construction Summary:

Tested with four (4) walls in place.
4" 16 ga carbon steel(CS) casing. 22, 20, 18 ga standard and washdown/thermal galv. CS liners. 22, 20, 18 ga washdown/thermal stainless steel(SS) liners. 18 ga washdown/thermal aluminum(AL) liners. 3-lb insulation. 0.1875" & 0.125" AL checkerplate floor. 14 ga CS floor. 12ga & 0.125" CS checkerplate. 22 ga CS floor liner. 18 ga AL floor liner. CS C8x11.5 base rail.

Options/Subcomponent Summary:

48x48 Ultra Tek Dampers. 12x12, 48x48 Tamco Damper. (2) 12x12, 46x46, 48x50, 48x48 Greenheck Dampers. 47x48 Haakon storm louver. 48x50 Haakon standard louver. Dri-Steem & Nortec steam humidifiers. (4) Stack model 122 MPQN fans. 2kW heater. Nema-3R enclosure. Please refer to Product Matrix for component details.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
13,100	115.0	144.5	156.0	4.1	3.6	4.2

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

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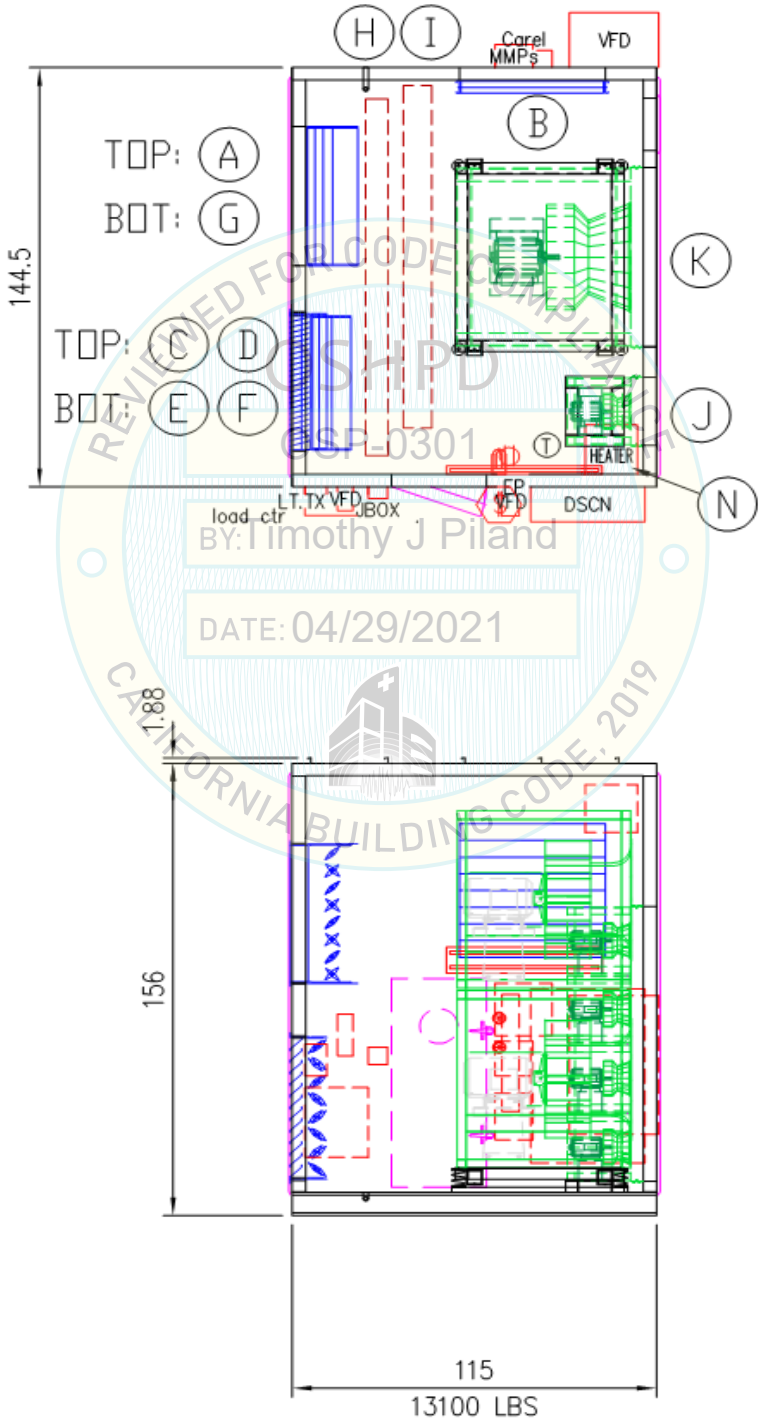
1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.		**UUT 2a**
Model Line:	Custom Air Handling Units		
Model Number:	Test Prototype	***Serial Number:*** N/A	

Unit Drawings:



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UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 2b

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:

Tested with three (3) walls in place (inlet wall removed). Carbon steel(CS) bracing added in place of removed wall (see bracing dwg). 4" 16 ga CS casing. 22, 20, 18 ga standard and washdown/thermal galv. CS liners. 22, 20, 18 ga washdown/thermal stainless steel(SS) liners. 18 ga washdown/thermal aluminum(AL) liners. 3-lb insulation. 0.1875" & 0.125" AL checkerplate floor. 14 ga CS floor. 12ga & 0.125" CS checkerplate. 22 ga CS floor liner. 18 ga AL floor liner. CS C8x11.5 base rail.

Options/Subcomponent Summary:

48x48 Ultra Tek Dampers. 12x12, 48x48 Tamco Damper. (2) 12x12, 46x46, 48x50, 48x48 Greenheck Dampers. 47x48 Haakon storm louver. 48x50 Haakon standard louver. Dri-Steem & Nortec steam humidifiers. (4) Stack model 122 MPQN fans. (2) Stack model 365 MPQN fans (2" spring isolators – upgraded to seismic grade isolators after initial isolator fail). 2kW heater. Nema-3R enclosure. Please refer to Product Matrix for component details.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
13,100	115.0	144.5	156.0	4.1	2.9	4.5

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Ultratech damper

Haakon storm, Greenheck damper

Greenheck damper

Haakon standard, Greenheck smoke

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

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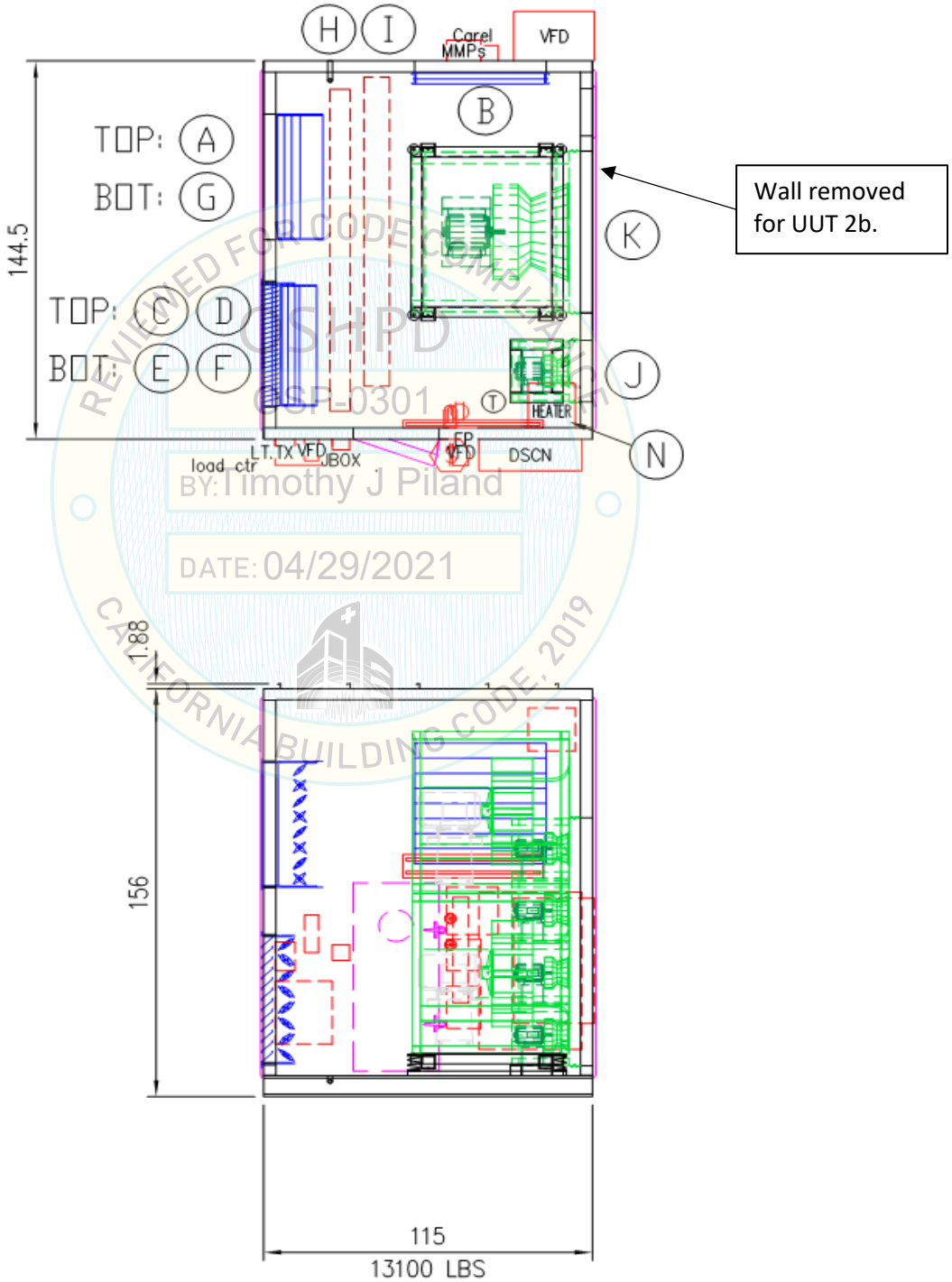
UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.	**UUT 2b**
Model Line:	Custom Air Handling Units	
Model Number:	Test Prototype	***Serial Number:*** N/A

Unit Drawings:



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BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 2c

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:

Tested with two (2) walls in place (inlet and outlet walls removed). Carbon steel(CS) bracing added in place of removed walls (see bracing dwg). 4" 16 ga CS casing. 22, 20, 18 ga standard and washdown/thermal galv. CS liners. 22, 20, 18 ga washdown/thermal stainless steel(SS) liners. 18 ga washdown/thermal aluminum(AL) liners. 3-lb insulation. 0.1875" & 0.125" AL checkerplate floor. 14 ga CS floor. 12ga & 0.125" CS checkerplate. 22 ga CS floor liner. 18 ga AL floor liner. CS C8x11.5 base rail.

Options/Subcomponent Summary:

12x12, 48x48 Tamco Dampers. (2) 12x12 Greenheck Dampers. Dri-Steem & Nortec steam humidifiers. (4) Stack model 122 MPQN fans. (2) Stack model 365 MPQN fans (2" spring isolators – upgraded to seismic grade isolators after initial isolator fail). 2kW heater. Nema-3R enclosure. Please refer to Product Matrix for component details.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
13,100	115.0	144.5	156.0	4.3	2.8	4.5

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

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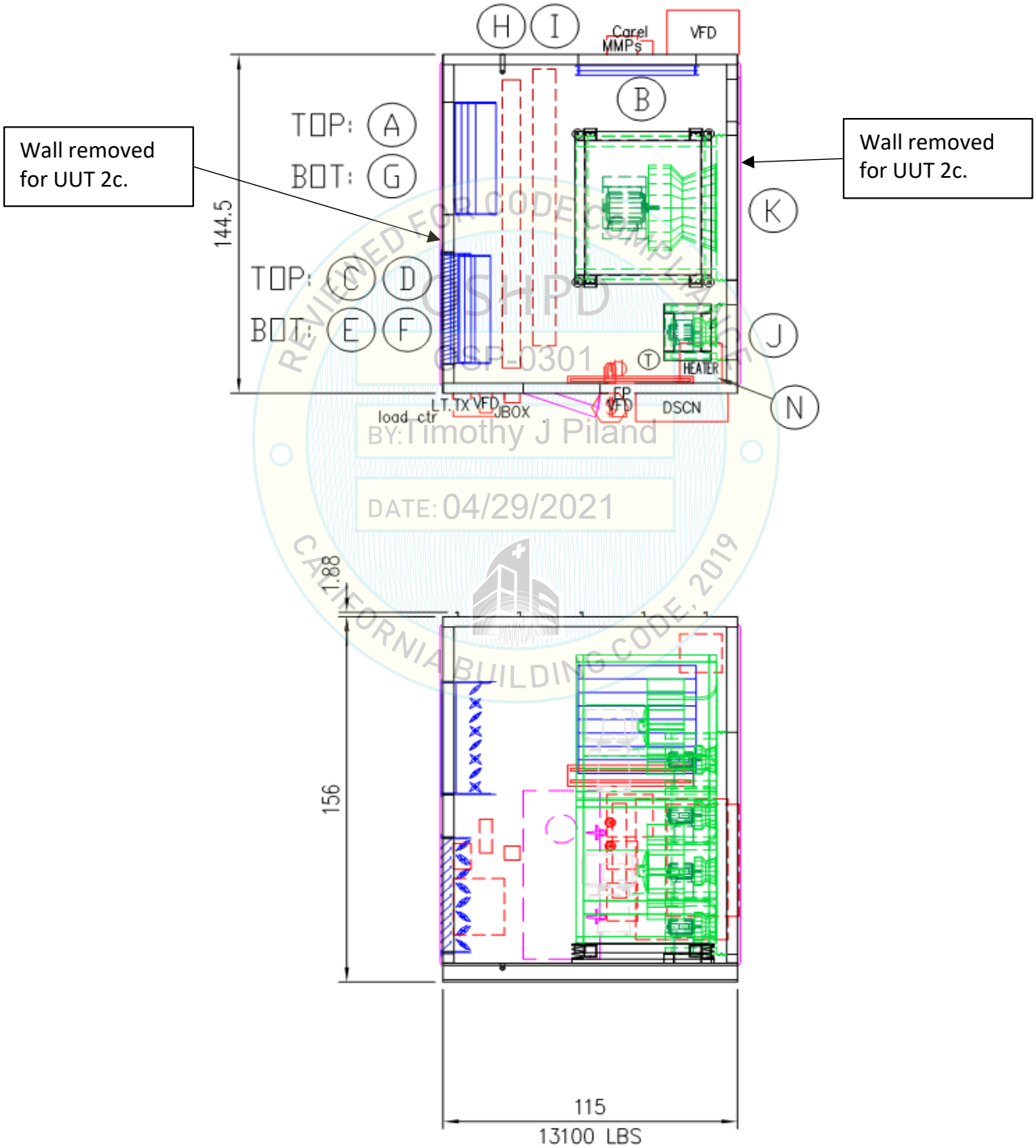
1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.		**UUT 2c**
Model Line:	Custom Air Handling Units		
Model Number:	Test Prototype	***Serial Number:*** N/A	

