



DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION
OFFICE OF STATEWIDE HOSPITAL PLANNING AND DEVELOPMENT

APPLICATION FOR HCAI SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0148

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Greenheck Fan Corporation

Manufacturer's Technical Representative: Brendan Banker

Mailing Address: PO Box 410, Schofield, WI 54479

Telephone: (715) 241-6160

Email: Brendan.banker@greenheck.com

Product Information

Product Name: Spun Aluminum Exhaust Fans (G/GB/XRED/XREB; CUE/CUBE/XRUD/XRUB)

Product Model Number(s): Various (See Attachments)

Product Category: Exhaust/Smoke Control Fans

Product Sub-Category: Exhaust/Smoke Control Fans

General Description: Centrifugal ventilation fans.

Mounting Description: Rigid base mounted on curbs and wall mounted on curbs.

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

Applicant Information

Applicant Company Name: VMC Group

Contact Person: John Giuliano

Mailing Address: 113 Main Street, Bloomingdale, NJ 07403

Telephone: (973) 838-1780

Email: John.Giuliano@thvmcgroup.com

Title: President



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

Company Name: THE VMC GROUP

Name: Kenneth Tarlow California License Number: S2851

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

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

Certification Method

☐ GR-63-Core ☒ ICC-ES AC156 ☐ IEEE 344 ☐ IEEE 693 ☐ NEBS 3
☐ Other (Please Specify): _____

Testing Laboratory

Company Name: ANCO ENGINEERS, INC.

Contact Person: Paul Ibanez

Mailing Address: 1965 33rd Street, Suite A, Boulder CO 80301

Telephone: (303) 443-7580 Email: Paul@ancoengineers.com

Company Name: DYNAMIC CERTIFICATION LABORATORY (DCL)

Contact Person: Josh Sailer

Mailing Address: 1315 Greg St., Ste 109, Sparks NV 89431

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

Company Name: ENVIRONMENTAL TESTING LABORATORIES, INC. (ETL)

Contact Person: Jeremy Lange

Mailing Address: 11034 Indian Trail, Dallas TX 75229-3513

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



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Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = Rigid: 1.5 ($SDS = 2.00$, $z/h=1$) and 1.03 ($SDS = 2.28$, $z/h=0$); Internally Isolated: 4.5 ($SDS = 2.00$, $z/h=1$) and 1.71 ($SDS = 2.28$, $z/h=0$)

SDS (Design spectral response acceleration at short period, g) = 2.00 ($z/h = 1$); 2.28 ($z/h = 0$)

a_p (Amplification factor) = 2.5

R_p (Response modification factor) = 6.0 (Rigid); 2.5 (Internally Isolated)

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

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

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

HCAI Approval (For Office Use Only) - Approval Expires on 12/17/2031

Date: 12/17/2025

Name: Mohammad Karim Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: SDS (g) = 2.0 z/h = 1

Condition of Approval (if applicable):

Table 1A: Certified Direct Drive Downblast Exhaust Fans - Rigid Base Mounted

Model Line	Model ²	Max Dimensions [in]			Max Weight [lbs]	Manufacturer	UUT
		Depth	Width	Height ¹			
Greenheck "G" Accurex "XRED" Venco "VECD"	G-060	20	20	32	20	Greenheck	UUT-3
	G-070	21	21	55	81		UUT-61
	G-080	22	22	59	95		Interpolated
	G-090	22	22	59	100		Interpolated
	G-095	22	22	59	111		Interpolated
	G-095	22	22	58	67		UUT-46
	G-097	25	25	76	134		Interpolated
	G-098	25	25	76	133		Interpolated
	G-099	25	25	76	135		Interpolated
	G-100	25	25	72	164		Interpolated
	G-100HP	25	25	72	162		Interpolated
	G-120	25	25	72	174		Interpolated
	G-130	29	29	72	179		Interpolated
	G-140	29	29	78	217		Interpolated
	G-140HP	29	29	78	215		Interpolated
	G-160	29	29	80	165		Interpolated
	G-160HP	29	29	80	145		Interpolated
	G-180	36	36	82	180		Interpolated
	G-200	36	36	82	229		UUT-19
	G-200HP	36	36	77	226		UUT-62
	G-240	43	43	90	302		Interpolated
	G-300	49	49	86	518		UUT-63

Notes:

¹Max height dimension includes tested curb height or maximum curb height of 42" for all interpolated base mounted fans

²HP denotes high pressure fans

Table 2A: Certified Belt Drive Downblast Exhaust Fans - Rigid Base Mounted

Model Line	Model ²	Max Dimensions [in]			Max Weight [lbs]	Manufacturer	UUT
		Depth	Width	Height ¹			
Greenheck "GB" Accurex "XREB" Venco "VECB"	GB-097	25	25	70	130	Greenheck	Interpolated
	GB-098	25	25	70	129		Interpolated
	GB-099	25	25	70	131		Interpolated
	GB-100	25	25	70	134		Interpolated
	GB-100HP	25	25	70	132		Interpolated
	GB-120	25	25	70	135		Interpolated
	GB-130	29	29	70	138		Interpolated
	GB-140	29	29	67	168		Interpolated
	GB-140HP	29	29	67	165		Interpolated
	GB-160	29	29	67	170		Interpolated
	GB-160HP	29	29	67	169		Interpolated
	GB-180	36	36	77	266		Interpolated
	GB-180HP	36	36	77	274		Interpolated
	GB-200	36	36	77	268		Interpolated
	GB-200HP	36	36	77	290		Interpolated
	GB-220	43	43	81	301		Interpolated
	GB-220HP	43	43	81	323		Interpolated
	GB-240	43	43	81	302		Interpolated
	GB-240HP	42	42	82	324		UUT-64
	GB-260	50	50	85	468		Interpolated
	GB-300	50	50	85	483		Interpolated
	GB-300HP	50	50	85	483		Interpolated
	GB-330	59	59	91	574		Interpolated
	GB-360	59	59	91	604		Interpolated
	GB-360HP	59	59	92	649		Interpolated
	GB-420	66	66	97	740		Interpolated
	GB-480	74	74	100	898		Interpolated
	GB-500	83	83	93	881		UUT-20
	GB-540	86	86	61	634		UUT-6
	GB-540	83	83	99	1,062		UUT-65

