



VCD-43V

Vertical Airfoil Blade Control Damper

Application and Design

VCD-43V is a low leakage damper with vertical blade orientation designed to meet the highest standards established for commercial control dampers. The VCD-43V is intended for application in medium to high pressure and velocity systems.

This model is IECC (International Energy Conservation Code) compliant with a leakage rating of 3 cfm/ft² at 1 in. wg (55 cmh/m² at .25 kPa) or less.

Damper Ratings

Pressure: Up to 8.0 in. wg (2 kPa) pressure differential
For pressures greater than 8 in wg, consult factory.

Velocity: Up to 6,000 fpm (30.5 m/s)

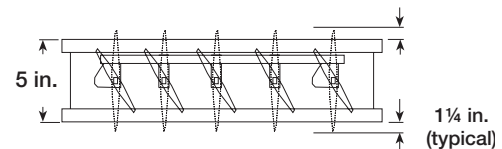
Leakage: 6 cfm/ft² at 4 in. wg (110cmh/m² at 1 kPa)
3 cfm/ft² at 1 in. wg (55cmh/m² at .25 kPa)

Temperature: -40°F to 250°F (-40°C to 121°C) Consult factory for higher temperatures.

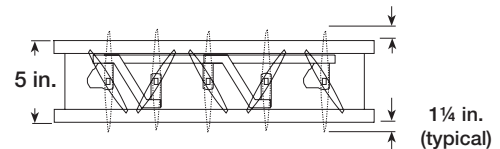


- W & H dimension furnished approximately 1/4 in. (6mm) undersize.

Construction	Standard	Optional
Frame Material	Aluminum	-
Frame Thickness	0.125 in (3.2mm)	-
Frame Type	5 in. x 1in. (127mm x 25mm) hat channel	Single Flange, Reverse Flange, Quick Connect
Blade Material	Extruded Aluminum	-
Blade Type	Airfoil	-
Linkage	Plated steel out of airstream, concealed in jamb	316SS
Axle Bearings	Synthetic with thrust washers	316SS with thrust washers
Axle Material	Plated steel	316SS
Blade Seals	TPE	Silicone
Jamb Seals	Stainless Steel	-
Paint Finishes	Mill Finish	Baked Enamel, Hi Pro Polyester, Industrial Epoxy, Kynar/Hylar (70% Kynar), Anodize



Parallel Blades



Opposed Blades

Size Limitations

in. (mm) W x H		Frame Type		
		Channel	Quick Connect	Single or Reverse Flange
Minimum Sizes		6 x 8 (178 x 203)	5 x 8 (127 x 203)	6 x 8 (178 x 203)
Maximum Sizes	Single Section	74 x 60 (1880 x 1524)		
	Multi- Section	148 x 120 (3759 x 3048)		
* varies by actuator				

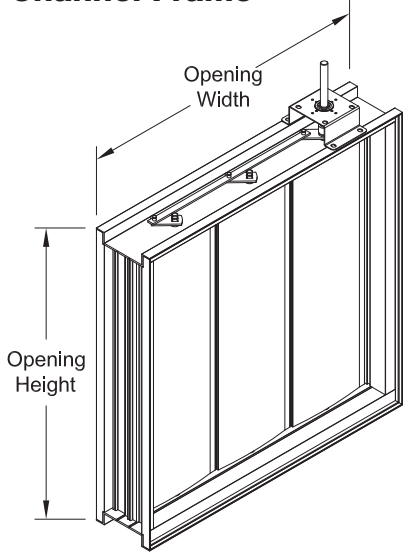
Features and Options:

- Blade seals - pressure activated to produce tighter sealing
- Actuators: electric or manual operators. Actuators (when supplied) are mounted on the top or bottom
- Clean wrap available
- NEMA 3, 4, 4x or 7 available