Unit Drawings:



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HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 3a

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:

Tested with four (4) walls in place.
2" 12 ga AL casing. 22, 20, 18 ga standard and washdown/thermal galv. CS liner. 22, 20, 18 ga washdown/thermal stainless steel(SS) liner. 18 ga standard and washdown/thermal AL liner. 6-lb insulation. 14 ga CS floor. 0.1875, 0.125" AL checkerplate. 12 ga, 0.125" CS checkerplate. 22 ga CS floor liner. 18 ga AL floor liner. CS C12x20.7 base rail.

Options/Subcomponent Summary:

240"W x 156"H Filter rack (angled, type 8, HEPA). 84" sound attenuator. 18, 24, 30, 36, & 42" UV lights. (6) 42"x110" cooling coils. 60" stratification eliminators. 60" bellmouth transition. Nema-1 enclosure.
Please refer to Product Matrix for component details.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
13,100	120.0	240.0	156.0	6.9	>33.3	>33.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

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UNIT UNDER TEST (UUT) SUMMARY SHEET

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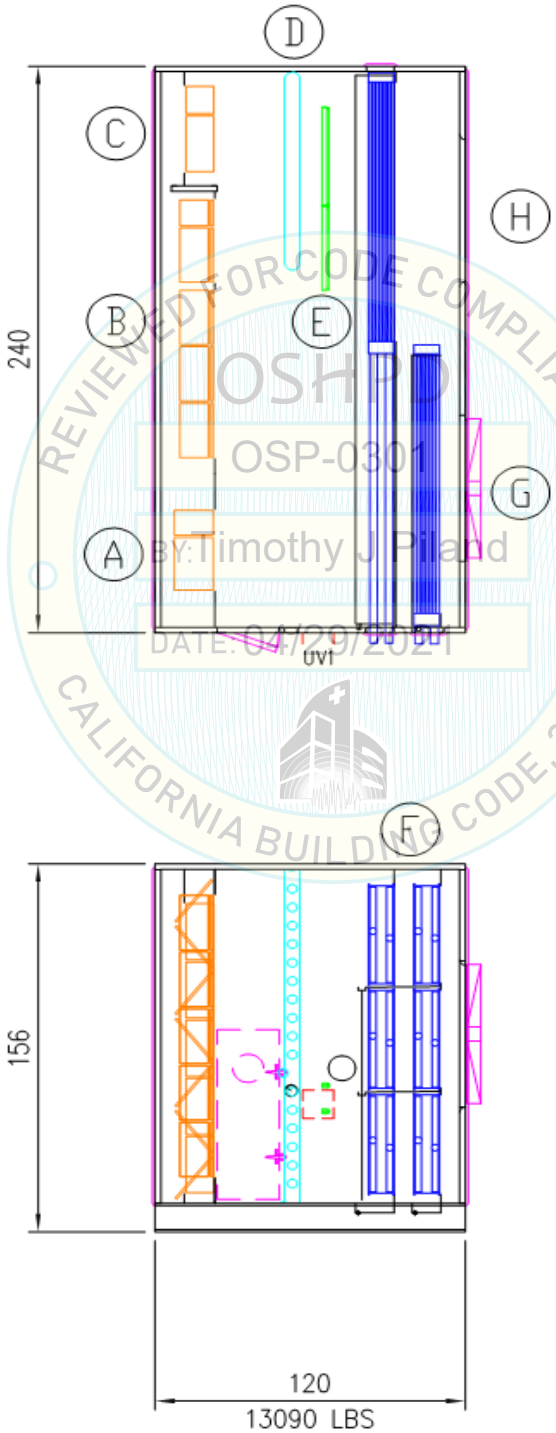
Manufacturer:	Haakon Industries, Ltd.	**UUT 3a**
Model Line:	Custom Air Handling Units	
Model Number:	Test Prototype	***Serial Number:*** N/A

Unit Drawings:



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DATE:04/29/2021
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UNIT UNDER TEST (UUT) SUMMARY SHEET

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HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 3b

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:

Tested with three (3) walls in place (inlet wall removed). Carbon steel(CS) bracing added in place of removed wall (see bracing dwg).
2" 12 ga aluminum(AL) casing. 22, 20, 18 ga standard and washdown/thermal galv. CS liner. 22, 20, 18 ga washdown/thermal stainless steel(SS) liner. 18 ga standard and washdown/thermal AL liner. 6-lb insulation. 14 ga CS floor. 0.1875, 0.125" AL checkerplate. 12 ga, 0.125" CS checkerplate. 22 ga CS floor liner. 18 ga AL floor liner. CS C12x20.7 base rail.

Options/Subcomponent Summary:

240"W x 156"H Filter rack (angled, type 8, HEPA). 84" sound attenuator. 18, 24, 30, 36, & 42" UV lights. (6) 42"x110" cooling coils. Nema-1 enclosure.
Please refer to Product Matrix for component details.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
13,100	120.0	240.0	156.0	12.7	13.4	>33.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

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UNIT UNDER TEST (UUT) SUMMARY SHEET

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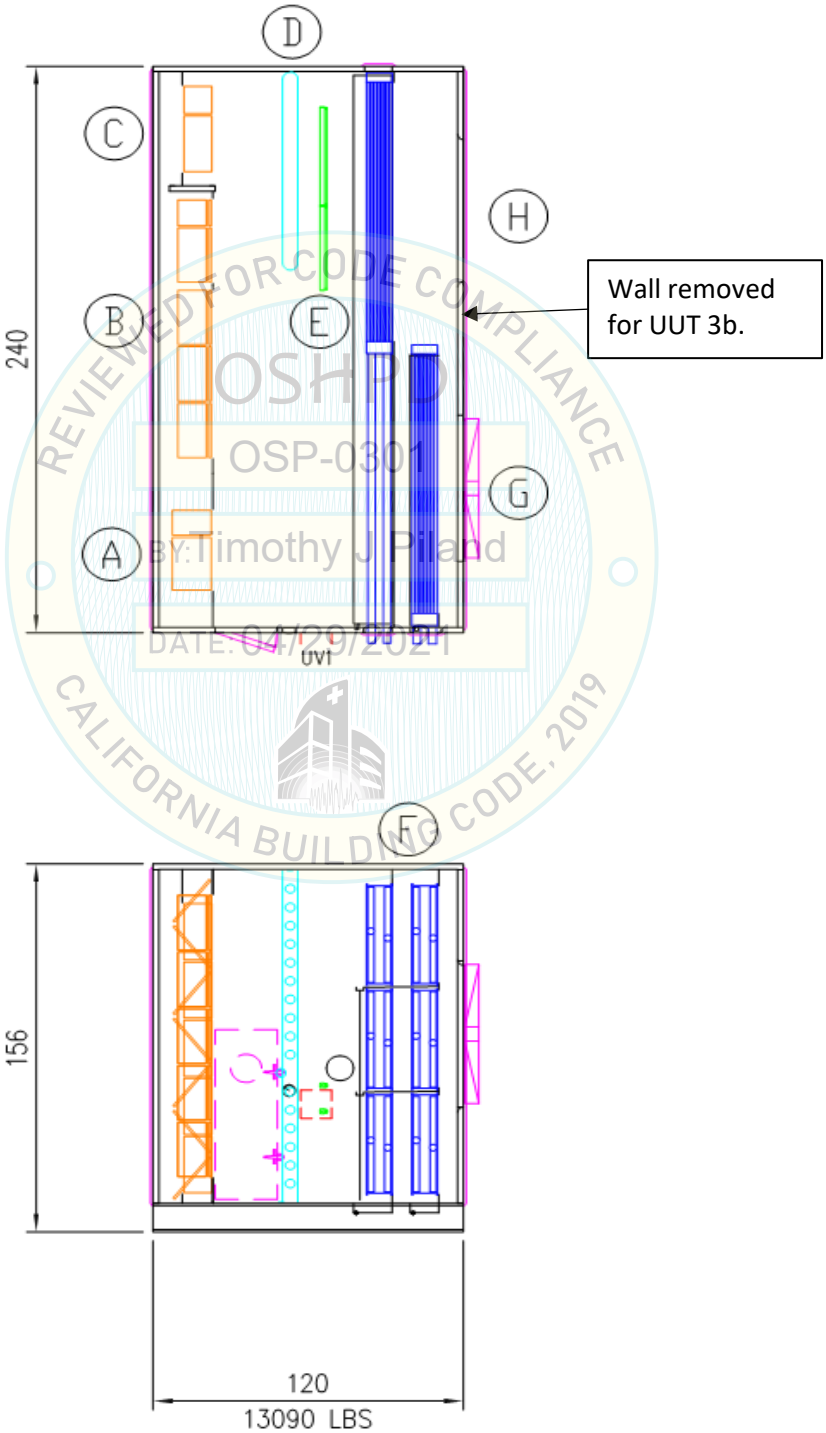
Manufacturer:	Haakon Industries, Ltd.	**UUT 3b**
Model Line:	Custom Air Handling Units	
Model Number:	Test Prototype	***Serial Number:*** N/A

Unit Drawings:



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UNIT UNDER TEST (UUT) SUMMARY SHEET

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HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 3c

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:

Tested with two (2) walls in place (inlet and outlet walls removed). Carbon steel(CS) & aluminum(AL) bracing added in place of removed walls (see bracing dwg).
2" 12 ga AL casing. 22, 20, 18 ga standard and washdown/thermal galv. CS liner. 22, 20, 18 ga washdown/thermal stainless steel(SS) liner. 18 ga standard and washdown/thermal AL liner. 6-lb insulation. 14 ga CS floor. 0.1875, 0.125" AL checkerplate. 12 ga, 0.125" CS checkerplate. 22 ga CS floor liner. 18 ga AL floor liner. CS C12x20.7 base rail.