Notes:

¹Max height dimension includes tested curb height or maximum curb height of 42" for all interpolated base mounted fans

²HP denotes high pressure fans

Table 3A: Certified Direct Drive Upblast Exhaust Fans - Rigid Base Mounted

Model Line	Model ²	Max Dimensions [in]			Max Weight [lbs]	Manufacturer	UUT
		Depth	Width	Height ¹			
Greenheck "CUE" Accurex "XCUE" Venco "VECD"	CUE-060	20	20	58	89	Greenheck	Interpolated
	CUE-070	21	21	58	90		Interpolated
	CUE-080	23	23	59	109		Interpolated
	CUE-090	23	23	59	110		Interpolated
	CUE-95	21	21	57	79		UUT-21
	CUE-095	23	23	61	112		Interpolated
	CUE-099	25	25	68	146		Interpolated
	CUE-100	25	25	69	148		Interpolated
	CUE-100HP	25	25	68	145		Interpolated
	CUE-120	25	25	68	150		Interpolated
	CUE-130	25	25	68	156		Interpolated
	CUE-140	29	29	70	184		Interpolated
	CUE-140HP	29	29	68	178		Interpolated
	CUE-160	29	29	70	182		Interpolated
	CUE-160HP	29	29	68	180		Interpolated
	CUE-160XP	29	29	68	171		UUT-49
	CUE-180	38	38	79	266		Interpolated
	CUE-180HP	38	38	77	275		Interpolated
	CUE-200	36	36	44	144		UUT-2
	CUE-200	38	38	79	294		Interpolated
	CUE-200HP	38	38	77	303		Interpolated
	CUE-240	43	43	81	363		Interpolated
	CUE-240HP	42	42	80	357		UUT-50
	CUE-300	50	50	85	543		Interpolated
	CUE-300HP	50	50	82	560		UUT-51

Notes:

¹Max height dimension includes tested curb height or maximum curb height of 42" for all interpolated base mounted fans

²HP denotes high pressure fans; XP denotes extended pressure fans

Table 4A: Certified Belt Drive Upblast Exhaust Fans - Rigid Base Mounted

Model Line	Model ²	Max Dimensions [in]			Max Weight [lbs]	Manufacturer	UUT
		Depth	Width	Height ¹			
Greenheck "CUBE" Accurex "XCUBE" Venco "VUCB"	CUBE-98	25	25	27	75	Greenheck	UUT-5
	CUBE-099	25	25	68	152		Interpolated
	CUBE100	25	25	69	152		Interpolated
	CUBE-100HP	25	25	68	150		Interpolated
	CUBE-120	25	25	68	152		Interpolated
	CUBE-130	25	25	68	158		Interpolated
	CUBE-140	29	29	70	181		Interpolated
	CUBE-140HP	29	29	68	179		Interpolated
	CUBE-160	29	29	70	191		Interpolated
	CUBE-160HP	29	29	68	182		Interpolated
	CUBE-160XP	29	29	68	189		Interpolated
	CUBE-180	38	38	79	250		Interpolated
	CUBE-180HP	38	38	77	247		Interpolated
	CUBE-200	38	38	79	142		Interpolated
	CUBE-200HP	38	38	77	142		Interpolated
	CUBE-220	43	43	81	174		Interpolated
	CUBE-220HP	43	43	81	174		Interpolated
	CUBE-240	43	43	81	142		Interpolated
	CUBE-240HP	43	43	81	175		Interpolated
	CUBE-240XP	42	42	80	337		UUT-52
	CUBE-300	50	50	85	476		Interpolated
	CUBE-300HP	50	50	85	515		Interpolated
	CUBE-300XP	50	50	85	473		Interpolated
	CUBE-360	59	59	93	644		Interpolated
	CUBE-360HP	59	59	87	494		UUT-53
	CUBE-360XP	59	59	93	652		Interpolated
	CUBE-420	66	66	95	790		Interpolated
	CUBE-480	76	76	51	603		UUT-1
	CUBE-480	74	74	95	790		UUT-54

Notes:

¹Max height dimension includes tested curb height or maximum curb height of 42" for all interpolated base mounted fans

