APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0502

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Greenheck Fan Corporation

Manufacturer's Technical Representative: Mark Vanderkooy

Mailing Address: 1100 Greenheck Drive, Schofield, WI 54476

Telephone: (715) 841-8538 Email: mark.vanderkooy@greenheck.com

Product Information

Product Name: Exhaust/Smoke Control Fans

Product Model Number(s): QEI-9-300 to QEI-60-300

Product Category: Exhaust/Smoke Control Fans

Product Sub-Category: NA

General Description: Inline mixed flow fans.

Mounting Description: Base mounted or Ceiling suspended with spring isolators.

Tested Seismic Enhancements: None

Applicant Information

Applicant Company Name: TRU Compliance, by Structural Integrity Associates

Contact Person: Daniel Zentner

Mailing Address: 233 SW Wilson Ave, Suite 101, Bend, OR 97702

Telephone: (541) 292-5839 Email: dzentner@structint.com

Title: Program Manager

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

Company Name: STRUCTURAL INTEGRITY ASSOCIATES, INC.

Name: LACHEZAR HANDZHIYSKI California License Number: S6515

Mailing Address: 5215 Hellyer Avenue, Suite 210, San Jose, CA 95138

Telephone: (669) 437-0200 Email: Lhandzhiyski@StructInt.com

Certification Method

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

☐ Other (Please Specify):

Testing Laboratory

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

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 4.5 (SDS = 2.0g); 2.4 (SDS = 3.2g)

S_{DS} (Design spectral response acceleration at short period, g) = 2.0 (z/h = 1); 3.2 (z/h = 0)

a_p (Amplification factor) = 2.5

R_p (Response modification factor) = 2

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

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

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

HCAI Approval (For Office Use Only) - Approval Expires on 04/23/2031

Date: 4/23/2025

Name: Timothy Piland Title: Senior Structural Engineer

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

Condition of Approval (if applicable):

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT MATRIX

TRU PROJECT NO. 2551654-001, Rev. 0

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: QEI

TABLE 1

Certified Product Construction Summary:

UL-705; 300 Construction; Belt Drive, Carbon Steel Shaft; Carbon Steel Housing; Carbon Steel Wheel

Certified Options Summary:

Motor Cover, Bolted access door, Copper and nylon extended lube lines, Inlet and outlet guard, Slip fit inlet & outlet, Punched inlet & outlet flanges, Belt guard, Belt tube, Mounting base, 80k and 200k bearings, Ceiling hung with motor in position E, G, or C.

Mounting Configuration:

Ceiling mounted - spring vibration isolated

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

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS}= ***2.0 g*** ***z/h=1.0*** S_{DS}= ***3.2 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model	Dimensions (in)			Weight (lbs.)	Notes	UUT
		Depth	Width	Height			
QEI	QEI-9-300	28.5	32.0	40.3	293		Interp.
	QEI-12-300	30.1	32.0	40.3	305		Interp.
	QEI-15-300	34.0	36.5	44.9	410		Interp.
	QEI-16-300	34.0	38.0	47.8	432		Interp.
	QEI-18-300	39.5	41.0	51.6	628		Interp.
	QEI-20-300	41.5	43.0	54.3	687		Interp.
	QEI-22-300	44.0	46.0	57.6	874		Interp.
	QEI-24-300	49.0	49.0	64.3	1,010		48
	QEI-27-300	53.0	52.0	67.0	1,153		Interp.
	QEI-30-300	60.5	65.0	77.0	1,180		Interp.
	QEI-33-300	65.0	68.0	81.0	1,892		Interp.
	QEI-36-300	69.0	73.0	87.5	2,184		Interp.
	QEI-40-300	75.5	85.0	96.3	3,028		Interp.
	QEI-44-300	80.5	91.0	104.8	3,513		Interp.
	QEI-49-300	86.5	97.0	111.3	4,590		Interp.
	QEI-54-300	93.5	105.0	122.3	5,199		Interp.
	QEI-60-300	102.4	113.0	126.5	5,812		63