Options/Subcomponent Summary:

240"W x 156"H Filter rack (angled, type 8, HEPA). 84" sound attenuator. 18, 24, 30, 36, & 42" UV lights. (6) 42"x110" cooling coils. Nema-1 enclosure.
Please refer to Product Matrix for component details.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
13,100	120.0	240.0	156.0	12.7	13.4	>33.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

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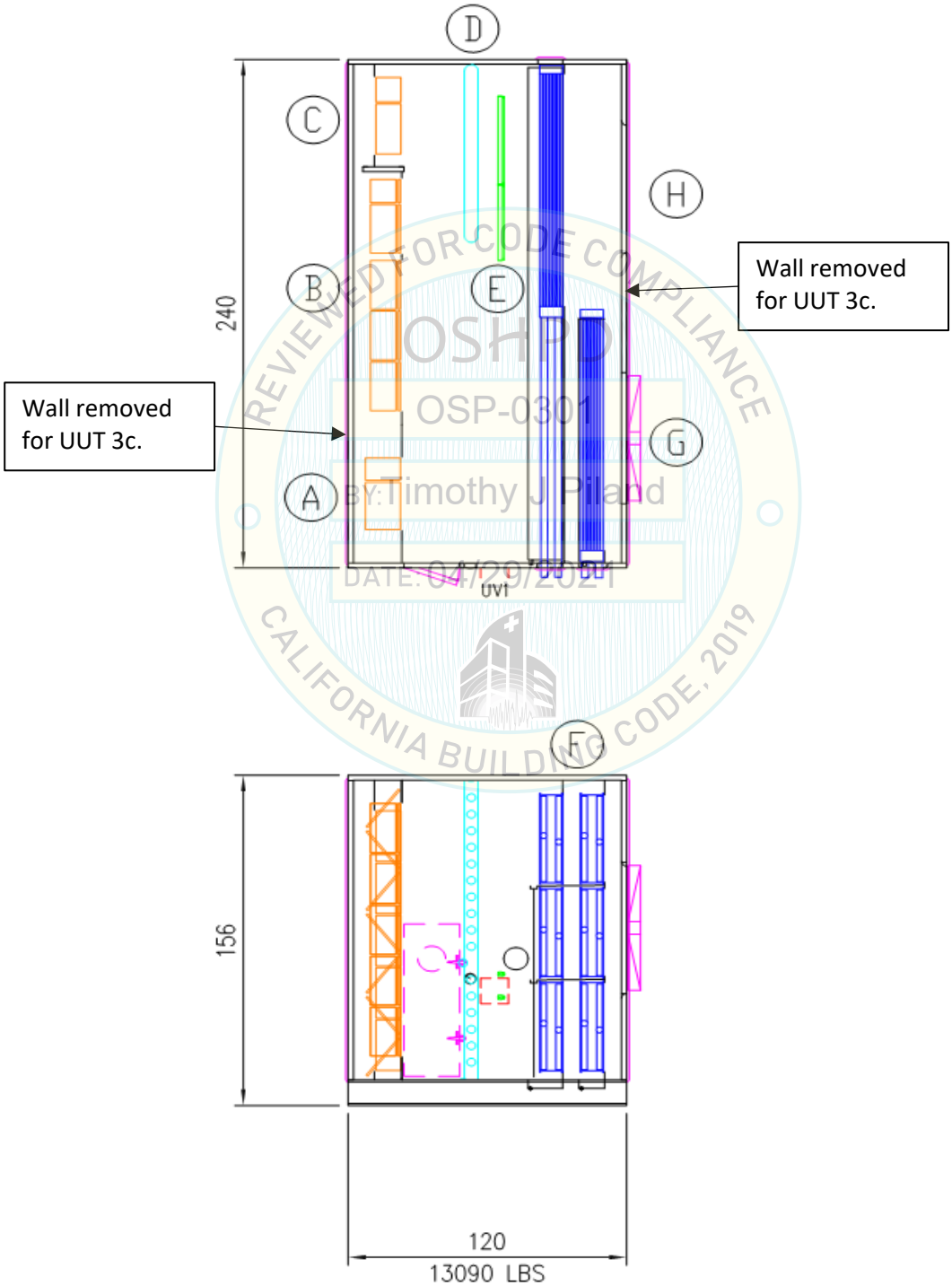
UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.	**UUT 3c**
Model Line:	Custom Air Handling Units	
Model Number:	Test Prototype	***Serial Number:*** N/A

Unit Drawings:



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OSP-0301
BY: Timothy J. Piland
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CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 4

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:
Tested with four (4) walls in place.
2" 16 ga carbon steel(CS) casing. CS C6x8.2 base rail.

Options/Subcomponent Summary:
(3) EPQN model 122 fans (1" spring isolators). (2) EPFN model 402 fans (2" spring isolators). Nema-3R enclosure.
Please refer to Product Matrix for component details.

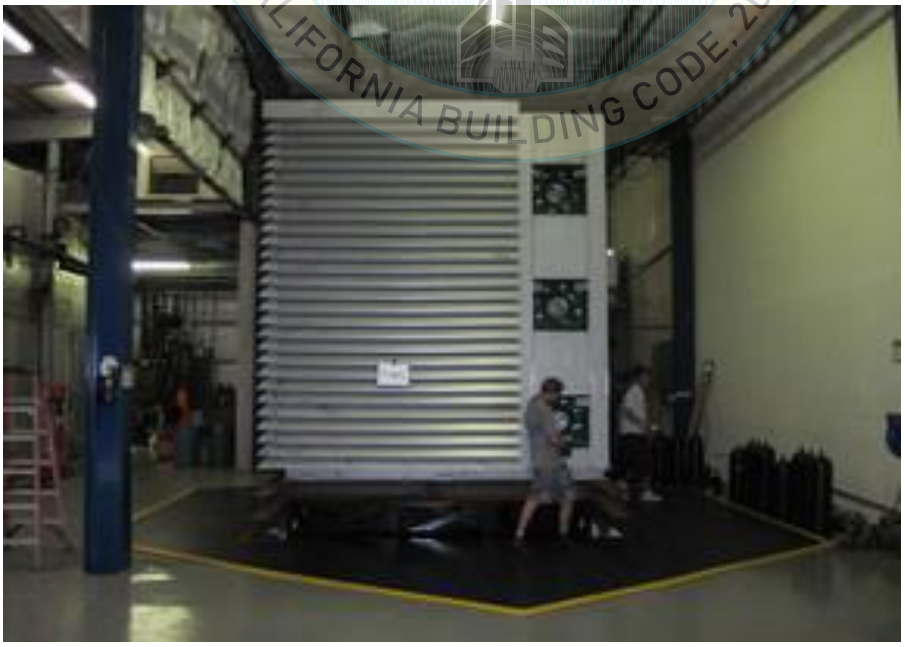
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
13,810	118.0	120.0	144.0	3.4	5.9	10.9

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:



Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

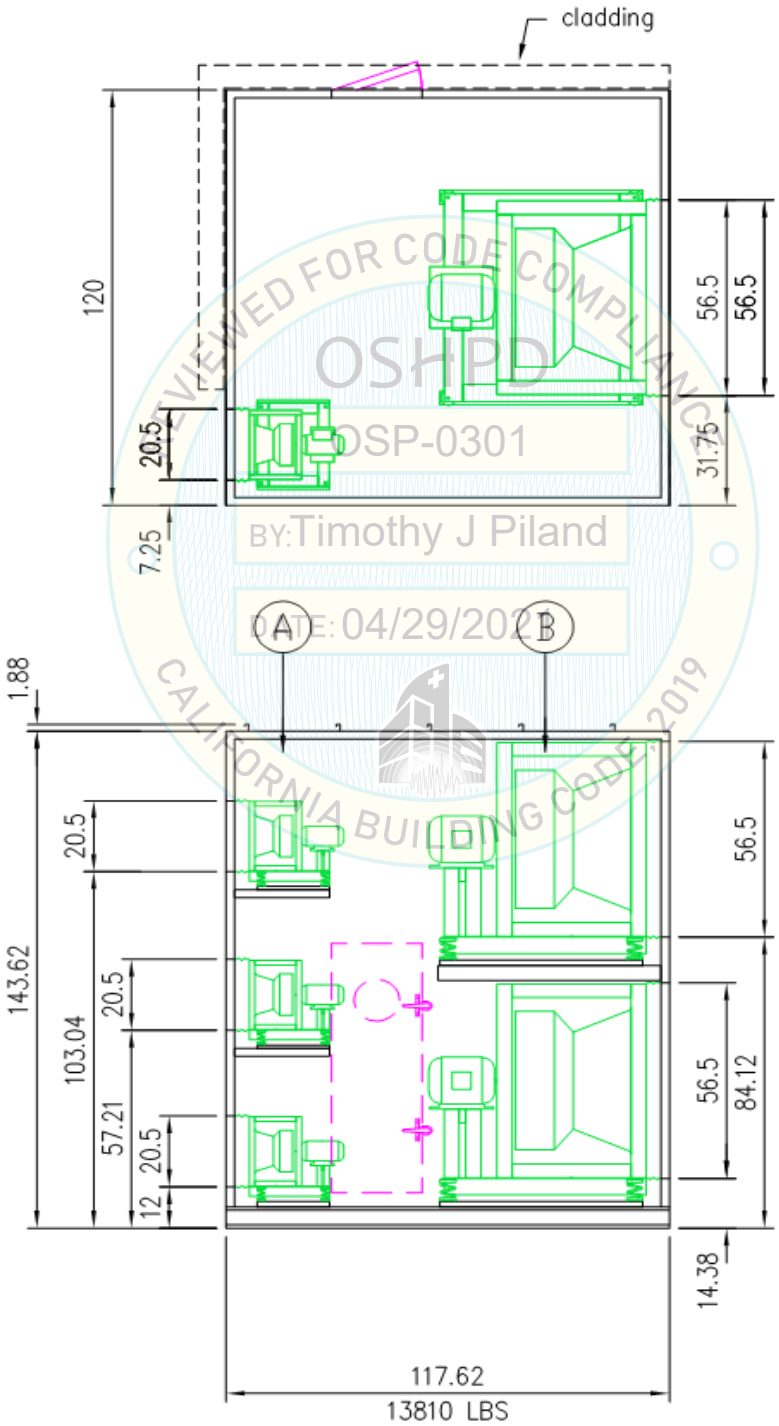
REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
Expiration Date
04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.	**UUT 4**
Model Line:	Custom Air Handling Units	
Model Number:	Test Prototype	***Serial Number:*** N/A

Unit Drawings:



REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 5

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:
Fan Skid

Options/Subcomponent Summary:
EPF model 122 fan. BC SWSI model 122 fan. BC SWSI model 600 fan. EPQN model 122 (vertical) fan. (all 2" spring isolators)
Please refer to Product Matrix for component details.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
6,540	141.0	110.0	140.0	2.5	1.9	5.7

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

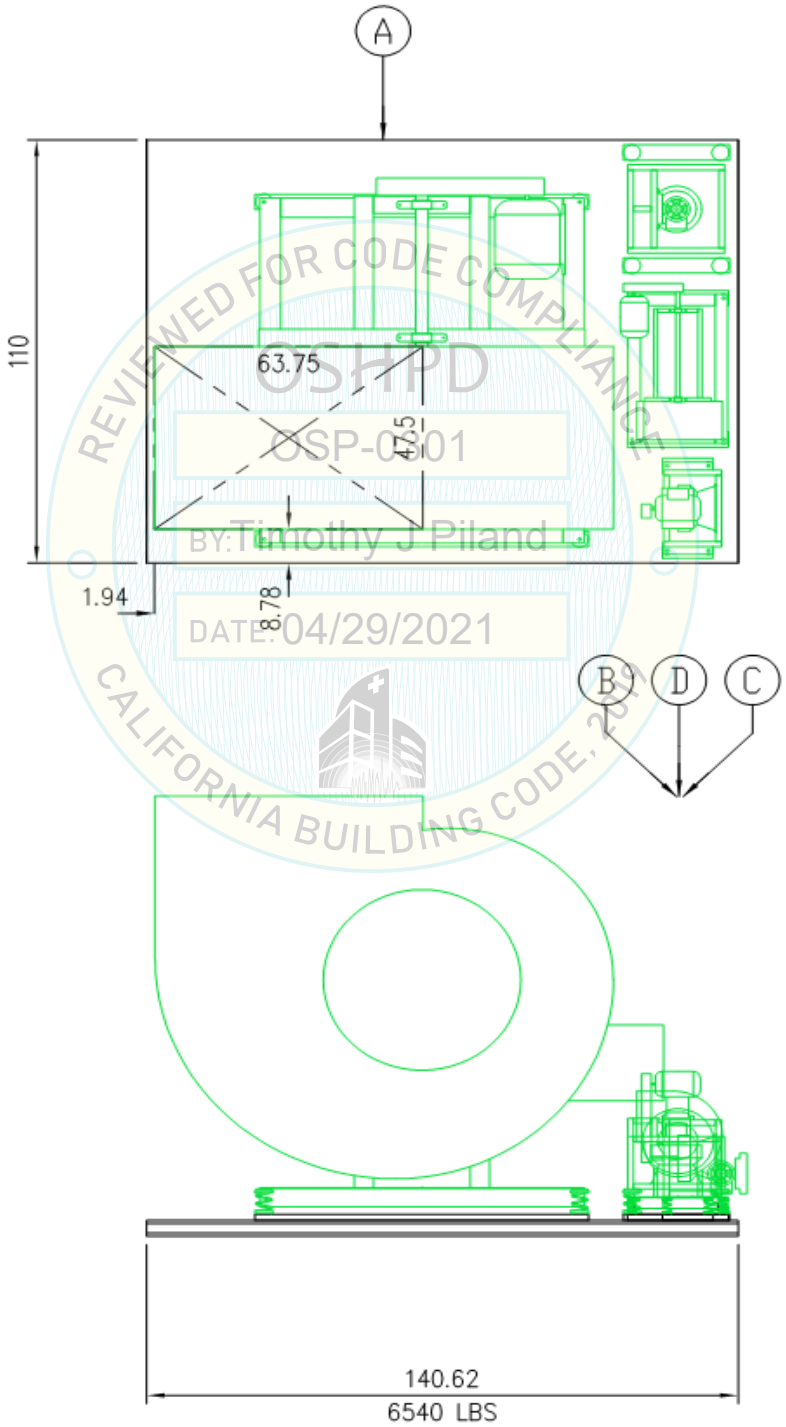
REVIEWED FOR CODE COMPLIANCE OSHPD OSP-0301 04/29/2021 CALIFORNIA BUILDING CODE 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.	**UUT 5**
Model Line:	Custom Air Handling Units	
Model Number:	Test Prototype	***Serial Number:*** N/A

Unit Drawings:



REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 6

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:
Fan Skid

Options/Subcomponent Summary:
EPQ model 660 fan (4" spring isolators).
Please refer to Product Matrix for component details