²HP denotes high pressure fans; XP denotes extended pressure fans

Table 1B: Certified Direct Drive Upblast Exhaust Fans - Rigid Wall Mounted

Model Line	Model ²	Max Dimensions [in]			Max Weight [lbs]	Manufacturer	UUT
		Depth	Width	Height ¹			
Greenheck "CUE" Accurex "XCUE" Venco "VUCD"	CUE-060	20	20	28	52	Greenheck	Interpolated
	CUE-070	20	20	28	52		Interpolated
	CUE-080	23	23	29	66		Interpolated
	CUE-090	23	23	29	67		Interpolated
	CUE-095	21	21	17	30		UUT-48
	CUE-095	21	21	17	51		UUT-47
	CUE-095	21	21	27	55		UUT-22
	CUE-095	24	24	31	70		UUT-55
	CUE-099	25	25	38	95		Interpolated
	CUE-100	25	25	39	96		Interpolated
	CUE-100HP	25	25	38	94		Interpolated
	CUE-120	25	25	38	97		Interpolated
	CUE-130	25	25	38	99		Interpolated
	CUE-140	29	29	40	121		Interpolated
	CUE-140HP	29	29	38	120		Interpolated
	CUE-160	29	29	40	126		Interpolated
	CUE-160HP	29	29	38	124		Interpolated
	CUE-160XP	29	29	38	122		Interpolated
	CUE-180HP	38	38	47	184		Interpolated
	CUE-180	38	38	49	187		Interpolated
	CUE-200HP	38	38	47	188		Interpolated
	CUE-200	37	37	38	168		UUT-56
	CUE-200	37	37	49	184		UUT-57
	CUE-200	36	36	41	204		UUT-23

Notes:

¹Max height dimension includes tested curb height or maximum curb height of 12" for all interpolated wall mounted fans

²HP denotes high pressure fans; XP denotes extended pressure fans

Table 2B: Certified Belt Drive Upblast Exhaust Fans - Rigid Wall Mounted

Model Line	Model ²	Max Dimensions [in]			Max Weight [lbs]	Manufacturer	UUT
		Depth	Width	Height ¹			
Greenheck "CUBE" Accurex "XCUBE" Venco "VUCB"	CUBE-99	25	25	26	97	Greenheck	Interpolated
	CUBE-100	25	25	27	99		Interpolated
	CUBE-100HP	25	25	26	96		Interpolated
	CUBE-120	25	25	26	101		Interpolated
	CUBE-130	25	25	26	103		Interpolated
	CUBE-130	25	25	39	99		UUT-58
	CUBE-140	29	29	28	123		Interpolated
	CUBE-140HP	29	29	26	121		Interpolated
	CUBE-160	29	29	28	127		Interpolated
	CUBE160HP	29	29	26	125		Interpolated
	CUBE-160XP	29	29	26	122		Interpolated
	CUBE-180	38	38	37	173		Interpolated
	CUBE-180HP	38	38	35	171		Interpolated
	CUBE-200	38	38	37	180		Interpolated
	CUBE-200HP	38	38	35	178		Interpolated
	CUBE-220	43	43	39	198		Interpolated
	CUBE-220HP	43	43	36	196		Interpolated
	CUBE-240	50	50	39	200		Interpolated
	CUBE-240HP	43	43	36	220		UUT-59
	CUBE-240XP	42	42	48	325		UUT-60
	CUBE-300	50	50	48	355		Interpolated
	CUBE-300HP	50	50	48	355		Interpolated
	CUBE-300XP	50	50	51	355		Interpolated
	CUBE-300XP	50	50	48	355		UUT-24

Notes:

¹Max height dimension includes tested curb height or maximum curb height of 12" for all interpolated wall mounted fans

²HP denotes high pressure fans; XP denotes extended pressure fans

Table 5A: Certified Subcomponents - Fan Wheels - Rigid Base Mounted Models

Component Type	Model	Manufacturer	Material	Weight [lb]	UUT
Fan Wheels	8" Composite	Greenheck	Composite, Backward Curved	1	UUT-61
	11" Composite			2	UUT-46
	8.25" Al Riveted		Aluminum, Backward Curved ¹	1	UUT-3
	11" Al Riveted			2	UUT-21
	18" Al Riveted		Aluminum, Backward Inclined	6	Interpolated
	21" Al Riveted			8	UUT-2, UUT-62
	25" Al Riveted			13	UUT-50, UUT-64
	31" Al Riveted			24	UUT-51, UUT-63
	36" Al Riveted			33	UUT-53
	43" Al Riveted			47	Interpolated
	49" Al Riveted			67	UUT-54
	55" Al Riveted			118	UUT-6, UUT-20, UUT-65
	10" Al Welded			3	UUT-5
	12" Al Welded			3	Interpolated
	14" Al Welded			4	Interpolated
	16" Al Welded			5	UUT-49
	18" Al Welded			6	UUT-52
	21" Al Welded			8	UUT-19
	10" CS Riveted		Carbon Steel, Backward Inclined	10	Interpolated
	12" CS Riveted			11	Interpolated
	14" CS Riveted			14	Interpolated
	16" CS Riveted			18	Interpolated
	18" CS Riveted			21	Interpolated
	21" CS Riveted			23	Interpolated
	25" CS Riveted			35	Interpolated
	31" CS Riveted			50	Interpolated
	36" CS Riveted			88	Interpolated
	43" CS Riveted			132	Interpolated
	49" CS Riveted			185	UUT-1

