



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

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

OFFICE USE ONLY

APPLICATION #: **OSP – 0105 – 10**

**OSHPD Special Seismic Certification Preapproval (OSP)**

Type:  New  Renewal

**Manufacturer Information**

Manufacturer: Greenheck Fan Corporation

Manufacturer's Technical Representative: Mr. David Berg

Mailing Address: 400 Ross Avenue, Schofield, WI 54476

Telephone: (713) 355-6628 Email: [david.berg@greenheck.com](mailto:david.berg@greenheck.com)

**Product Information**

Product Name: LFC (Low-Profile Fan Coil) Air Handling Units

Product Type: Air Handling Equipment

Product Model Number: LFC-15L-FC, LFC-20L-FC, LFC-25-FC, LFC-30L-FC, LFC-45L-FC, LFC-50L-FC, LFC-65L-FC, LFC-85L-FC  
(List all unique product identification numbers and/or part numbers)

General Description: The Greenheck Model LFC line consists of low-profile horizontal fan coil suspended units available in eight sizes. The units are designed for air conditioning and/or heating, and feature a forward curved wheel and an option of up to 8 rows of heating and cooling coils. Seismic enhancements were made to the test units and modifications required to address anomalies observed during the testing shall be incorporated into the production units.

Mounting Description: Suspended mounted with cable bracing

**Applicant Information**

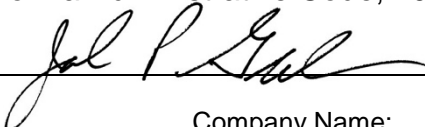
Applicant Company Name: The VMC Group

Contact Person: Mr. John Giuliano

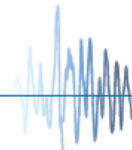
Mailing Address: 113 Main Street, Bloomingdale, NJ 07403

Telephone: (973) 838-1780 Email: [john.giuliano@thvmcgroup.com](mailto:john.giuliano@thvmcgroup.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: 12/2/16  
Title: President Company Name: The VMC Group

"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: The VMC Group

Name: Mr. Ken Tarlow California License Number: SE2851

Mailing Address: 113 Main Street, Bloomingdale, NJ 07403

Telephone: (973) 838-1780 Email: [ken.tarlow@thvmcgroup.com](mailto:ken.tarlow@thvmcgroup.com)

**Supports and Attachments Preapproval**

- Supports and attachments are preapproved under OPM- \_\_\_\_\_  
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)
- Supports and attachments are not preapproved

**Certification Method**

- Testing in accordance with:  ICC-ES AC156
- Other (Please Specify): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Testing Laboratory**

Company Name: Dynamic Certification Laboratories

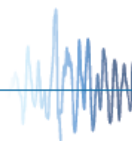
Contact Name: Kelly Laplace / Josh Sailer

Mailing Address: 1315 Greg Pkwy # 109, Sparks, NV 89431

Telephone: (775) 358-5085 Email: [kelly@shaketest.com](mailto:kelly@shaketest.com) / [josh@shaketest.com](mailto:josh@shaketest.com)

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STATE OF CALIFORNIA – HEALTH AND HUMAN SERVICES AGENCY  
OSH-FD-759 (REV 12/16/15)





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

**Seismic Parameters**

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

Design Basis of Equipment or Components ( $F_p/W_p$ ) = 2.70

$S_{DS}$  (Design spectral response acceleration at short period, g) = 1.50

$a_p$  (In-structure equipment or component amplification factor) = 2.50

$R_p$  (Equipment or component response modification factor) = 2.50

$\Omega_0$  (System overstrength factor) = 2.0

$I_p$  (Importance factor) = 1.5

$z/h$  (Height factor ratio) = 1

Equipment or Component Natural Frequencies (Hz) = N/A

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

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) = \_\_\_\_\_

$\Omega_0$  (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) = \_\_\_\_\_

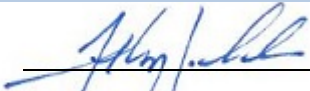
Tank(s) designed in accordance with ASME BPVC, 2015:  Yes  No

**List of Attachments Supporting Special Seismic Certification**

Test Report(s)  Drawings  Calculations  Manufacturer's Catalog

Other(s) (Please Specify): UUT, Certified Product and Certified Sub-Component Matrices

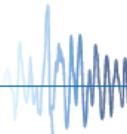
**OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2022**