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5,910	84.0	146.0	135.0	1.8	2.6	3.9

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

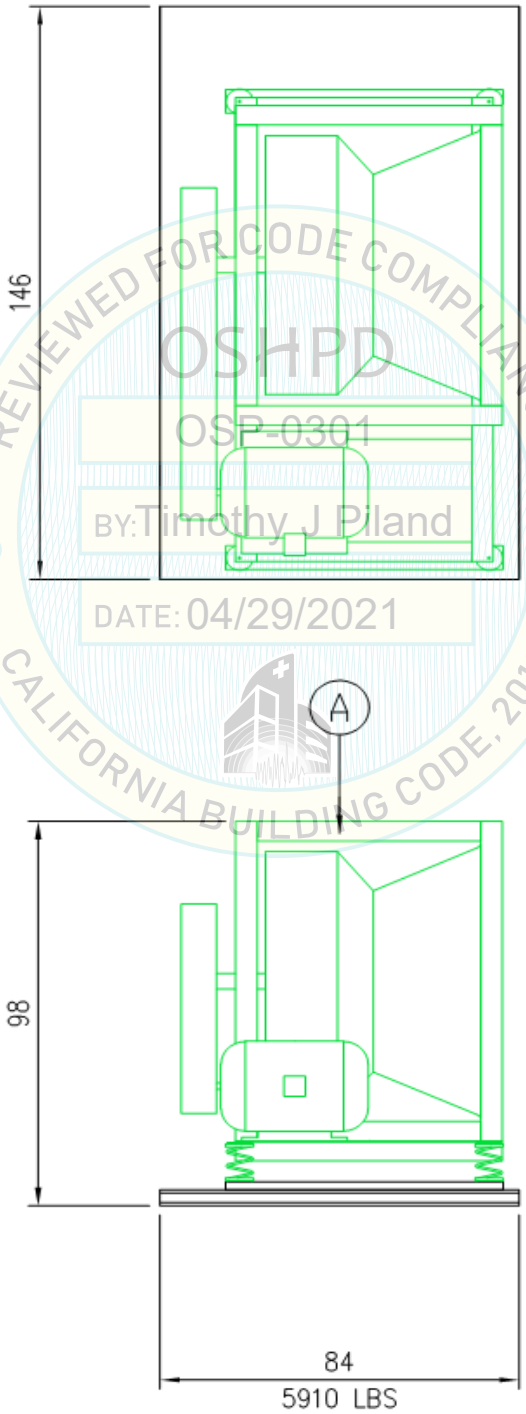
REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.		**UUT 6**
Model Line:	Custom Air Handling Units		
Model Number:	Test Prototype	***Serial Number:*** N/A	

Unit Drawings:



REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 7

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:
Fan Skid

Options/Subcomponent Summary:
EPQN Model 542 fan (2" spring isolators). BAF DWDI model 122 fan (1" spring isolators).
Please refer to Product Matrix for component details.

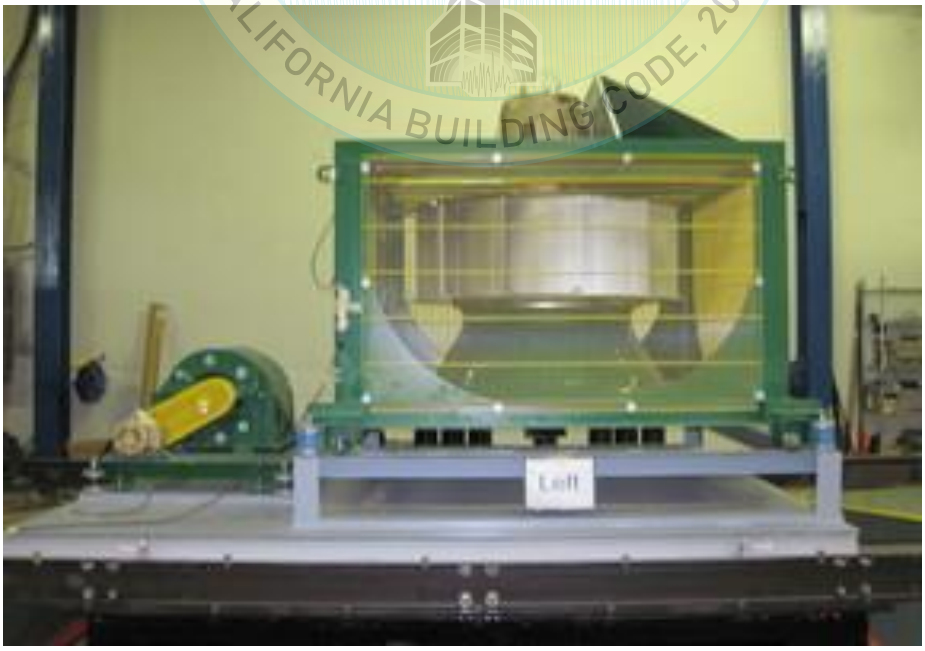
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5,050	132.0	118.0	80.0	2.8	2.4	9.0

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:



Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

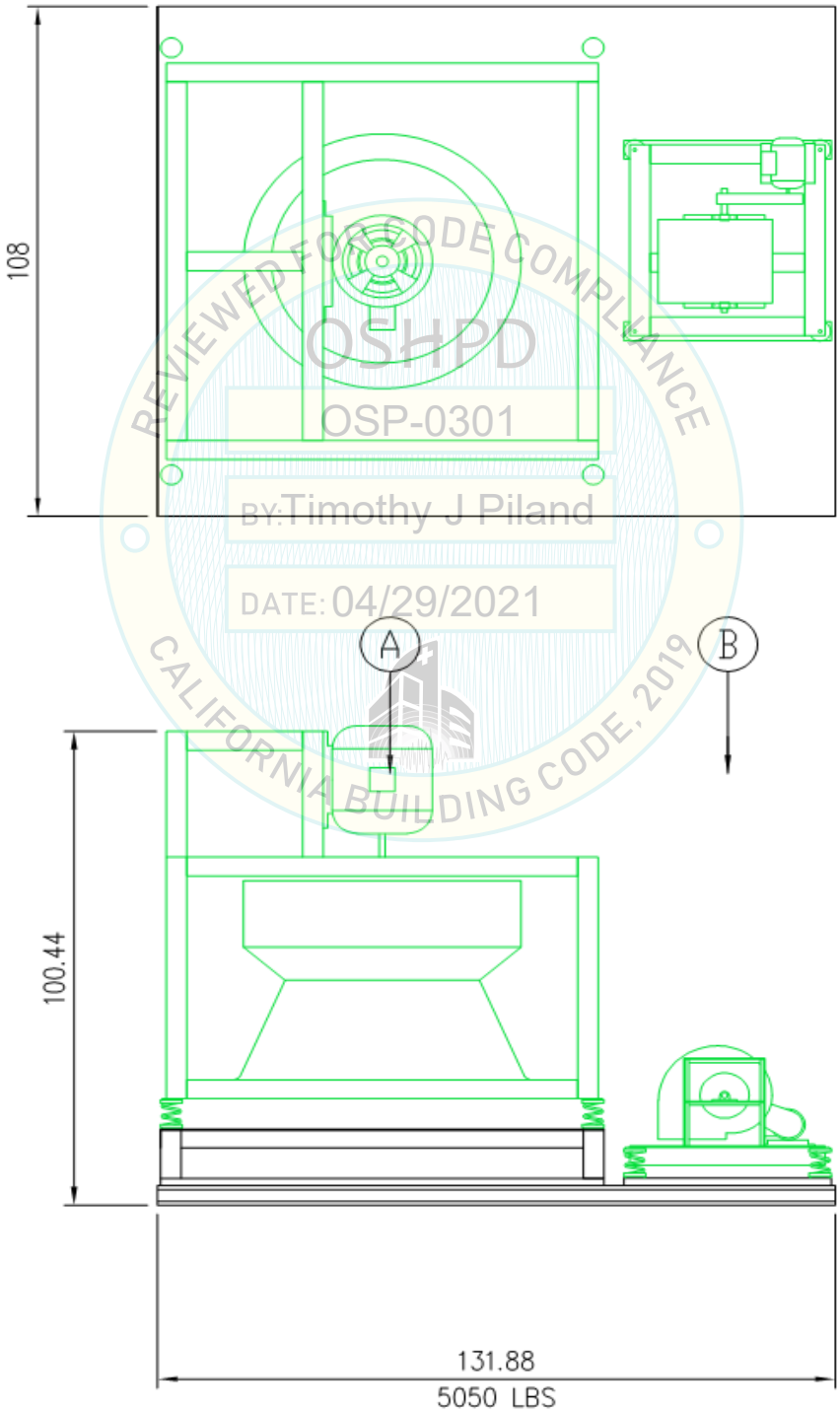
REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.	**UUT 7**
Model Line:	Custom Air Handling Units	
Model Number:	Test Prototype	***Serial Number:*** N/A

Unit Drawings:



REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 8

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:
Fan Skid

Options/Subcomponent Summary:
BC DWDI model 660 fan (2" spring isolators).
Please refer to Product Matrix for component details.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
11,000	138.0	130.0	153.0	2.5	4.2	4.2

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
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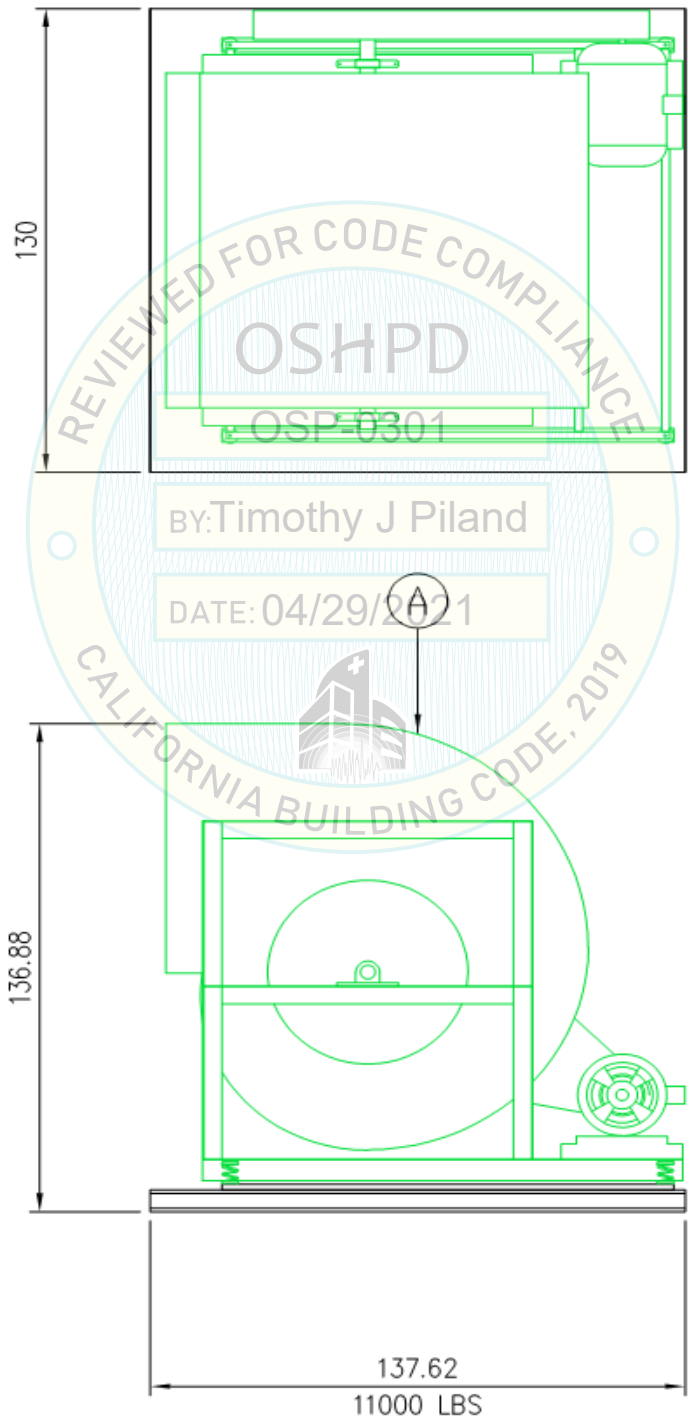
04/29/2021
CALIFORNIA BUILDING CODE 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.	**UUT 8**
Model Line:	Custom Air Handling Units	
Model Number:	Test Prototype	***Serial Number:*** N/A

Unit Drawings:



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OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

UUT 9

Manufacturer: Haakon Industries, Ltd.
Model Line: Custom Air Handling Units
Model Number: Test Prototype ***Serial Number:*** N/A

Product Construction Summary:
Tested with two (2) walls in place.
2" 16 ga carbon steel(CS) casing. CS C6x8.2 base rail.