Note: ¹Aluminum, backward curved fan wheels are obsolete

Table 6A: Certified Subcomponents - Rigid Base Mounted Models

Component Type	Model	Manufacturer	Description	Material	Weight [lbs]	UUT
Motors	48	Vari-Green	1/15HP, 115-230V	Carbon Steel Frame	4	Extrapolated
	48		1/6HP, 115V		8	UUT-46
	48		1/4HP, 115-230V		8	Interpolated
	48		1/2HP, 115-230V		11	Interpolated
	56		1/10HP, 115-230V		10	UUT-61
	56		1/3HP, 115-230V		13	Interpolated
	56		3/4HP, 115-230V		14	Interpolated
	56		1HP, 115-230V		19	Interpolated
	184T		3 HP, 208-480V		78	UUT-50
	184T		5 HP, 208-480V		80	UUT-64
	56	WEG	1.5HP, 208-480V		30	Extrapolated
	182T		3HP, 208-460V		69	UUT-52
	215T		10HP, 208-460V		207	UUT-53
	48/56	Baldor	1/30HP, 115 - 460V		5	Extrapolated
	48/56		1/3 HP, 115 - 460V		11	UUT-21
	143T		1 HP, 208-460V		40	UUT-49
	143T		2 HP, 115 - 460V		50	UUT-19
	182T		5HP, 208 - 600V		90	UUT-62
	184T		7.5HP, 208 - 600V		95	Interpolated
	213T		10HP, 208 - 600V		185	Interpolated
	215T		15HP, 208 - 600V		190	UUT-20
	215T		10HP, 208-460V		235	UUT-54
	254T		15HP, 208-600V		250	UUT-63
	256T		20HP, 208-460V		286	UUT-65
	254T		7.5HP, 208-600V		294	UUT-51
Disconnect Switches	NEMA 1	Square-D Disconnect	Disconnect Switch	Carbon Steel	3	UUT-19, UUT-20
	NEMA 3R/4	Square-D Disconnect	Disconnect Switch		15	UUT-20
	NEMA 12	ABB	Disconnect Switch		18	UUT-63, UUT-65
Speed Controllers	6A	Raffel Systems	Single Gang Box	Steel, Plastic	1	UUT-21
	8A	Raffel Systems	Single Gang Box		1	Interpolated
	10A	Raffel Systems	Single Gang Box		1	UUT-19
Vari-Green Drive	208 - 230V	Greenheck	NEMA 4X	Aluminum	12	UUT-20
	460V	Greenheck	NEMA 4X		12	UUT-52, UUT-53, UUT-63

Table 3B: Certified Subcomponents - Fan Wheels - Wall Mounted Models

Component Type	Model	Manufacturer	Material	Weight [lb]	UUT
Fan Wheels	8" Composite	Greenheck	Composite, Backward Curved	1	Extrapolated
	11" Composite			2	UUT-47, UUT-48, UUT-55
	11" Al Riveted		Aluminum, Backward Curved ¹	2	UUT-22
	18" Al Riveted		Aluminum, Backward Inclined	6	Interpolated
	21" Al Riveted			8	Interpolated
	25" Al Riveted			13	Interpolated
	31" Al Riveted			24	Interpolated
	10" Al Welded			3	Interpolated
	12" Al Welded			3	Interpolated
	14" Al Welded			4	UUT-58
	16" Al Welded			5	Interpolated
	18" Al Welded			6	UUT-60
	21" Al Welded			8	UUT-23, UUT-56, UUT-57
	25" Al Welded			13	UUT-59
	31" Al Welded			24	UUT-24

Note: ¹Aluminum & backward curved fan wheels are obsolete

Table 4B: Certified Subcomponents - Wall Mounted Models

Component Type	Model	Manufacturer	Description	Material	Weight [lbs]	UUT
Motors	48	Vari-Green	1/15HP, 115-230V	Carbon Steel Frame	4	Extrapolated
	48		1/6HP, 115V, EC		8	UUT-47, UUT-48
	56		1/10HP, 115-230v		10	Extrapolated
	48	Marathon	1/8HP, 115V		8	UUT-55
	48		1/3HP, 115V		14	Interpolated
	56		2HP, 208-460V		47	Interpolated
	182T	WEG	3HP, 208-460V		67	UUT-60
	184T		2HP, 208-460V		66	UUT-56, UUT-57
	182T		3HP, 208-460V		67	UUT-59
	48/56	Baldor	1/30HP, 115 - 460V		5	UUT-22
	48/56		1/3 HP, 115 - 460V		11	Interpolated
	56		3/4HP, 115-230V		23	Interpolated
	56		1.5HP, 208-460V		35	UUT-58
	143T		2 HP, 115 - 460V		65	UUT-23
	182T		3 HP, 208-460V		69	Interpolated
	182T		5HP, 208 - 600V		90	Interpolated
	184T		7.5HP, 208 - 600V		100	UUT-24
Disconnect Switches	NEMA 1	Square-D Disconnect	Disconnect Switch	Carbon Steel	3	UUT-22, 23, 24, 47, 48
	NEMA 3R/4	Square-D Disconnect	Disconnect Switch		15	UUT-24
Speed Controllers	6A	Raffel Systems	Single Gang Box	Steel, Plastic	1	UUT-22, 47, 48
	8A	Raffel Systems	Single Gang Box		1	Interpolated
	10A	Raffel Systems	Single Gang Box		1	UUT-23
Vari-Green Drive	208 - 230V	Greenheck	NEMA 4X	Aluminum	12	UUT-57, UUT-60
	460V	Greenheck	NEMA 4X		12	UUT-24



UNIT UNDER TEST (UUT) Summary Sheet

UUT-1

Test Report: ANCO 3298.04

Model Line	Model Number	Manufacturer
CUBE Belt Drive Upblast Fan	S-CUBE-480-75-F	Greenheck

Product Construction Summary

Spun aluminum housing, steel wheel, belt drive upblast exhaust fan. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

