

# ***SUBMITTAL***

*Job Title:* **St. Joseph's Catholic Academy**

*Engineer:* PBCI Engineering

*Contractor:* Aircon Engineering

*Date:* 04/11/13

*Submitted By:* Logan Sieg

**WARD-BOLAND ASSOCIATES INC**

**5735 INDUSTRY LANE STE 9**

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**US**

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Received Date 4-30-13

Review is for general compliance with  
Contract Documents. No responsibility is  
assumed for correctness of dimensions,  
quantities or details.

NO EXCEPTIONS TAKEN XX

MAKE CORRECTIONS NOTED

AMEND & RESUBMIT

REJECTED – SEE REMARKS

PBCI – Engineering

Reviewed Date 5-1-13

By: F. PENO



P.O. Box 410 Schofield, WI 54476 (715) 359-6171 FAX (715) 355-2399 [www.greenheck.com](http://www.greenheck.com)

Design Condition	
Number of Systems	1
Fans per System	1
Fans On Standby	No
System Type	Constant Volume
Lab Exh. Vol. (CFM)	1,030
Min Lab Exh. Vol. (CFM)	1,030
Add. BAP Air (CFM)	515
Wind Speed (MPH)	10.0

Fan Selection Criteria	
Volume (CFM)	1,545
External SP (in. wg)	0.8
Internal SP (in. wg)	0.113
Total SP (in. wg)	0.913
Air Stream Temp (F)	70
Elevation (ft)	0
Drive Loss (%)	12.1

Fan Performance	
Fan RPM	3898
Max Fan RPM	4050
Operating Power (hp)	1.75

Motor Specs	
Motor Size	2
RPM	3600
Voltage	208
Cycle	60 Cycle
Phase	3
Enclosure	TEFC
Drives	Dual
Drive Service Factor	2

Discharge Performance	
Nozzle OV (ft/min)	3,511
Effective Plume Ht. (ft)	20.1

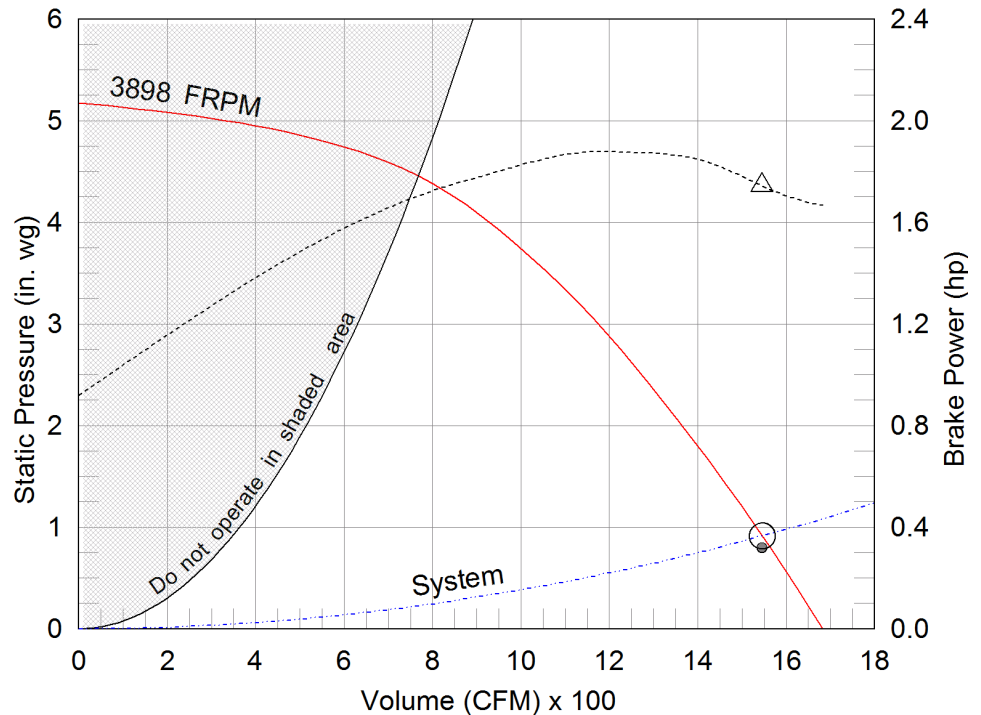
Weights	
Fan (LMD) (lb)	219
Motor/Drive (lb)	66
Accessories (lb)	193
Total System Weight (lb)	478

