APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY	
APPLICATION #:	OSP – 0271-10

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Twin City Fan Companies

Manufacturer's Technical Representative: Matt Settergren

Mailing Address: 5959 Trenton Lane North, Plymouth, MN 55442

Telephone: 763.551.7535 Email: msettergren@tcf.com

Product Information

Product Name: Inline Fans

Product Type: Mixed Flow and Centrifugal Inline Fans

Product Model Number: Various; See Certified Product Matrix Table 1
(List all unique product identification numbers and/or part numbers)

General Description: Vibration Isolated Mixed Flow and Inline Centrifugal air handling fans, See Certified Product Matrix. Seismic enhancement made to the test units/modifications required to address the anomalies observed during the tests shall be incorporated into the production units.

Mounting Description: Base mounted on spring isolators with seismic restraints and suspended with spring isolators and seismic cable restraints.

Applicant Information

Applicant Company Name: The VMC Group

Contact Person: John P. Giuliano

Mailing Address: 113 Main Street, Bloomingdale, NJ 07403

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

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

Signature of Applicant: Date: 9/28/16

Title: President Company Name: The VMC Group

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

Company Name: The VMC Group

Name: Ken Tarlow, SE California License Number: SE2851

Mailing Address: 113 Main St, Bloomingdale, NJ 07403

Telephone: 973-838-1780 Email: ken.tarlow@thevmcgroup.com

Supports and Attachments Preapproval

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

☒ Supports and attachments are not preapproved

Certification Method

☒ Testing in accordance with: ☒ ICC-ES AC156

☐ Other (Please Specify): _____

Testing Laboratory

Company Name: Twin City Fan Companies

Contact Name: Matt Settergren

Mailing Address: 5955 Trenton Lane North, Plymouth, MN 55442

Telephone: 973-838-1780 Email: msettergren@tcf.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 Table 1

S_{DS} (Design spectral response acceleration at short period, g) = See Table 1

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

R_p (Equipment or component response modification factor) = 2.0(Spring Isolated Floor); 2.5(Suspended Isolated

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

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

Equipment or Component Natural Frequencies (Hz) = See attached tables

Overall dimensions and weight (or range thereof) = See attached tables

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: 11/1/2016

Print Name: M. R. Karim Title: SHFR

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

Condition of Approval (if applicable):

Table 1: Certified Inline Fans

Manufacturer	Approved Twin City Model	Approved Aerovent Model	Size	Max Dimensions (in)			Tested Weight (lb)	Max Weight[1] (lb)	Testing Scope	SDS[4]	z/h[4]	Fp/Wp[4]	Mounting Configuration	Construction	Accessories/Subcomponent Summary
				Depth	Width	Height									
Twin City Fan	TCLB/TCLBR QCLB/QCLBR/ QCLBSH	LCBD/LCBDR LAMX/LAMXR/ LAMXSH	90A1	22.25	19.63	38.50	134	---	UUT 17	2.0 2.5	1 0	4.50 1.88	Spring Isolators with Snubbers Horizontal Base Mounted Motor Positions A, B, C, G, H	Carbon Steel/ Aluminum/ Stainless Steel Wheels Carbon Steel/ Aluminum/ Stainless Steel Housings Belt Driven, Arrangement 9, Horizontal Shaft Rotation Axis Class I & II Construction	Electric Motors[2] Bolted/Hinged Access Door Two Restaurant Cleanout Doors Standard Drain/Drain with Plug Inlet/Outlet Flange Aluminum Inlet/Outlet Screen Stainless Steel Inlet/Outlet Screen Carbon Steel Inlet/Outlet Screen Weather Cover-Standard Type with Closed Slot Mounting Tab[3] Weather Cover-Hinged Type with Closed Slot Mounting Tab[3] Belt Guard Belt Tube High Temperature Package High Temperature Caulk Fins on Wheel Backplate Shaft Seal-Standard Type Extended Lube Lines -Standard Type Extended Lub Lines-Copper Type Mounted NEMA 1 Carbon Steel Disconnect Switch Mounted NEMA 3R Carbon Steel Disconnect Switch Mounted NEMA 4X Stainless Steel Disconnect Switch Piezometer Flow Measurement Ring Carbon Steel Painted Finish Trapezoidal Leg Gusset[3] Additional Seismic Bracing consisting of pipe supports, corner gussets and doubler plates[3]
			90A2	22.25	19.63	38.50	142	---	UUT 26	2.0 2.5	1 0	4.50 1.88			
			90A2	19.75	32.00	24.00	168	---	UUT 1	2.5	1	5.63			
			105	22.25	33.57	33.57	---	219	Interpolated	2.0 2.5	1 0	4.50 1.88			
			122	23.25	36.06	36.06	---	248							
			135	25.75	39.38	39.38	---	298							
			150	26.88	40.88	40.88	---	307							
			165	29.38	43.00	43.00	---	324							
			182	32.19	49.38	49.38	---	435							
			200	35.00	52.75	52.75	---	474							
			222	37.13	57.31	57.31	---	610							
			245	40.63	62.75	62.75	---	677							
			270	44.44	66.25	66.25	---	818							
			300	50.06	71.38	71.38	---	992							
			330	54.63	76.00	76.00	---	1181							
			365	60.19	79.00	79.00	---	1294							
			402	66.38	84.50	84.50	---	1557							
			445	73.19	92.75	92.75	---	1831							
			490	80.25	99.13	99.13	---	2197							
			542	89.13	113.50	113.50	---	2981							
			600	97.75	123.19	123.19	---	3875							
	TSL QSL/QSLR/ QSLSH	CBD AMX/AMXR/ AMXSH	122	25.25	35.13	35.13	---	356							
			150	29.75	39.73	39.73	---	462							
			165	30.62	42.79	42.79	---	529							
			182	33.89	50.45	50.45	---	606							
			200	37.18	54.20	54.20	---	674							
			222	40.19	59.15	59.15	---	838							
			245	44.31	64.61	64.61	---	889							
			270	54.00	62.00	68.00	1244	---	UUT 2	2.5	1	5.63			
			270	48.83	69.41	69.41	---	1244	Interpolated	2.0 2.5	1 0	4.50 1.88			
			300	54.52	74.38	74.38	---	1411							
			330	59.90	77.81	77.81	---	1695							
			365	66.37	82.75	82.75	---	2044							
			402	73.00	94.77	94.77	---	2328							
			402	70.75	59.75	104.77	2328	---	UUT 16	2.0 2.5	1 0	4.50 1.88			
			445	80.92	102.72	102.72	---	3026	Interpolated	2.0 2.5	1 0	4.50 1.88			
			490	88.99	109.18	109.18	---	3589							
			542	98.71	117.01	117.01	---	4617							
			600	108.74	125.47	125.47	---	5882							
			660	120.11	134.77	134.77	---	7500							
			730	132.77	144.76	144.76	---	7700							
			730	134.00	107.00	155.00	7700	---	UUT 3	2.5	1	5.63			
	CDD	TSL (Arr. 4)	12	22.25	33.75	33.75	251	---	UUT 4	2.5	1	5.63	Spring Isolators with Snubbers Horizontal Base Mounted	Carbon Steel/ Aluminum Wheels Carbon Steel/ Aluminum Housings Direct Drive, Arrangement 4, Horizontal Shaft Rotation Axis Class I, II & III Construction	Electric Motors[2] Bolted/Hinged Access Door Standard Drain/Drain with Plug Inlet/Outlet Flange Aluminum/Carbon Steel Inlet/Outlet Screen Mounted NEMA 1 & 3R Carbon Steel Disconnect Switch Mounted NEMA 4X Stainless Steel Disconnect Switch Piezometer Flow Measurement Ring Carbon Steel/Aluminum Painted Finish Seismic Stand Side Gusset[3] Seismic Stand End Gusset[3] Seismic Gusset Reinforcement[3] Seismic Motor Gusset[3] Seismic Floor Mounting Pad[3]
			14	22.25	33.57	33.57	260	---	UUT 23	2.0 2.5	1 0	4.50 1.88			
			16	23.25	36.06	36.06	---	360	Interpolated	2.0 2.5	1 0	4.50 1.88			
			18	25.75	39.38	39.38	---	390							
			20	26.88	40.88	40.88	---	555							
			22	29.38	43.00	43.00	---	715							
			25	32.19	49.38	49.38	---	895							
			28	35.00	52.75	52.75	---	1135							
			32	37.13	57.31	57.31	---	1410							
			35	40.63	62.75	62.75	---	1675							
			39	44.44	66.25	66.25	---	2120							
			44	50.06	71.38	71.38	2897	---	UUT 5	2.5	1	5.63			
									UUT 20, 22	2.0 2.5	1 0	4.50 1.88			

Notes:

1. Max Weight Includes largest motor

2. See motor summary for more information

3. See subcomponent summary for more information

4. Certification is limited to the lower rating on either the Certified Fan Tables, as listed above, or as listed on the Certified Subcomponents Tables.