49" Carbon Steel Riveted Backward Inclined Fan Wheel: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
603	76.0	76.0	51.0	3.8	3.5	5.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.28	1.0	1.5	3.65	2.74	1.52	0.61
		-	-	-	-	-	-	-

Test Mounting Details

Base mounted rigid on GPF57-G18, 18" roof curb using ungraded 1/4" sheet metal screws (10 per side) or at 1/2 the spacing specified in Greenheck installation manual (required upgrade). Roof curb mounted to table using 1/4" ungraded sheet metal screws at 16" o.c.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-2

Test Report: ANCO 3298.04

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-200-B	Greenheck

Product Construction Summary

Spun aluminum housing, aluminum wheel, direct drive upblast exhaust fan. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

21" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
144	36.0	36.0	31.5	7.8	8.3	13.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.28	1.0	1.5	3.65	2.74	1.52	0.61
		-	-	-	-	-	-	-

Test Mounting Details

Base mounted rigid on GPF30-G12, 12" roof curb using ungraded 1/4" sheet metal screws (10 per side) or at 1/2 the spacing specific in Greenheck installation manual (required upgrade). Roof curb mounted to table using 1/4" ungraded sheet metal screws at 16" o.c.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-3

Test Report: ANCO 3298.04

Model Line	Model Number	Manufacturer
G Direct Drive Downblast Fan	G-060-D	Greenheck

Product Construction Summary

Spun aluminum housing, aluminum wheel, direct drive downblast fan. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

8.25" Aluminum Riveted Backward Curved Fan Wheel: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
13	20.0	20.0	13.5	16.5	16.5	15.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.28	1.0	1.5	3.65	2.74	1.52	0.61
		-	-	-	-	-	-	-

Test Mounting Details

Base mounted rigid on GPR17-G18, 18" roof curb using 1/4" sheet metal screws at spacing specific in Greenheck installation manual. Roof curb mounted to table using 1/4" ungraded sheet metal screws at 16" o.c.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-5

Test Report: ANCO 3298.04

Model Line	Model Number	Manufacturer
CUBE Belt Drive Upblast Fan	CUBE-098-4	Greenheck

Product Construction Summary

Spun aluminum housing, aluminum wheel, belt driven upblast exhaust fan. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

10" Aluminum Welded Backward Inclined Fan Wheel: Greenheck;

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
53	25.0	25.0	26.5	7.1	4.9	15.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.28	1.0	1.5	3.65	2.74	1.52	0.61
		-	-	-	-	-	-	-

Test Mounting Details

Base mounted rigid on GPFV-19-G24, 24" roof curb using ungraded 1/4" sheet metal screws at spacing specified in Greenheck installation manual. Roof curb mounted to table using 1/4" ungraded sheet metal screws at 16" o.c.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-6

Test Report: ANCO 3298.04

Model Line	Model Number	Manufacturer
GB Belt Drive Downblast Fan	GB-540-150	Greenheck

Product Construction Summary

Spun aluminum housing, aluminum wheel, belt drive downblast fan. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

55" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
634	86.0	86.0	61.0	4.1	3.6	4.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.28	1.0	1.5	3.65	2.74	1.52	0.61
		-	-	-	-	-	-	-

Test Mounting Details

Base mounted rigid on SDCURB-64-S24, 24" roof curb using ungraded 1/4" sheet metal screws at spacing specified in Greenheck installation manual. Roof curb mounted to table using 1/4" ungraded sheet metal screws at 16" o.c.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-19

Test Report: ETL 14238

Model Line	Model Number	Manufacturer
G Direct Drive Downblast Fan	G-203-B	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap with prepunched mounting holes. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

21" Aluminum Welded Backward Inclined Fan Wheel: Greenheck; 143T Carbon Steel Frame (2HP, 115-460V) Motor: Baldor; NEMA 1 Carbon Steel Disconnect Switch: Square-D Disconnect; 10A Steel & Plastic Speed Controller: Raffel Systems

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
229	36.0	36.0	70.0	7.3	11.8	7.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		3.20	0.0	1.5	-	-	2.13	0.85

Test Mounting Details

Base mounted rigid on 42" Roof Curb using (24) 1/4" self tapping screws to attach fan to curb & (16) 5/16" Grade 8 bolts to attach curb to curb mount.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-20

Test Report: ETL 14238

Model Line	Model Number	Manufacturer
GB Belt Drive Downblast Fan	GB-500-150	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap with prepunched mounting holes. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

55" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck; 215T Carbon Steel Frame (15HP, 208-600V) Motor: Baldor; NEMA 1 & NEMA 3R/4 Carbon Steel Disconnect Switches: Square-D Disconnect; 208-230V Aluminum Vari-Green Drive: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
881	83.0	83.0	93.0	30.4	29.3	>33.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		3.20	0.0	1.5	-	-	2.13	0.85

Test Mounting Details

Base mounted rigid on 30" roof curb using (20) 1/4" self-tapping screws to attach fan to curb extension, (20) 1/4" self-tapping screws to attach curb extension to curb, and (36) 5/16" self-tapping screws attach curb to wood curb mount.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-21

Test Report: ETL 14238

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-095-E	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap with prepunched mounting holes. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

11" Aluminum Riveted Backward Curved Fan Wheel: Greenheck; 48/56 Carbon Steel Frame (1/3HP, 115-460V) Motor: Baldor; 6A Steel & Plastic Speed Controller: Raffel Systems