Fan Construction	
Material Type	Spark B
Drive Type	Belt
Arrangement	9
Nozzle Size (in.)	9

Plenum Configuration	
Bypass Air Plenum "BAP"	Yes
Arrangement	Inline

## Model: VEKTOR-H-9-9

### Fume Exhaust System



- △ Operating Bhp point
- Operating point at Total SP
- Operating point at External SP
- Fan curve
- - - System curve
- - - Brake horsepower curve

External SP	0.8 in. wg
Isolation Damper	0.113 in. wg
Total SP	0.913 in. wg

Note: Using External SP only, the fan would have been incorrectly selected at:  
3860 RPM 1.68 Bhp

### Sound Power by Octave Band (Individual Fan)

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA
Inlet Sound	87	94	91	92	89	83	80	72	93	82

LwA - A weighted sound power level, based on ANSI S1.4

dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5.0 ft- dBA levels are not licensed by AMCA International



### **Options & Accessories:**

Energy Efficient Motor - meets NEMA Table 12-11  
Motor with Class B Insulation  
Bypass Air Plenum - Single Wall, Steel Liner, Bottom Exhaust Intake  
Coated with LabCoat, Dark Gray (041), Entire Unit  
Switch - NEMA-3R, Toggle, Mounted and Wired  
System Warranty - 1 Year  
UL/cUL-705 - "Power Ventilators"  
Shaft Material - Turned and Polished Steel with Protective Coating  
Curb Cap Material - Coated  
Bypass Damper - VCD-23, Galvaneal, Coated, 6 x 6, w/hood and inlet screen, Qty: 1  
Bypass Damper Actuator - Electric, Modulating, w/o Transformer, 24 VAC, Model: TF24, Qty: 1  
Isolation Damper - VCD-23, Galvaneal, Coated, 18 x 18, Parallel Blades, mounted in BAP, one per fan  
Isolation Damper Actuator - Electric, 24 VAC, 2 pos., SR, w/Transformer, Model: TF24, Qty: 1  
Roof Curb - GPFHL, 21/21, Galvanized Construction, 12 Inch Height, 1 Inch Insulation, Mill Finish  
Extended Lube Lines - Nylon  
Motor Cover

## Standard Construction: Vektor-H High Plume Fans

### Fan Housing and Conical Nozzle

Aerodynamically designed housing constructed of welded steel.  
Interior and exterior surfaces of steel fan housings are coated with 4-6 mils dft LabCoat.  
High velocity conical discharge nozzle coated with 4-6 mils dft LabCoat.  
Integral housing drain system with threaded connection.  
Fasteners are stainless steel.  
Integral stainless steel lifting lugs on fan housing.  
Integral lifting lugs on bypass plenums(bypass plenums are available as a Vektor fan option).  
Access panel for inspection or removal of impeller, shaft, and bearings without removal of fan housing.  
Standard coating color is dark gray-041.

### Impeller

Fan impeller is non-overloading centrifugal backward inclined flat blade. Standard construction is welded aluminum.  
Aluminum centrifugal impellers are coated with Hi Pro Polyester Resin.

### Belt Drive Components

Air handling quality bearings selected with and L(10) life in excess of 100,000 hours(equivalent to an average or L(50) life of 500,000 hours).  
Extended lube lines for fan bearing lubrication.  
Fan bearings and extended lube lines are pre-filled with synthetic grease.  
Shafts are polished and turned steel.  
Fan and motor pulleys are constant speed and sized for 200% of motor horsepower.  
Motor, belts, pulleys, and bearings are sealed from contaminated airstream.

### Isolation and Bypass Dampers (Vektor System Options)

Gravity backdraft isolation dampers are model EMV-11, constructed of aluminum.  
Bypass and isolation control dampers are model VCD-23, constructed of galvaneal.  
Damper blades and frames are coated with Hi Pro Polyester Resin.  
Bypass and isolation dampers are accessible from the exterior of the system.  
Isolation dampers are parallel blade operation.  
Bypass dampers are opposed blade operation.

