APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0475 – 10

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☒ New ☐ Renewal

Manufacturer Information

Manufacturer: Krueger

Manufacturer's Technical Representative: Justin Anderson, Sr. Product Manager - Equipment

Mailing Address: 1401 N. Plano Rd., Richardson, TX 75081

Telephone: (972) 497-0416 Email: janderson@krueger-hvac.com

Product Information

Product Name: Fan Coils: KVP, KVF, KHF, KHG, KVG

Product Type: Mechanical equipment

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

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

Mounting Description: Rigid base and wall mounted (KVF, KVP, KVG); ceiling suspended without spring isolators (KHF, KHG)

Applicant Information

Applicant Company Name: The VMC Group

Contact Person: John Giuliano

Mailing Address: 113 Main Street, Bloomingdale, NJ 07403

Telephone: (973) 838-1780 Email: john.giuliano@thevmcgroup.com

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2016.

Signature of Applicant: Date: 8/23/16

Title: President Company Name: The VMC Group

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

Company Name: Dynamic Certification Laboratories

Name: Dr. Ahmad Itani, S.E. California License Number: SE-5220

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

Telephone: (775) 358-5085 Email: Itani@shaketest.com

Supports and Attachments Preapproval

☐ Supports and attachments are preapproved under OPM- _____
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)

☒ Supports and attachments are not preapproved

Certification Method

☒ Testing in accordance with: ☒ ICC-ES AC156

☐ Other (Please Specify): _____

Testing Laboratory

Company Name: Dynamic Certification Laboratories

Contact Name: Kelly Laplace, Project Manager

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

Telephone: (775) 358-5085 Email: Kelly@shaketest.com

Seismic Parameters

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

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

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

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

R_p (Equipment or component response modification factor) = 6.0

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1.0

Equipment or Component Natural Frequencies (Hz) = See attachment

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

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

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

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

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

R (Response modification coefficient) = _____

Ω_0 (System overstrength factor) = _____

C_d (Deflection amplification factor) = _____

I_p (Importance factor) = 1.5

Height to Center of Gravity above base = _____

Equipment or Component Natural Frequencies (Hz) = _____

Overall dimensions and weight (or range thereof) = _____

Tank(s) designed in accordance with ASME BPVC, 2015: ☐ Yes ☒ No

List of Attachments Supporting Special Seismic Certification

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

☐ Other(s) (Please Specify): _____

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

Signature: _____ Date: 9/14/16

Print Name: M. R. Karim Title: SHFR

Special Seismic Certification Valid Up to : S_{DS} (g) = See above z/h = 1.0

Condition of Approval (if applicable): _____

Special Seismic Certification
Certified Components - Fan Coil Units

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Family: Fan Coil Units

Certified Product Construction: Top, side and bottom panel construction : exterior is 18 gage galvanized carbon steel (with powder-coated exterior finish in KRUEGER-branded "KVFC," "KVFF" and "KVFS" models); interior insulation is 1/2" foil-face fiberglass with elastomeric closed cell foam.

Mounting Description: Rigid base and wall mounted [1]

Product Family	KRUEGER Model Number	JCI Model Number	Dimensions (in)			Max. Weight (lb)	Sds (g), z/h=1 [4]	Fp/Wp	UUT
			Length	Width	Height				
Fan Coil Units, KVF [2, 3]	KVFC 02	FLX 02	41	12 1/2	14 1/2	75	2.5	1.88	UUT5
	KVFC 03	FLX 03	46	12 1/2	14 1/2	75 - 180	2.5	1.88	Interpolated
	KVFC 04	FLX 04	54	12 1/2	14 1/2				Interpolated
	KVFC 06	FLX 06	68	12 1/2	14 1/2				Interpolated
	KVFL 02	FLC 02	36	11 1/4	15 1/2	75 - 180	2.5	1.88	Interpolated
	KVFL 03	FLC 03	41	11 1/4	15 1/2				Interpolated
	KVFL 04	FLC 04	49	11 1/4	15 1/2				Interpolated
	KVFL 06	FLC 06	63	11 1/4	15 1/2				Interpolated
	KVFH 02	FWC 02	36	9 1/4	26	75 - 180	2.5	1.88	Interpolated
	KVFH 03	FWC 03	40	9 1/4	26				Interpolated
	KVFH 04	FWC 04	46	9 1/4	26				Interpolated
	KVFH 06	FWC 06	56	9 1/4	26				Interpolated
	KVFH 08	FWC 08	58	9 1/4	26				Interpolated
	KVFH 10	FWC 10	72	9 1/4	26				Interpolated
	KVFH 12	FWC 12	80	9 1/4	26				Interpolated
	KVFF 02	FWX 02	41	10	25 1/4	75 - 180	2.5	1.88	Interpolated
	KVFF03	FWX 03	45	10	25 1/4				Interpolated
	KVFF 04	FWX 04	51	10	25 1/4				Interpolated
	KVFF 06	FWX 06	61	10	25 1/4				Interpolated
	KVFF 08	FWX 08	63	10	25 1/4				Interpolated
	KVFF 10	FWX 10	77	10	25 1/4				Interpolated
	KVFF 12	FWX 12	85	10	25 1/4				Interpolated
	KVFS 02	FWI 02	41	10	28 3/4	75 - 180	2.5	1.88	Interpolated
	KVFS 03	FWI 03	45	10	28 3/4				Interpolated
	KVFS 04	FWI 04	51	10	28 3/4				Interpolated
	KVFS 06	FWI 06	61	10	28 3/4				Interpolated
	KVFS 08	FWI 08	63	10	28 3/4				Interpolated
	KVFS 10	FWI 10	77	10	28 3/4				Interpolated
	KVFS 12	FWI 12	85	10	28 3/4	180	2.5	1.88	UUT6

Notes:

1. Certified units are attached at the base and rear of the unit
2. KVFC and KVFL = Low Profile Vertical Floor Mounted; KVFH, KVFF and KVFS = Standard Vertical Floor Mounted
3. For KVF units, "C" designates a low profile exposed module, "S" designates an exposed module with a vertical sloped top, "F" designates an exposed module with a flat top, and "H" designates a concealed module. The C and S modules differ from the H modules in that they feature an additional powder-coated exterior paneling.
4. Certification level is limited to the lower rating of either the Certified Components, as listed here, or the subcomponents, as listed on the Certified Subcomponent tables.

Special Seismic Certification
Certified Components - Fan Coil Units

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Family: Fan Coil Units

Certified Product Construction: Top, side and bottom panel construction : exterior is 18 gage galvanized carbon steel; interior insulation is 1/2" foil-face fiberglass with elastomeric closed cell foam.

Mounting Description: Rigid base and wall mounted [1]

Product Family	KRUEGER Model Number	JCI Model Number[2]	Dimensions (in)			Max. Weight (lb)	Sds (g), z/h=1 [3]	Fp/Wp	UUT
			Length	Width	Height				
Fan Coil Units, KVP	KVPH 03	FSC 03	18	18	88	190	2.5	1.88	UUT9
	KVPH 04	FSC 04	18	18	88	190 - 260			Interpolated
	KVPH 06	FSC 06	20	20	88				Interpolated
	KVPH 08	FSC 08	20	20	88				Interpolated
	KVPH 10	FSC 10	24	24	88				Interpolated
	KVPH 12	FSC 12	24	24	88	260			UUT10
	KVPS 03	FSS 03	18	18	88	190 - 260	2.5	1.88	Extrapolated
	KVPS 04	FSS 04	18	18	88				Extrapolated
	KVPS 06	FSS 06	20	20	88				Extrapolated
	KVPS 08	FSS 08	20	20	88				Extrapolated
	KVPS 10	FSS 10	24	24	88				Extrapolated
	KVPS 12	FSS 12	24	24	88				Extrapolated
	KVPP 03	FSM 03	18	18	88	190 - 260	2.5	1.88	Extrapolated
	KVPP 04	FSM 04	18	18	88				Extrapolated
	KVPP 06	FSM 06	20	20	88				Extrapolated
	KVPP 08	FSM 08	20	20	88				Extrapolated
	KVPP 10	FSM 10	24	24	88				Extrapolated
	KVPP 12	FSM 12	24	24	88				Extrapolated

Notes:

1. Certified units are attached at the base and rear of the unit
2. KVPP/KPVS (primary/secondary) units are identical in construction to KVPH (concealed) units, and vary by a software change.
3. Certification level is limited to the lower rating of either the Certified Components, as listed here, or the subcomponents, as listed on the Certified Subcomponent tables.