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
79	21.0	21.0	57.0	17.2	16.3	31.6

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		3.20	0.0	1.5	-	-	2.13	0.85

Test Mounting Details

Base mounted rigid on 42" roof curb using (16) 5/16" self-tapping screws to attach fan to curb and (12) 5/16" Grade 8 bolts to curb to curb mount.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-22

Test Report: ETL 14238

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-095-E	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap with prepunched mounting holes. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

11" Aluminum Riveted Backward Curved Fan Wheel: Greenheck; 48/26 Carbon Steel Frame (1/30HP, 115-460V) Motor: Baldor; NEMA 1 Carbon Steel Disconnect Switch: Square-D Disconnect; 6A Steel & Plastic Speed Controller: Raffel Systems

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
54	21.0	21.0	27.0	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		3.20	0.0	1.5	-	-	2.13	0.85

Test Mounting Details

Wall mounted rigid on 12" curb using (16) 5/16" self-tapping screws to attach fan to curb and (12) 5/16" self-tapping screws to attach curb to wood curb mount.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-23

Test Report: ETL 14238

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-200-B	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap with prepunched mounting holes. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

21" Aluminum Welded Backward Inclined Fan Wheel: Greenheck; 143T Carbon Steel Frame (2HP, 115-460V) Motor: Baldor; NEMA 1 Carbon Steel Disconnect Switch: Square-D Disconnect; 10A Steel & Plastic Speed Controller: Raffel Systems

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
204	36.0	36.0	41.0	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		3.20	0.0	1.5	-	-	2.13	0.85

Test Mounting Details

Wall mounted rigid on 12" curb using (24) 1/4" self-tapping screws to attach fan to curb and (16) 5/16" self-tapping screws to attach curb to wood curb mount.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-24

Test Report: ETL 14238

Model Line	Model Number	Manufacturer
CUBE Belt Drive Upblast Fan	CUBE-300XP-75	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap with prepunched mounting holes. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

31" Aluminum Welded Backward Inclined Fan Wheel: Greenheck; 184T Carbon Steel Frame (7.5HP, 208-600V) Motor: Baldor; NEMA 1 & NEMA 3R/4 Carbon Steel Disconnect Switch: Square-D Disconnect; 460V Aluminum Vari-Green Drive: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
351	50.0	50.0	48.0	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		3.20	0.0	1.5	-	-	2.13	0.85

Test Mounting Details

Wall mounted rigid on 12" curb using (24) 1/4" self-tapping screws to attach fan to curb and (24) 5/16" self-tapping screws to attach curb to wood curb mount.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-46

Test Report: ETL 15332

Model Line	Model Number	Manufacturer
G Direct Drive Downblast Fan	G-095-V6-6-X	Greenheck

Product Construction Summary

Aluminum housing, Composite backward curved fan wheel, Aluminum curb cap with prepunched mounting holes. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

11" Composite Backward Curved Fan Wheel: Greenheck; 48 Carbon Steel Frame (1/6HP, 115V) Motor: Vari-Green

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
67	22.0	22.0	16.0	15.4	15.8	24.1

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		3.20	0.0	1.5	-	-	2.13	0.85

Test Mounting Details

Base mounted rigid on 17.5" x 17.5" x 42" curb. Curb mounted to table with (16) 5/16" Grade 8 bolts with washers. Fan mount to curb top with (16) 24 1/4" Tek screws.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-47

Test Report: ETL 15332

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-095-US-6-X	Greenheck

Product Construction Summary

Aluminum housing, Composite backward curved fan wheel, Aluminum curb cap with prepunched mounting holes. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

11" Composite Backward Curved Fan Wheel: Greenheck; 48 Carbon Steel Frame (1/6HP, 115V, EC) Motor: Vari-Green; NEMA 1 Carbon Steel Disconnect Switch: Square-D Disconnect; 6A Steel & Plastic Speed Controller: Raffel Systems

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
51	21.0	21.0	17.0	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		3.20	0.0	1.5	-	-	2.13	0.85

Test Mounting Details

Base mounted rigid on 19" x 19" x 12" curb (PN: GPF-19-G12) to rigid wall fixture. Weight includes curb weight. Curb mounted to wall with twelve (12) 1/4" x 1" lag screws. UUT mounted to top of curb with sixteen (16) 1/4" Tek screws



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-48

Test Report: ETL 15332

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-095-U6-6-X	Greenheck

Product Construction Summary

Aluminum housing, Composite backward curved fan wheel, Aluminum curb cap with prepunched mounting holes. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

11" Composite Backward Curved Fan Wheel: Greenheck; 48 Carbon Steel Frame (1/6HP, 115V, EC) Motor: Vari-Green; NEMA 1 Carbon Steel Disconnect Switch: Square-D Disconnect; 6A Steel & Plastic Speed Controller: Raffel Systems

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
29	21.0	21.0	17.0	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		3.20	0.0	1.5	-	-	2.13	0.85

Test Mounting Details

Rigid wall mounted to wall bracket on rigid wall fixture. Bracket mounted to wall with (12) 5/16" Grade 8 bolts with washers. Fan mounted to bracket with (16) 1/4" Tek screws.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-49

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-160XP	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

16" Aluminum Welded Backward Inclined Fan Wheel: Greenheck; 143T Carbon Steel Frame (1HP, 208-460V) Motor: Baldor