Options/Subcomponent Summary:
Evaporative Humidifier.
Please refer to Product Matrix for component details.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
3,500	120.0	120.0	129.0	5.9	>33.3	6.1

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.5	1.0	1.5	4.00	3.00	1.67	0.67
		2.5	0.0					

Test Mounting Details:

Unit mounted to test fixture using ten (10) grade 5 3/4" diameter hex head bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

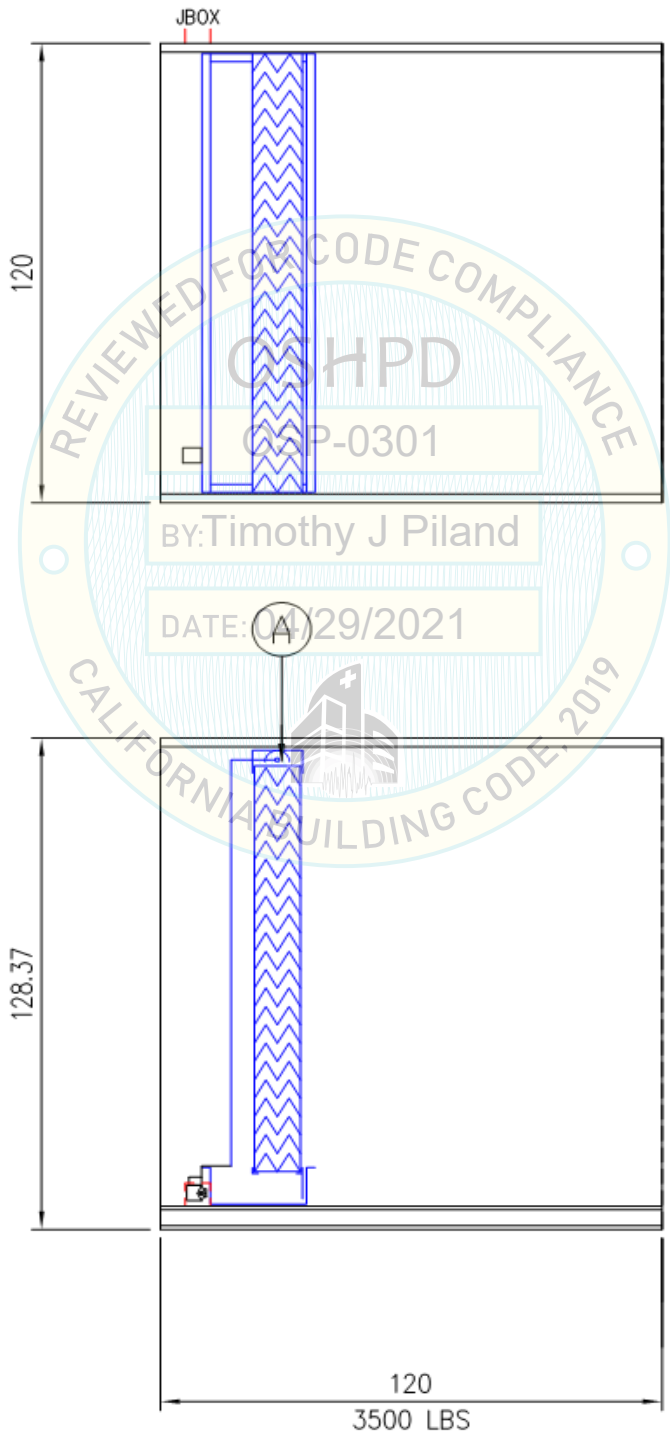
REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
Expiration Date
04/29/2021
CALIFORNIA BUILDING CODE 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.		**UUT 9**
Model Line:	Custom Air Handling Units		
Model Number:	Test Prototype	***Serial Number:*** N/A	

Unit Drawings:



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BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

HAAKON INDUSTRIES

TRU COMPLIANCE

Manufacturer:	Haakon Industries, Ltd.	**UUT 10**
Model Line:	Custom Air Handling Units	
Model Number:	Test Prototype	***Serial Number:*** 19-5574-473-C

Product Construction Summary:

Tested with three (3) walls in place.

2" 16 ga. carbon steel(CS) casing. 22 ga CS standard liners. 3-lb insulation. 12 ga CS checkerplate floor. 22 ga CS floor liners. CS C6x8.2 base rails.

Options/Subcomponent Summary:

Active Air Solutions AAS-AirRailx36 ionization bar (36" length). Active Air Solutions AAS-AirRailx143 ionization bar (143" length). Active Air Solutions AAS-7504 power transformer. Armstrong Humidipack humidifier (144"W x 134"H x 8.5"D). Armstrong Humidipack humidifier (24"W x 24"H x 8.5"D). 686q AcoustiFLO fan array (4W x 4H standard configuration) with one (1) Baldor fan motor and three (3) WEG fan motors. Two (2) ABB ACH580 VFD's. Tamco model 1000 damper (12"W x 12"H, parallel horizontal blades) with Ebtron air measurement station (13.5"W x 12"H) and Belimo FSNF120-S US actuator. Tamco model 1000 damper (60"W x 60"H, parallel horizontal blades) with Ebtron air measurement station and four (4) FSNF120-S US Belimo actuators. Haakon storm louver (61"W x "60"H, vertical blades). Haakon standard louver (60"W x 58"H, horizontal blades). Greenheck VCD23-304SS damper (60"W x 60"H, parallel horizontal blades).

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
15,554	113.5	240.0	152.0	4.1	6.8	8.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.0	1.0	1.5	3.20	2.40	2.07	0.83
		3.1	0.0					

Test Mounting Details:

Unit was mounted to a wide flange beam test frame using thirty (30) 5/16" fillet welds (spaced at 8" O.C. max. along both sides). Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test. Contents were included in testing per operating conditions.

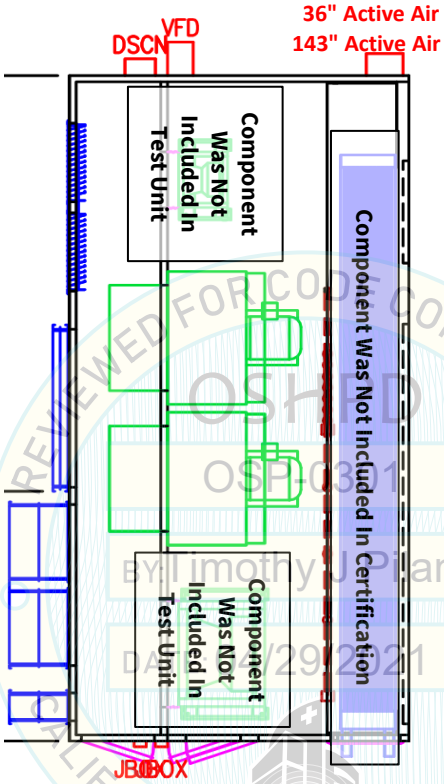
REVIEWED FOR CODE COMPLIANCE OSHPD OSP-0301 BY: Timothy S Piland DATE: 04/28/2021 CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

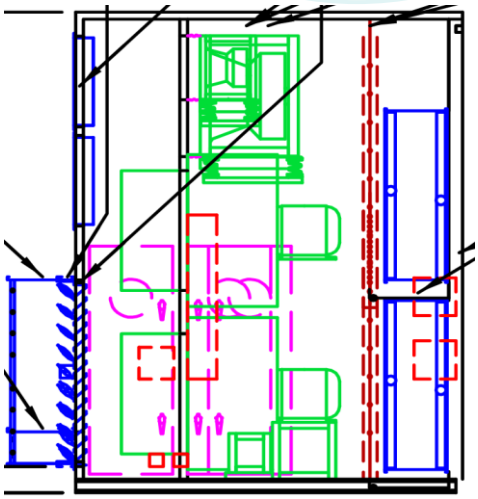
1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.		**UUT 10**
Model Line:	Custom Air Handling Units		
Model Number:	Test Prototype	***Serial Number:***	19-5574-473-C

Unit Drawings:



Plan View



Right Elevation View

REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J. Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

Manufacturer:	Haakon Industries, Ltd.		**UUT 11**
Model Line:	Custom Air Handling Units		
Model Number:	Test Prototype	***Serial Number:***	19-5574-474-C

Product Construction Summary:

Tested with three (3) walls in place.

2” 16 ga. carbon steel(CS) casing. 22 ga CS standard liners. 3-lb insulation. 12 ga CS checkerplate floor. 22 ga CS floor liners. CS C8x11.5 base rails.

Options/Subcomponent Summary:

686q AcoustiFLO fan array (staggered configuration, 3 on bottom / 2 on top) with one (1) Baldor fan motor, two (2) WEG fan motors and two (2) NIDEC fan motors. Hoffman electrical panel (36"W x 60"H x 12"D). MMP panel (12"W x 16"H x 8.5"D). ABB ACH580 VFD.

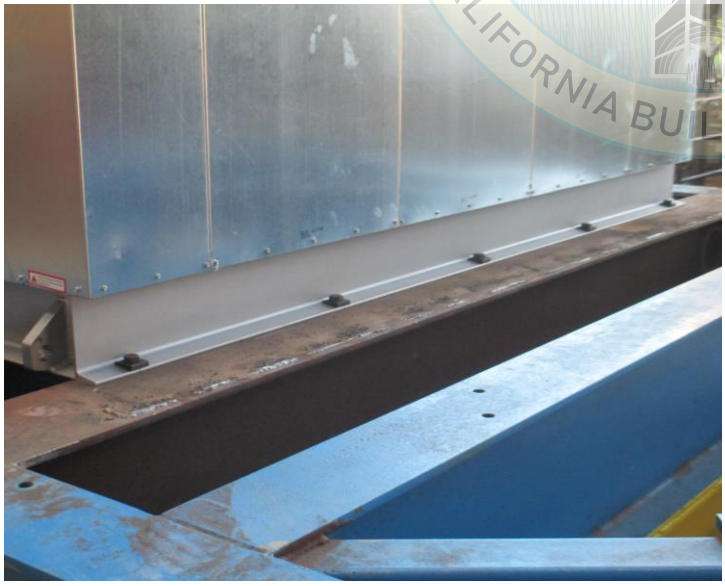
UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
8,124	104.3	165.5	110.3	4.2	17.8	13.4

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2019	ICC-ES AC156 (2015)	2.0	1.0	1.5	3.20	2.40	1.80	0.72
		2.7	0.0					

Test Mounting Details:



Unit was mounted to a wide flange beam test frame using ten (10) 3/4"-10 SAE grade 8 bolts with leveling washers, spring washers and nuts (spaced at 24" O.C. max. along both sides). Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test. Contents were included in testing per operating conditions.

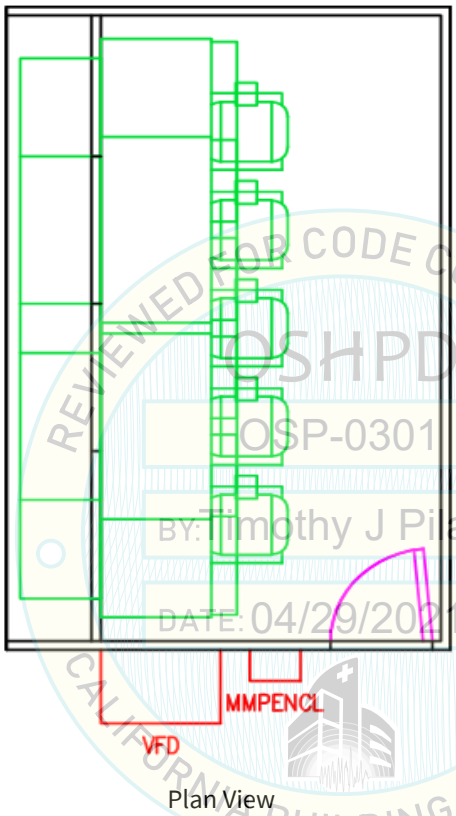
REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
04/29/2021
CALIFORNIA BUILDING CODE, 2019

UNIT UNDER TEST (UUT) SUMMARY SHEET

1800711-CR-001-R2

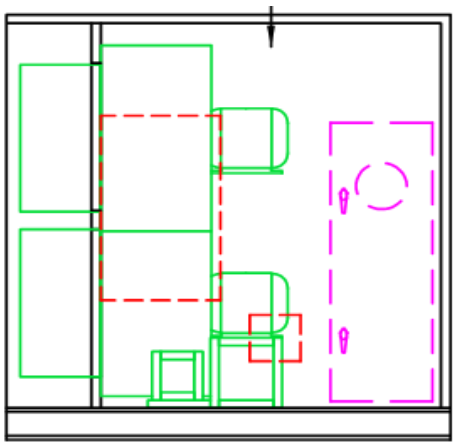
Manufacturer:	Haakon Industries, Ltd.		**UUT 11**
Model Line:	Custom Air Handling Units		
Model Number:	Test Prototype	***Serial Number:***	19-5574-474-C

Unit Drawings:

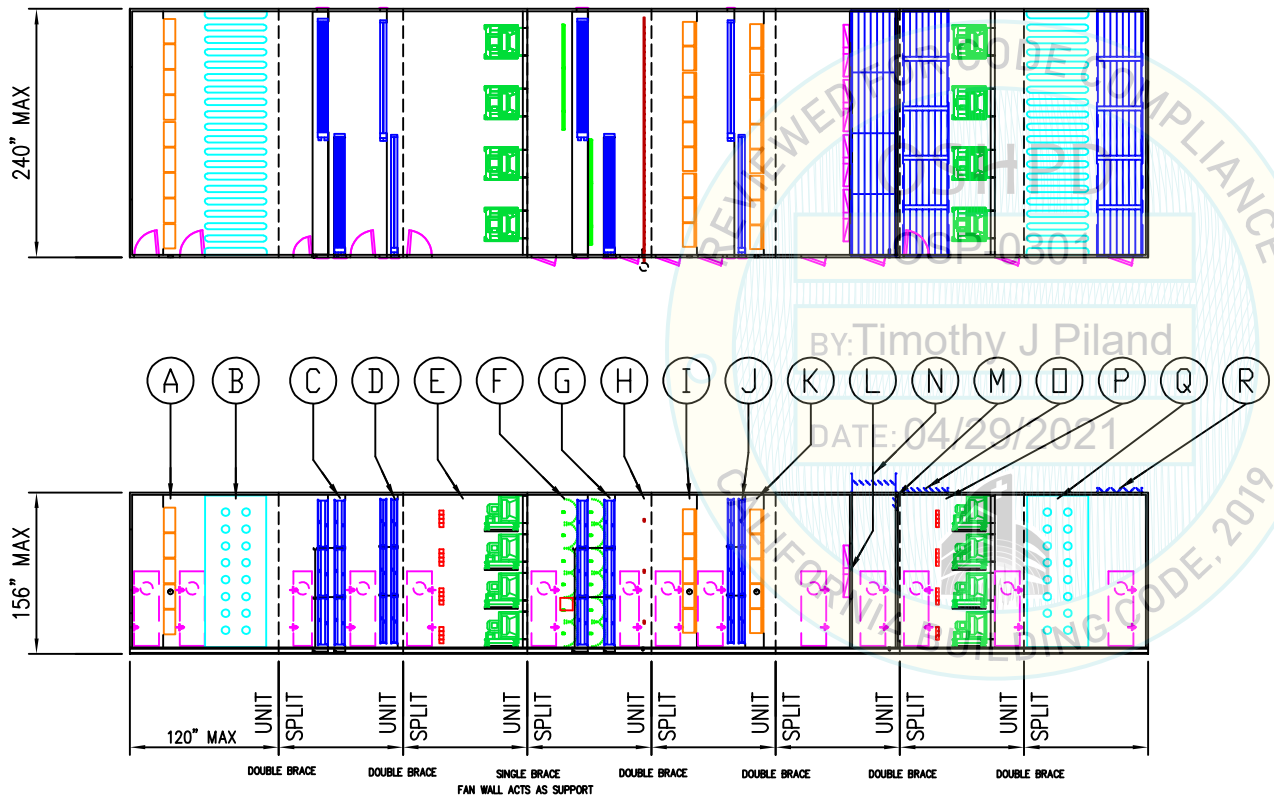


Plan View

REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019



Right Elevation View

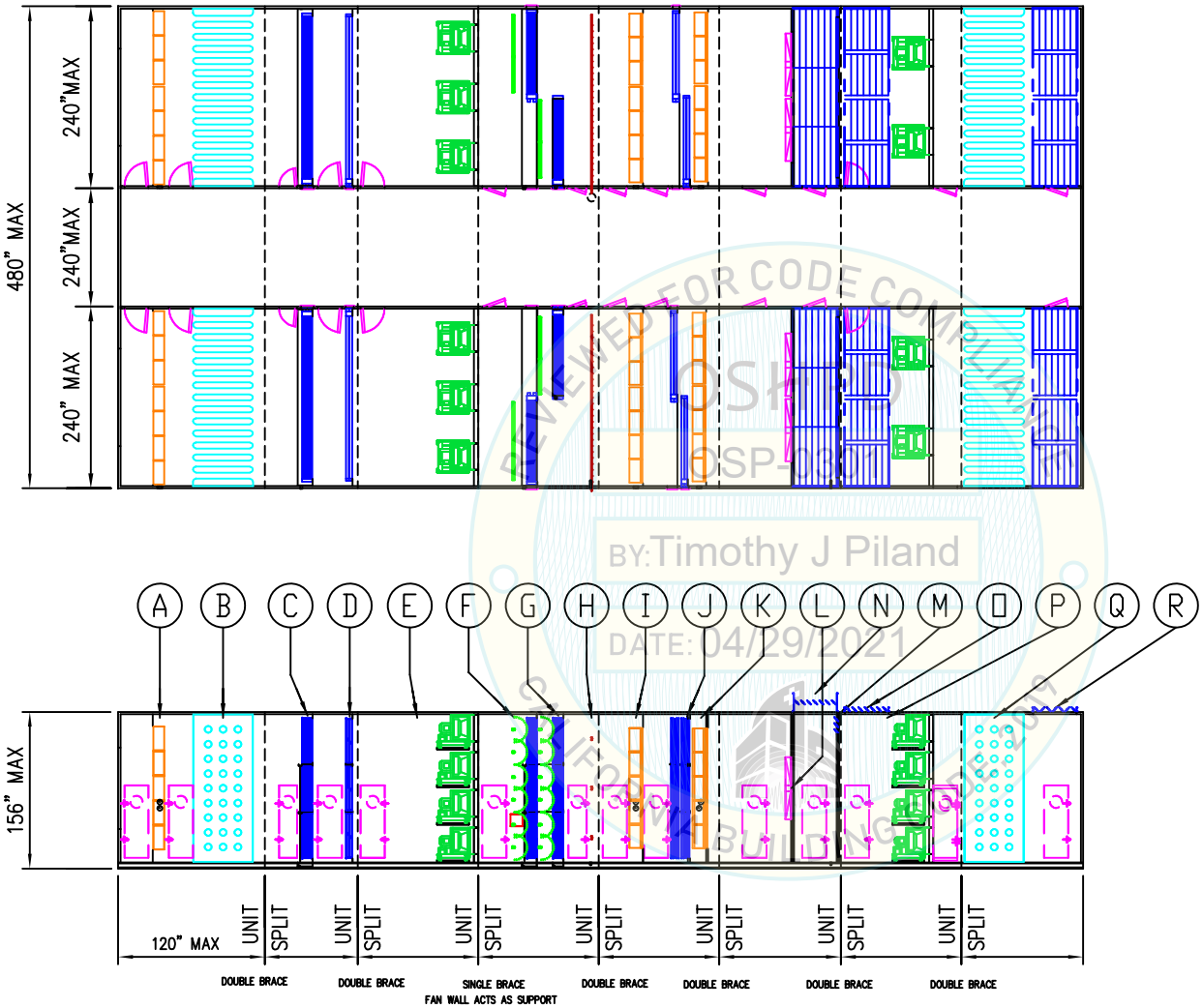


A FILTERS
B SOUND ATTENUATOR
C WATER COIL
D WATER COIL
E FAN
F UV LIGHTS
G COOLING COIL
H HUMIDIFIER
I FILTERS
J WATER COIL
K FILTERS
L STRATIFICATION ELIMINATORS
M DAMPER
N DAMPERS
O DAMPERS
P FAN
Q SOUND ATTENUATOR
R DAMPER

REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

See SPLIT FRAME DETAILS for clarification on the location of all seismic bracing. Internal walls such as fan bulkheads and internal damper walls are considered a single seismic brace when located at a unit split which is consistent with UUT's tested.

PROJECT	OSHPD CERTIFICATION PH I					HAAKON INDUSTRIES
JOB NO. 5913	DRAWN BY WG					11851 DYKE ROAD, RICHMOND, BC CANADA V7A 4X8
TAG OSP	DATE OCT 10/12			OSP-0301		



A FILTERS
B SOUND ATTENUATOR
C WATER COIL
D WATER COIL
E FAN
F UV LIGHTS
G COOLING COIL
H HUMIDIFIER
I FILTERS
J WATER COIL
K FILTERS
L STRATIFICATION ELIMINATORS
M DAMPER
N DAMPERS
O DAMPERS
P FAN
Q SOUND ATTENUATOR
R DAMPER

REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
STRUCTURAL BUILDING PLAN REVIEWER

See SPLIT FRAME DETAILS for clarification on the location of all seismic bracing. Internal walls such as fan bulkheads and internal damper walls are considered a single seismic brace when located at a unit split which is consistent with UUT's tested.

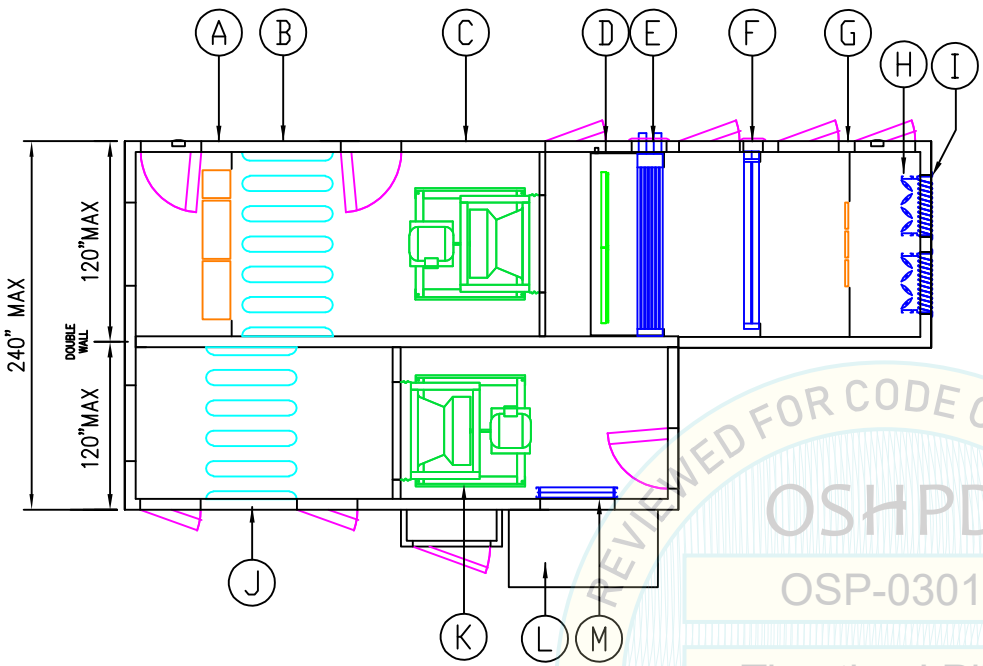
PROJECT OSHPD CERTIFICATION PH I

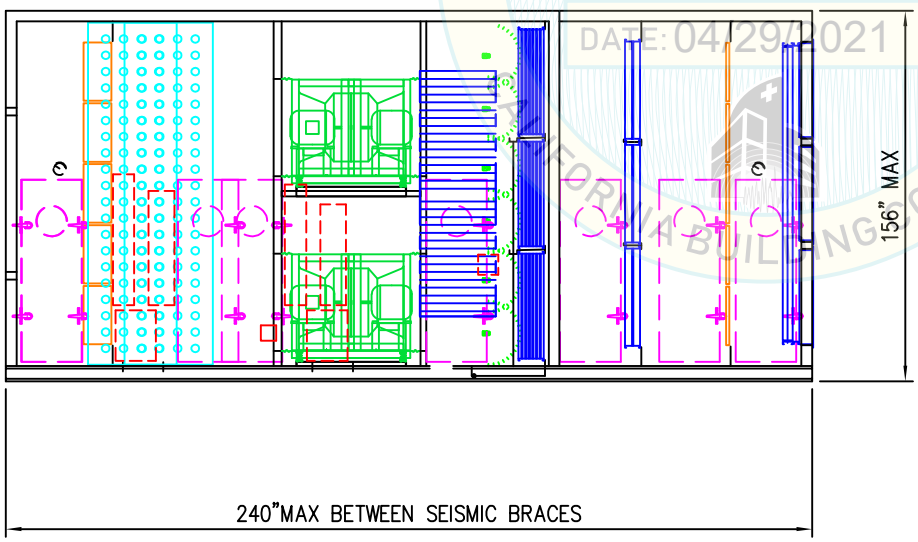
JOB NO.	5913	DRAWN BY	WG
TAG	OSP-2	DATE	OCT 10/12

04/29/2021

OSP-0301

HAAKON INDUSTRIES
11851 DYKE ROAD, RICHMOND, BC CANADA V7A 4X8





A FILTERS
B SOUND ATTENUATOR
C FAN
D UV LIGHTS
E WATER COIL
F WATER COIL
G FILTER
H DAMPER
I LOUVER
J SOUND ATTENUATOR
K FAN
L HOOD
M DAMPER

REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

See DOUBLE FRAME – SIDE WALLS, SINGLE FRAME – SIDE WALLS AND SPLIT FRAME DETAILS for clarifications on the location of all seismic bracing. Internal walls such as fan bulkheads and internal damper walls are considered a single seismic brace when located at a unit split which is consistent with UUT's tested.

