



**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION**

**APPLICATION FOR OSHPD SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)**

OFFICE USE ONLY

APPLICATION #: **OSP – 0502 – 10**

OSHPD 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: QEI

Product Type: Mixed Flow Inline Fans

Product Model Number: QEI-9-II to QEI-60-II

(List all unique product identification numbers and/or part numbers)

General Description: Inline mixed flow fans.

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

Applicant Information

Applicant Company Name: TRU Compliance, LLC

Contact Person: Matthew J. Tobolski, PhD, SE

Mailing Address: 960 SW Disk Drive, Suite 104, Bend, OR 97702

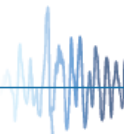
Telephone: (541) 205-4064 Email: mtobolski@trucompliance.com

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: 1/19/2017

Title: President Company Name: TRU Compliance, LLC

"Access to Safe, Quality Healthcare Environments that Meet California's Diverse and Dynamic Needs"





**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION**

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

Company Name: TRU Compliance, LLC

Name: Matthew J. Tobolski, PhD, SE California License Number: S5648

Mailing Address: 960 SW Disk Drive, Suite 104, Bend, OR 97702

Telephone: (541) 205-4064 Email: mtobolski@trucompliance.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): _____

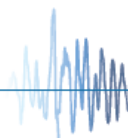
Testing Laboratory

Company Name: Environmental Testing Laboratory (ETL)

Contact Name: Paul E. Little

Mailing Address: 11034 Indian Trail, Dallas, TX 75229

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





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FACILITIES DEVELOPMENT DIVISION**

Seismic Parameters

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

Design Basis of Equipment or Components (F_p/W_p) = 4.5 ($S_{DS} = 2.0g$); 2.4 ($S_{DS} = 3.2g$)

S_{DS} (Design spectral response acceleration at short period, g) = 2.0 ($z/h = 1.0$); 3.2 ($z/h = 0.0$)

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

R_p (Equipment or component response modification factor) = 2.0

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1.0 ($S_{DS} = 2.0g$); 0.0 ($S_{DS} = 3.2g$)

Equipment or Component Natural Frequencies (Hz) = See Attachment

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

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

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

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

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

R (Response modification coefficient) = _____

Ω_0 (System overstrength factor) = _____

C_d (Deflection amplification factor) = _____

I_p (Importance factor) = 1.5

Height to Center of Gravity above base = _____

Equipment or Component Natural Frequencies (Hz) = _____

Overall dimensions and weight (or range thereof) = _____

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

List of Attachments Supporting Special Seismic Certification

Test Report(s) Drawings Calculations Manufacturer's Catalog

Other(s) (Please Specify): Attachment A

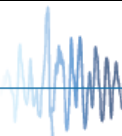
OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2022

Signature:  Date: June 6, 2017

Print Name: Ali Sumer Title: DSE

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. 16028



<i>Manufacturer:</i> Greenheck Fan Corporation <i>Model Line:</i> QEI	TABLE 1
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Certified Product Construction Summary:
 UL-705; Class II 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 configuration must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2016 *Seismic Certification Limits:* $S_{DS} = 2.0g$ $z/h=1.0$ $I_p = 1.5$
 $S_{DS} = 3.2g$ $z/h=0.0$

Model Line	Model	Dimensions (in)			Weight (lb)	Notes	UUT
		Depth	Width	Height			
QEI	QEI-9-II	28.5	32.0	40.3	293		Interp.
	QEI-12-II	30.1	32.0	40.3	305		Interp.
	QEI-15-II	34.0	36.5	44.9	410		Interp.
	QEI-16-II	34.0	38.0	47.8	432		Interp.
	QEI-18-II	39.5	41.0	51.6	628		Interp.
	QEI-20-II	41.5	43.0	54.3	687		Interp.
	QEI-22-II	44.0	46.0	57.6	874		Interp.
	QEI-24-II	49.0	49.0	64.3	1010		48
	QEI-27-II	53.0	52.0	67.0	1153		Interp.
	QEI-30-II	60.5	65.0	77.0	1180		Interp.
	QEI-33-II	65.0	68.0	81.0	1892		Interp.
	QEI-36-II	69.0	73.0	87.5	2184		Interp.
	QEI-40-II	75.5	85.0	96.3	3028		Interp.
	QEI-44-II	80.5	91.0	104.8	3513		Interp.
	QEI-49-II	86.5	97.0	111.3	4590		Interp.
	QEI-54-II	93.5	105.0	122.3	5199		Interp.
QEI-60-II	102.4	113.0	126.5	5812		63	

SPECIAL SEISMIC CERTIFICATION CERTIFIED COMPONENT MATRIX

TRU PROJECT NO. 16028



<i>Manufacturer:</i> Greenheck Fan Corporation	TABLE 2
<i>Model Line:</i> QEI	

Certified Product Construction Summary:
UL-705; Class II 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 configuration must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2016 *Seismic Certification Limits:* $S_{DS} = 2.0g$ $z/h=1.0$ $I_p = 1.5$
 $S_{DS} = 3.2g$ $z/h=0.0$