Table 1: Certified Inline Fans (Continued)

Manufacturer	Approved Twin City Model	Approved Aerovent Model	Size	Max Dimensions (in)			Tested Weight (lb)	Max Weight[1] (lb)	Testing Scope	SDS[4]	z/h[4]	Fp/Wp[4]	Mounting Configuration	Construction	Accessories/Subcomponent Summary
				Depth	Width	Height									
Twin City Fan	DSI	SCDD	080A	19	15.33	15.33	57	---	UUT 6	2.5	1	5.63	Spring Isolators with Snubbers Horizontal Base Mounted Motor Positions A, C, G	Galvanized Steel/ Aluminum Wheels Galvanized Steel/ Aluminum Housings Direct Drive, Arrangement 4 (DSI) Belt Driven, Arrangement 9 (BSI) Horizontal Shaft Rotation Axis	Electric Motors[2] Inlet/Outlet Collar Aluminum Inlet/Outlet Screen Galvanized Steel Inlet/Outlet Screen Stainless Steel Hardware Stainless Steel Shaft Insulated Housing-Neoprene Coated Insulation Insulated Housing-Foil Backed Insulation Motor Cover-Standard Type with Closed Slot Mounting Tab[3] Belt Guard Belt Tube Fins on Wheel Backplate Shaft Seal-Standard Type Extended Lube Lines -Standard Type Mounted NEMA 1 Carbon Steel Disconnect Switch Mounted NEMA 3R Carbon Steel Disconnect Switch Mounted NEMA 4 Polycarbonate Disconnect Switch Painted Finish Seismic Isolator Reinforcement Washer[3] Seismic Support Frame[3] Seismic Support Strut, Top[3] Seismic Support Strut, Bottom[3] Seismic Bearing Support Back Plate[3]
			080A	21.00	15.33	21.33	58	---	UUT 19	2.0 2.5	1 0	4.50 1.88			
			080A	19.00	15.33	15.33	---	63	Interpolated	2.0 2.5	1 0	4.50 1.88			
			090A	19.00	15.33	15.33	---	76							
			100A	20.50	17.81	17.81	---	106							
			120A	21.50	19.38	19.38	---	127							
			135A/135AN	23.00	21.56	21.56	---	132							
			150A/150AN	24.00	23.82	23.82	---	157							
			165A/165AN	26.00	26.50	26.50	160	---	UUT 7	2.5	1	5.63			
			165A/165AN	28.00	26.50	32.50	152 150	---	UUT 30 UUT 32	2.0 2.5	1 0	4.50 1.88			
			165A/165AN	26.00	26.50	26.50	---	165	Extrapolated	2.0 2.5	1 0	4.50 1.88			
	BSI	SCBD	080A	19.00	15.33	15.33	---	99	Extrapolated	2.0 2.5	1 0	5.63			
			080A	19.00	27.33	15.33	99	---	UUT 8	2.5	1	5.63			
			090A	19.00	15.33	15.33	---	102	Interpolated	2.0 2.5	1 0	4.50 1.88			
			100A	20.50	17.81	17.81	---	106							
			120A	21.50	19.38	19.38	---	127							
			135A/135AN	23.00	21.56	21.56	---	132							
			150A	26.00	23.82	42.57	132	---	UUT 28	2.0 2.5	1 0	4.50 1.88			
			150A/150AN	24.00	23.82	23.82	---	161	Interpolated	2.0 2.5	1 0	4.50 1.88			
			165A/165AN	26.00	26.50	26.50	---	167							
			180A/180AHP	28.50	29.00	29.00	---	193							
			210A/210AHP	32.00	32.34	32.34	---	223							
			225A/225AHP	34.00	34.00	34.00	---	287							
			245A/245AHP	36.50	37.50	37.50	---	352							
			270A/270AHP	39.00	40.13	40.13	---	394							
			300A/300AHP	41.50	44.13	44.13	---	537							
			300A	41.50	44.13	64.13	537	---	UUT 14	2.5	1	5.63			
			330A/330AHP	45.50	48.81	48.81	---	554	Interpolated	2.0 2.5	1 0	4.50 1.88			
			365A/365AHP	48.50	50.13	50.13	---	665							
			402A/402AHP	52.00	55.25	55.25		822							
			402A	52.00	55.25	75.25	822	---	UUT 9	2.5	1	5.63			
	DSI	SCDD	080A	21.00	15.33	15.33	40	---	UUT 29 UUT 31	2.0 2.5	1 0	3.60 1.50	Hanging Spring Isolators with Seismic Restraint Cables Horizontal Ceiling Hung Mounted Motor Positions A, C, E, G		
				19.00	15.33	15.33	57	---	UUT 10	2.5	1	4.50			
			080A	19.00	15.33	15.33	---	63	Interpolated	2.0 2.5	1 0	3.60 1.50			
			090A	19.00	15.33	15.33	---	76							
			100A	20.50	17.81	17.81	---	106							
			120A	21.50	19.38	19.38	---	127							
			135A/135AN	23.00	21.56	21.56	---	132							
			150A/150AN	24.00	23.82	23.82	---	157							
			165AN	26.00 28.00	26.50	32.50	134 140	---	UUT 21 UUT 24	2.0 2.5	1 0	3.60 1.50			
			165A	26.00	26.50	26.50	160	---	UUT 11	2.5	1	4.50			
			165A/165AN	26.00	26.50	26.50	---	167	Extrapolated	2.0 2.5	1 0	3.60 1.50			
	BSI	SCBD	080A	19.00	15.33	15.33	---	99	Extrapolated	2.0 2.5	1 0	3.60 1.50			
			080A	19.00	27.33	15.33	99	---	UUT 12	2.5	1	4.50			
			090A	19.00	15.33	15.33	---	102	Interpolated	2.0 2.5	1 0	3.60 1.50			
			100A	20.50	17.81	17.81	---	106							
			120A	21.50	19.38	19.38	---	127							
			135A/135AN	23.00	21.56	21.56	---	132							
			150A	26.00	36.57	23.82	130 140	---	UUT 27 UUT 25	2.0 2.5	1 0	3.60 1.50			
				26.00	36.57	36.57	146	---	UUT 18	2.0 2.5	1 0	3.60 1.50			
			150A/150AN	24.00	23.82	23.82	---	161	Interpolated	2.0 2.5	1 0	3.60 1.50			
			165A/165AN	26.00	26.50	26.50	---	167							
			180A/180AHP	28.50	29.00	29.00	---	193							
			210A/210AHP	32.00	32.34	32.34	---	223							
			225A/225AHP	34.00	34.00	34.00	---	287							
			245A/245AHP	36.50	37.50	37.50	---	352							
			270A/270AHP	39.00	40.13	40.13	---	394							
			300A/300AHP	41.50	44.13	44.13	---	537							
			300A	41.50	64.13	44.13	537.00	---	UUT 15	2.5	1	4.50			
			330A/330AHP	45.50	48.81	48.81	---	554	Interpolated	2.0 2.5	1 0	3.60 1.50			
			365A/365AHP	48.50	50.13	50.13	---	665							
			402A/402AHP	52.00	55.25	55.25	---	822							
			402A	52.00	75.25	55.25	822	---	UUT 13	2.5	1	4.50			

Notes:

1. **Max Weight Includes largest motor**
2. **See motor summary for more information**
3. **See subcomponent summary for more information**
4. **Certification is limited to the lower rating on either the Certified Fan Tables, as listed above, or as listed on the Certified Subcomponents Tables.**

Table 2a: Certified Subcomponents: Belt Driven Motors[1]

Motor HP	Weight	Baldor		Teco-Westinghouse		RBC / AO Smith / Century / Marathon		TCF/JLRBC	
		Horizontal Base Mount	Horizontal Ceiling Hung	Horizontal Base Mount	Horizontal Ceiling Hung	Horizontal Base Mount	Horizontal Ceiling Hung	Horizontal Base Mount	Horizontal Ceiling Hung
1/8	12	Extrapolated		Extrapolated	Extrapolated	Extrapolated	Extrapolated		Extrapolated
1/4	18					UUT 28	UUT 27		
1/3	19					Interpolated	Interpolated		
1/2	27								
3/4	34								
1	38	UUT 17						UUT 8	UUT 12
1-1/2	40	Interpolated							Interpolated
2	41			UUT 26	UUT 25				
3	72			Interpolated	Interpolated				UUT-18
5	80					UUT 1			
7-1/2	149					UUT 14	UUT 15		
10	180					Interpolated			
15	316				UUT 13	UUT 9			
20	348					Interpolated			
25	380								
30	433	UUT 2							
40	560					UUT 16			
50	754								
60	800								
75	840								
100	1120								
125	1833			UUT 3					

Table 2b: Certified Subcomponents: Direct Driven Motors[1]

Motor HP	Weight	Baldor		Teco-Westinghouse		RBC / AO Smith / Century / Marathon		TCF/JLRBC		Worldwide Electric
		Horizontal Base Mount	Horizontal Ceiling Hung	Horizontal Base Mount	Horizontal Ceiling Hung	Horizontal Base Mount	Horizontal Ceiling Hung	Horizontal Base Mount	Horizontal Ceiling Hung	Horizontal Base Mount
1/8	12	Extrapolated		Extrapolated	Extrapolated	Extrapolated	UUT 10	UUT 6	UUT 31	Extrapolated
1/4	18					UUT 19	Interpolated	Interpolated	Interpolated	
1/3	19				UUT 29	Interpolated				
1/2	27				Interpolated					
3/4	27									
1	38									
1-1/2	40									
2	41	UUT-4			UUT 21					
3	72	Interpolated		UUT 30		UUT 7	UUT 11	UUT 32	UUT 24	
5	80			Interpolated						UUT 23
7-1/2	149									Interpolated
10	180									
15	316									
20	348									
25	380									
30	433									
40	560	UUT-20		UUT-22						UUT 5

Notes:

1. All motors are available in voltages ranging from 110V to 575V based upon customer request.

Certified Motors
Excluded from Offering

2. Certification is limited to the lower rating on either the Certified Fan Tables, as listed above, or as listed on the Certified Subcomponents Tables.

Table 3: Certified Subcomponents: Miscellaneous Subcomponents

Twin City Fan Model Line	Size	subcomponent thickness (in)	Description	Manufacturer	Material	Drive	Comment	UUT
TCLB/TCLBR QCLB/QCLBR/QCLBSH/ TSL QSL/QSLR/QSLSH DSI/BSI CDD	All, UNO	0.11	Closed Slot Weather Cover Mounting Tab	Twin City Fan	Carbon Steel/ Aluminum/ Stainless Steel (Dependant upon fan construction, see certified product matrix)	Belt	Min. Qty (2) required on all weather covers	2, 3
	300-490	0.25	1.5" OD pipe supports with 1/4" thick corner gussets and doubler plates.				Additional seismic bracing. Corner gussets and doubler plates mounted at base of the mounting support and pipe supports extended from the base of the corner support to the center of fan housing.	N/A
	542-730	0.31	2" OD pipe supports with 5/16" thick corner gussets and doubler plates.					3
TSL QSL/QSLR/QSLSH	122-150	0.11	Trapezoidal Leg Gusset				Min. Qty (4) Trapezoidal Leg Gussets required per unit to have minimum of 4" of weld contact with fan housing	N/A
	182-270	0.14						2
	300-365	0.19						N/A
	402-490	0.25						
CDD	14-18	0.19	Seismic Stand Side Gusset			Direct	(2) Required on each unit between horizontal base mount support legs in the axial direction	5
	20-44	0.25						
	14-18	0.19	Seismic Stand End Gusset				Min. Qty (4) required to reinforce horizontal base mount support legs between fan housing and floor	
	20-44	0.25						
	14-18	0.19	Seismic Gusset Reinforcement				Min. Qty (4) required, (1) at each Seismic Gusset Reinforcement attachment point	
	20-44	0.25						
	14-28	0.25	Seismic Motor Gusset				Min. Qty (4) required to be mounted between motor and fan housing	
	32	0.31						
	35-44	0.38						
	14-44	0.25	Seismic Floor Mounting				(4) Required per unit, one at each corner.	
BSI	330-402	0.25	Seismic Isolator Reinforcement Washer		Galvanized Steel/ Aluminum (Dependant upon fan construction, see certified product matrix)	Belt	(4) Required per unit on inside corner of fan at isolator attachment point.	9,13
		0.19	Seismic Support Frame				(4) Required per unit	
		0.19	Seismic Support Strut, Top				(4) Required per unit, (2) on either side of Bearing Support Plate	
		0.19	Seismic Support Strut, Bottom				(4) Required per unit, (2) on either side of Bearing Support Plate	
		0.19	Seismic Bearing Support Back Plate				(1) Required per unit mounted on wheel side of bearing support	

Notes:

1. Certification is limited to the lower rating on either the Certified Fan Tables, as listed above, or as listed on the Certified Subcomponents Tables.