Special Seismic Certification
Certified Components - Fan Coil Units

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Family: Fan Coil Units

Certified Product Construction: Top, side and bottom panel construction : exterior is 18 gage galvanized carbon steel; interior insulation is 1/2" scrim-reinforced foil-face fiberglass with elastomeric closed cell foam.

Mounting Description: Rigid base and wall mounted [1]

Product Family	KRUEGER Model Number	JCI Model Number	Dimensions (in)									Max. Weight (lb)	Sds (g), z/h=1 [3]	Fp/Wp	UUT
			Main Cabinet			Supply Plenum[2]			Mixing Box[2]						
			Length	Width	Height	Length	Width	Height	Length	Width	Height				
Fan Coil Units, KVG	KVGH 04	FCC 04	22	23	49	22	15	15	22	15	15	160	2.5	1.88	UUT33
	KVGH 06	FCC 06	22	23	49	22	15	15	22	15	15	160 - 350			Interpolated
	KVGH 08	FCC 08	22	23	49	22	15	15	22	15	15				Interpolated
	KVGH 10	FCC 10	29	36	49	29	18	18	29	18	18				Interpolated
	KVGH 12	FCC 12	29	36	49	29	18	18	29	18	18				Interpolated
	KVGH 16	FCC 16	46	36	49	46	18	18	46	18	18				Interpolated
	KVGH 20	FCC 20	46	36	49	46	18	18	46	18	18	350			UUT34

Notes:

1. Certified units are attached at the base and rear of the unit
2. Units can be installed with or without supply plenum and mixing box. UUT33 and UUT34 were tested with supply plenum and mixing box.
3. Certification level is limited to the lower rating of either the Certified Components, as listed here, or the subcomponents, as listed on the Certified Subcomponent tables.

Special Seismic Certification
Certified Components - Fan Coil Units

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Family: Fan Coil Units

Certified Product Construction: Top, side and bottom panel construction : exterior is 20 gage galvanized carbon steel; interior insulation is 1/2" foil-face fiberglass with elastomeric closed cell foam.

Mounting Description: Ceiling suspended (without spring isolators)

Product Family	KRUEGER Model Number[1, 2]	JCI Model Number	Dimensions (in) Main Cabinet			Max. Weight (lb)	Sds (g), z/h=1 [3]	Fp/Wp	Unit
			Length	Width	Height				
Fan Coil Units, KHG / KHF	KHGP 06 w/ mix	FNP 06 w/ mix	47 3/8	37	16 3/4	161	1.93	1.45	UUT23
	KHGP 08 w/ mix	FNP 08 w/ mix	47 3/8	42	16 3/4	161 - 340			Interpolated
	KHGP 10 w/ mix	FNP 10 w/ mix	47 3/8	46	16 3/4				Interpolated
	KHGP 12 w/ mix	FNP 12 w/ mix	47 3/8	51	16 3/4				Interpolated
	KHGP 14 w/ mix	FNP 14 w/ mix	47 3/8	56	16 3/4				Interpolated
	KHGP 16 w/ mix	FNP 16 w/ mix	47 3/8	61	16 3/4				Interpolated
	KHGP 18 w/ mix	FNP 18 w/ mix	47 3/8	66	16 3/4				Interpolated
	KHGP 20 w/ mix	FNP 20 w/ mix	47 3/8	70	16 3/4	340			UUT26
	KHGP 06	FNP 06	32 1/2	37	16 3/4	161 - 340	1.93	1.45	Extrapolated
	KHGP 08	FNP 08	32 1/2	42	16 3/4				Extrapolated
	KHGP 10	FNP 10	32 1/2	46	16 3/4				Extrapolated
	KHGP 12	FNP 12	32 1/2	51	16 3/4				Extrapolated
	KHGP 14	FNP 14	32 1/2	56	16 3/4				Extrapolated
	KHGP 16	FNP 16	32 1/2	61	16 3/4				Extrapolated
	KHGP 18	FNP 18	32 1/2	66	16 3/4				Extrapolated
	KHGP 20	FNP 20	32 1/2	70	16 3/4				Extrapolated
	KHGH 06	FNF 06	29 1/8	37	16 3/4	161 - 340	1.93	1.45	Extrapolated
	KHGH 08	FNF 08	29 1/8	42	16 3/4				Extrapolated
	KHGH 10	FNF 10	29 1/8	46	16 3/4				Extrapolated
	KHGH 12	FNF 12	29 1/8	51	16 3/4				Extrapolated
	KHGH 14	FNF 14	29 1/8	56	16 3/4				Extrapolated
	KHGH 16	FNF 16	29 1/8	61	16 3/4				Extrapolated
	KHGH 18	FNF 18	29 1/8	66	16 3/4				Extrapolated
	KHGH 20	FNF 20	29 1/8	70	16 3/4				Extrapolated

Notes:

1. KHGP units can be installed with or without mixing box. Units were tested with a mixing box.
2. KHGH stands for a "free return" unit and is identical to the KHGP unit, except without the fan enclosure.
3. Certification level is limited to the lower rating of either the Certified Components, as listed here, or the subcomponents, as listed on the Certified Subcomponent tables.

Special Seismic Certification
Certified Components - Fan Coil Units

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Family: Fan Coil Units

Certified Product Construction: Top, side and bottom panel construction: exterior is 20 gage galvanized carbon steel; interior insulation is 1/2" foil-face fiberglass with elastomeric closed cell foam.

Mounting Description: Ceiling suspended (without spring isolators)

Product Family	KRUEGER Model Number	JCI Model Number	Dimensions (in) Main Cabinet			Max. Weight (lb)	Sds (g), z/h=1 [1]	Fp/Wp	Unit
			Length	Width	Height				
Fan Coil Units, KHG / KHF (Continued)	KHGE 06	FNE 06	31 7/8	31 1/4	18	152 - 286	1.93	1.45	UUT35
	KHGE 08	FNE 08	31 7/8	36 1/4	18				Interpolated
	KHGE 10	FNE 10	31 7/8	40 1/4	18				Interpolated
	KHGE 12	FNE 12	31 7/8	45 1/4	18				Interpolated
	KHGE 14	FNE 14	31 7/8	50 1/4	18				Interpolated
	KHGE 16	FNE 16	31 7/8	55 1/4	18				Interpolated
	KHGE 18	FNE 18	31 7/8	60 1/4	18				Interpolated
	KHGE 20	FNE 20	31 7/8	64 1/4	18				UUT36
	KHFP 02	FHP 02	25 1/4	25 1/4	10 3/4	24 - 71	1.93	1.45	UUT37
	KHFP 03	FHP 03	28 1/2	25 1/4	10 3/4				Interpolated
	KHFP 04	FHP 04	34 3/4	25 1/4	10 3/4				Interpolated
	KHFP 06	FHP 06	41 1/2	25 1/4	10 3/4				Interpolated
	KHFP 08	FHP 08	48 1/2	25 1/4	10 3/4				Interpolated
	KHFP 09	FHP 09	52 4/7	25 1/4	10 3/4				Interpolated
	KHFP 10	FHP 10	62 1/2	25 1/4	10 3/4				Interpolated
	KHFP 12	FHP 12	69 1/2	25 1/4	10 3/4				UUT38

Note:

1. Certification level is limited to the lower rating of either the Certified Components, as listed here, or the subcomponents, as listed on the Certified Subcomponent tables.

Special Seismic Certification
Certified Subcomponents

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Fan Coil Units

Certified Subcomponent: Coils

Coils (KVF, KVP, KVG Units)

KRUEGER Unit Type	JCI Unit Type	Unit Size	Manufacturer	Material	Dimensions (in)		Max Row Qty (Heat)	Max Row Qty (Cool)	Weight (lb)	Sds (g), z/h=1 [1]	Fp/Wp	Unit
					Height	Width						
KVFL	FL	02	JCI	Aluminum fins, copper tubes, galvanized carbon steel casing	11.75	41	2	2	11	2.5	1.88	UUT 5
		3, 4			11.75	41 - 68	2	3	11 - 79			Interpolated
		06			11.75	68	2	3	79			Interpolated
KVF	FW	02			10.5	16	1	3	36			Interpolated
		3, 4, 6, 8, 10			10.5	16 - 60	1	3	36 - 77			Interpolated
		12			10.5	60	1	3	77			UUT 6
KVP	FS	03			32	16.5	2	3	20	2.5	1.88	UUT9
		04 - 10			32	16.5 - 22.5	2	3	20 - 66			Interpolated
		12			33	22.5	2	3	66			UUT10
KVG	FCC	04			15	48	2	4	7	2.5	1.88	UUT33
		6-18			18	48	2	4	7 - 77			Interpolated
		20			18	48	2	4	77			UUT34

Coils (KHG, KHF Units)

KRUEGER Unit Type	JCI Unit Type	Unit Size	Manufacturer	Material	Dimensions (in)		Max Row Qty (Heat)	Max Row Qty (Cool)	Weight (lb)	Sds (g), z/h=1 [1]	Fp/Wp	Unit
					Height	Width						
KHGP	FNP	06	JCI	Aluminum fins, copper tubes, galvanized carbon steel casing	12.5	14	2	6	5	1.93	1.45	UUT23
		8-18			12.5	14 - 47	2	6	5 - 111			Interpolated
		20			12.5	47	2	6	111			UUT26
KHG	FN	06			14	15	2	6	17	1.93	1.45	UUT35
		8-18			14	22 - 44	2	6	17 - 67			Interpolated
		20			14	48	2	6	71			UUT36
KHF	FH	02			8	16	2	6	7	1.93	1.45	UUT37
		3 - 10			8	19.25 - 52	2	6	7 - 45			Interpolated
		12			8	60	2	6	51			UUT38

Note:

1. Certification level is limited to the lower rating of either the Certified Subcomponents, as listed here, or the components, as listed on the Certified Component tables.