Model Line	Model	Dimensions (in)			Weight (lb)	Notes	UUT
		Depth	Width	Height			
QEI	QEI-9-II	28.5	32.0	40.3	293		Interp.
	QEI-12-II	30.1	32.0	40.3	305		Interp.
	QEI-15-II	34.0	36.5	44.9	410		Interp.
	QEI-16-II	34.0	38.0	47.8	432		Interp.
	QEI-18-II	39.5	41.0	51.6	628		Interp.
	QEI-20-II	41.5	43.0	54.3	687		Interp.
	QEI-22-II	44.0	46.0	57.6	874		Interp.
	QEI-24-II	49.0	49.0	64.3	1010		47
	QEI-27-II	53.0	52.0	67.0	1153		Interp.
	QEI-30-II	60.5	65.0	77.0	1180		Interp.
	QEI-33-II	65.0	68.0	81.0	1892		Interp.
	QEI-36-II	69.0	73.0	87.5	2184		Interp.
	QEI-40-II	75.5	85.0	96.3	3028		Interp.
	QEI-44-II	80.5	91.0	104.8	3513		Interp.
	QEI-49-II	86.5	97.0	111.3	4590		Interp.
	QEI-54-II	93.5	105.0	122.3	5199		Interp.
QEI-60-II	102.4	113.0	126.5	5812		49	

SPECIAL SEISMIC CERTIFICATION
 CERTIFIED SUBCOMPONENT MATRIX

TRU PROJECT NO. 16028



<i>Manufacturer:</i> Greenheck Fan Corporation	<i>Table Description:</i> Motors	TABLE 3
<i>Model Line:</i> QEI		

<i>Building Code:</i> CBC 2016	<i>Seismic Certification Limits:</i>	$S_{DS} = 2.0g$ $z/h = 1.0$ $S_{DS} = 3.2g$ $z/h = 0.0$ $I_P = 1.5$
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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. 16028



<i>Manufacturer:</i> Greenheck Fan Corporation	<i>Table Description:</i> Fan wheels	TABLE 4
<i>Model Line:</i> QEI		

Building Code: CBC 2016 *Seismic Certification Limits:* $S_{DS} = 2.0g$ $z/h = 1.0$ $I_P = 1.5$
 $S_{DS} = 3.2g$ $z/h = 0.0$

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
QEI (Greenheck)	15		15		20	Carbon Steel		Interp.
	18.25		18.25		24	Carbon Steel		Interp.
	20		20		30	Carbon Steel		Interp.
	22.25		22.25		37	Carbon Steel		Interp.
	24.5		24.5		46	Carbon Steel		Interp.
	27		27		56	Carbon Steel		Interp.
	30		30		73	Carbon Steel		47,48
	33		33		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		348	Carbon Steel		Interp.
	54.25		54.25		421	Carbon Steel		Interp.
	60		60		515	Carbon Steel		Interp.
	66		66		630	Carbon Steel		Interp.
73		73		780	Carbon Steel		49,63	

SPECIAL SEISMIC CERTIFICATION
 CERTIFIED SUBCOMPONENT MATRIX



TRU PROJECT NO. 16028

<i>Manufacturer:</i> Greenheck Fan Corporation	<i>Table Description:</i> Accessories/options	TABLE 5
<i>Model Line:</i> QEI		

Building Code: CBC 2016 *Seismic Certification Limits:* $S_{DS} = 2.0g$ $z/h = 1.0$ $I_P = 1.5$
 $S_{DS} = 3.2g$ $z/h = 0.0$

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. 16028



<i>Manufacturer:</i>	Greenheck Fan Corporation	UUT 47
<i>Model Line:</i>	QEI	
<i>Model Number:</i>	QEI-24-II-200-X	

Product Construction Summary:
UL-705; Class II construction; Belt Drive, Carbon Steel shaft; Carbon steel housing; Carbon steel wheel

Options/Subcomponent Summary:
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.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1010	49	49	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 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:



Floor mounted - isolated using (4) VMC MSH-1E-530N isolators w/ (1) 1/2" Grade 8 bolt attaching Isolator to unit & (2) 5/8" Grade 8 bolts attaching isolator to table.

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. 16028



<i>Manufacturer:</i>	Greenheck Fan Corporation	UUT 48
<i>Model Line:</i>	QEI	
<i>Model Number:</i>	QEI-24-II-200-X	

Product Construction Summary:
UL-705; Class II construction; Belt Drive, Carbon Steel shaft; Carbon steel housing; Carbon steel wheel

Options/Subcomponent Summary:
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.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1010	49	49	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 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:



Ceiling suspended - isolated using (4) 5/8" Ø A307 threaded rods w/ rod stiffeners & (2) Mason RW30N-B-410 & (2) Mason RW30N-B-336 isolators & (4) 3/8" Ø diag. cable braces w/ 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. 16028



<i>Manufacturer:</i>	Greenheck Fan Corporation	UUT 49
<i>Model Line:</i>	QEI	
<i>Model Number:</i>	QEI-60-II-1000-X	

Product Construction Summary:
UL-705; Class II construction; Belt Drive, Carbon Steel shaft; Carbon steel housing; Carbon steel wheel

Options/Subcomponent Summary:
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.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5812	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 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:



Floor mounted - isolated using (4) Mason SSLFH-C-1750 isolators w/ (1) 1/2" Grade 8 bolt attaching Isolator to unit & (4) 5/8" Grade 8 bolts attaching isolator to table.
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. 16028



Manufacturer: Greenheck Fan Corporation	UUT 63
Model Line: QEI	
Model Number: QEI-60-II-1000-X Serial Number: N/A	

Product Construction Summary:
UL-705; Class II construction; Belt Drive, Carbon Steel shaft; Carbon steel housing; Carbon steel wheel

Options/Subcomponent Summary:
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.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5812	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 2016	ICC-ES AC156	2.0 g	1.0	1.5	3.2	2.4	2.13	0.85
		3.2 g	0.0					

Test Mounting Details:



Ceiling suspended - isolated using (4) 7/8" Ø A307 threaded rods w/ rod stiffeners & (4) Mason RW30N-D-2150 isolators & (16) 3/8" Ø diag. cable braces w/ 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.