Table 4: UUT Specification & Data Sheets

Special Seismic Certification Test Units

Product Line	Model Tested	Dimensions (inches)			Weight (lb)	Mounting	UUT ID:
		Depth	Width	Height			
QCLB	90A1	19.75	32.00	24.00	168	Horizontal Base Mounted on Spring Isolators	UUT-1
TSL	270	54.00	62.00	68.00	1244	Horizontal Base Mounted on Spring Isolators	UUT-2
QSL	730	138.00	112.00	153.75	7760	Horizontal Base Mounted on Spring Isolators	UUT-3
CDD	12	23.00	22.00	26.06	251	Horizontal Base Mounted on Spring Isolators	UUT-4
CDD	44	62.00	69.00	74.25	2897	Horizontal Base Mounted on Spring Isolators	UUT-5
DSI	080A	19.00	15.33	15.33	57	Horizontal Base Mounted on Spring Isolators	UUT-6
DSI	165A	26.00	26.50	26.50	160	Horizontal Base Mounted on Spring Isolators	UUT-7
BSI	080A	19.00	27.33	15.33	99	Horizontal Base Mounted on Spring Isolators	UUT-8
BSI	402A	52.00	55.25	75.25	822	Horizontal Base Mounted on Spring Isolators	UUT-9
DSI	080A	19.00	15.33	15.33	57	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-10
DSI	165A	26.00	26.50	26.50	160	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-11
BSI	080A	19.00	27.33	15.33	99	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-12
BSI	402A	52.00	75.25	55.25	822	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-13
BSI	300A	41.50	44.13	64.13	537	Horizontal Base Mounted on Spring Isolators	UUT-14
BSI	300A	41.50	44.13	44.13	537	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-15
TSL	402	70.75	59.75	104.77	2328	Horizontal Base Mounted on Spring Isolators	UUT-16

Table 4: UUT Specification & Data Sheets (Continued)

Special Seismic Certification Test Units

Product Line	Model Tested	Dimensions (inches)			Weight (lb)	Mounting	UUT ID:
		Depth	Width	Height			
TCLB	90A2	22.25	19.63	38.50	134	Horizontal Base Mounted on Spring Isolators	UUT-17
BSI	150A	26.00	36.57	36.57	146	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-18
DSI	080A	21.00	15.33	21.33	58	Horizontal Base Mounted on Spring Isolators	UUT-19
CDD	44	62.00	69.00	74.25	1552	Horizontal Base Mounted on Spring Isolators	UUT-20
DSI	165AN	28.00	26.50	32.50	134	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-21
CDD	44	62.00	69.00	74.25	1710	Horizontal Base Mounted on Spring Isolators	UUT-22
CDD	14	26.00	24.00	28.06	238	Horizontal Base Mounted on Spring Isolators	UUT-23
DSI	165AN	28.00	26.50	32.50	140	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-24
BSI	150A	26.00	36.57	23.82	140	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-25
TCLB	090A2	22.25	19.63	38.50	142	Horizontal Base Mounted on Spring Isolators	UUT-26
BSI	150A	26.00	36.57	23.82	130	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-27
BSI	150A	26.00	23.82	42.57	132	Horizontal Base Mounted on Spring Isolators	UUT-28
DSI	080A	21.00	15.33	15.33	40	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-29
DSI	165AN	28.00	26.50	32.50	152	Horizontal Base Mounted on Spring Isolators	UUT-30
DSI	080A	21.00	15.33	15.33	40	Horizontal Ceiling Suspended with Spring Cable Restraints	UUT-31
DSI	165AN	28.00	26.50	32.50	150	Horizontal Base Mounted on Spring Isolators	UUT-32

UUT 1

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
QCLB, Mixed flow fan

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
90A1

Product Construction Summary:
Aluminum wheel, Aluminum housing, belt driven, horizontal base mounted, arrangement 9 with motor position C, horizontal shaft rotation axis.

Option / Component Summary:
(2) VMC MSS-1C-50 & (2) VMC MSS-1C-100 Seismic Spring Isolators, Motor: Marathon 5 HP, 208-230/460V, Belt Drive
Restaurant cleanout doors, punched inlet and outlet flange, aluminum inlet and outlet screens, OSHA belt guard painted OSHA yellow, drain with plug, belt tube, copper extended lube lines, mounted NEMA 1 disconnect switch, UL 762 package, AMCA Spark B construction, fins on wheel backplate, high temperature caulk

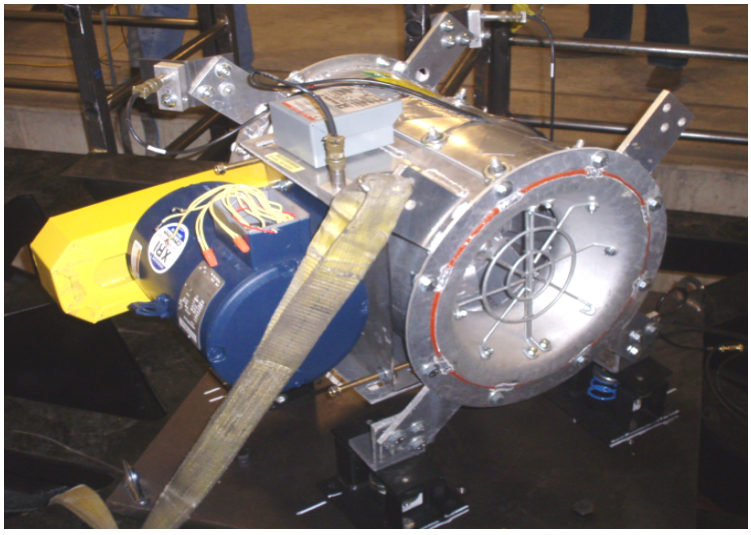
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
19.75	32.00	24.00	168	lb	3.80	4.28	3.18

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations,which used 3/8-16 UNC A307 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 2

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
TSL, Tubular centrifugal inline fan

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
270

Product Construction Summary:
Stainless steel wheel, stainless steel housing, belt driven, horizontal base mounted, arrangement 9 with motor position H, horizontal shaft rotation axis.

Option / Component Summary:
(2) VMC MSS-1E-650 & (2) VMC MSS-1E-400 Seismic Spring Isolators, Motor: Baldor 30 HP, 230/460V, Belt Drive
Hinged access door, punched inlet and outlet flange, stainless steel inlet and outlet screens, weather cover standard type painted OSHA yellow, drain with plug, belt tube, extended lube lines, shaft seal standard type, piezometer flow measurement ring, mounted NEMA 4X stainless steel disconnect switch, UL 705 package

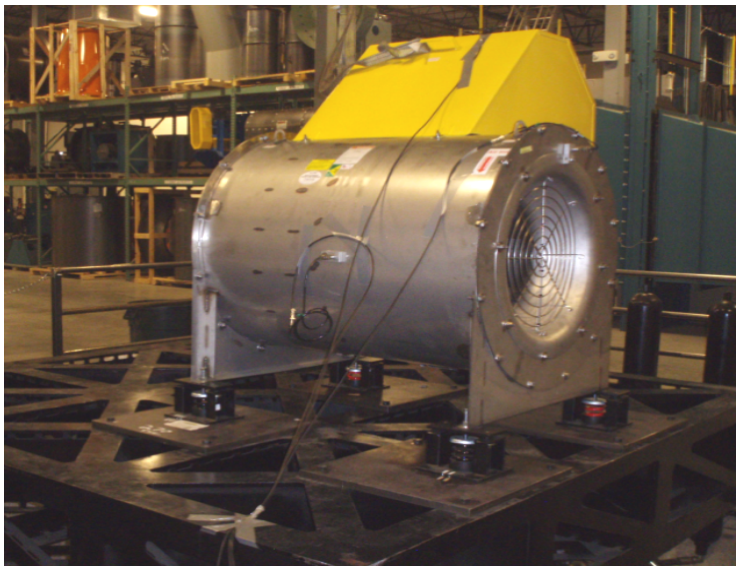
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
54.00	62.00	68.00	1244	lb	3.45	3.25	2.77

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 3

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
QSL, Quiet Mixed Flow Fans

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
730

Product Construction Summary:
Painted steel housing and wheel, belt driven, horizontal base mounted, arrangement 9 with motor position A, horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC MSSH-1E-2575N Seismic Spring Isolators, Motor: Teco-Westinghouse 125 HP, 460V, Belt Drive
Bolted access door, punched inlet flange, punched outlet flange, steel inlet screen, steel outlet screen, hinged weather cover, belt tube, high temperature package, extended lube lines, mounted NEMA 3R caron steel disconnect switch, carbon steel painted finish, UL smoke and heat package, fins on wheel backplate, high temperature caulk.

UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
134.00	107.00	155.00	7700	lb	2.538	2.563	4.76

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:

The 730 QSL fan with VMC isolators was mounted to the ANCO shake table as specified in the installation instructions. The fan was then mounted to the (4) VMC isolators. The isolators were attached to 1 inch adapter plates and mounted to the shake table. The isolator's air gap was set to 1/4" before the test. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 4

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
CDD, Tubular Centrifugal Fan

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
12

Product Construction Summary:
Painted steel housing and wheel, direct driven, horizontal base mounted, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1C-100 Seismic Spring Isolators, Motor: Baldor EM3555T 2 HP, 230/460V, Direct Drive
Bolted access door, punched inlet flange, punched outlet flange, steel inlet screen, steel outlet screen, drain with plug, mounted NEMA 3R caron steel disconnect switch, carbon steel painted finish.

UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
23.00	22.00	26.06	251	lb	3.80	4.20	6.30

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:

The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations,which used 3/8-16 UNC A307 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 5

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
CDD, Tubular Centrifugal Fan

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
44

Product Construction Summary:
Painted aluminum housing and wheel, direct driven, horizontal base mounted, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(2) VMC MSSH-1E-1000 and (2) VMC MSSH-1E-825N Seismic Spring Isolators, Motor: WorldWide Electric WWE40-9-365T 40 HP, 230/460V, Direct Drive Bolted access door, punched inlet flange, punched outlet flange, aluminum inlet screen, aluminum outlet screen, mounted NEMA 4X stainless steel disconnect switch, aluminum painted finish.

UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
62.00	69.00	74.25	2897	lb	3.60	4.00	3.40

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:

The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 6

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
DSI, Direct Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
080A

Product Construction Summary:
Painted galvanized steel housing and aluminum wheel, direct driven, horizontal base mounted, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1C-50 Seismic Spring Isolators, Motor: TCF 66543600, 1/8HP, 115V, Direct Drive
Galvanized steel inlet guard, galvanized steel outlet guard, Neoprene coated insulation, Speed Controller, UL 705, mounted NEMA 1 galvanized steel disconnect switch, galvanized steel painted finish.

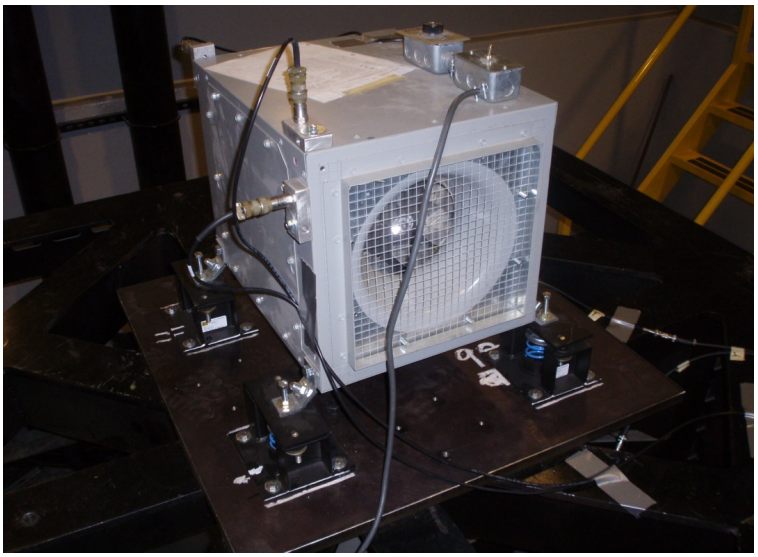
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
19.00	15.33	15.33	57	lb	6.20	4.80	5.00

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations,which used 3/8-16 UNC A307 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 7

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
DSI, Direct Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
165A

Product Construction Summary:
Aluminum housing and wheel, direct driven, horizontal base mounted, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(2) VMC MSS-1C-100 & (2) VMC MSS-1C-50 Seismic Spring Isolators, Motor: TCF Marathon E1930, 3 HP, 230/460V, Direct Drive
Aluminum inlet guard, aluminum outlet guard, stainless steel hardware, UL 705, .
mounted NEMA 1 galvanized steel disconnect switch

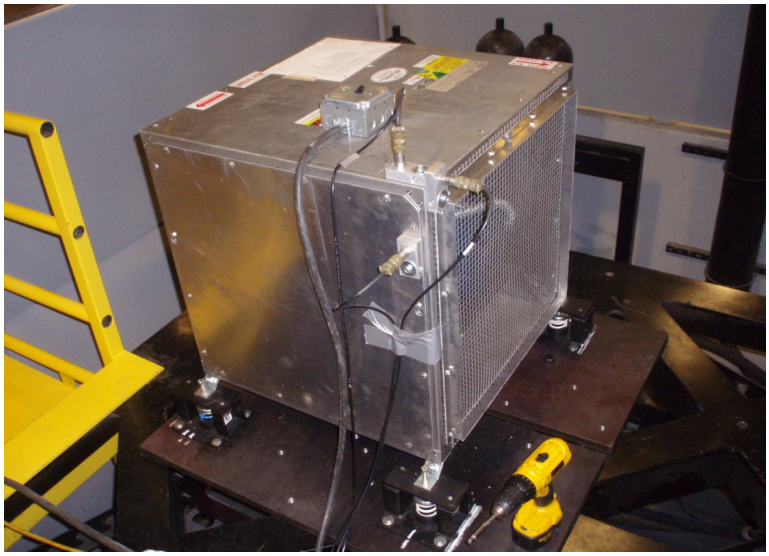
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
26.00	26.50	26.50	160	lb	4.10	6.00	5.70

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations,which used 3/8-16 UNC A307 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 8

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
BSI, Belt Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
080A

Product Construction Summary:
Painted galvanized steel housing and aluminum wheel, belt driven, horizontal base mounted, arrangement 9 with motor position C, horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1C-50 Seismic Spring Isolators, Motor: TCF 73505603, 1HP, 115/230V, Belt Drive
Galvanized steel inlet guard, galvanized steel outlet guard, Foil backed insulation, UL 705, extended lubrication lines, motor cover, mounted NEMA 1 galvanized steel disconnect switch, galvanized steel painted finish.

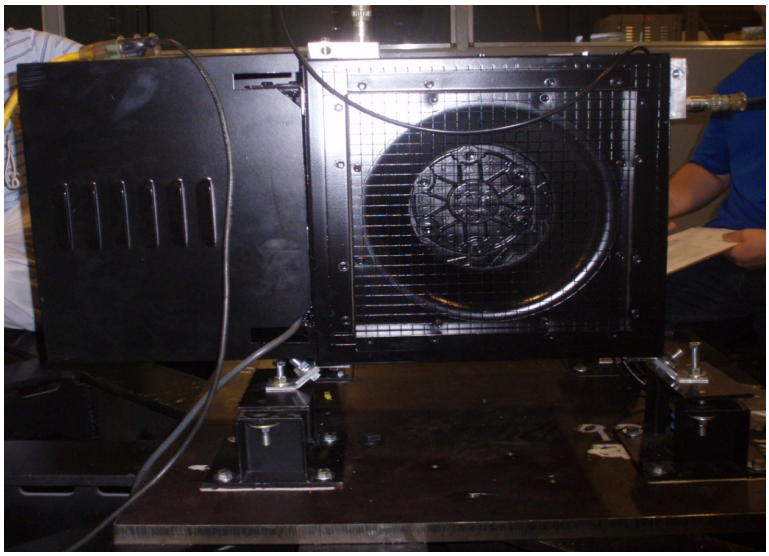
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
19.00	27.33	15.33	99	lb	4.70	4.00	4.00

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations,which used 3/8-16 UNC A307 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 9

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
BSI, Belt Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
402A

Product Construction Summary:
Aluminum housing and wheel, belt driven, horizontal base mounted, arrangement 9 with motor position A, horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1E-400 Seismic Spring Isolators, Motor: AO Smith/Century T57033, 15HP, 230/460V, Belt Drive
Aluminum inlet guard, aluminum outlet guard, Stainless steel hardware, UL 705, extended lubrication lines, belt guard, mounted NEMA 4 polycarbonate disconnect switch, Stainless Steel shaft, AMCA spark B construction

UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
52.00	55.25	75.25	822	lb	3.00	2.80	5.80

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:

The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 10

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
DSI, Direct Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
080A

Product Construction Summary:
Painted galvanized steel housing and aluminum wheel, direct driven, horizontal ceiling hung, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(4) VMC HRSA-1B-35 Hanging Spring Isolators with SB Seismic Restraint Cables, Motor: RBC/Genteq 7124-1315, 1/8HP, 115V, Direct Drive Galvanized steel inlet guard, galvanized steel outlet guard, Neoprene coated insulation, Speed Controller, UL 705, mounted NEMA 1 galvanized steel disconnect switch, galvanized steel painted finish.

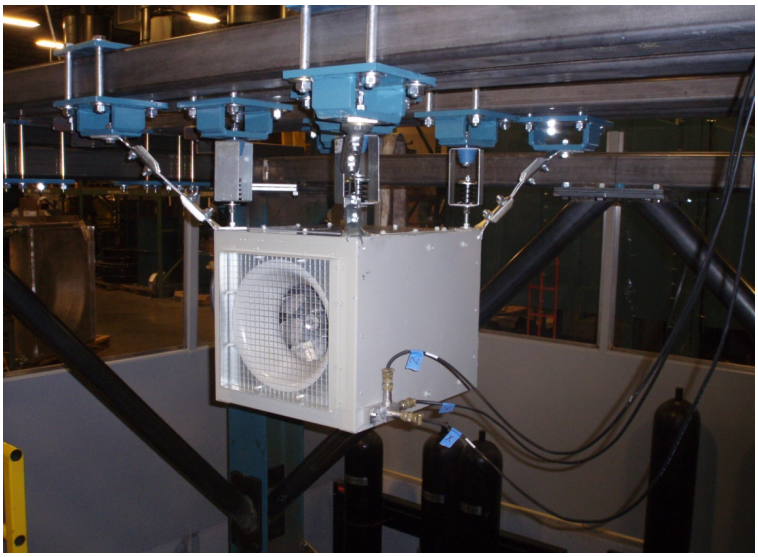
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
19.00	15.33	15.33	57	lb	N/A	N/A	N/A

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 11

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
DSI, Direct Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
165A

Product Construction Summary:
Aluminum housing and wheel, direct driven, horizontal ceiling hung, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(4) VMC HRSA-1B-70 Hanging Spring Isolators with SB Seismic Restraint Cables, Motor: RBC E217V1, 3 HP, 230/460V, Direct Drive
Aluminum inlet guard, aluminum outlet guard, Stainless steel hardware, UL 705, mounted NEMA 3R polycarbonate disconnect switch.