Special Seismic Certification
Certified Subcomponents

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Fan Coil Units

Certified Subcomponent: Fans

Fans (KVF, KVP, KVG Units)

Unit Size	Manufacturer	Type	Drive	Blade Material	Number of Fans	Fan Wheel Diam. (in)	Fan Wheel Width (in)	Motor Frame	Fan + Motor Weight (lb)	Sds (g), z/h=1 [1]	Fp/Wp	Unit
02	Revcor	DWDI, Forward Curve	Direct	Galvanized carbon steel	1	5.75	3.75	42	11	2.5	1.88	UUT5
03 - 10					1,2,4	5.75	3.75 - 7		11 - 28			Interpolated
12					4	5.75	7		28			UUT6
03	Morrison	DWDI, Forward Curve	Direct	Galvanized carbon steel	1	7	6	48	19	2.5	1.88	UUT9
04 - 10					1	7 - 9	6 - 10		19 - 25			Interpolated
12					1	9	10		25			UUT10
04	Morrison	DWDI, Forward Curve	Direct	Galvanized carbon steel	1	9	6	48	20	2.5	1.88	UUT33
06-18					1,2	9 - 10	6 - 8		20 - 43			Interpolated
20					2	9	8		43			UUT34

Fans (KHG, KHF Units)

Unit Size	Manufacturer	Type	Drive	Blade Material	Number of Fans	Fan Wheel Diam. (in)	Fan Wheel Width (in)	Motor Frame	Fan + Motor Weight (lb)	Sds (g), z/h=1 [1]	Fp/Wp	Unit
06	Morrison	DWDI, Forward Curve	Direct	Galvanized carbon steel	1	9	4	48	20	1.93	1.45	UUT23, UUT35
08 - 18					1, 2	9	4 - 6		20 - 46			Interpolated
20					2	9	6		46			UUT26, UUT36
2	Beckett	DWDI, Forward Curve	Direct	Galvanized carbon steel	1	5.75	6.5	48	11	1.93	1.45	UUT37
3 - 10					1, 2, 4	5.75	6.5 - 8		11 - 50			Interpolated
12					4	5.75	8		50			UUT38

Note:

1. Certification level is limited to the lower rating of either the Certified Subcomponents, as listed here, or the components, as listed on the Certified Component tables.

Special Seismic Certification
Certified Subcomponents

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Fan Coil Units

Certified Subcomponent: Motors

Fan Motors (KVF, KVP, KVG Units)							
Manufacturer	Drive	Voltage	HP	Material	Sds (g), z/h=1 [1]	Fp/Wp	Unit
Regal Beloit	Direct	115	1/35	Painted carbon steel shell	2.5	1.88	UUT9
			1/25				UUT5
			1/25 - 1/20				Interpolated
			1/20				UUT6
			1/20 - 1/3				Interpolated
			1/4				UUT10
			1/3				UUT33, UUT34

Fan Motors (KHG, KHF Units)							
Manufacturer	Drive	Voltage	HP	Material	Sds (g), z/h=1 [1]	Fp/Wp	Unit
Regal Beloit	Direct	115	1/20	Painted carbon steel shell	1.93	1.45	Extrapolated
			1/10				UUT38 [2]
			1/10 - 1/4				Interpolated
			1/4				UUT23, UUT37
			1/3				UUT35, UUT36

Notes:

1. Certification level is limited to the lower rating of either the Certified Subcomponents, as listed here, or the components, as listed on the Certified Component tables.
2. Two identical Regal Beloit motors were tested in UUT38. The Extrapolated motor is identical in size and composition to the tested motors.

Special Seismic Certification
Certified Subcomponents

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Fan Coil Units

Certified Subcomponent: Filters

Filters (KVF, KVP, KVG Units)

KRUEGER Unit Type	JCI Unit Type	Unit Size	Manufacturer	Type	Material	Height (in)	Width (in)	Weight (lb)	Sds (g), z/h=1 [1]	Fp/Wp	Unit
KVF	FW/FL	02	AAF	1" pleated	Cotton-based fiber	7.5	21.5	0.2	2.5	1.88	UUT5
		03 - 10	AAF	1" pleated		7.5 - 9.25	21.5 - 65.25	0.2 - 0.3			Interpolated
		12	AAF	1" pleated		9.25	65.25	0.3			UUT6
KVP	FS	03	AAF	1" pleated	Cotton-based fiber	13 .75	24	0.2	2.5	1.88	UUT9
		04 - 10	AAF	1" pleated		13 .75 - 19.75	24 - 29	0.2			Interpolated
		12	AAF	1" pleated		19.75	29	0.2			UUT10
KVG	FCC	04	AAF	1" Throwaway	Cotton-based fiber	13.75	23	0.4	2.5	1.88	UUT33
		06 - 18	AAF	1" Throwaway		13.75 - 16.75	23 - 45	0.4 - 0.8			Interpolated
		20	AAF	1" Throwaway		16.75	45	0.8			UUT34

Filters (KHG, KHF Units)

KRUEGER Unit Type	JCI Unit Type	Unit Size	Manufacturer	Type	Material	Height (in)	Width (in)	Weight (lb)	Sds (g), z/h=1 [1]	Fp/Wp	Unit
KHG	FN	06	AAF	2" pleated	Cotton-based fiber	16	16	0.3	1.93	1.45	UUT23, UUT35
		08 - 18	AAF	2" pleated		13.75	16 - 50	0.4 - 0.9			Interpolated
		20	AAF	2" pleated		16	50	1.0			UUT26, UUT36
KHF	FH	02	Koch	1" Throwaway	Cotton-based fiber	10.5	16	0.2	1.93	1.45	UUT37
		03 - 10	Koch	1" Throwaway		10.5	19.25 - 52	0.2 - 0.3			Interpolated
		12	Koch	1" Throwaway		10.5	60	0.3			UUT38

Note:

1. Certification level is limited to the lower rating of either the Certified Subcomponents, as listed here, or the components, as listed on the Certified Component tables.

Special Seismic Certification
Certified Subcomponents

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Fan Coil Units

Certified Subcomponent: Dampers

Dampers (KVGH)									
Unit Size	Manufacturer	Construction	Qty	Height (in)	Width (in)	Weight (lb)	Sds (g), z/h=1 [1]	Fp/Wp	Unit
4	JCI	16 gauge, galvanized carbon steel	1	9	15	5.5	2.5	1.88	UUT33
6-18			1	9	20	7.4			Interpolated
20			1	9	36	13.3			UUT34

Dampers (KGH)									
Unit Size	Manufacturer	Construction	Qty	Height (in)	Width (in)	Weight (lb)	Sds (g), z/h=1 [1]	Fp/Wp	Unit
6	JCI	16 gauge, galvanized carbon steel	2	10	12.625	10	1.93	1.45	UUT23
8-18			2	10	12.625 to 40.625	10 to 15			Interpolated
20			2	10	40.625	15			UUT26

Note:

1. Certification level is limited to the lower rating of either the Certified Subcomponents, as listed here, or the components, as listed on the Certified Component tables.