### Pre-Shipment Testing

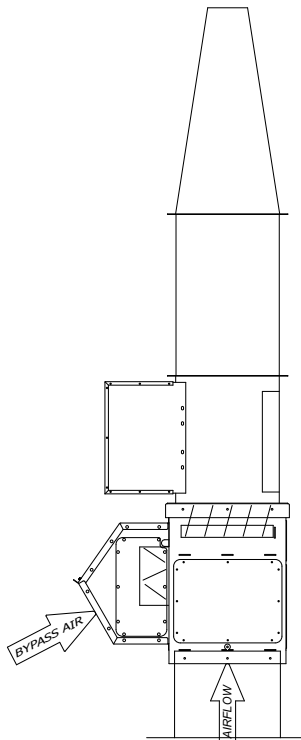
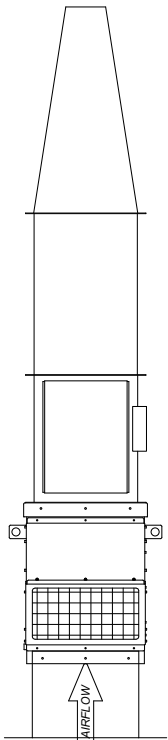
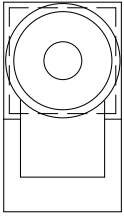
Fans and motors are factory tested to ensure proper operation.  
Belt drive fans and motors are vibration balanced to below 0.15 inches/sec-pk filter in(per AMCA 204).

### Certifications and Listings

Vektor-H sizes 9-36 are licensed to bear the AMCA 210 label for Air Performance.  
Vektor-H sizes 9-36 are licensed to bear the AMCA 300 label for Sound Performance.  
Vektor-H fans with suitable motors are available with UL 705 listing.  
Vektor-H fans with suitable construction are available with UL 762 listing.

**Model: VEKTOR-H-9-9**

**Fume Exhaust System**

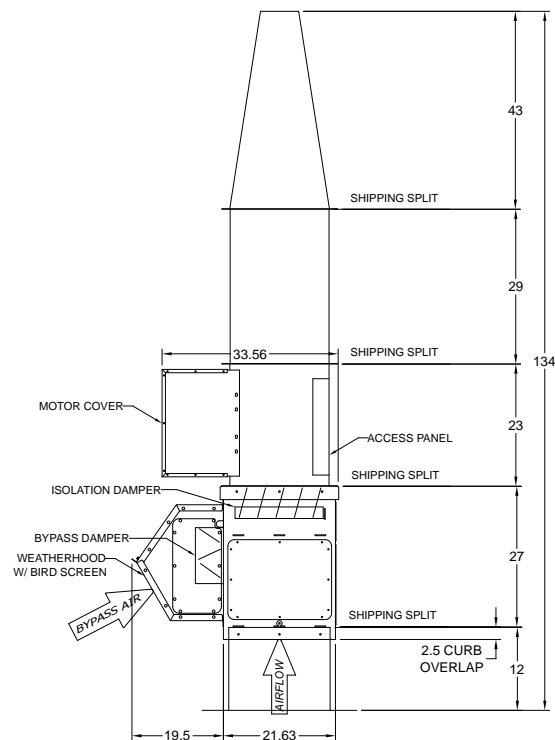
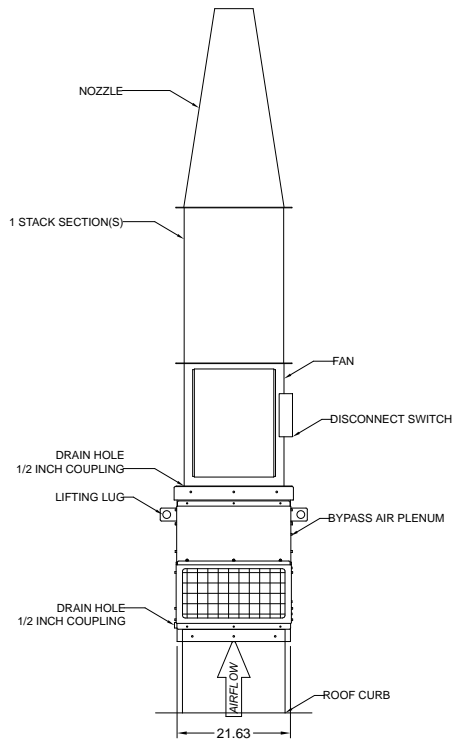


Notes: All dimensions shown are in units of in.

Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-9-9

Fume Exhaust System

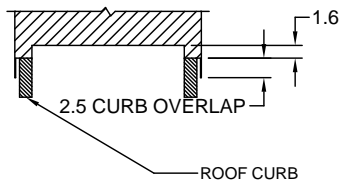
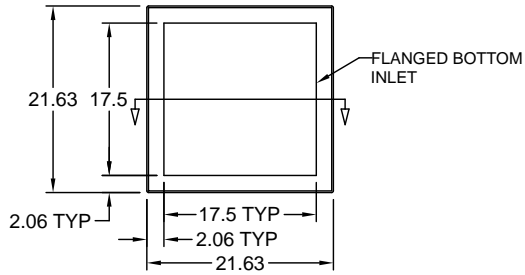


Notes: All dimensions shown are in units of in.

Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

**Model: VEKTOR-H-9-9**

**Fume Exhaust System**



A MAXIMUM INLET VELOCITY OF 1500 FPM IS RECOMMENDED

Notes: All dimensions shown are in units of in.

Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

## Disconnect Switch

Enclosure Rating: NEMA-3R

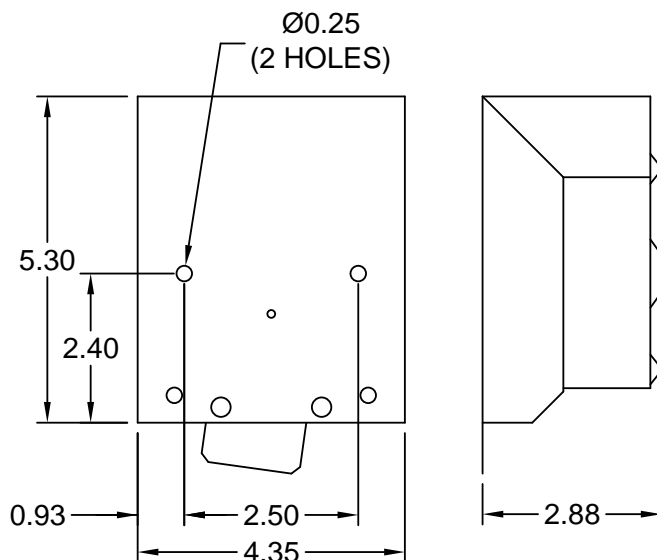
### Standard Construction Features:

Enclosure constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment: to provide a degree of protection against falling dirt, rain, sleet, snow, and windblown dust. The enclosed equipment will be undamaged by the external formation of ice on the enclosure. This enclosure meets the rod entry, rain, external icing, outdoor corrosion protection and gasket design tests. Enclosure is equipped with provision to lockout in the off position with customer supplied lock.

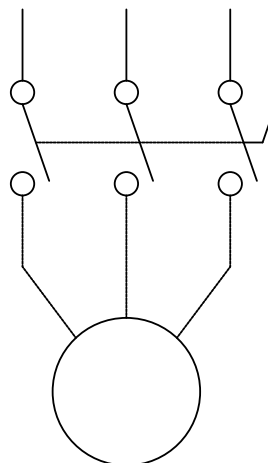
### Disconnect Switch Configuration

Type:	Toggle	Motor Size:	2 hp	Voltage:	208	UL Listed:	Yes
Manufacturer:	Square D	Cycle:	60	Amperage:	30	CSA Approved:	Yes
Overload Protection:	None	Phase:	3	Pole(s):	3	Rating:	10 hp
Mounting:	Mounted and Wired	RPM:	3600	Wiring (Exp. Resist.):			