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
171	28.3	28.3	68.0	9.5	8.3	13.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-49 fan was mounted on the 26 3/4" x 26 3/4" x 42" hinged curb using (20) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (10) #12 Tek screws, and (3) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly base mounted to the shake table interface plate using (8) 3/8" Grade 5 bolts and flat washers.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-50

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-240HP	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

25" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck; 184T Carbon Steel Frame (3HP, 208-480V) Motor: Vari-Green

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
357	42.0	42.0	80.0	9.0	8.0	12.5

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-50 fan was mounted on the 38 1/2" x 38 1/2" x 42" hinged using (10) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (14) #12 Tek screws, and (5) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly base mounted to the shake table interface plate using (12) 3/8" Grade 5 bolts and flat washers.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-51

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-300HP	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

31" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck; 254T Carbon Steel Frame (7.5HP, 208-600V) Motor: Baldor

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
560	49.5	49.5	82.0	6.3	5.0	9.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-51 fan was mounted on the 40 1/2" x 40 1/2" x 42" hinged curb using (20) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (4) 5/16" Grade 5 bolts and serrated flange nuts, and (9) 1/4" self drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly base mounted to the shake table interface plate using (12) 3/8" Grade 5 bolts and flat washers.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-52

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUBE Belt Drive Upblast Fan	CUBE-240XP	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

18" Aluminum Welded Backward Inclined Fan Wheel: Greenheck; 182T Carbon Steel Frame (3HP, 208-460V) Motor: WEG; 460V Aluminum Vari-Green Drive: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
337	42.0	42.0	80.0	8.8	8.0	13.0

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-52 fan was mounted on the 38 1/2" x 38 1/2" x 42" hinged curb using (10) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. To keep the unit closed (5) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used. The curb was rigidly base mounted to the shake table interface plate using (12) 3/8" Grade 5 bolts and flat washers.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-53

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUBE Belt Drive Upblast Fan	CUBE-360HP	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

36" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck; 215T Carbon Steel Frame (10HP, 208-460V) Motor: WEG; 460V Aluminum Vari-Green Drive: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
494	59.0	59.0	87.0	9.0	8.3	25.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-53 fan was mounted on the 46 3/4" x 46 3/4" x 42" hinged curb using (16) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (6) 5/16" Grade 5 weld studs and serrated flange nuts, and (9) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly base mounted to the shake table interface plate using (12) 3/8" Grade 5 bolts and flat washers.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-54

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUBE Belt Drive Upblast Fans	CUBE-480	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

49" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck; 215T Carbon Steel Frame (10HP, 208-460V) Motor: Baldor

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
790	74.0	74.0	95.0	6.3	7.0	8.0

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-54 fan was mounted on the 58 3/4" x 58 3/4" x 42" hinged curb using (20) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (26) 1/4" self-drilling sheet metal screws and (8) 5/16" grade 5 weld studs and flange nuts were used for hinge bracket to hinge frame connection. To keep the unit closed (9) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly base mounted to the shake table interface plate using (12) 3/8" Grade 5 bolts and flat washers.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-55

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-095	Greenheck

Product Construction Summary

Aluminum housing, Composite curved fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

11" Composite Backward Curved Fan Wheel: Greenheck; 48 Carbon Steel Frame (1/8HP, 115V) Motor: Marathon

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
70	23.3	23.3	30.5	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-55 fan was mounted on the 23 5/8" x 23 5/8" x 12" hinged curb (16) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (8) #12 Tek screws, and (3) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly wall mounted to the wall fixture using (8) 5/16" Grade 5 bolts, flat washers, 1 5/8 x 1 5/8 x 1/4" carbon steel plate washers and channel nuts.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-56

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fans	CUE-200	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

21" Aluminum Welded Backward Inclined Fan Wheel: Greenheck; 184T Carbon Steel Frame (2HP, 208-460V) Motor: WEG

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
168	36.5	36.5	37.3	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-56 fan was mounted on the wall bracket using (8) 1/4" Grade 5 bolts and nuts, and (2) 5/16" Grade 5 weld studs and serrated flange nuts were used to connect the fan to hinge bracing. The bracket was rigidly wall mounted to the wall fixture using (16) 5/16" Grade 5 bolts, flat washers, 1 5/8 x 1 5/8 x 1/4" carbon steel plate washers and channel nuts.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-57

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUE Direct Drive Upblast Fan	CUE-200	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

21" Aluminum Welded Backward Inclined Fan Wheel: Greenheck; 184T Carbon Steel Frame (2HP, 208-460V) Motor: WEG; 208-230V Aluminum Vari-Green Drive: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
184	36.3	36.3	49.0	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-57 fan was mounted on the 34 1/2" x 34 1/2" x 12" hinged curb using (4) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (14) #12 Tek screws, and (5) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly wall mounted to the wall fixture using (12) 5/16" Grade 5 bolts, flat washers, 1 5/8 x 1 5/8 x 1/4" carbon steel plate washers and channel nuts.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-58

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUBE Belt Drive Upblast Fan	CUBE-130	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

14" Aluminum Welded Backward Inclined Fan Wheel: Greenheck; 56 Carbon Steel Frame (1.5HP, 208-460V) Motor: Baldor

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
99	24.3	24.3	38.3	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-58 fan was mounted on the 32 1/2" x 32 1/2" x 12" hinged curb using (4) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (8) #12 Tek screws, and (5) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly wall mounted to the wall fixture using (8) 5/16" Grade 5 bolts, flat washers, 1 5/8 x 1 5/8 x 1/4" carbon steel plate washers and channel nuts.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-59