Special Seismic Certification
Certified Subcomponents

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Fan Coil Units

Certified Subcomponent: Controls

Controls						
Model Number	Manufacturer	Description	Material	Sds (g), z/h=1 [1]	Fp/Wp	Unit
MS-VMA1620-0	Johnson Controls	Metasys controller	Plastic cover	2.5	1.88	UUT23, UUT26
66-001-1000	Johnson Controls	Fanspeed control assembly	Plastic and fiberglass	2.5	1.88	UUT23
66-003-1000	Johnson Controls	Fanspeed control assembly	Plastic and fiberglass	1.93	1.45	UUT26
66-006-1000	Johnson Controls	Fanspeed control assembly	Plastic and fiberglass	2.5	1.88	UUT5-6, UUT9-10
PC-07-0103	Johnson Controls	Pipe sensor	Stainless steel	2.5	1.88	UUT9-10
PC-01-4000	Johnson Controls	Control board	Fiberglass	2.5	1.88	UUT33-34
84-52007-10	Johnson Controls	Fan coil unit relay board	Fiberglass	2.5	1.88	UUT33
84-52007-17	Johnson Controls	Fan coil unit relay board	Fiberglass	2.5	1.88	UUT34, UUT26
B63-001-2068	Johnson Controls	Fan coil unit relay board	Fiberglass	2.5	1.88	UUT33-34, UUT26
PC-01-0026	Johnson Controls	Thermostat controller	Plastic cover	2.5	1.88	UUT9-10
T602DFH-4	Johnson Controls	Thermostat controller	Plastic cover	2.5	1.88	UUT6
T701DFN-1	Johnson Controls	Thermostat controller	Plastic cover	2.5	1.88	UUT10
PC-00-0249	Erie	Actuator, PopTop, 24V	Stainless steel cover	2.5	1.88	UUT23-26
PC-00-0250	Erie	Actuator, PopTop, 120V	Stainless steel cover	2.5	1.88	UUT5
PC-00-0737	Erie	Actuator, PopTop, 120V - CW,44 In	Stainless steel cover	2.5	1.88	UUT9-10
PC-00-0738	Erie	Actuator, PopTop, 120V - HW,44 In	Stainless steel cover	2.5	1.88	UUT9-10
PC-00-0775	Erie	Actuator, PopTop, 120V - CW,86 In	Stainless steel cover	2.5	1.88	UUT6
PC-00-0776	Erie	Actuator, PopTop, 120V - HW,86 In	Stainless steel cover	2.5	1.88	UUT6
PC-03-0001	Cleveland Controls	Airflow switch	Stainless steel housing	2.5	1.88	UUT23, UUT26
PE-10-9300	Hartland	Transformer	130deg C class B insulation	2.5	1.88	UUT23, UUT26
PC-01-0134	Johnson Controls	Fan coil unit relay board	Fiberglass	1.93	1.45	UUT35-38

Note:

1. Certification level is limited to the lower rating of either the Certified Subcomponents, as listed here, or the components, as listed on the Certified Component tables.

Special Seismic Certification
Tested Components - Fan Coil Units

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Family: Fan Coil Units

Tested Product Construction: Galvanized carbon steel cabinet

Tested Mounting Description: KVFC, KVFS, KVPH and KVGH are rigid base and wall mounted (certified units are attached at the base and rear of the unit); KHGP, KHGE and KHFP units are ceiling suspended (without spring isolators)

KRUEGER Model	JCI Model	Dimensions (in)									Weight (lb)	Mounting	Sds (g), z/h=1	Unit
		Main Cabinet*			Supply Plenum			Mixing Box						
		Length	Width	Height	Length	Width	Height	Length	Width	Height				
KVFC 02	FLX 02	41	12 1/2	14 1/2	N/A	N/A	N/A	N/A	N/A	N/A	75	Rigid base and wall mounted	2.5	UUT5
KVFS 12	FWI 12	85	10	28 3/4	N/A	N/A	N/A	N/A	N/A	N/A	180		2.5	UUT6
KVPH 03	FSC 03	18	18	88	N/A	N/A	N/A	N/A	N/A	N/A	190		2.5	UUT9
KVPH 12	FSC 12	24	24	88	N/A	N/A	N/A	N/A	N/A	N/A	260		2.5	UUT10
KVGH 04	FCC 04	22	23	49	22	15	15	22	15	15	160		2.5	UUT33
KVGH 20	FCC 20	46	36	49	46	18	18	46	18	18	350		2.5	UUT34
KHGP 06	FNP 06	47 3/8	37	16 3/4	N/A	N/A	N/A	N/A	N/A	N/A	161	Ceiling suspended	2.5	UUT23
KHGP 20	FNP 20	47 3/8	70	16 3/4	N/A	N/A	N/A	N/A	N/A	N/A	340		1.93	UUT26
KHGE 06	FNE 06	31 7/8	31 1/4	18	N/A	N/A	N/A	N/A	N/A	N/A	152		1.93	UUT35
KHGE 20	FNE 20	31 7/8	64 1/4	18	N/A	N/A	N/A	N/A	N/A	N/A	286		1.93	UUT36
KHFP 02	FHP 02	25 1/4	25 1/4	10 3/4	N/A	N/A	N/A	N/A	N/A	N/A	24		1.93	UUT37
KHFP 12	FHP 12	69 1/2	25 1/4	10 3/4	N/A	N/A	N/A	N/A	N/A	N/A	71		1.93	UUT38

*Main cabinet dimensions for KHGP 06 and KHGP 20 include mixing box, which is integral to the tested unit.

UUT5 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KVFC 02, JCI Model FLX 02

Options: 2 row heating and 2 row cooling coils, direct drive fan, 115V 1/25HP motor, 1" pleated filter, fanspeed control assembly, actuator

Cabinet Construction Summary

Construction: 18 Gauge Galvanized Steel (exterior), Fiberglass (interior)

UUT Properties

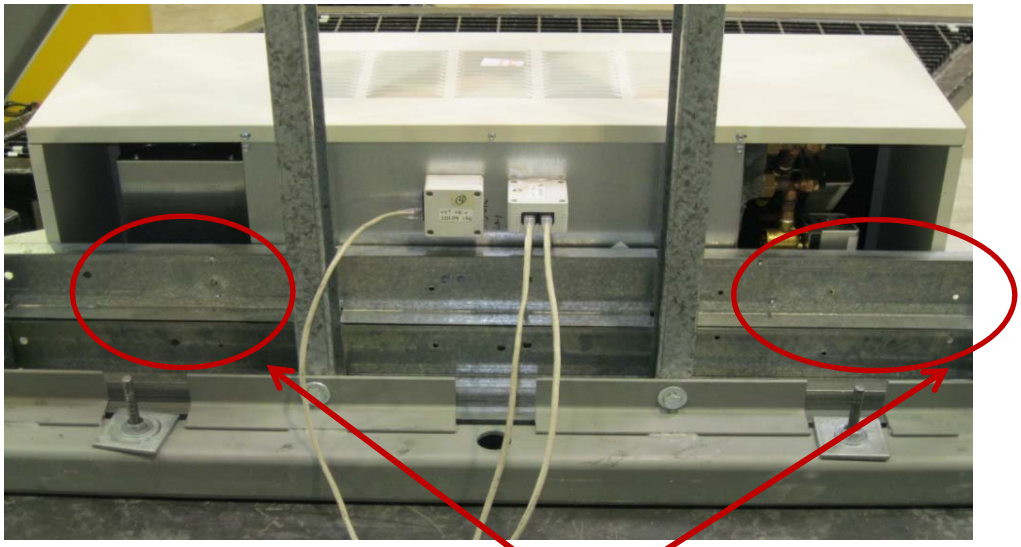
Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
75	Main Cabinet	41	12 1/2	14 1/2	N/A	N/A	N/A

Seismic Test Parameters

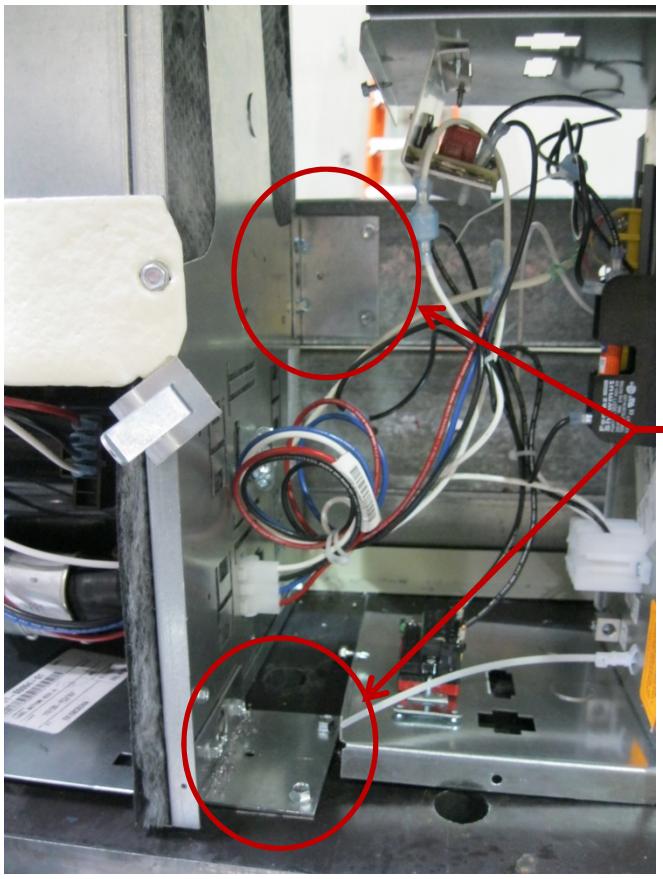
Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1	1.5	4.00	3.00	1.67	0.67

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

The unit was mounted at the bottom and back using four manufacturer-provided angle clips (one on each front bottom corner and two at the back of the unit at approximately 7 inches high). Each clip was held in place using four #12, 3/4-inch long sheet metal screws; two screws were attached through the unit, and two through the DCL-provided steel fixture.