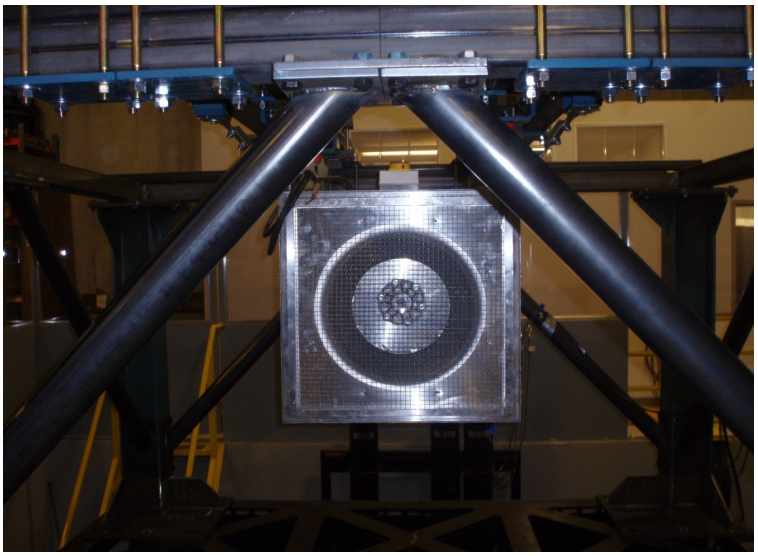
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
26.00	26.50	26.50	160	lb	N/A	N/A	N/A

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 12

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
BSI, Belt Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
080A

Product Construction Summary:
Painted galvanized steel housing and aluminum wheel, belt driven, horizontal ceiling hung, arrangement 9 with motor position C and horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC HRSA-1B-50 Hanging Spring Isolators with SB Seismic Restraint Cables, Motor:TCF# 73505603, 1 HP, 115V, Belt Drive Galvanized steel inlet guard, galvanized steel outlet guard, Foil Backed Insulation, UL 705, extended lubrication lines, mounted NEMA 1 galvanized steel disconnect switch, galvanized steel painted finish.

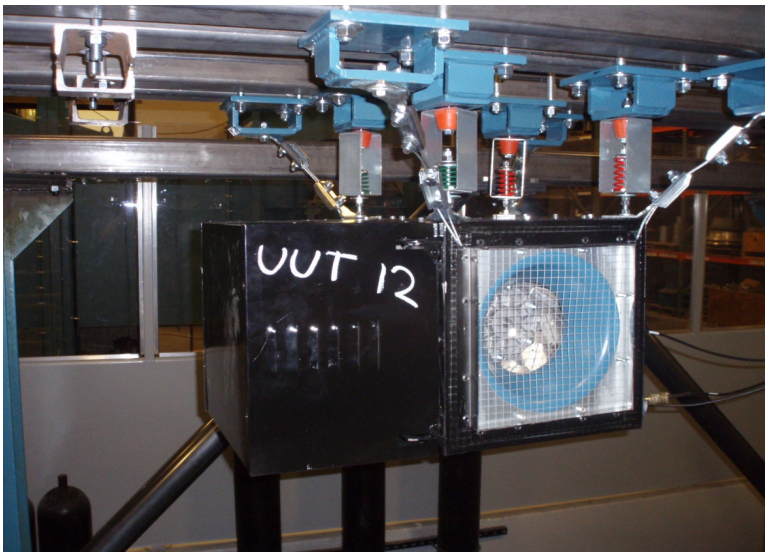
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
19.00	27.33	15.33	99	lb	N/A	N/A	N/A

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 13

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
BSI, Belt Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
402A

Product Construction Summary:
Aluminum housing and wheel, belt driven, horizontal ceiling hung, arrangement 9 with motor position C and horizontal shaft rotation axis.

Option / Component Summary:
(2) VMC HRSA-1C-370 & (2) VMC HRSA-1C-300 Hanging Spring Isolators with SB Seismic Restraint Cables, Motor: Teco NP0154, 15 HP, 230/460V, Belt Drive Aluminum inlet guard, aluminum outlet guard, Stainless steel hardware, UL 705, extended lubrication lines, belt guard, mounted NEMA 4 polycarbonate disconnect switch, Stainless Steel shaft, AMCA spark B construction

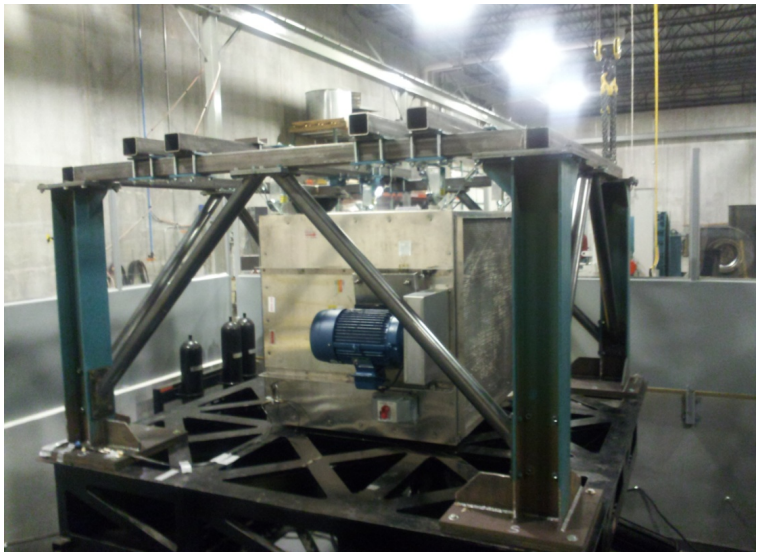
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
52.00	75.25	55.25	822	lb	N/A	N/A	N/A

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 14

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
BSI, Belt Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
300A

Product Construction Summary:
Aluminum housing and wheel, belt driven, horizontal base mounted, arrangement 9 with motor position A, horizontal shaft rotation axis.

Option / Component Summary:
(2) VMC MSS-1C-150 & (2) VMC MSS-1C-300 Seismic Spring Isolators, Motor: AO Smith/Century T57031, 7.5 HP, 230/460V, Belt Drive Aluminum inlet guard, aluminum outlet guard, Stainless steel hardware, UL 705, extended lubrication lines, belt guard, mounted NEMA 3R galvanized steel disconnect switch, Stainless Steel shaft, AMCA spark B construction

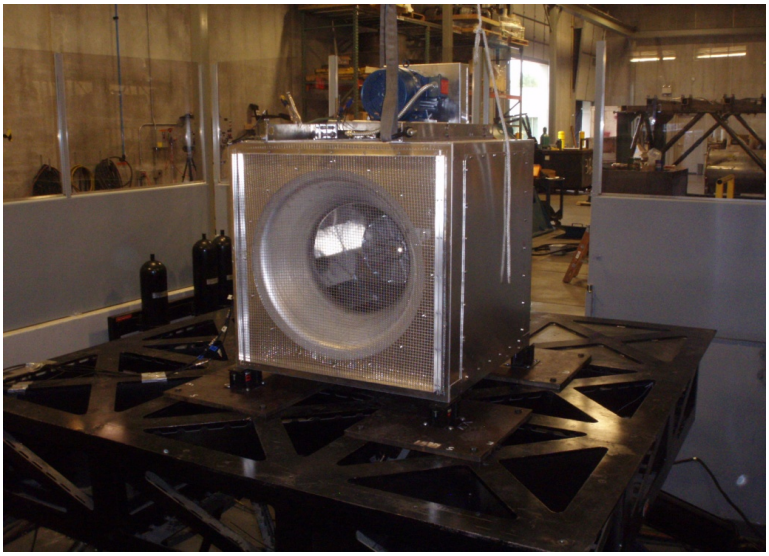
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
41.50	44.13	64.13	537	lb	4.00	3.70	7.30

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 15

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
BSI, Belt Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
300A

Product Construction Summary:
Aluminum housing and wheel, belt driven, horizontal ceiling hung, arrangement 9 with motor position C and horizontal shaft rotation axis.

Option / Component Summary:
(2) VMC HRSA-1C-300 & (2) VMC HRSA-1C-50 Hanging Spring Isolators with SB Seismic Restraint Cables, Motor: AO Smith/Century T57031, 7.5 HP, 230/460V
Aluminum inlet guard, aluminum outlet guard, Stainless steel hardware, UL 705, extended lubrication lines, belt guard,
mounted NEMA 3R galvanized steel disconnect switch, Stainless Steel shaft, AMCA spark B construction

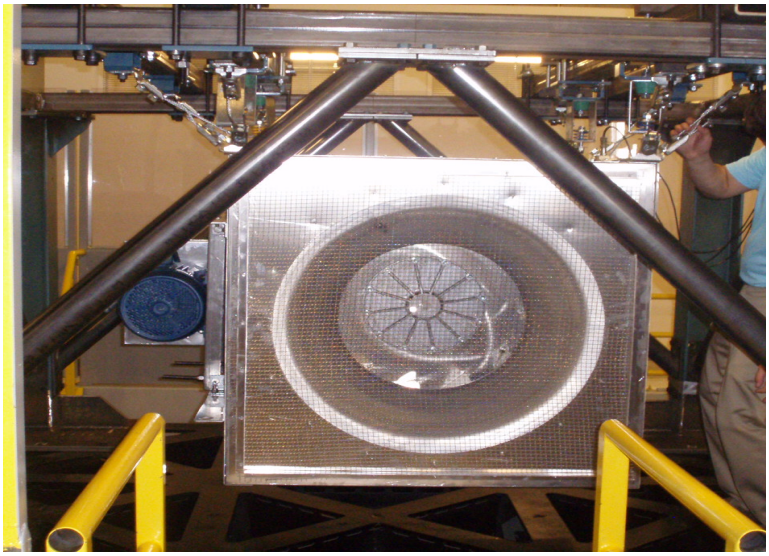
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
41.50	64.13	44.13	537	lb	N/A	N/A	N/A

SEISMIC PARAMETERS

Building Code	Test Criteria	Sds (g)	Z/h	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2016	ICC-ES AC156	2.5	1.0	4.00	3.00	1.68	0.68

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 16

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Aberdeen Facility, 515 Commerce St, Aberdeen, SD 57401

Product Line:
TSL Centrifugal Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
402