Signature:  Date: January 10, 2018

Print Name: Timothy J. Piland Title: SSE

Special Seismic Certification Valid Up to :  $S_{DS}$  (g) = 1.50  $z/h$  = 1

Condition of Approval (if applicable): \_\_\_\_\_



**Table 1 - Certified LFC Cabinet Sizes**

Model	Unit Size	Maximum Weight [ lbs ]	Maximum Length [ in ]	Maximum Width [ in ]	Maximum Height [ in ]	UUT	Enclosure	Roof level		Ground Level	
								S <sub>DS</sub>	z/h	S <sub>DS</sub>	z/h
LFC	15	270.0	42.00	38.00	11.00	UUT 1	NEMA 1	1.50	1.0	1.50	0.0
	20	330.0	42.00	38.00	14.00	Interpolated	NEMA 1	1.50	1.0	1.50	0.0
	25	400.0	42.00	38.00	16.00	Interpolated	NEMA 1	1.50	1.0	1.50	0.0
	30	460.0	47.00	38.00	18.50	Interpolated	NEMA 1	1.50	1.0	1.50	0.0
	45	560.0	47.00	50.00	18.50	Interpolated	NEMA 1	1.50	1.0	1.50	0.0
	50	660.0	50.00	50.00	21.00	Interpolated	NEMA 1	1.50	1.0	1.50	0.0
	65	780.0	54.00	50.00	26.00	Interpolated	NEMA 1	1.50	1.0	1.50	0.0
	85	890.0	54.00	62.00	26.00	UUT 2	NEMA 1	1.50	1.0	1.50	0.0

Note: 1) That the tested Sds level is highlighted in yellow

2) The Test Report has a small error with the UUT numbers being reversed which is fixed on this table

**Table 2 - Certified LFC Base Frame Construction**

Use	Size	Material	MFR	UUT
LFC	15	18 Gauge Galvanized CS	Greenheck	1
	20-65			Interpolated
	85			2

Note: CS stands for Cold Rolled Carbon Steel

**Table 3 - Certified LFC Enclosure Construction: Wall/Roof Exterior Panels**

Skin	Insulation	Panel Nominal Thicknes	Wall/Roof Panel Material	Wall/Roof Panel Type	Unit Size	MFR	UUT
Motor Access Panel	Matte Faced Fiberglass	1"	18ga Galvanized CS	Double Wall	15-85	Greenheck	1 and 2
Coil Access Panel	Matte Faced Fiberglass	1"	18ga Galvanized CS	Double Wall	15-85		
Front Panel	Matte Faced Fiberglass	1"	18ga Galvanized CS	Double Wall	15-85		
Inlet Side Panel	Matte Faced Fiberglass	1"	18ga Galvanized CS	Double Wall	15-85		
Filter Access Door	Matte Faced Fiberglass	1"	18ga Galvanized CS	Double Wall	15-85		
Coil Side Panel	Matte Faced Fiberglass	1"	18ga Galvanized CS	Double Wall	15-85		

Note: CS stands for Cold Rolled Carbon Steel

**Table 4a - Certified LFC Hydronic/DX Coils**

Dimensions		Width (inches)								MFR	UUT
		31	31	31	31	43	43	43	55		
Height (inches)	7.5	Size 15								Precision Coils	1
	10.0		Size 20								Interpolated
	12.5			Size 25							Interpolated
	15.0				Size 30						Interpolated
	15.0					Size 45					Interpolated
	17.5						Size 50				Interpolated
	22.5							Size 65			Interpolated
	22.5								Size 85		

Note: The Hydronics and DX coils are identical in material and construction and only differ in their use

Table 4b - Certified LFC Hydronic/DX Coil Options		UUT
Casing Material	Galvanized Carbon Steel (18 Gauge)	1 and 2
Tube Material	Copper	
Tube Outer Diameter	0.5"	
Tube Wall Thickness	0.016"	
Permitted Fin Material	Aluminum	
Permitted Fins per Inch	6-14	
Permitted Tube Rows	1 (Heating)	--
	2 (Heating)	1 and 2
	4 (Heating/Cooling)	--
	6 (Cooling)	1 and 2
	8 (Cooling)	--
Header Type	Copper	1 and 2

Note: The Hydronics and DX coils are identical in material and construction and only differ in their use

**Table 5 - Certified LFC Fans**

• Forward Curved Centrifugal Fan

	HP	2.00	5.00	Fan MFR
	Weight	85.6 lbs	150 lbs	
Size (Dia - Width)	5.75"	UUT 1		Revcor / Greenheck
Impeller Weight	~ 1.5 lbs			
Size (Dia - Width)	11.62"		UUT 2	
Impeller Weight	~ 2 lbs			

Wheel Material	Fan Diameter	Part No.	MFR	UUT
Galvanized Carbon Steel	5.75"	335496	Revcor	1
Galvanized Carbon Steel	11.62"	335480		2

MFR	Part No.	Housing Material	UUT
Greenheck	826093	Galvanized Carbon Steel	1
	826074		2