Mounting locations at back of unit (rear view of unit)



Mounting locations at back and base of unit (interior view of unit)

UUT6 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KVFS 12, JCI Model FWI 12

Options: 1 row heating and 3 row cooling coils, direct drive fan, 115V 1/20HP motor, 1" pleated filter, fanspeed control assembly, thermostat controller, actuator

Cabinet Construction Summary

Panel Construction: 18 Gauge Galvanized Steel (exterior), closed cell foam insulation (interior)

UUT Properties

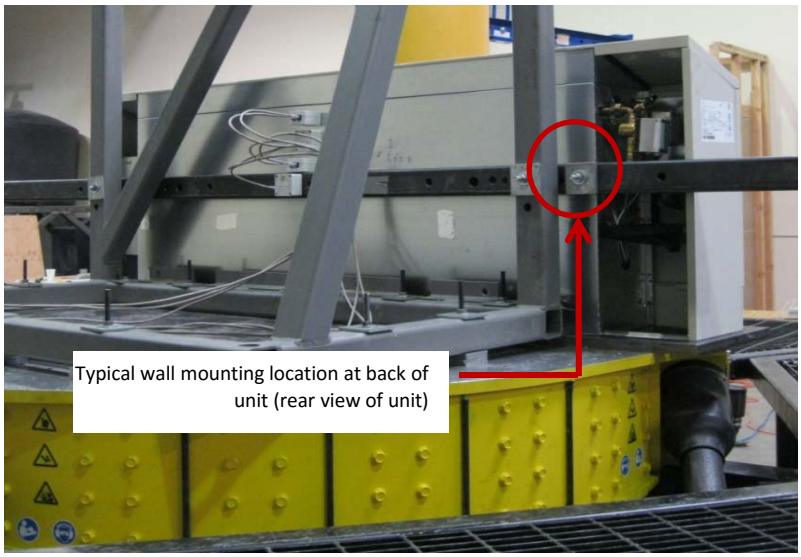
Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	**Width**	**Height**	**Front-Back**	**Side-Side**	**Vertical**
180	Main Cabinet	85	10	28 3/4	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1	1.5	4.00	3.00	1.67	0.67

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

The unit was mounted at the base using four #14 sheet metal screws through the flange at the unit's base. The unit was mounted at the back using the two manufacturer-provided brackets integral to the unit and one 1/2-inch diameter Grade 5 bolt per bracket to attach the unit to the DCL shake table interface frame. The manufacturer-provided brackets at the back of the unit were located at approximately 12 inches from the unit's base.



Mounting locations at base of unit (interior view of unit)

UUT9 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KVPH 03, JCI Model FSC 03

Options: 2 row heating and 3 row cooling coils, direct drive fan, 120V 1/35HP motor, 1" pleated filter, fanspeed control assembly, pipe sensor, thermostat controller, actuators

Cabinet Construction Summary

Panel Construction: 18 Gauge Galvanized Steel (exterior), Fiberglass (interior)

UUT Properties

Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
190	Main Cabinet	18	18	88	N/A	N/A	N/A

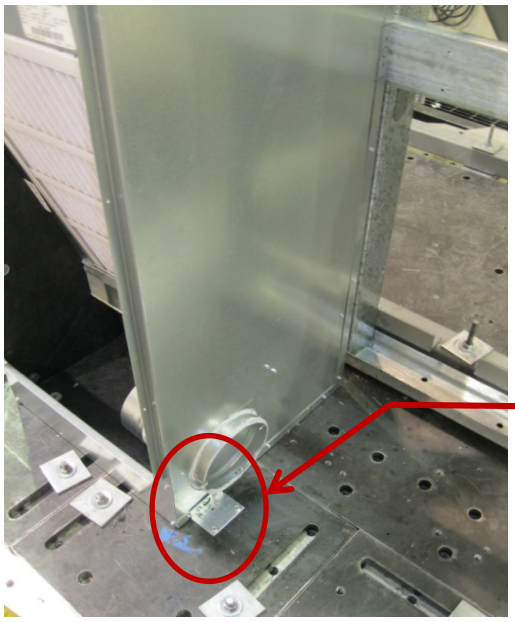
Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1	1.5	4.00	3.00	1.67	0.67

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

The unit was mounted at the bottom and back using four manufacturer-provided angle clips (two on each front-bottom corner, and one on each side at approximately 58.5 inches high. Each clip was held in place using four #12, 3/4-inch long sheet metal screws; two screws were attached through the unit, and two through the DCL-provided steel fixture.

Mounting location at back of unit



Mounting location at base of unit

UUT10 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KVPH 12, JCI Model FSC 12

Options: 2 row heating and 3 row cooling coils, direct drive fan, 120V 1/4HP motor, 1" pleated filter, fanspeed control assembly, pipe sensor, thermostat controller, actuators

Cabinet Construction Summary

Panel Construction: 18 Gauge Galvanized Steel (exterior), Fiberglass (interior)

UUT Properties

Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
260	Main Cabinet	24	24	88	N/A	N/A	N/A

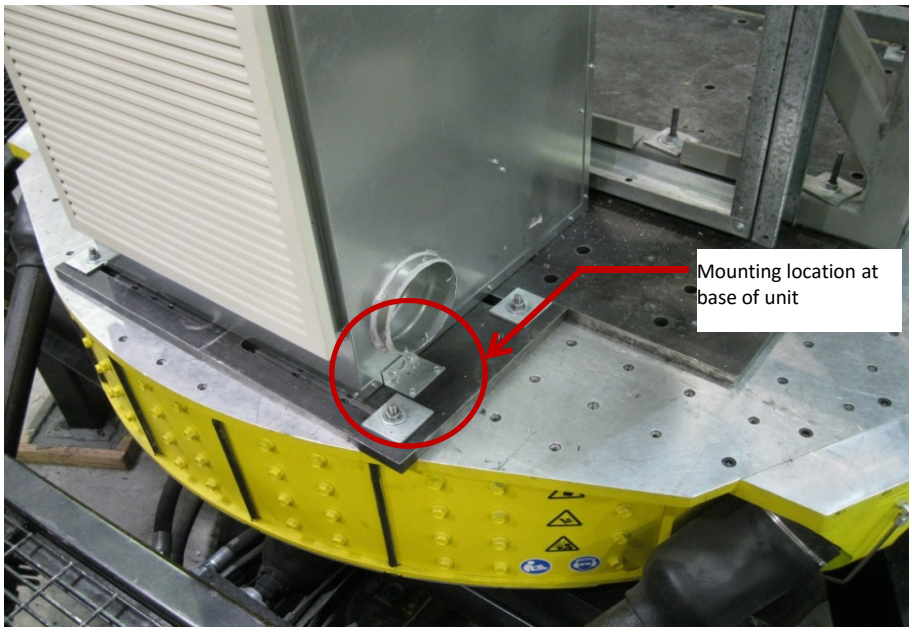
Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1	1.5	4.00	3.00	1.67	0.67

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

The unit was mounted at the bottom and back using four manufacturer-provided angle clips (two on each front-bottom corner, and one on each side at approximately 58.5 inches high. Each clip was held in place using four #12, 3/4-inch long sheet metal screws; two screws were attached through the unit, and two through the DCL-provided steel fixture.

Mounting location at back of unit


Mounting location at base of unit

UUT23 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KHGP 06, JCI Model FNP 06

Options: 2 row heating and 6 row cooling coils, direct drive fan, 115V 1/4HP motor, 2" pleated filter, dampers, Metasys controller, fanspeed control assembly, actuator, airflow switch and transformer

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), Fiberglass (interior)

UUT Properties

Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
161	Main Cabinet*	47 3/8	37	16 3/4	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1	1.5	4.00	3.00	1.67	0.67

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

*Main cabinet dimensions include mixing box, which is integral to the tested unit.