Product Construction Summary:
Cabon steel housing and wheel, belt driven, horizontal base mount, arrangement 9 belt drive with motor position A and horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC MSSH-1E-825N Seismic Spring Isolators, Motor: Marathon GT0037 50 HP, 230/460V, Belt Drive
Access door, extended lubrication lines, OSHA belt guard, punched inlet and outlet flange

UUT PROPERTIES

Dimensions (inches)			Weight	Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height		Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
70.75	59.75	104.77	2328 lbs.	2.81	2.88	9.61

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:

The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 17

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Aberdeen Facility, 515 Commerce St, Aberdeen, SD 57401

Product Line:
TCLB Centrifugal Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
90A2

Product Construction Summary:
Cabon steel housing and aluminum wheel, belt driven, horizontal base mount, arrangement 9 belt drive with motor position A and horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1C-50 Seismic Spring Isolators, Motor: Baldor L3510T 1 HP, 115/208-230V, Belt Drive
Extended lubrication lines, OSHA belt guard, belt tube, punched inlet and outlet flange

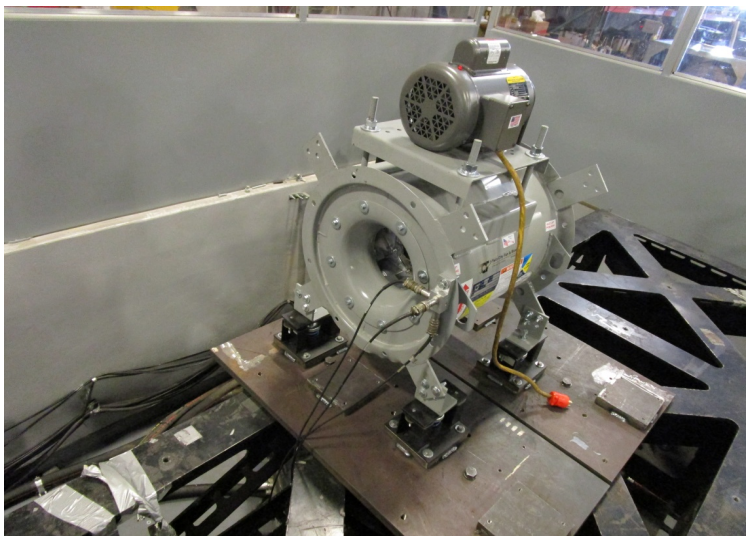
UUT PROPERTIES

Dimensions (inches)			Weight	Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height		Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
22.25	19.63	38.50	134 lbs.	4.26	4.02	15.20

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations,which used 3/8-16 UNC A307 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 18

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Elkton Facility, 201 Badger Street North, Elkton, SD 57026

Product Line:
BSI Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
150A

Product Construction Summary:
Galvanized steel housing and aluminum wheel, belt driven, horizontal ceiling mount, arrangement 9 belt drive with motor position C and horizontal shaft rotation axis.

Option / Component Summary:
(2) VMC HRSA-1B-70 and (2) HRSA-1B-50 Hanging Spring Isolators with Seismic Restraint Cables, Motor: TCF 73505856 2 HP, 230V/460V, Belt Drive Extended lubrication lines, NEMA 1 galvanized steel disconnect switch, belt tube

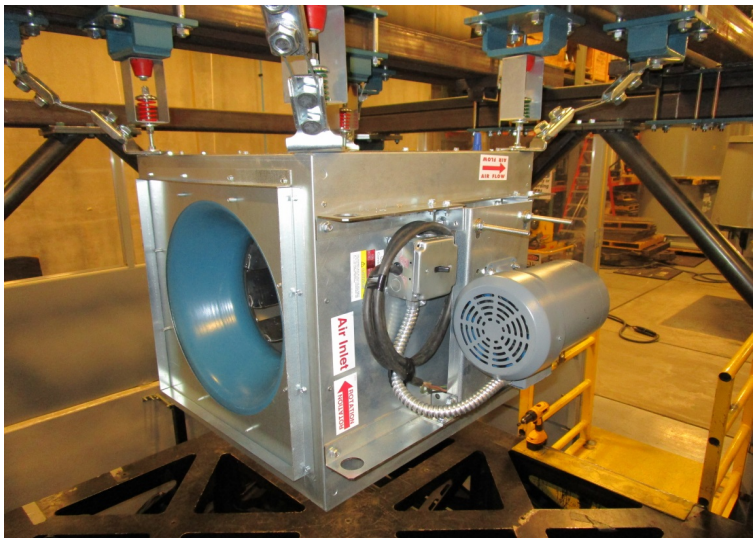
UUT PROPERTIES

Dimensions (inches)			Weight	Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height		Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
26.00	36.57	36.57	146 lbs.	N/A	N/A	N/A

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 19

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Elkton Facility, 201 Badger Street North, Elkton, SD 57026

Product Line:
DSI Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
080A

Product Construction Summary:
Galvanized steel housing and aluminum wheel, belt driven, horizontal base mount, arrangement 4 direct drive and horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1C-50 Seismic Spring Isolators, Motor: TCF 1/4 HP Marathon G1316, 115V/208-230V, Direct Drive
NEMA 1 galvanized steel disconnect switch

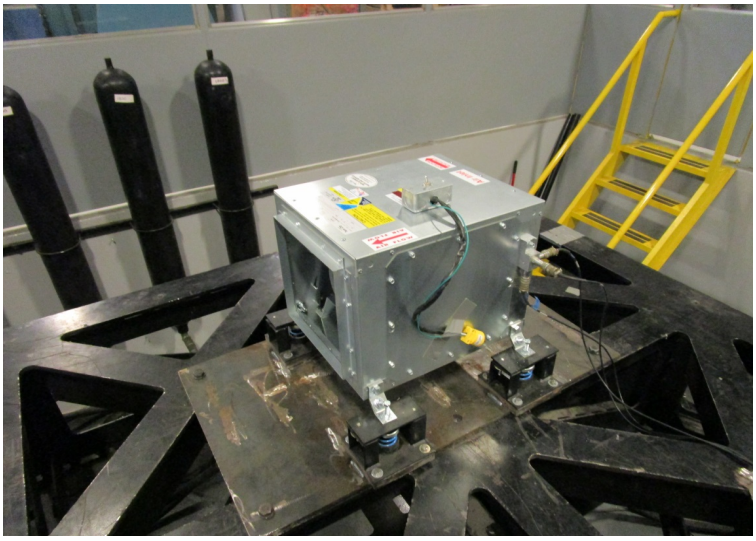
UUT PROPERTIES

Dimensions (inches)			Weight	Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height		Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
21.00	15.33	21.33	58 lbs.	6.08	7.01	7.10

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations,which used 3/8-16 UNC A307 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 20

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Aberdeen Facility, 515 Commerce St, Aberdeen, SD 57401

Product Line:
CDD Inline Centrifugal

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
44

Product Construction Summary:
Painted aluminum housing and wheel, direct driven, horizontal base mounted, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(2) VMC MSSH-1E-1000 and (2) MSSH-1E-825 Seismic Spring Isolators, Motor: Baldor M4348T 40 HP, 230/460V, Direct Drive
Bolted access door, punched inlet flange, punched outlet flange, aluminum painted finish.

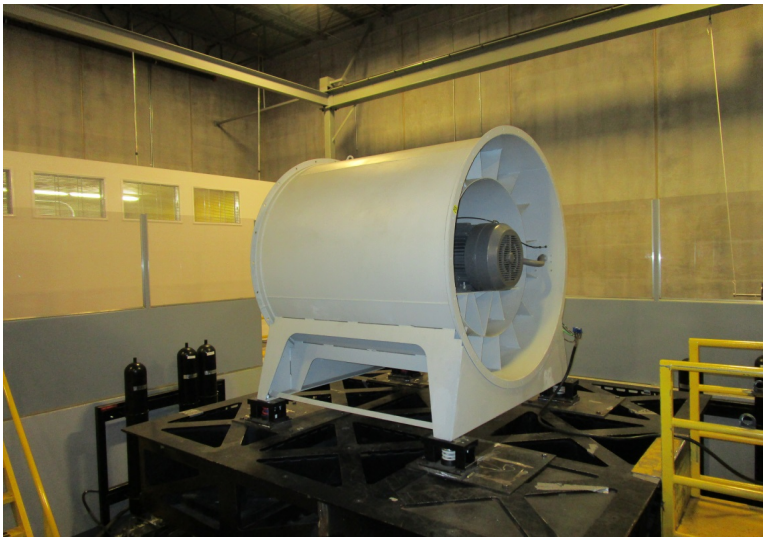
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
62.00	69.00	74.25	1552	lb	5.20	5.25	3.55

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 21

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Elkton Facility, 201 Badger Street North, Elkton, SD 57026

Product Line:
DSI Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
165AN

Product Construction Summary:
Galvanized steel housing and aluminum wheel, direct drive, horizontal ceiling mount, arrangement 4 direct drive horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC HRSA-1B-50 Hanging Spring Isolators with Seismic Restraint Cables, Motor: Teco-Westinghouse DTP0024 2 HP, 230V/460V, Direct Drive NEMA 1 galvanized steel disconnect switch

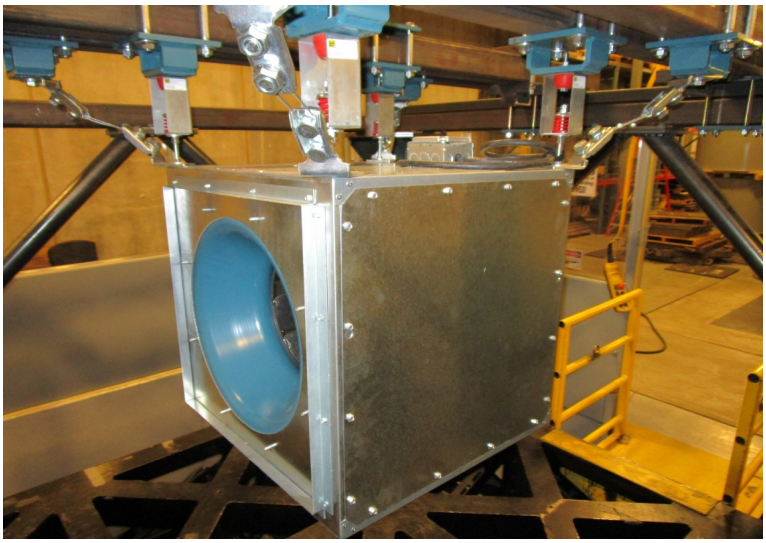
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
28.00	26.50	32.50	134	lbs.	N/A	N/A	N/A

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 22

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Aberdeen Facility, 515 Commerce St, Aberdeen, SD 57401

Product Line:
CDD Inline Centrifugal

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
44

Product Construction Summary:
Painted aluminum housing and wheel, direct driven, horizontal base mounted, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(2) VMC MSSH-1E-1000 and (2) MSSH-1E-825 Seismic Spring Isolators, Motor: Teco-Westinghouse E0408 40 HP, 230/460V, Direct Drive
Bolted access door, punched inlet flange, punched outlet flange, aluminum painted finish.