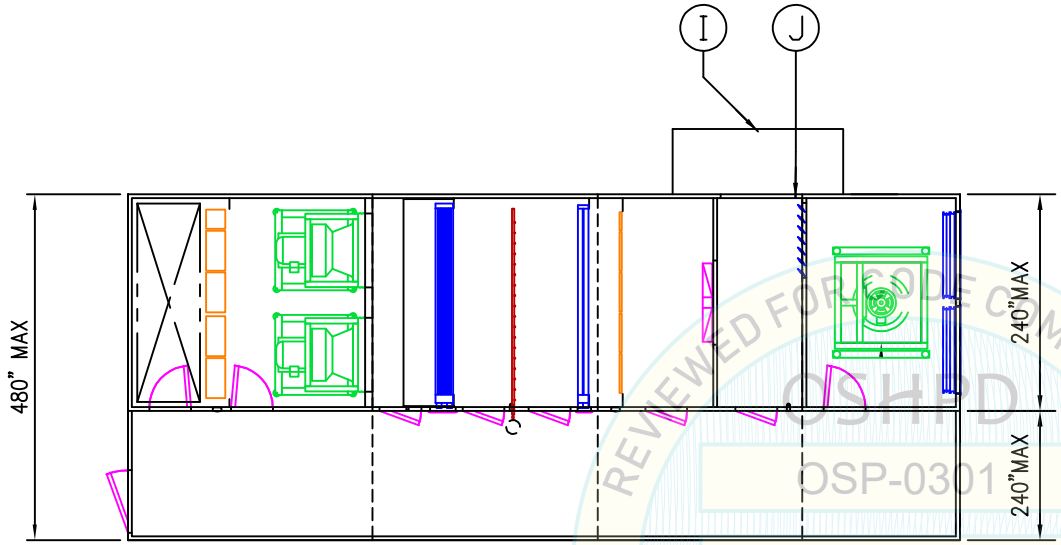
PROJECT OSHPD CERTIFICATION PH I

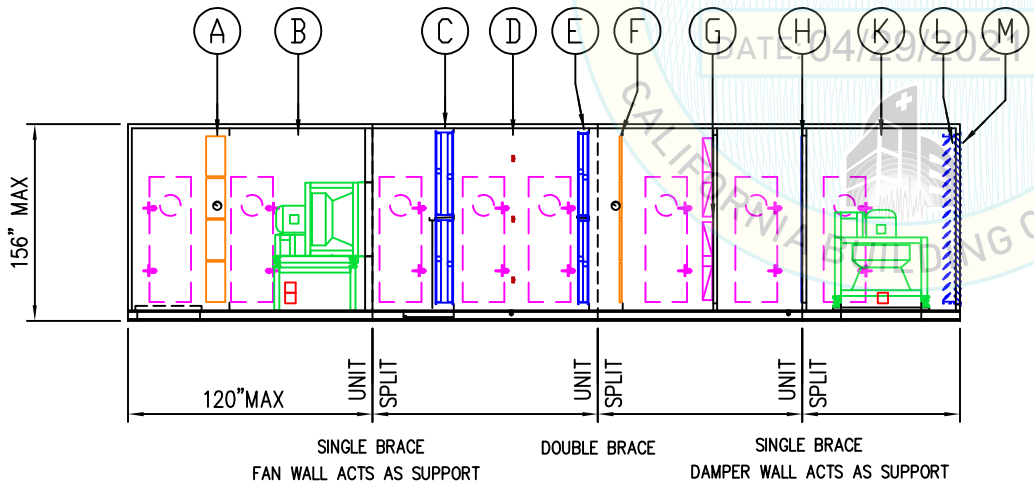
JOB NO.	5913	DRAWN BY	WG
TAG	OSP-4	DATE	OCT 10/12

04/29/2021

OSP-0301

HAAKON INDUSTRIES
11851 DYKE ROAD, RICHMOND, BC, CANADA V7A 4X8



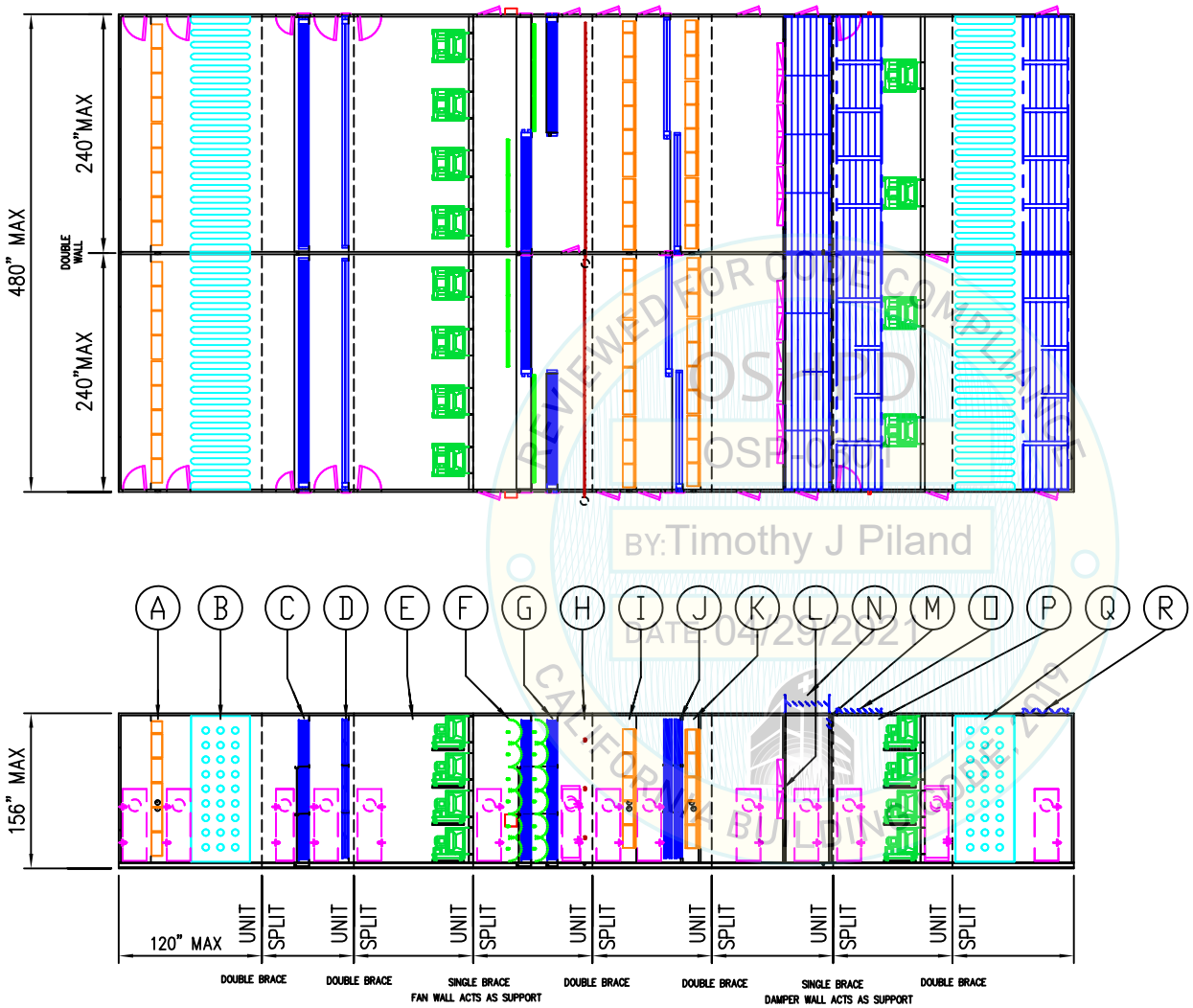


- (A) FILTERS
- (B) FANS
- (C) WATER COIL
- (D) HUMIDIFIER
- (E) WATER COIL
- (F) FILTERS
- (G) STRATIFICATION ELIMINATORS
- (H) DAMPERS
- (I) HOODS
- (J) DAMPERS
- (K) FAN
- (L) DAMPERS
- (M) LOUVERS

REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE 04/29/2021
CALIFORNIA BUILDING CODE, 2019

See SPLIT FRAME DETAILS for clarification on the location of all seismic bracing. Internal walls such as fan bulkheads and internal damper walls are considered a single seismic brace when located at a unit split which is consistent with UUT's tested.

PROJECT	OSHPD CERTIFICATION PH I					HAAKON INDUSTRIES 11851 DYKE ROAD, RICHMOND, BC CANADA V7A 4X8
JOB NO. 5913	DRAWN BY WG					
TAG OSP-5	DATE OCT 10/12			OSP-0301		



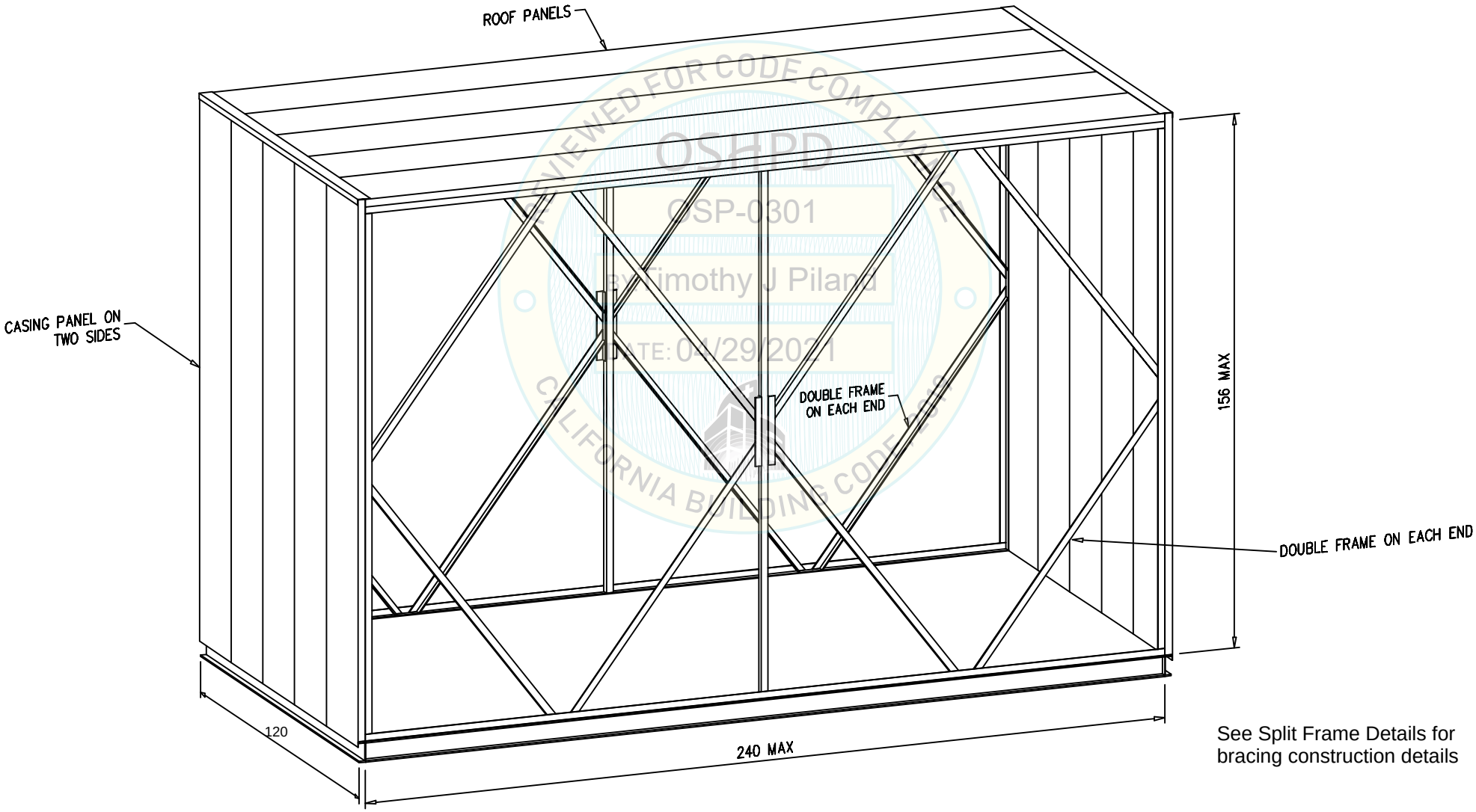
REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE

- A FILTERS
- B SOUND ATTENUATOR
- C WATER COIL
- D WATER COIL
- E FAN
- F UV LIGHTS
- G WATER COIL
- H HUMIDIFIER
- I FILTERS
- J WATER COIL
- K FILTERS
- L STRATIFICATION ELIMINATORS
- M DAMPER
- N DAMPERS
- O DAMPERS
- P FAN
- Q SOUND ATTENUATOR
- R DAMPER

See DOUBLE FRAME – SIDE WALLS, SINGLE FRAME – SIDE WALLS AND SPLIT FRAME DETAILS for clarifications on the location of all seismic bracing. Internal walls such as fan bulkheads and internal damper walls are considered a single seismic brace when located at a unit split which is consistent with UUT's tested.