### Electrical Drawing Details



### Wiring Schematic



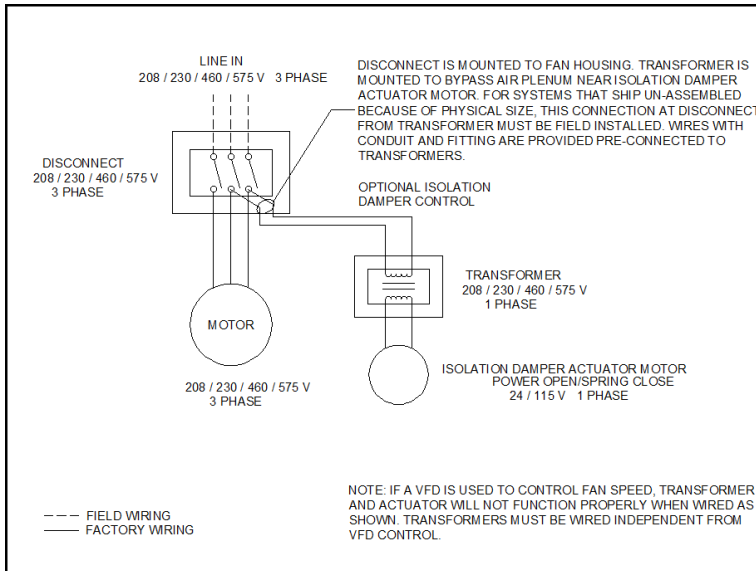
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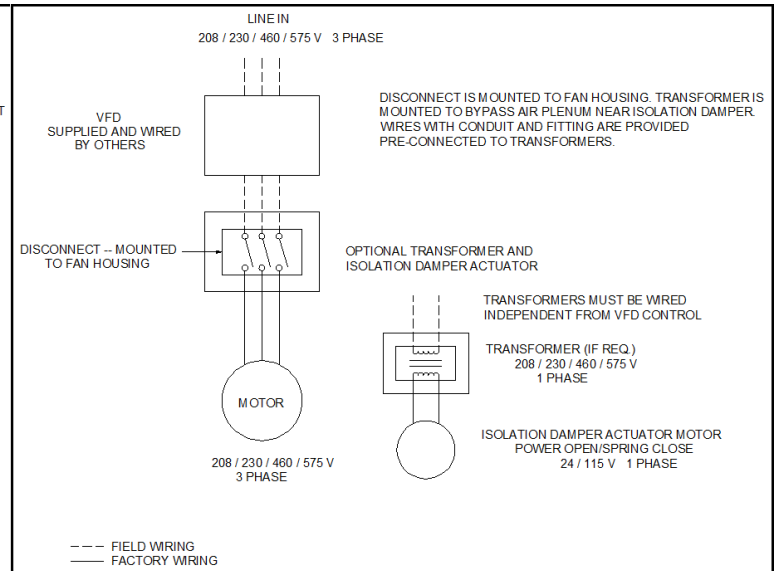
## Fan Motor Report and Wiring Diagram

<b>Motor Size (hp):</b> 2	<b>Service Factor:</b> No Preference
<b>Motor RPM:</b> 3600	<b>Motor Design:</b> NEMA
<b>Windings:</b> 1	<b>Motor Duty:</b>
<b>Cycles:</b> 60 Cycle	<b>Insulation Class:</b> B
<b>Phase:</b> 3	<b>CSA Motor:</b> No Preference
<b>Motor Frame Size:</b> 145T	<b>Motor Base Type:</b> Rigid
<b>Voltage:</b> 208	<b>VFD Rated:</b> No
<b>Ambient Temp (C):</b> No Preference	

**No VFD (3 phase)**



**System with VFD (3 phase)**



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## **Vektor Exhaust Fan Warranty - 12 Months**

**WARRANTY AND LIABILITY:** SELLER warrants to Buyer that products manufactured are free from defects in material and workmanship for a period of 12 months from the date of shipment. SELLER's obligations and liabilities under this warranty are limited to furnishing FOB factory or warehouse at SELLER's designated shipping point, freight allowed to Buyer's city, (or point of export for shipments outside the conterminous United States) replacement equipment (or at the option of SELLER parts therefore) for all Seller's products not conforming to this warranty and which have been returned to the manufacturer. No liability whatever shall attach to SELLER until said products have been paid for and such liability shall be strictly limited to the purchase price of the equipment shown to be defective. SELLER may make further warranty protection available on an optional extra-cost basis and which must be authorized and in writing.

Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.

Electrical components, excluding motors, are warranted only to the extent warranted by the original manufacturer. To the extent that SELLER is entitled to pass through a warranty of the original equipment manufacturer of the electrical goods sold, SELLER will pass through such warranties to Buyer.

ANY MISUSE, NEGLECT, FAILURE TO FOLLOW INSTRUCTIONS OR MANUALS OF INSTALLATION OF MAINTENANCE REPAIR, SERVICE, RELOCATION OR ALTERATION TO OR OF, OR OTHER TAMPERING WITH, THE PRODUCTS PERFORMED BY ANY PERSON OR ENTITY OTHER THAN SELLER WITHOUT SELLER'S PRIOR WRITTEN APPROVAL OR ANY USE OF REPLACEMENT PARTS NOT SUPPLIED BY SELLER, SHALL IMMEDIATELY VOID AND CANCEL ALL WARRANTIES WITH RESPECT TO THE AFFECTED PRODUCTS.