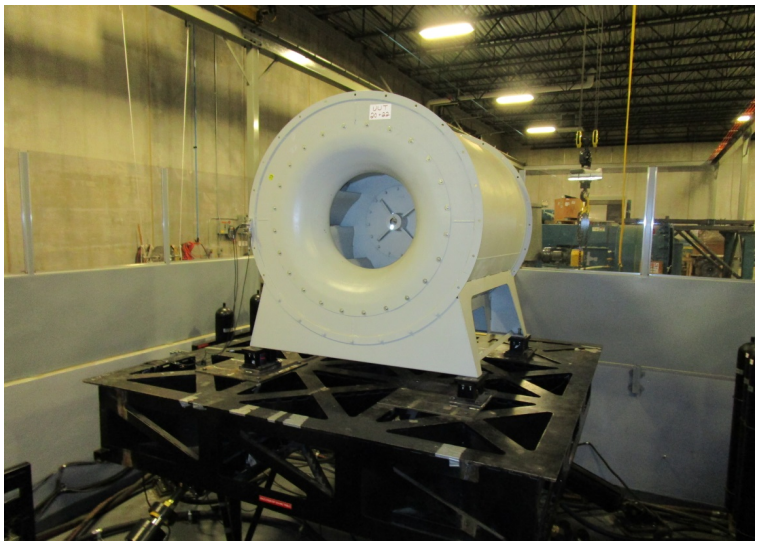
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
62.00	69.00	74.25	1710	lb	4.61	5.09	4.05

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 23

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Aberdeen Facility, 515 Commerce St, Aberdeen, SD 57401

Product Line:
CDD Inline Centrifugal

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
14

Product Construction Summary:
Carbon Steel housing and wheel, direct driven, horizontal base mounted, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1C-150 Seismic Spring Isolators, Motor: Worldwide Electric HH15-18-184T 5 HP, 230/460V, Direct Drive
Punched inlet flange, punched outlet flange

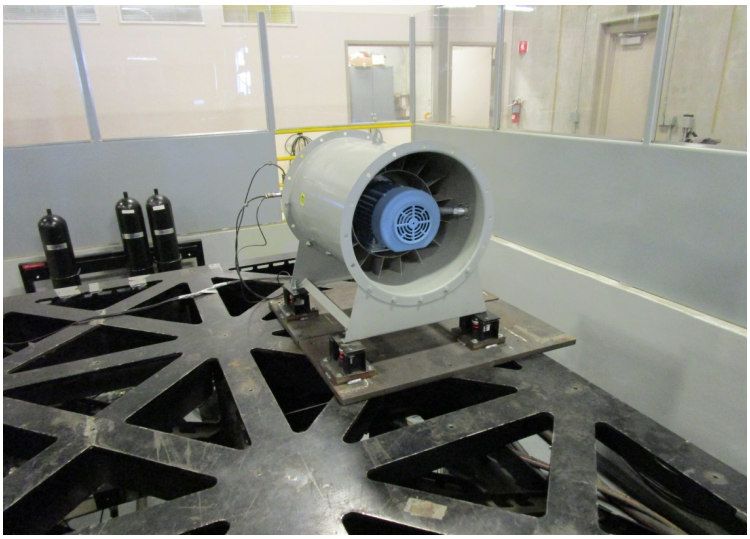
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
26.00	24.00	28.06	238	lb	4.70	4.52	3.50

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 24

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Elkton Facility, 201 Badger Street North, Elkton, SD 57026

Product Line:
DSI Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
165AN

Product Construction Summary:
Galvanized steel housing and aluminum wheel, direct drive, horizontal ceiling mount, arrangement 4 direct drive horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC HRSA-1B-50 Hanging Spring Isolators with Seismic Restraint Cables, Motor: TCF 73505856 2 HP, 230V/460V, Direct Drive
NEMA 1 galvanized steel disconnect switch

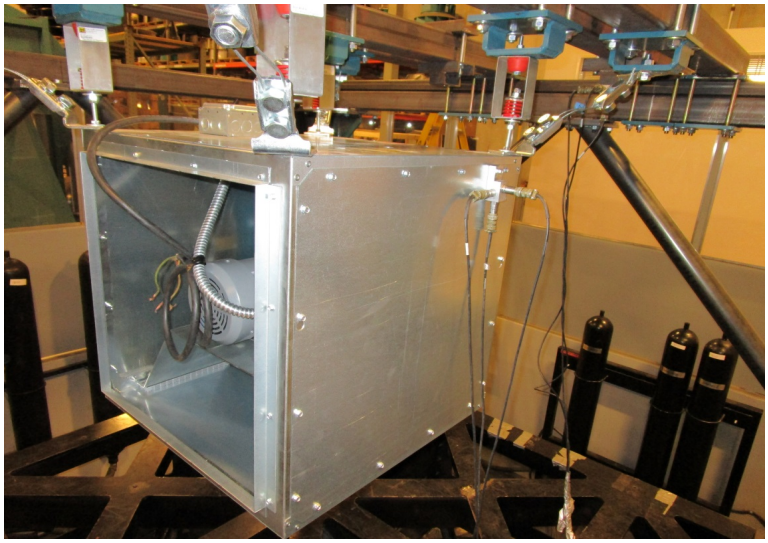
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
28.00	26.50	32.50	140	lbs.	N/A	N/A	N/A

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 25

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Elkton Facility, 201 Badger Street North, Elkton, SD 57026

Product Line:
BSI Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
150A

Product Construction Summary:
Galvanized steel housing and aluminum wheel, belt drive, horizontal ceiling mount, arrangement 9 belt drive with motor position C and horizontal shaft rotation axis.

Option / Component Summary:
(2) VMC HRSA-1B-50 & (2) VMC HRSA-1B-70 Hanging Spring Isolators with Seismic Restraint Cables, Motor: Teco-Westinghouse NP0024
2 HP, 230V/460V, Belt Drive
NEMA 1 galvanized steel disconnect switch, belt tube

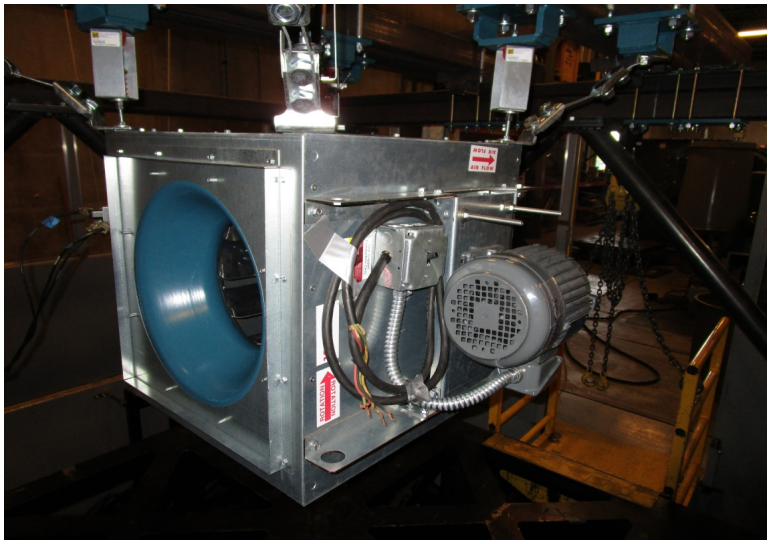
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
26.00	36.57	23.82	140	lbs.	N/A	N/A	N/A

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware.
Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 26

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Aberdeen Facility, 515 Commerce St, Aberdeen, SD 57401

Product Line:
TCLB Centrifugal Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
90A2

Product Construction Summary:
Cabon steel housing and aluminum wheel, belt driven, horizontal base mount, arrangement 9 belt drive with motor position A and horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1C-50 Seismic Spring Isolators, Motor: Teco-Westinghouse NP0024 2 HP, 230V/460V, Belt Drive
Extended lubrication lines, OSHA belt guard, belt tube, punched inlet and outlet flange

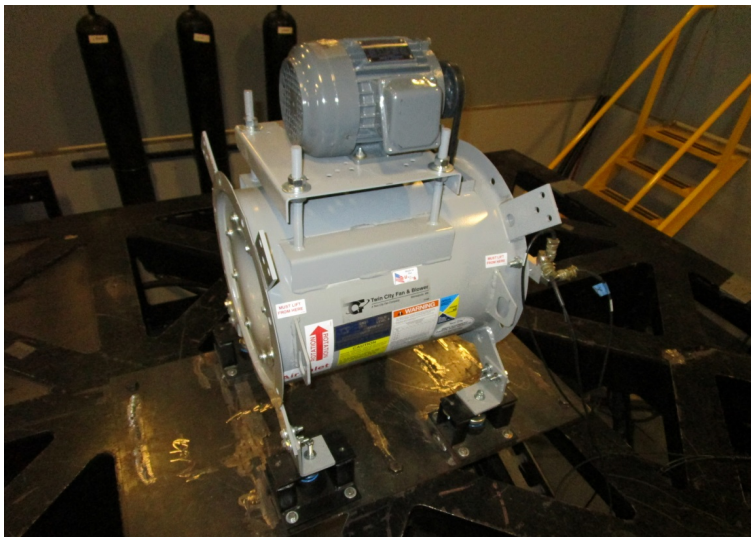
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
22.25	19.63	38.50	142	lbs.	4.26	4.10	6.13

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 27

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Elkton Facility, 201 Badger Street North, Elkton, SD 57026

Product Line:
BSI Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
150A

Product Construction Summary:
Galvanized steel housing and aluminum wheel, belt drive, horizontal ceiling mount, arrangement 9 belt drive with motor position C and horizontal shaft rotation axis.