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUBE Belt Drive Upblast Fans	CUBE-240HP	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

25" Aluminum Welded Backward Inclined Fan Wheel: Greenheck; 182T Carbon Steel Frame (3HP, 208-460V) Motor: WEG

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
220	42.5	42.5	35.8	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-59 fan was mounted on the wall bracket using (8) 1/4" Grade 5 bolts and nuts and (4) 5/16" Grade 5 weld studs and serrated flange nuts were used to connect the fan to hinge bracing. The bracket was rigidly wall mounted to the wall fixture using (16) 5/16" Grade 5 bolts, flat washers, 1 5/8 x 1 5/8 x 1/4" carbon steel plate washers and channel nuts.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-60

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
CUBE Belt Drive Upblast Fan	CUBE-240XP	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

18" Aluminum Welded Backward Inclined Fan Wheel: Greenheck; 182T Carbon Steel Frame (3HP, 208-460V) Motor: Marathon; 208-230V Aluminum Vari-Green Drive: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
325	42.0	42.0	48.0	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-60 fan was mounted on the 38 1/2" x 38 1/2" x 12" hinged curb using (13) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (14) #12 Tek screws, and (5) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly wall mounted to the wall fixture using (12) 5/16" Grade 5 bolts, flat washers, 1 5/8 x 1 5/8 x 1/4" carbon steel plate washers and channel nuts.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-61

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
G Direct Drive Downblast Fan	G-070	Greenheck

Product Construction Summary

Aluminum housing, Composite backward curved fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

8" Composite Backward Curved Fan Wheel: Greenheck; 56 Carbon Steel Frame (1/10HP, 115-230V) Motor: Vari-Green

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
81	21.0	21.0	54.3	11.5	11.8	16.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-61 fan was mounted on the 21 1/2" x 21 1/2" x 42" hinged curb using (6) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (6) #12 Tek screws, and (3) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly base mounted to the shake table interface plate using (8) 3/8" Grade 5 bolts and flat washers.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-62

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
G Direct Drive Downblast Fan	G-200HP	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

21" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck; 182T Carbon Steel Frame (5HP, 208-600V) Motor: Baldor

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
226	35.3	35.3	77.0	7.0	5.3	11.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-62 fan was mounted on the 34 1/2" x 34 1/2" x 42" non-hinged curb using (20) 1/4" self drilling screws around the perimeter. The curb was rigidly base mounted to the shake table interface plate using (12) 3/8" Grade 5 bolts and flat washers.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-63

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
G Direct Drive Downblast Fan	G-300	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

31" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck; 254T Carbon Steel Frame (15HP, 208-600V) Motor: Baldor; NEMA 12 Carbon Steel Disconnect Switch: ABB; 460V Aluminum Vari-Green Drive: Greenheck

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
518	48.3	48.3	86.0	6.8	5.3	8.8

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-63 fan was mounted on the 40 5/8" x 40 5/8" x 42" hinged curb using (8) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (16) 1/4" self-drilling sheet metal screws, and (4) 5/16" Grade 5 weld studs and flange nuts were used to connect hinge bracket to hinge frame. To keep the unit closed (2) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used. The curb was rigidly base mounted to the shake table interface plate using (12) 3/8" Grade 5 bolts and flat washers.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-64

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
GB Belt Drive Downblast Fan	GB-240HP	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

25" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck; 184T Carbon Steel Frame (5HP, 208-480V) Motor: Vari-Green

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
324	42.0	42.0	81.3	16.5	4.8	8.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-64 fan was mounted on the 38 1/2" x 38 1/2" x 42" hinged curb using (20) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (14) #12 Tek screws, and (5) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used to keep unit closed. The curb was rigidly base mounted to the shake table interface plate using (12) 3/8" Grade 5 bolts and flat washers.



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



UNIT UNDER TEST (UUT) Summary Sheet

UUT-65

Test Report: DCL 27298-2501

Model Line	Model Number	Manufacturer
GB Belt Drive Downblast Fan	GB-540	Greenheck

Product Construction Summary

Aluminum housing, Aluminum backward inclined fan wheel, Aluminum curb cap. Motor and drives isolated on shock mounts.

Options / Subcomponent Summary

55" Aluminum Riveted Backward Inclined Fan Wheel: Greenheck; 256T Carbon Steel Frame (20HP, 208-460V) Motor: Baldor; NEMA 12 Carbon Steel Disconnect Switch: ABB

UUT Properties

Weight [lbs]	Dimensions [in]			Lowest Nat. Freq. [Hz]		
	Depth	Width	Height	F-B	S-S	V
1,062	83.0	83.0	98.5	5.3	5.0	6.0

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S _{DS}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	-	-
		2.28	0.0	1.5	-	-	1.52	0.61

Test Mounting Details

UUT-65 fan was mounted on the 64 3/4" x 64 3/4" x 42" hinged curb using (6) 5/16" Grade 5 weld studs and serrated flange nuts for both hinge brackets. The hinge brackets were attached to the curb using (28) 1/4" self-drilling sheet metal screws, and (8) 5/16" Grade 5 weld studs and flange nuts were used to connect hinge bracket to hinge frame. To keep the unit closed (9) 1/4" self-drilling sheet metal screws opposite of hinge pivot were used. The curb was rigidly base mounted to the shake table interface plate using (12) 3/8" Grade 5 bolts and flat washers.



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