THE WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESSED OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE. SELLER PROVIDES NO INDEPENDENT WARRANTY FOR THIRD PARTY PRODUCTS OR COMPONENTS SOLD TOGETHER OR INCORPORATED WITH SELLER'S PRODUCT(S).

## Heavy Load Roof Curb

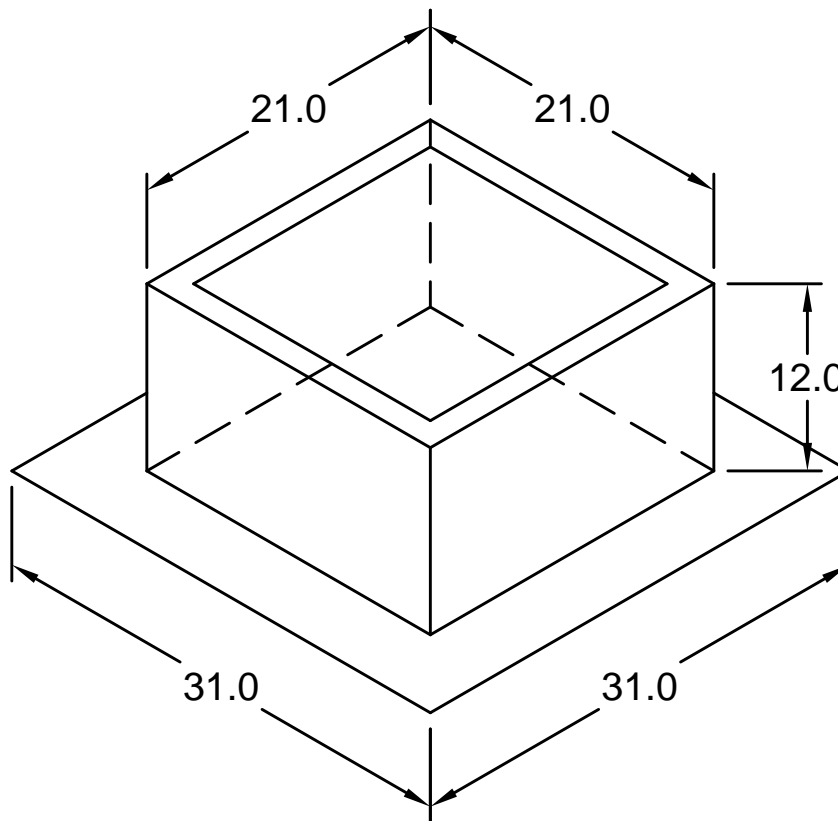
Model: GPFHL

**Standard Construction Features:**

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of galvanized steel (14 ga) - Straight Sided - Single roof flashing flange (5 in. width) - Insulated (1 in. thick, 3 lb density).

**NOTES:**

- Curb actual dimension is 0.5 in. smaller than cap dimension.
- The maximum allowable roof opening dimension is actual minus 4 in..
- The roof opening dimension may not be the structural opening dimension.



ISOMETRIC VIEW

Notes: All dimensions shown are in units of in.

## VCD-23 Low Leakage Control Damper-Bypass

### Application and Design

The model VCD-23 is a low leakage control for application as an automatic control or manual balancing damper. This model is intended for applications in low to medium pressure and velocity systems. A wide range of electric and pneumatic actuators are available.

Non-jackshafted dampers will be supplied with a blade drive lever for internal actuator mounting. When external actuator mounting is specified in which case an extension pin with clip kit will be provided.

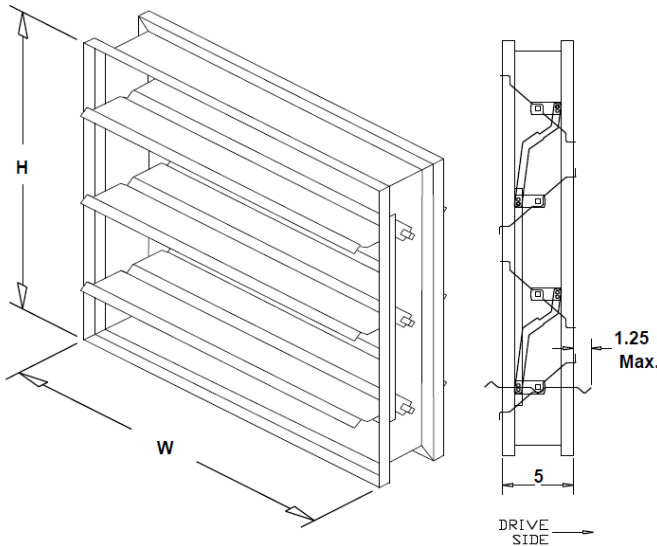
Note: The extension pin with clip kit includes the extension pin and clip.