Motor Mount Configuration	HP Range	Material	UUT
Horizontal Shaft Rear Mount	2 Hp Max	Galvanized Carbon Steel	1
	5 HP Max	Galvanized Carbon Steel	2

**Table 6 - Certified LFC Flat Filter (2" MERV 8)**

Unit	Cartridge Quantity	Frame Material Options	Dimensions [ in ]		MFR	UUT
			Width	Height		
Size 15	2	Galvanized Carbon Steel	9	18	AirGuard	UUT 1
Size 20	1	Galvanized Carbon Steel	12	12 or 24"		Interpolated
Size 25	2	Galvanized Carbon Steel	14	18		Interpolated
Size 30	1	Galvanized Carbon Steel	16	16 or 20"		Interpolated
Size 45	2	Galvanized Carbon Steel	16	24		Interpolated
Size 50	2	Galvanized Carbon Steel	18	24		Interpolated
Size 65	2	Galvanized Carbon Steel	24	24		Interpolated
Size 85	2	Galvanized Carbon Steel	24	24		UUT 2

**Table 7 - Certified LFC Flat Media Options**

Type	Filter Material	MFR	UUT
2" MERV 8	Pleated	AirGuard	1 and 2

**Table 8 - Certified LFC Dampers**

Unit Size	Supply		Return		Qty	MFR	UUT
	Height [ in ]	Width [ in ]	Height [ in ]	Width [ in ]			
15	8.25	34.625	5.75	33	1	Greenheck	1
20	11.563	34.625	8.75	33	1		Interpolated
25	13.5	34.625	10.75	33	1		Interpolated
30	14.625	46.625	13.25	33	1		Interpolated
45	14.625	46.625	13.25	45	1		Interpolated
50	17.25	46.625	15.5	45	1		Interpolated
65	22.25	46.625	20.75	45	1		Interpolated
85	22.25	58.625	20.75	57	1	2	

Damper Material		Blade Orientation	MFR	Part No.	Supply		Return		UUT
Frame	Blades				Height [ in ]	Width [ in ]	Height [ in ]	Width [ in ]	
Galvanized Carbon Steel	Galvanized Carbon Steel	HZ Opposed	Greenheck	VCD-23	8.25 - 22.5	34.625 - 58.625	5.75 - 20.75	33 - 57	1 and 2

Actuator MFR	Part No.	Material	UUT
Belimo	LMP24-3	Galvanized Carbon Steel	1
Belimo	NMB24-3	Galvanized Carbon Steel	2



**UNIT UNDER TEST (UUT)  
SUMMARY SHEET**

**UUT-01**

VMA-51133-01C

Model Line	Model Number	Manufacturer
LFC Air Handling Equipment	LFC-15L-FC	Greenheck

**Product Construction Summary**

18 Gauge Galvanized Carbon Steel Base, 18 Gauge Galvanized Carbon Steel Walls, Fiberglass Insulation

**Options / Subcomponent Summary**

Coils: Precision Coils; Fan: Greenheck/Revcor; Damper: Greenheck; Filter: AirGuard; Actuator: Belimo

**UUT Properties**

Weight [ lbs ]	Dimensions [ in ]			Lowest Nat. Freq. [ Hz ]		
	Length	Width	Height	F-B	S-S	V
270	42	38	11	N/A	N/A	N/A

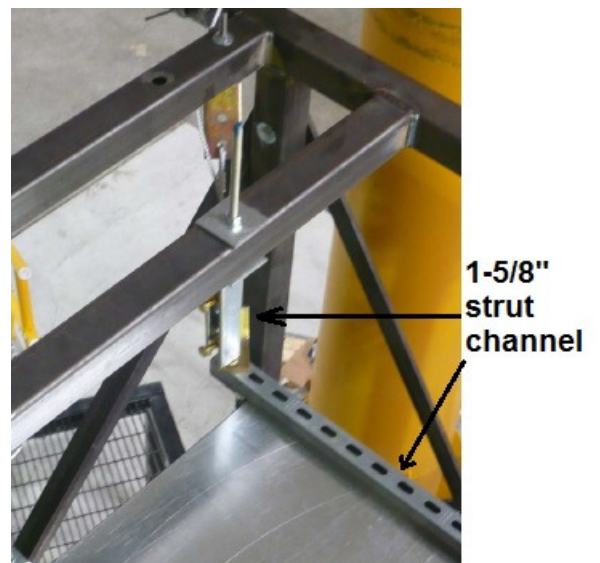
**UUT Highest Passed Seismic Run Information**

Building Code	Test Criteria	S <sub>DS</sub> (g)	z/h	I <sub>P</sub>	A <sub>FLX-H</sub> (g)	A <sub>RIG-H</sub> (g)	A <sub>FLX-V</sub> (g)	A <sub>RIG-V</sub> (g)
CBC 2016	ICC-ES AC156	1.50	1.00	1.50	2.40	1.80	1.00	0.40

**Test Mounting Details**

The UUTs were attached to the fixturing wall at four corners utilizing the International Seismic Application Technology (ISAT) C10 splayed cable braces oriented at 45 degrees, and 1/2" ASTM A307 rod. Seismic enhancements were made in the form of a 1-5/8" x 12GA strut channel along the front and back of the UUT and 1-5/8" x 12GA strut channel rod stiffeners.