Option / Component Summary:
(2) VMC HRSA-1B-50 & (2) VMC HRSA-1B-70 Hanging Spring Isolators with Seismic Restraint Cables, Motor: Marathon G1316 1/4 HP, 115/208-230V, Belt Drive
NEMA 1 galvanized steel disconnect switch, belt tube

UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
26.00	36.57	23.82	130	lbs.	N/A	N/A	N/A

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:

The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 28

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies Elkton Facility, 201 Badger Street North, Elkton, SD 57026

Product Line:
BSI Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
150A

Product Construction Summary:
Galvanized steel housing and aluminum wheel, belt drive, horizontal base mount, arrangement 9 belt drive with motor position A\ and horizontal shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1C-50 Seismic Spring Isolators, Motor: Marathon G1316 1/4 HP, 115/208-230V, Belt Drive
NEMA 1 galvanized steel disconnect switch, belt tube

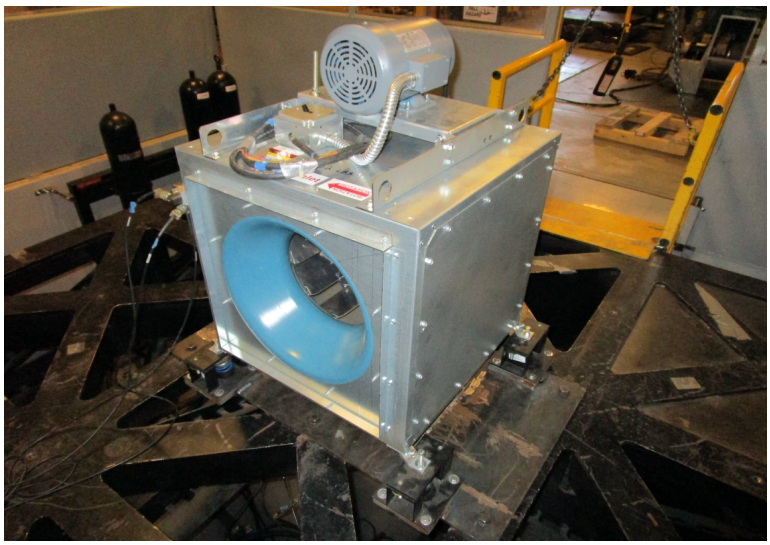
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
26.00	23.82	42.57	132	lbs.	4.09	3.30	8.52

SEISMIC PARAMETERS (refer to ASCE 7-10 Supplement)

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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 29

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
DSI, Direct Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
080A

Product Construction Summary:
Galvanized steel housing and aluminum wheel, direct driven, horizontal ceiling hung mounted, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(4) VMC HRSA-1B-35 Hanging Spring Isolators with Seismic Restriaint Cables, Motor: Teco-Westinghouse 1/3 HP S0/34 115V Direct Drive UL 705, mounted NEMA 1 galvanized steel disconnect switch

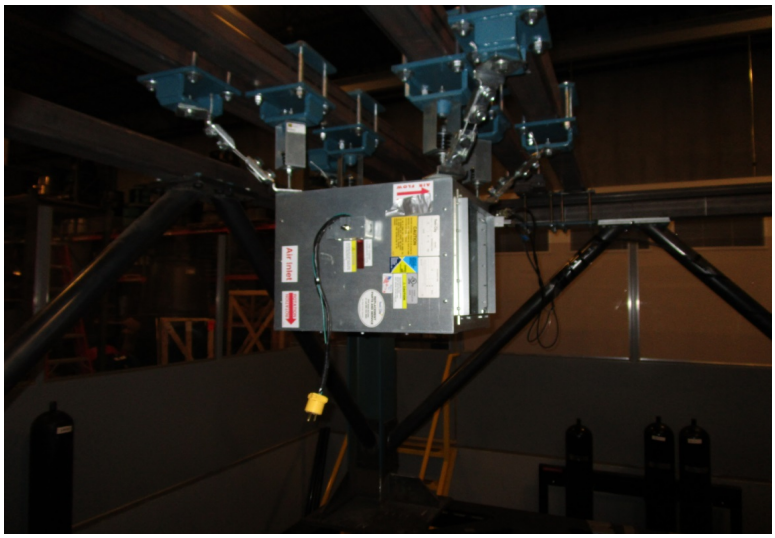
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
21.00	15.33	15.33	40	lbs.	N/A	N/A	N/A

SEISMIC 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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware.
Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 30

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
DSI, Direct Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
165AN

Product Construction Summary:
Galvanized steel housing and aluminum wheel, direct driven, horizontal base mount, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1C-50 Seismic Spring Isolators, Motor: Teco-Westinghouse NP0034, 3 HP, 230/460V, Direct Drive
UL 705, mounted NEMA 1 galvanized steel disconnect switch.

UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
28.00	26.50	32.50	152	lbs.	4.26	3.64	6.33

SEISMIC 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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:

The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 31

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
DSI, Direct Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
080A

Product Construction Summary:
Painted galvanized steel housing and aluminum wheel, direct driven, horizontal ceiling hung mounted, arrangement 4 with horizontal motor shaft rotation a

Option / Component Summary:
(4) VMC HRSA-1B-35 Hanging Spring Isolators with Seismic Restriaint Cables, Motor: TCF 66543600 1/8 HP 115V Direct Drive
UL 705, mounted NEMA 1 galvanized steel disconnect switch

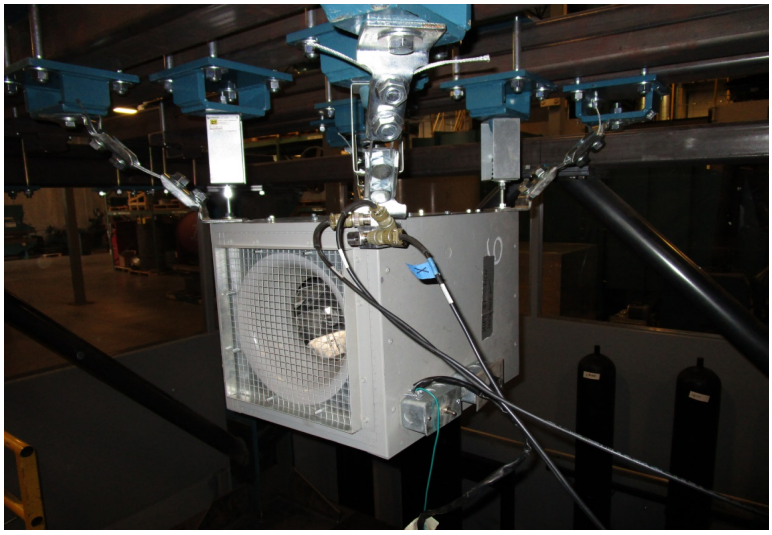
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
21.00	15.33	15.33	40	lb	N/A	N/A	N/A

SEISMIC 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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied hardware. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. The isolators were bolted to 0.75" thick steel brackets that were attached to a rigid ceiling hung structure. The seismic cable restraints were set at 45 degrees from vertical diagonally from each corner. The seismic cable restraints were anchored to The ceiling hung structure. The ceiling hung structure was mounted to the table using 5/8-11 UNC A325 hardware.
Component was full of content during test and maintained structural integrity and functionality after the shake test.

UUT 32

Unit Under Test (UUT) Summary Sheet

Manufacturer:
Twin City Fan Companies, Ltd., 5959 Trenton Lane North, Plymouth, MN 55442

Product Line:
DSI, Direct Drive Square Inline

Testing Laboratory:
Twin City Fan Companies, Ltd., 5955 Trenton Lane North, Plymouth, MN 55442

Model Number:
165AN

Product Construction Summary:
Galvanized Steel housing and aluminum wheel, direct driven, horizontal base mount, arrangement 4 with horizontal motor shaft rotation axis.

Option / Component Summary:
(4) VMC MSS-1C-50 Seismic Spring Isolators, Motor: TCF , 2 HP 73505856, 230/460V, Direct Drive
UL 705, mounted NEMA 1 galvanized steel disconnect switch.

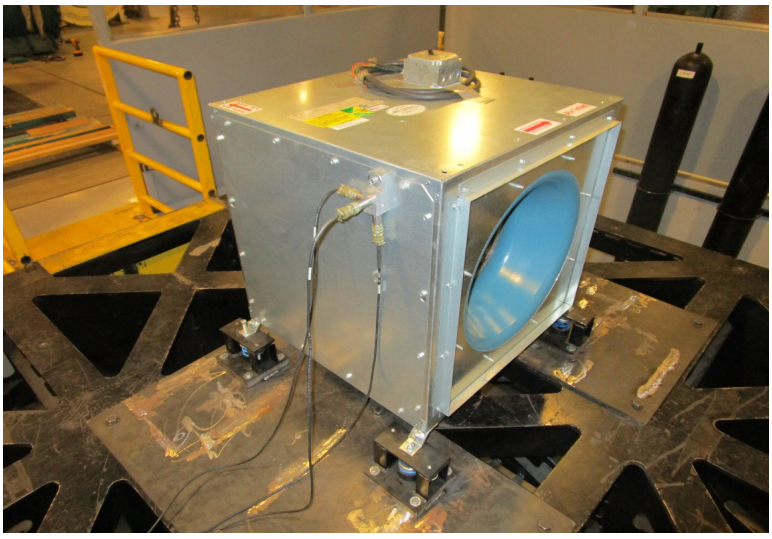
UUT PROPERTIES

Dimensions (inches)			Weight		Lowest Natural Frequencies (Hz) +/-		
Depth	Width	Height			Front-Back (Horizontal X)	Side-Side (Horizontal Y)	Up-Down (Vertical Z)
28.00	26.50	32.50	150	lbs.	4.34	5.20	6.99

SEISMIC 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	0.0	1.5	2.50	1.00	1.68	0.68
		2	1.0	1.5	3.20	2.40	1.34	0.54

Unit Mounting Description / Configuration:



The fans were secured to the isolators using the supplied bolt and jam-nut. The spacing and deflection of the isolators were set as close to manufacturer recommendations as possible. Field installation should have an air gap of 1/4". The isolators were bolted to a 1.00" thick steel adaptor plate per VMC hardware recommendations, which used 5/8-11 UNC A325 bolts. The adaptor plates were mounted to the table using 5/8-11 UNC A325 hardware. Component was full of content during test and maintained structural integrity and functionality after the shake test.