The unit was ceiling-suspended using (4) 90 deg. brackets on the side and 4 flat brackets on the top of each of the four corners. Each bracket attached to unit using four #12 3/4" SMS. Each flat bracket overlaps the 90 deg. bracket, and a 1/2" threaded rod is attached through each and up into the fixture frame. Each threaded rod is stiffened using a length of unistrut and three B-line 1/2-inch clips, placed two inches from the top and bottom of the unistrut, and one at the approximate middle of the unistrut. Lateral bracing accomplished using 14 gage 45 degree brackets provided by JCI, 3/16" cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT26 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KHGP 20, JCI Model FNP 20

Options: 2 row heating and 6 row cooling coils, direct drive fan, 115V 1/4HP motor, 2" pleated filter, dampers, Metasys controller, fanspeed control assembly, fan coil unit relay board, actuator, airflow switch and transformer

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), Fiberglass (interior)

UUT Properties

Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	**Width**	**Height**	**Front-Back**	**Side-Side**	**Vertical**
260	Main Cabinet*	47 3/8	70	16 3/4	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	1.93	1	1.5	3.09	2.32	1.29	0.51

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

*Main cabinet dimensions include mixing box, which is integral to the tested unit.

Unit was ceiling-suspended using (4) 90 deg. brackets on the side and 4 flat brackets on the top of each of the four corners. Each bracket attached to unit using four #12 3/4" SMS. Each flat bracket overlaps the 90 deg. bracket, and a 1/2" threaded rod is attached through each and up into the fixture frame. Each threaded rod is stiffened using a length of unistrut and three B-line 1/2-inch clips, placed two inches from the top and bottom of the unistrut, and one at the approximate middle of the unistrut. Lateral bracing accomplished using 14 gage 45 degree brackets provided by JCI, 3/16" cable with 4 saddle clamps per cable (2 saddle clamps at each connection).

UUT33 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KVGH 04, JCI Model FCC 04

Options: 2 row heating and 4 row cooling coils, direct drive fan, 115V 1/3HP motor, 1" throwaway filter, dampers, control board, fan coil unit relay board

Cabinet Construction Summary

Panel Construction: 18 Gauge Galvanized Steel (exterior), Fiberglass (interior)

UUT Properties

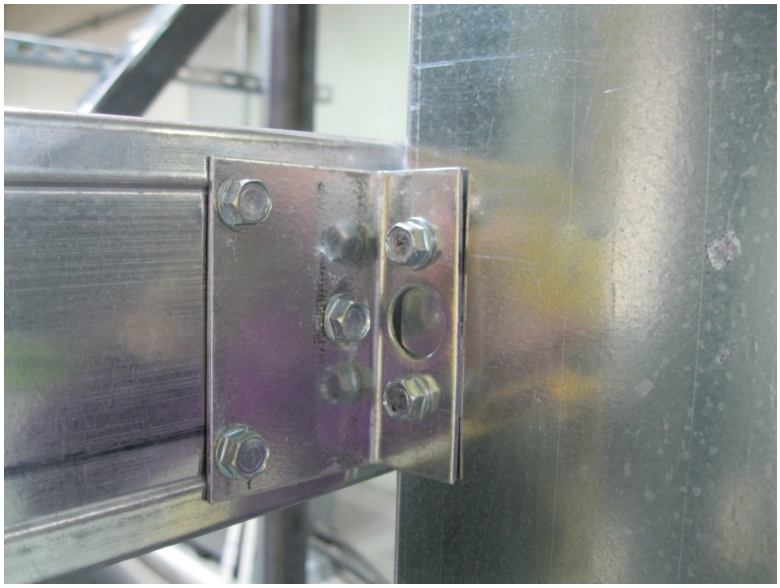
Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
160	Main Cabinet	22	23	49	N/A	N/A	N/A
	Supply Plenum	22	15	15			
	Mixing Box	22	15	15			

Seismic Test Parameters

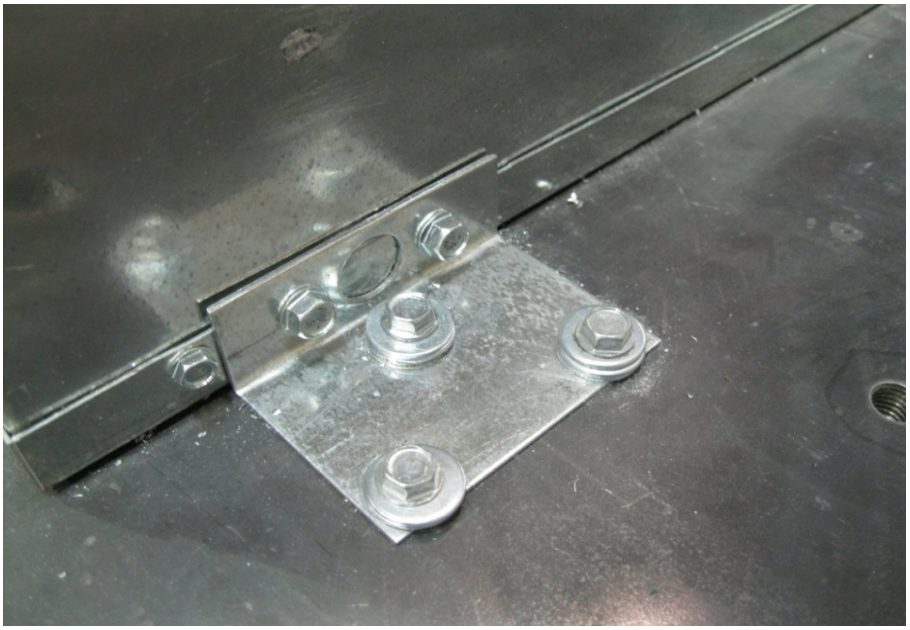
Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1	1.5	4.00	3.00	1.67	0.67

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

The unit was mounted at the bottom and back using four manufacturer-provided angle clips (one on each bottom-front corner, and one on each side at approximately 55 inches high. Each clip was held in place using five #12, 3/4-inch long sheet metal screws; two screws were attached through the unit, and three through the DCL-provided steel fixture.



Mounting bracket at back of unit



Mounting bracket at base of unit

UUT34 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KVGH 20, JCI Model FCC 20

Options: 2 row heating and 4 row cooling coils, direct drive fan, 115V 1/3HP motor, 1" throwaway filter, dampers, control board, fan coil unit relay board

Cabinet Construction Summary

Panel Construction: 18 gage galvanized Steel (exterior), 1/2" fiberglass insulation

UUT Properties

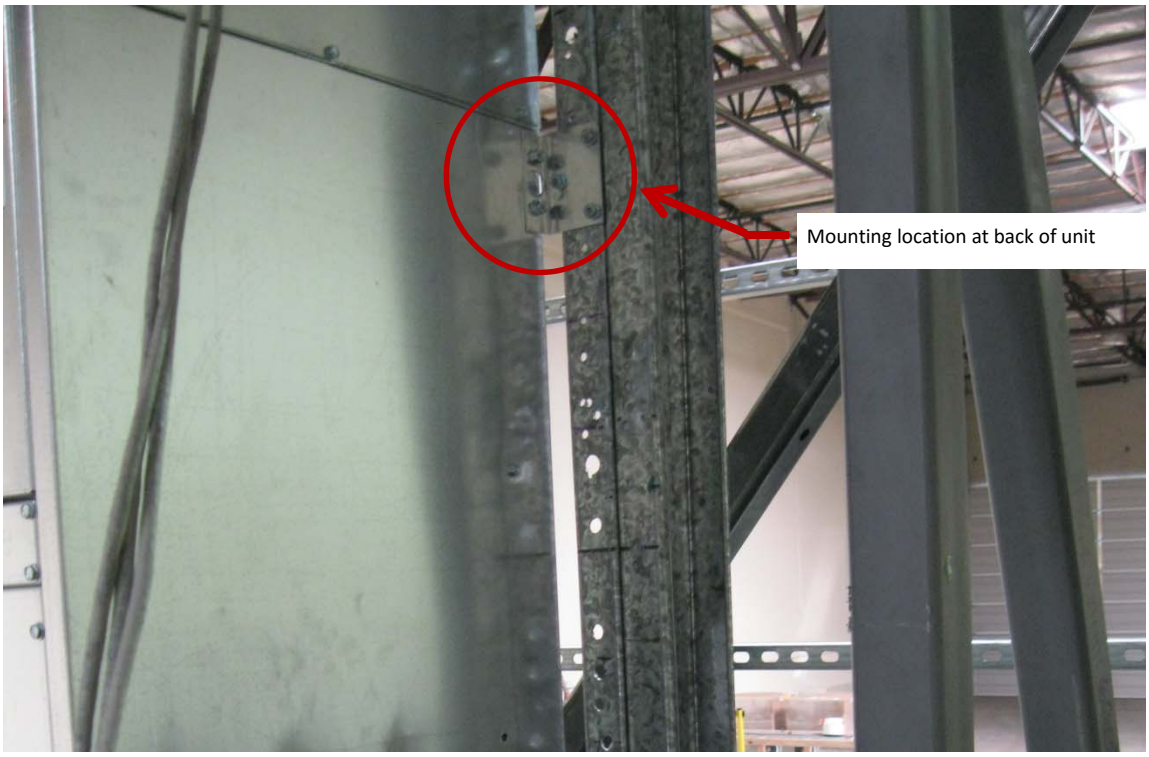
Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
350	Main Cabinet	46.0	36.0	49.0	N/A	N/A	N/A
	Supply Plenum	46.0	18.0	18.0			
	Mixing Box	46.0	18.0	18.0			