**UUT 1**



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





**UNIT UNDER TEST (UUT)  
SUMMARY SHEET**

**UUT-02**

VMA-51133-01C

Model Line	Model Number	Manufacturer
LFC Air Handling Equipment	LFC-85L-FC	Greenheck

**Product Construction Summary**

18 Gauge Galvanized Carbon Steel Base, 18 Gauge Galvanized Carbon Steel Walls, Fiberglass Insulation

**Options / Subcomponent Summary**

Coils: Precision Coils; Fan: Greenheck/Revcor; Damper: Greenheck; Filter: AirGuard; Actuator: Belimo

**UUT Properties**

Weight [ lbs ]	Dimensions [ in ]			Lowest Nat. Freq. [ Hz ]		
	Length	Width	Height	F-B	S-S	V
890	54	62	26	N/A	N/A	N/A

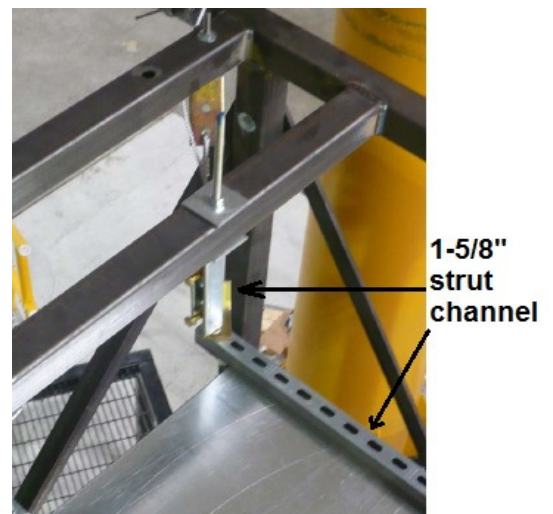
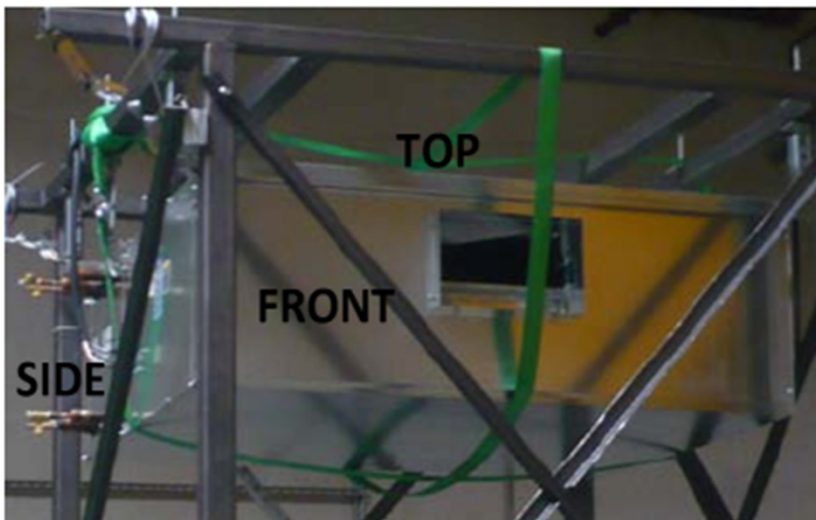
**UUT Highest Passed Seismic Run Information**

Building Code	Test Criteria	S <sub>DS</sub> (g)	z/h	I <sub>p</sub>	A <sub>FLX-H</sub> (g)	A <sub>RIG-H</sub> (g)	A <sub>FLX-V</sub> (g)	A <sub>RIG-V</sub> (g)
CBC 2016	ICC-ES AC156	1.50	1.00	1.50	2.40	1.80	1.00	0.40

**Test Mounting Details**

The UUTs were attached to the fixturing wall at four corners utilizing the International Seismic Application Technology (ISAT) C10 splayed cable braces oriented at 45 degrees, and 1/2" ASTM A307 rod. Seismic enhancements were made in the form of a 1-5/8" x 12GA strut channel along the front and back of the UUT and 1-5/8" x 12GA strut channel rod stiffeners.

**UUT2**



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