SPECIAL SEISMIC CERTIFICATION CERTIFIED COMPONENT MATRIX

TRU PROJECT NO. 2551654-001, Rev. 0

Manufacturer: Greenheck Fan Corporation
Model Line: QEI

TABLE 2

Certified Product Construction Summary:

UL-705; 300 Construction; Belt Drive, Carbon Steel Shaft; Carbon Steel Housing; Carbon Steel Wheel

Certified Options Summary:

Motor Cover, Bolted access door, Copper and nylon extended lube lines, Inlet and outlet guard, Slip fit inlet & outlet, Punched inlet & outlet flanges, Belt guard, Belt tube, Mounting base, 80k and 200k bearings, Base mounted with motor in positions A, G, or C.

Mounting Configuration:

Base mounted - spring vibration isolated

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

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS}= ***2.0 g*** ***z/h=1.0*** S_{DS}= ***3.2 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model	Dimensions (in)			Weight (lbs.)	Notes	UUT
		Depth	Width	Height			
QEI	QEI-9-300	28.5	32.0	40.3	203		Interp.
	QEI-12-300	30.1	32.0	40.3	305		Interp.
	QEI-15-300	34.0	36.5	44.9	410		Interp.
	QEI-16-300	34.0	38.0	47.8	432		Interp.
	QEI-18-300	39.5	41.0	51.6	628		Interp.
	QEI-20-300	41.5	43.0	54.3	687		Interp.
	QEI-22-300	44.0	46.0	57.6	874		Interp.
	QEI-24-300	49.0	49.0	64.3	1,010		47
	QEI-27-300	53.0	52.0	67.0	1,153		Interp.
	QEI-30-300	60.5	65.0	77.0	1,180		Interp.
	QEI-33-300	65.0	68.0	81.0	1,892		Interp.
	QEI-36-300	69.0	73.0	87.5	2,184		Interp.
	QEI-40-300	75.5	85.0	96.3	3,028		Interp.
	QEI-44-300	80.5	91.0	104.8	3,513		Interp.
	QEI-49-300	86.5	97.0	111.3	4,590		Interp.
	QEI-54-300	93.5	105.0	122.3	5,199		Interp.
	QEI-60-300	102.4	113.0	126.5	5,812		49

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 2551654-001, Rev. 0

TRU COMPLIANCE

Manufacturer: Greenheck Fan Corporation
Model Line: QEI
Table Description: Motors

TABLE 3

Building Code: CBC 2022
Seismic Certification Limits: S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 3.2 g z/h = 0.0; I_P = 1.5

Component Type	Manufacturer	Model	Description	Notes	UUT
Motor	Baldor	56T	*Fan sizes 9-36; 2 hp; 208-600V*		Interp.
		143T	*Fan sizes 9-36; 1.5 hp; 208-600V*		Interp.
		145T	*Fan sizes 9-36; 3 hp; 208-600V*		Interp.
		182T	*Fan sizes 9-40; 5 hp; 208-600V*		Interp.
		184T	*Fan sizes 9-40; 7.5 hp; 208-600V*		Interp.
		213T	*Fan sizes 15-44; 10 hp; 208-600V*		Interp.
		215T	*Fan sizes 15-54; 15 hp; 208-600V*		Interp.
		254T	*Fan sizes 18-60; 20 hp; 208-600V*		Interp.
		256T	*Fan sizes 22-60; 25 hp; 208-600V*		Interp.
		284T	*Fan sizes 24-60; 30 hp; 208-600V*	*UUT: 25 hp; 575V*	47, 48
		286T	*Fan sizes 27-60; 40 hp; 208-600V*		Interp.
		324T	*Fan sizes 30-60; 50 hp; 208-600V*		Interp.
		326T	*Fan sizes 36-60; 60 hp; 208-600V*		Interp.
		364T	*Fan sizes 40-60; 75 hp; 208-600V*		Interp.
		365T	*Fan sizes 44-60; 100 hp; 208-600V*		Interp.
		404T	*Fan sizes 49-60; 100 hp; 208-600V*		Interp.
		405T	*Fan sizes 49-60; 100 hp; 208-600V*	*UUT: 100 hp; 230/460V*	49, 63