PROJECT	OSHPD CERTIFICATION PH I				HAAKON INDUSTRIES
JOB NO. 5913	DRAWN BY WG				11851 DYKE ROAD, RICHMOND, BC CANADA V7A 4X8
TAG OSP-6	DATE OCT 10/12		OSP-0301		

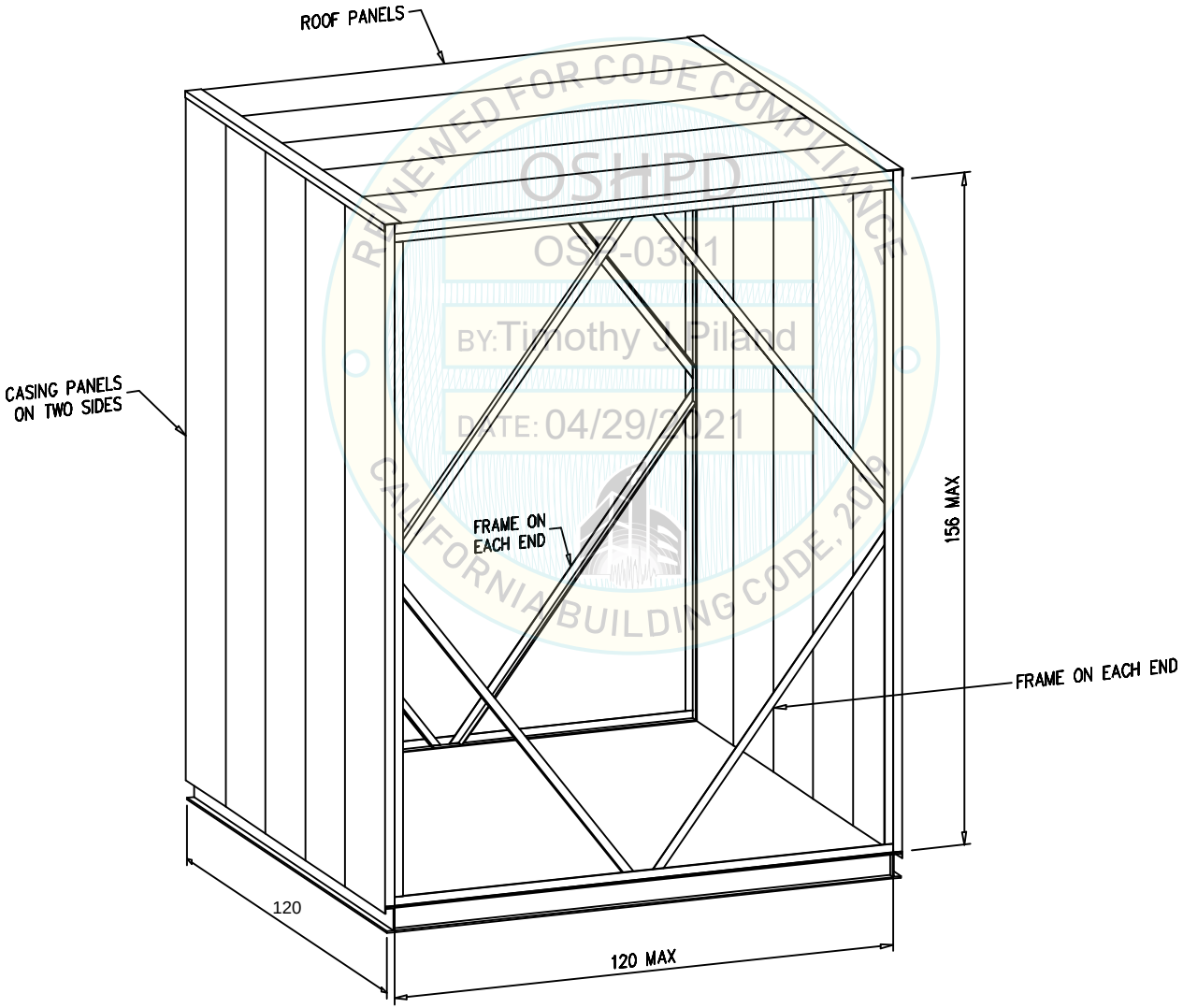
04/29/2021



REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
by Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODES

See Split Frame Details for bracing construction details

JOB: OSHPD CERTIFICATION PH I		DWG BY: SNC	DATE: 2013-05-07
JOB #: 5913	DOUBLE FRAME – SIDE WALLS		REV: 0

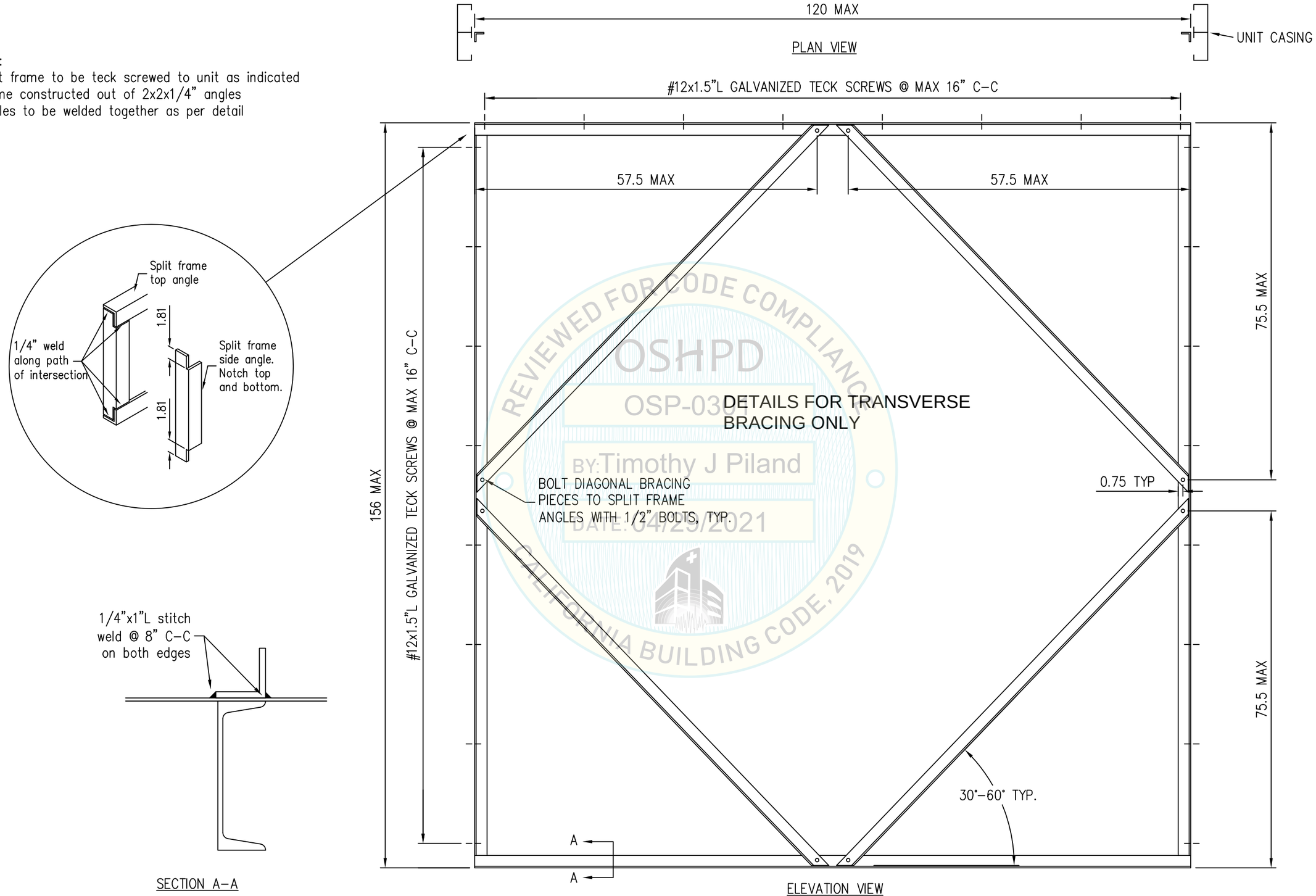


RENEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

See Split Frame Details for bracing construction details

JOB: OSHPD CERTIFICATION PH I		DWG BY: SNC	DATE: 2003-05-07
JOB #: 5913	SINGLE FRAME – SIDE WALLS		REV: 0

NOTES:
- split frame to be teck screwed to unit as indicated
- frame constructed out of 2x2x1/4" angles
- angles to be welded together as per detail

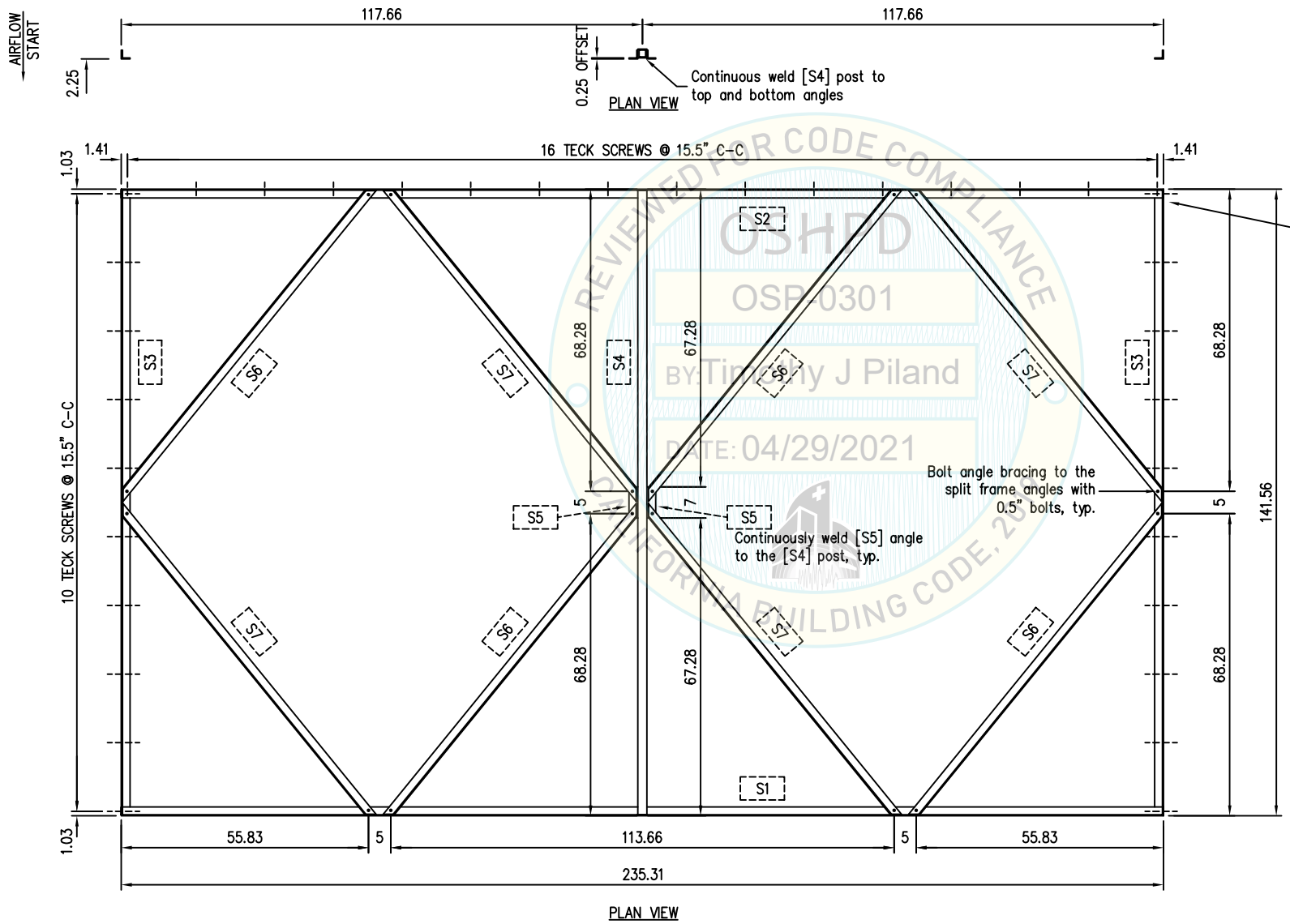


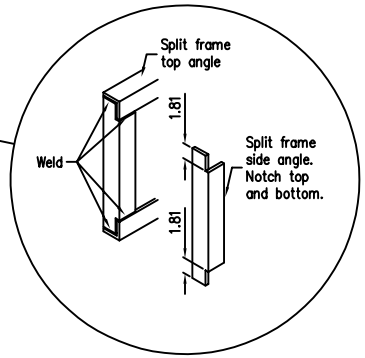
REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2019

DETAILS FOR TRANSVERSE BRACING ONLY

JOB: OSHPD CERTIFICATION PH I		FAB TAG : C518	DWG BY: SNC	DATE: 2013-04-15	5913U18SSF01
JOB #: 5913	*** SPLIT FRAME DETAILS ***	UNIT TAG: OSP-0301	UUT-9	REV: 2	

04/29/2021





NOTES:
- Aluminum frame
- Continuously weld frame together.
- Frame does not need to be painted.
- Frame constructed of 2x2x0.25 angles
- Frame to be teck screwed to unit as shown
- Bottom angle welded to the floor with 1/4"x1"L stitch welds @ 8" C-C.
- Unit to ship with the bracing angles loose.

REVIEWED FOR CODE COMPLIANCE
OSHPD
OSP-0301
BY: Timothy J Piland
DATE: 04/29/2021
CALIFORNIA BUILDING CODE, 2013

JOB: OSHPD CERTIFICATION PH I		FAB TAG : C512	DWG BY: SNC	DATE: 2012-07-28	5913U11SSF01	
JOB # 5913	*** SPLIT FRAME DETAILS ***	UNIT TAG: OSP-0301 UUT-3		REV: 0		Page 71 of 71

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