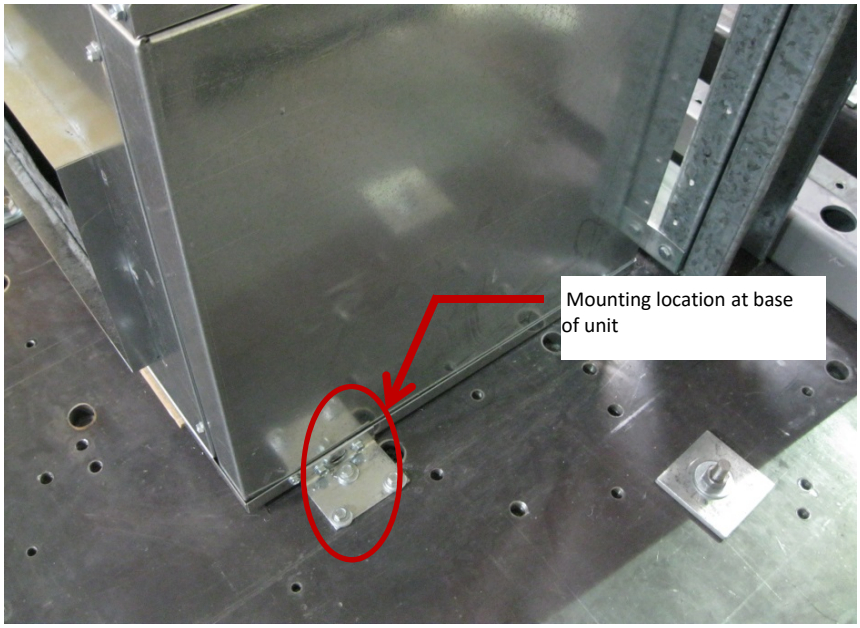
Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1	1.5	4.00	3.00	1.67	0.67

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

The unit was mounted at the bottom and back using four manufacturer-provided angle clips (two on each front-bottom corner, and one on each side at approximately 58.5 inches high. Each clip was held in place using five #12, 3/4-inch long sheet metal screws; two screws were attached through the unit, and three through the DCL-provided steel fixture.


Mounting location at back of unit


Mounting location at base of unit

UUT35 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KHGE 06, JCI Model FNE 06

Options: 2 row heating and 6 row cooling coils, direct drive fan, 115V 1/3HP motor, 2" pleated filter, fan coil unit relay board

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), Fiberglass (interior)

UUT Properties

Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
152	Main Cabinet	31 7/8	31 1/4	18	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	1.93	1	1.5	3.09	2.32	1.29	0.51

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

The unit was ceiling-suspended using the mounting brackets integral to the unit. A 1/2" diameter threaded rod was attached through each bracket and up into the fixture frame, with the unit hanging at approximately 15 1/4 inches below the fixture frame. The rod spacing was 16.5 inches in the short direction of the unit, and a maximum of 22 inches in the long direction. Each threaded rod was stiffened using a length of P1000 channel and three B-line 1/2-inch clips, placed at the top, bottom, and approximate center of the channel. Lateral bracing consisted of (8) lengths of 3/16" wire rope and (16) 10 gage 2"x5.5" galvanized carbon steel brackets provided by JCI, bent in the middle at a 45 degree angle. The brackets were placed at each end of the wire rope, and secured with (2) saddle clamps per rope.

UUT36 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KHGE 20, JCI Model FNE 20

Options: 2 row heating and 6 row cooling coils, direct drive fan, 115V 1/3HP motor, 2" pleated filter, fan coil unit relay board

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), Fiberglass (interior)

UUT Properties

Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
286	Main Cabinet	31 7/8	64 1/4	18	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	1.93	1	1.5	3.09	2.32	1.29	0.51

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

The unit was ceiling-suspended using the mounting brackets integral to the unit. A 1/2" diameter threaded rod was attached through each bracket and up into the fixture frame, with the unit hanging at approximately 15 1/4 inches below the fixture frame. The rod spacing was 16.5 inches in the short direction of the unit, and a maximum of 55 inches in the long direction. Each threaded rod was stiffened using a length of P1000 channel and three B-line 1/2-inch clips, placed at the top, bottom, and approximate center of the channel. Lateral bracing consisted of (8) lengths of 3/16" wire rope and (16) 10 gage 2"x5.5" galvanized carbon steel brackets provided by JCI, bent in the middle at a 45 degree angle. The brackets were placed at each end of the wire rope, and secured with (2) saddle clamps per rope.

UUT37 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KHFP 02, JCI Model FHP 02

Options: 2 row heating and 6 row cooling coils, direct drive fan, 115V 1/4HP motor, 1" throwaway filter, fan coil unit relay board

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), Fiberglass (interior)

UUT Properties

Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
24	Main Cabinet	25 1/4	25 1/4	10 3/4	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	1.93	1	1.5	3.09	2.32	1.29	0.51

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

The unit was ceiling-suspended using the mounting brackets integral to the unit. A 1/2" diameter threaded rod was attached through each bracket and up into the fixture frame, with the unit hanging at approximately 15 1/4 inches below the fixture frame. The rod spacing was 12.5 inches in one direction of the unit, and 17.5 inches in the other. Each threaded rod was stiffened using a length of P1000 channel and three B-line 1/2-inch clips, placed at the top, bottom, and approximate center of the channel. Lateral bracing consisted of (8) lengths of 3/16" wire rope and (16) 10 gage 2"x5.5" galvanized carbon steel brackets provided by JCI, bent in the middle at a 45 degree angle. The brackets were placed at each end of the wire rope, and secured with (2) saddle clamps per rope.

UUT38 Unit Under Test Summary Sheet

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line

Model Number: KRUEGER Model KHFP 12, JCI Model FHP 12

Options: 2 row heating and 6 row cooling coils, direct drive fan, 115V 1/10HP motor, 1" throwaway filter, fan coil unit relay board

Cabinet Construction Summary

Panel Construction: 20 Gauge Galvanized Steel (exterior), Fiberglass (interior)