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 2551654-001, Rev. 0

TABLE 4

Manufacturer: Greenheck Fan Corporation
Model Line: QEI
Table Description: Fan Wheels

Building Code: CBC 2022
Seismic Certification Limits: S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 3.2 g z/h = 0.0; I_P = 1.5

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lbs.)	Material	Notes	UUT
		Depth	Width	Height				
QEI (Greenheck)	15		15.0		20	*Carbon Steel*		Interp.
	18.25		18.25		24	*Carbon Steel*		Interp.
	20		20.0		30	*Carbon Steel*		Interp.
	22.25		22.25		37	*Carbon Steel*		Interp.
	24.5		24.5		46	*Carbon Steel*		Interp.
	27		27.0		56	*Carbon Steel*		Interp.
	30		30.0		73	*Carbon Steel*		47, 48
	33		33.0		89	*Carbon Steel*		Interp.
	36.5		36.5		135	*Carbon Steel*		Interp.
	40.25		40.25		171	*Carbon Steel*		Interp.
	44.5		44.5		228	*Carbon Steel*		Interp.
	49		49.0		348	*Carbon Steel*		Interp.
	54.25		54.25		421	*Carbon Steel*		Interp.
	60		60.0		515	*Carbon Steel*		Interp.
	66		66.0		630	*Carbon Steel*		Interp.
	73		73.0		780	*Carbon Steel*		49, 63

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 2551654-001, Rev. 0

Manufacturer: Greenheck Fan Corporation
Model Line: QEI
Table Description: Accessories/options

TABLE 5

Building Code: CBC 2022
Seismic Certification Limits: S_{DS} = 2.0 g z/h = 1.0; S_{DS} = 3.2 g z/h = 0.0; I_P = 1.5

Component Type	Manufacturer	Model	Description	Notes	UUT
Sure-Aire (100-240 VAC)	Greenheck	384799	*Max pressure - 8.30 inches W.C.*		47, 48
		384800	*Max pressure - 22.14 inches W.C.*		Interp.
		384801	*Max pressure - 41.52 inches W.C.*		Interp.
		384802	*Max pressure - 83.04 inches W.C.*		Interp.
		384803	*Max pressure - 138.40 inches W.C.*		Interp.
Sure-Aire (24 VAC/VDC)	Greenheck	384986	*Max pressure - 8.30 inches W.C.*		Interp.
		384987	*Max pressure - 22.14 inches W.C.*		Interp.
		384988	*Max pressure - 41.52 inches W.C.*		Interp.
		384989	*Max pressure - 83.04 inches W.C.*		Interp.
		384990	*Max pressure - 138.40 inches W.C.*		49, 63

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 2551654-001, Rev. 0

Manufacturer: Greenheck Fan Corporation

Model Line: QEI

UUT	Unit Description (mounting)	Report Number (UUT#)	Testing Lab	Year Tested	ISO 17025 Accredited?	S_{DS}	z/h	I_P
47	QEI-24-300 (base mounted - isolated)	14238, Rev. 1 (UUT47)	Environmental Testing Lab (ETL)	2016	Yes	2.0 3.2	1.0 0.0	1.5
48	QEI-24-300 (ceiling mounted - isolated)	14238, Rev. 1 (UUT48)	Environmental Testing Lab (ETL)	2016	Yes	2.0 3.2	1.0 0.0	1.5
49	QEI-60-300 (base mounted - isolated)	14238, Rev. 1 (UUT49)	Environmental Testing Lab (ETL)	2016	Yes	2.0 3.2	1.0 0.0	1.5
63	QEI-60-300 (ceiling mounted - isolated)	16028-TR-001 (UUT63)	Environmental Testing Lab (ETL)	2017	Yes	2.0 3.2	1.0 0.0	1.5

Notes:

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 2551654-001, Rev. 0

UUT 47

Manufacturer:	*Greenheck Fan Corporation*
Model Line:	*QEI*
Model Number:	*QEI-24-300*
Serial Number:	*N/A*
Test Report:	*14238, Rev. 1 (UUT47)*