### RATINGS

Leakage: Class 1A @ 1 in. wg, Class 1 @ 4 in. wg

Temperature: 200.0 F - 250.0 F Consult factory for higher temperatures.

Installation instructions available at [www.greenheck.com](http://www.greenheck.com)



Notes: All dimensions shown are in units of inches.

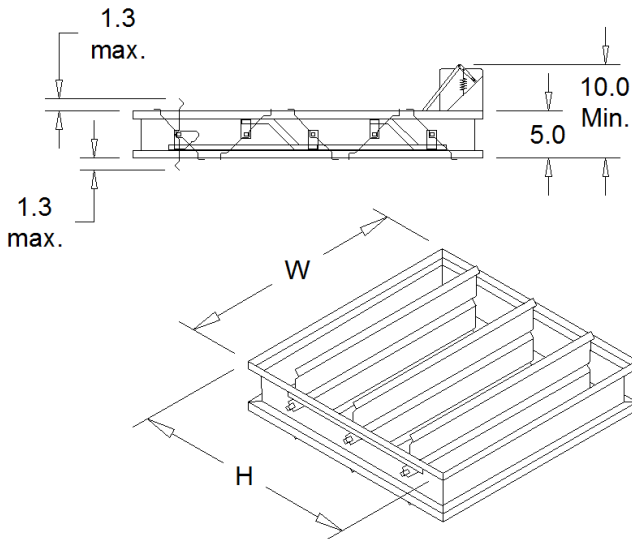
W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Electrical accessory wiring terminates at the accessory.  
Field wiring is required to individual components.

### Construction Features

Temperature:	180	Frame Thickness (ga):	16	Coating Type:	Hi-Pro Polyester
Frame Material:	Galvaneal	Blade Thickness (ga):	16	Coating Thickness:	2-3 mils
Blade Action:	Opposed	Blade Seal:	TPE		
Jamb Seal Mat.:	304 SS	Actuator Mount:	External		
Axle Material:	Plated Steel				
Axle Bearings:	Synthetic				
Linkage Material:	Plated Steel				

Damper Qty	Damper Width (in)	Damper Height (in)	Total Actuator Qty	Actuator Model	Actuator Mfg.
1	6	6	1	TF24	Belimo



## VCD-23 Low Leakage Control Damper-Isolation

### Application and Design

The model VCD-23 is a low leakage control for application as an automatic control or manual balancing damper. This model is intended for applications in low to medium pressure and velocity systems. A wide range of electric and pneumatic actuators are available.

Non-jackshafted dampers will be supplied with a blade drive lever for internal actuator mounting. When external actuator mounting is specified in which case an extension pin with clip kit will be provided.

Note: The extension pin with clip kit includes the extension pin and clip.

### RATINGS

Leakage: Class 1A @ 1 in. wg, Class 1 @ 4 in. wg

Temperature: 200.0 F - 250.0 F Consult factory for higher temperatures.

Installation instructions available at [www.greenheck.com](http://www.greenheck.com)

Notes: All dimensions shown are in units of inches.

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Electrical accessory wiring terminates at the accessory.  
Field wiring is required to individual components.

### Construction Features

Temperature:	180	Frame Thickness (ga):	14	Coating Type:	Hi-Pro Polyester
Frame Material:	Galvaneal	Blade Thickness (ga):	16	Coating Thickness:	2-3 mils
Blade Action:	Opposed	Blade Seal:	TPE		
Jamb Seal Mat.:	304 SS	Actuator Mount:	External		
Axle Material:	Plated Steel				
Axle Bearings:	Synthetic				
Linkage Material:	Plated Steel				

Damper Qty	Damper Width (in)	Damper Height (in)	Total Actuator Qty	Actuator Model	Actuator Mfg.
1	18	18	1	TF24	Belimo