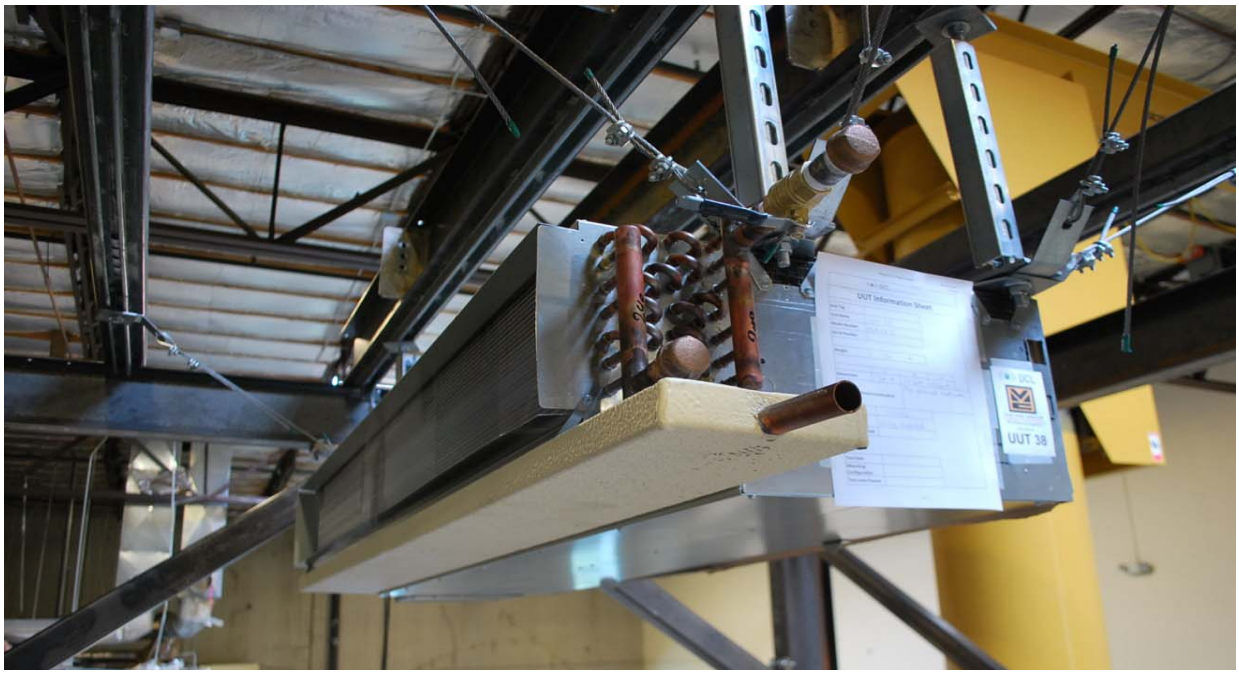
UUT Properties

Weight (lb)		Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	**Width**	**Height**	**Front-Back**	**Side-Side**	**Vertical**
71	Main Cabinet	69 1/4	25 1/4	10 3/4	N/A	N/A	N/A

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	1.93	1	1.5	3.09	2.32	1.29	0.51

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



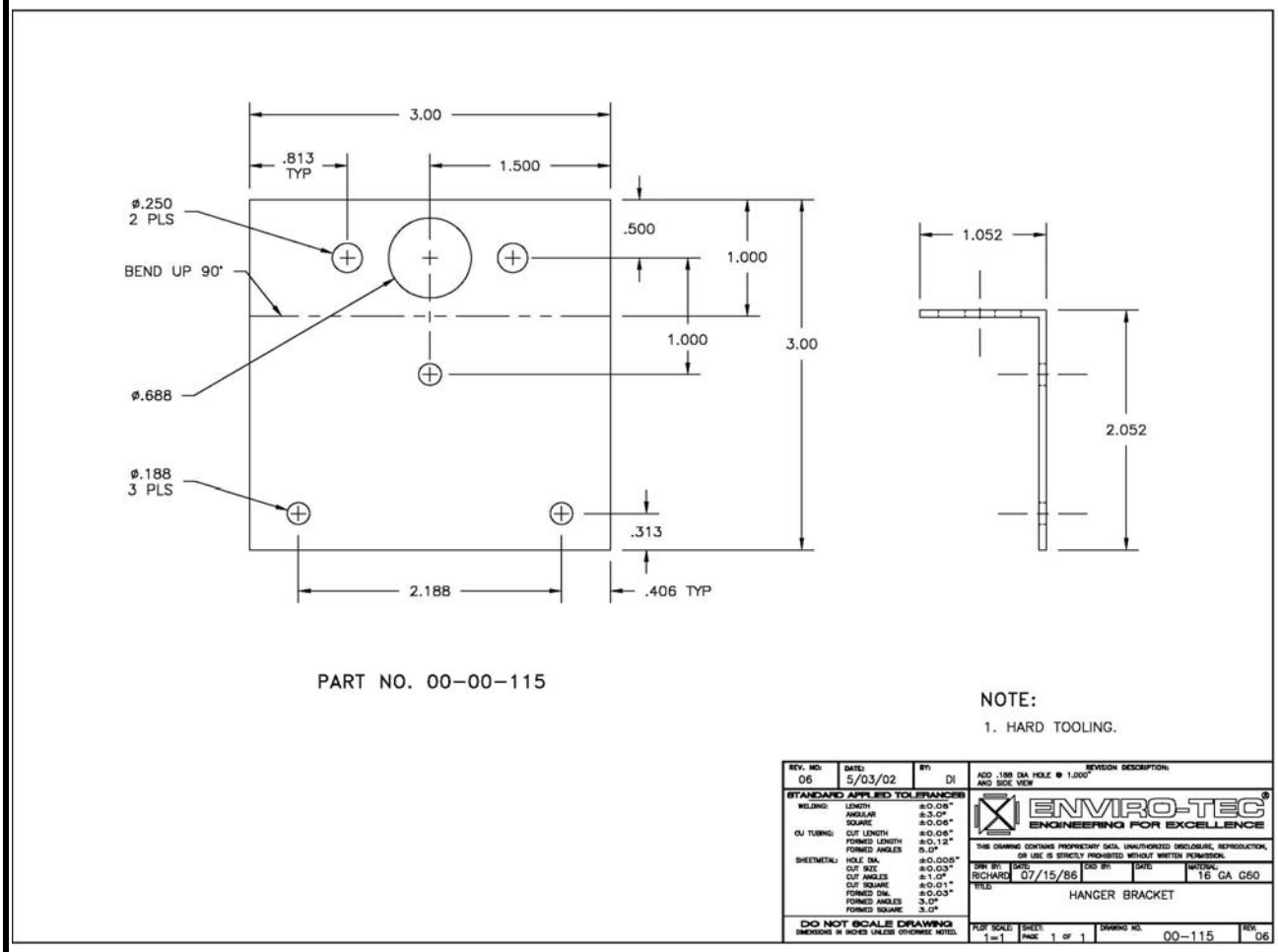
The unit was ceiling-suspended using the mounting brackets integral to the unit. A 1/2" diameter threaded rod was attached through each bracket and up into the fixture frame, with the unit hanging at approximately 15 1/4 inches below the fixture frame. The rod spacing was 12.5 inches in one direction of the unit, and 61.5 inches in the other. Each threaded rod was stiffened using a length of P1000 channel and three B-line 1/2-inch clips, placed at the top, bottom, and approximate center of the channel. Lateral bracing consisted of (8) lengths of 3/16" wire rope and (16) 10 gage 2"x5.5" galvanized carbon steel brackets provided by JCI, bent in the middle at a 45 degree angle. The brackets were placed at each end of the wire rope, and secured with (2) saddle clamps per rope.

Angle Clip Detail
UUT5, UUT9-10, UUT33-34

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line



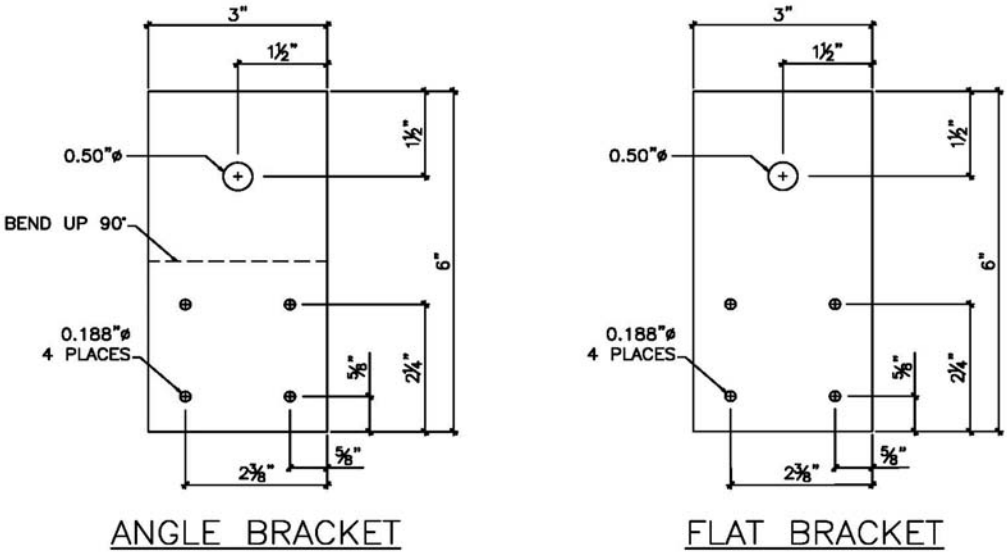
Note: Angle clips used for mounting UUT5, UUT9-10 and UUT33-34. Clip material is 16 gage G60 galvanized steel. Each clip was held in place using four #12, 3/4-inch long sheet metal screws; two screws were attached through the unit, and two through the DCL-provided steel fixture.

Mounting Bracket Details
UUT23, UUT26

DCL Dynamic Certification Laboratories

Manufacturer: KRUEGER

Product Line: Commercial Product Line



Note: Bracket material is 16 gage G60 galvanized steel.

Photograph showing typical mounting for UUT23, UUT26.

For UUT23 and UUT26, the unit was ceiling-mounted using (4) angle brackets on the side and 4 flat brackets on the top of each of the four corners. Each bracket was attached to unit using four #14 3/4" SMS as shown in the above photograph.