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,010	49.0	49.0	64.3	4.2	4.2	6.5

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}(g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022	ICC-ES AC156	2.0	1.0	1.5	3.20	2.40	2.13	0.85
		3.2	0.0					

Product Construction Summary:

UL-705; 300 Construction; Belt Drive, Carbon Steel Shaft; Carbon steel Housing; Carbon Steel Wheel

Options/Subcomponent Summary:

Description
25 Hp Motor
Motor Cover
Bolted Access Door
Belt Guard
Belt Tube
Inlet and Outlet Guard
Punched Inlet & Outlet Flanges
Copper and Nylon Extended Lube Lines
Mounting Base
Motor in Position G

Test Mounting Details:

UUT47 was base mounted - isolated to the test fixture using four (4) VMC MSH-1E-530N isolators to the equipment skid using one (1) 1/2" Grade 8 bolt for each isolator. The isolators were mounted to the test fixture using two (2) 5/8" Grade 8 bolts for each isolator.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test. Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 2551654-001, Rev. 0

UUT 48

Manufacturer:	*Greenheck Fan Corporation*
Model Line:	*QEI*
Model Number:	*QEI-24-300*
Serial Number:	*N/A*
Test Report:	*14238, Rev. 1 (UUT48)*

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,010	49.0	49.0	64.3	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}(g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022	ICC-ES AC156	2.0	1.0	1.5	3.20	2.40	2.13	0.85
		3.2	0.0					

Product Construction Summary:

UL-705; 300 Construction; Belt Drive, Carbon Steel Shaft; Carbon steel Housing; Carbon Steel Wheel

Options/Subcomponent Summary:

Description
25 Hp Motor
Motor Cover
Bolted Access Door
Belt Guard
Belt Tube
Inlet and Outlet Guard
Punched Inlet & Outlet Flanges
Copper and Nylon Extended Lube Lines
Mounting Base
Motor in Position G

Test Mounting Details:

UUT48 was ceiling mounted - isolated to the test fixture using four (4) 5/8" Ø A307 threaded rods w/ rod stiffeners, two (2) Mason RW30N-B-410 & two (2) Mason RW30N-B-336 isolators and four (4) 3/8" Ø cable braces with Mason SCB-3/SCBH-3 clips at ends.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test. Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 2551654-001, Rev. 0

UUT 49

Manufacturer:	*Greenheck Fan Corporation*
Model Line:	*QEI*
Model Number:	*QEI-60-300*
Serial Number:	*N/A*
Test Report:	*14238, Rev. 1 (UUT49)*

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5,812	102.4	113.0	126.5	2.5	2.1	4.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}(g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022	ICC-ES AC156	2.0	1.0	1.5	3.20	2.40	2.13	0.85
		3.2	0.0					

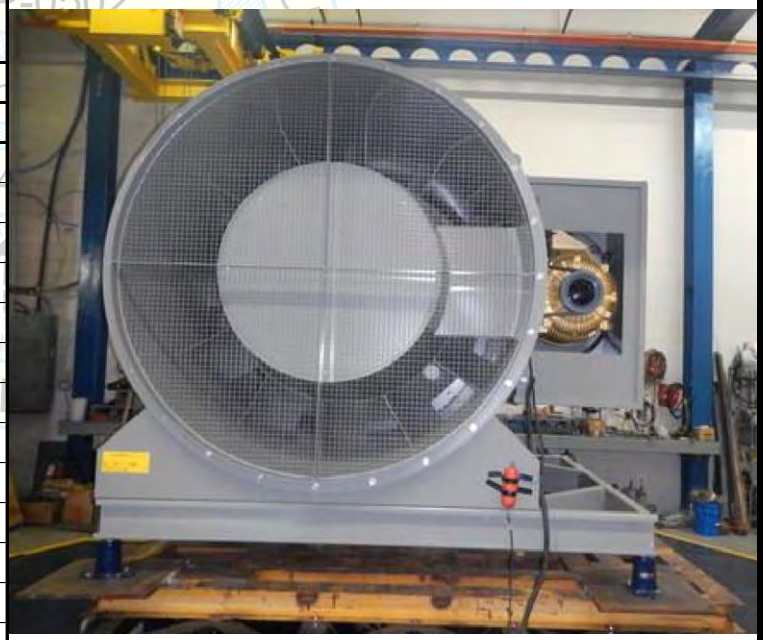
Product Construction Summary:

UL-705; 300 Construction; Belt Drive, Carbon Steel Shaft; Carbon steel Housing; Carbon Steel Wheel

Options/Subcomponent Summary:

Description
100 Hp Motor
Motor Cover
Bolted Access Door
Belt Guard
Belt Tube
Inlet and Outlet Guard
Punched Inlet & Outlet Flanges
Copper and Nylon Extended Lube Lines
Mounting Base
Motor in Position C

Test Mounting Details:



UUT49 was base mounted - isolated to the test fixture using four (4) Mason SSLFH-C-1750 isolators to the equipment skid using one (1) 1/2" Grade 8 bolt for each isolator. The isolators were mounted to the test fixture using four (4) 5/8" Grade 8 bolts for each isolator. Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test. Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

TRU PROJECT NO. 2551654-001, Rev. 0

UUT 63

Manufacturer:	*Greenheck Fan Corporation*
Model Line:	*QEI*
Model Number:	*QEI-60-300*
Serial Number:	*N/A*
Test Report:	*16028-TR-001 (UUT63)*

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5,812	102.4	113.0	126.5	N/A	N/A	N/A

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS}(g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022	ICC-ES AC156	2.0	1.0	1.5	3.20	2.40	2.13	0.85
		3.2	0.0					

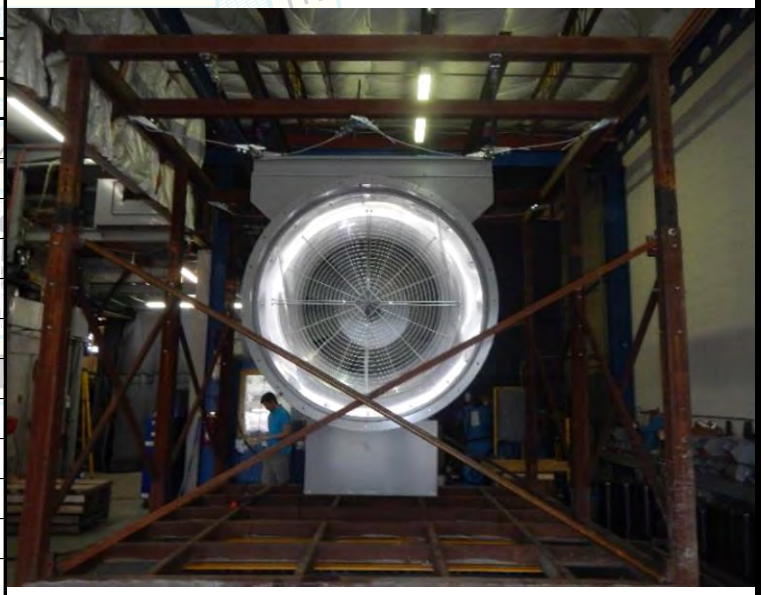
Product Construction Summary:

UL-705; 300 Construction; Belt Drive, Carbon Steel Shaft; Carbon steel Housing; Carbon Steel Wheel

Options/Subcomponent Summary:

Description
100 Hp Motor
Motor Cover
Bolted Access Door
Belt Guard
Belt Tube
Inlet and Outlet Guard
Punched Inlet & Outlet Flanges
Copper and Nylon Extended Lube Lines
Mounting Base
Motor in Position E

Test Mounting Details:



UUT63 was ceiling mounted - isolated to the test fixture using four (4) 7/8" Ø A307 threaded rods w/ rod stiffeners and four (4) Mason RW30N-D-2150 isolators & sixteen (16) 3/8" Ø cable braces with Mason SCB-4 brackets at ends.

Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test. Contents were included in testing per operating conditions.