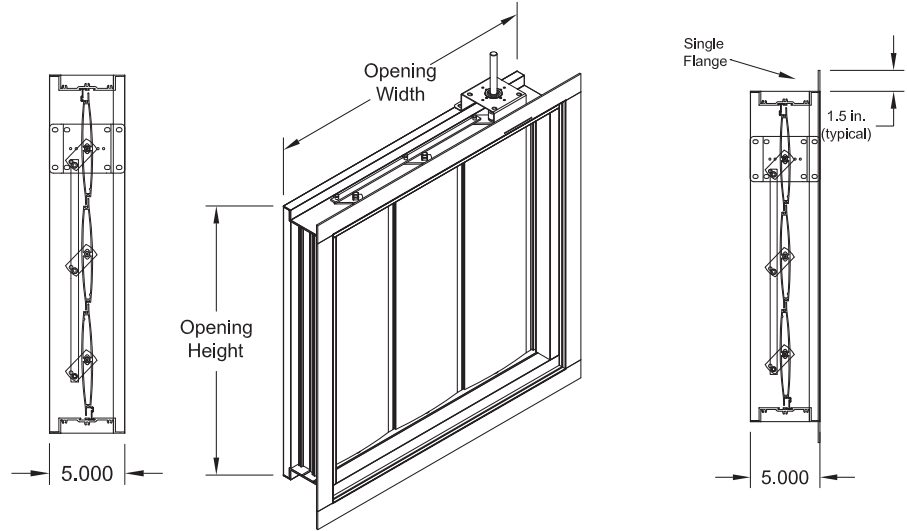
Frame Type Options

VCD-43V

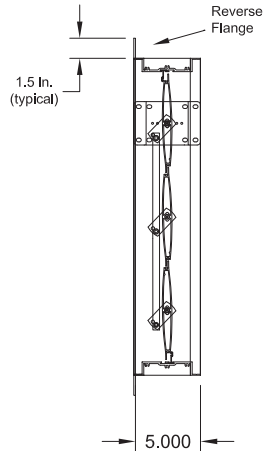
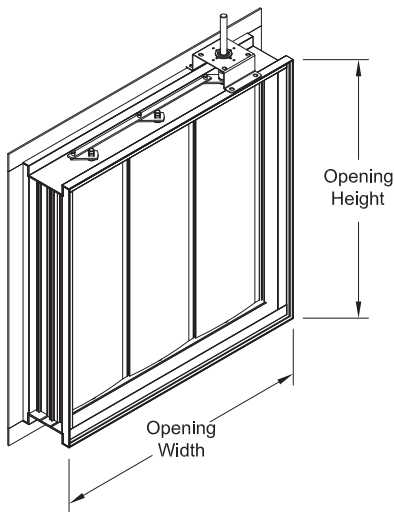
Channel Frame



Single Flange

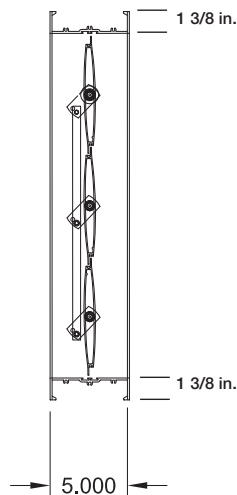
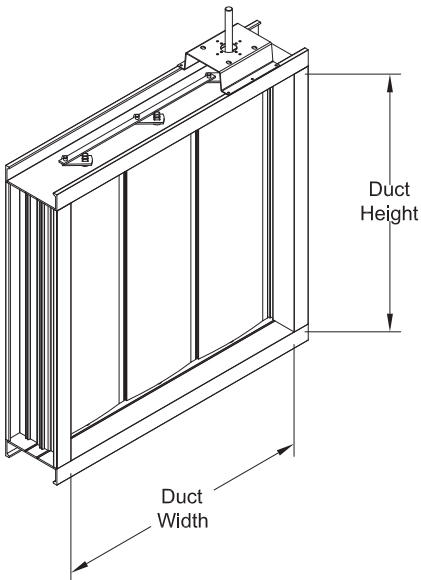


Reverse Flange

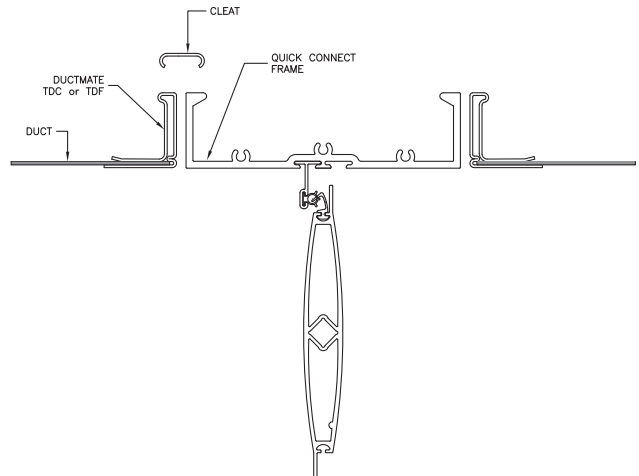


* Width and height is based on outside dimension. W & H dimensions furnished approximately 1/4 in. (6mm) undersize.

Quick Connect



Note: When ordering the Quick Connect Frame, size is based on duct size (or inside dimension of the damper frame). Quick connect frame is actual size.



This pressure drop testing was conducted in accordance with AMCA Standard 500-D using the three configurations shown. All data has been corrected to represent standard air at a density of 0.075 lb/ft^3 (1.201 kg/m^3).

Actual pressure drop found in any HVAC system is a combination of many factors. This pressure drop information along with an analysis of other system influences should be used to estimate actual pressure losses for a damper installed in a given HVAC system.

AMCA Test Figures

Figure 5.3 Illustrates a fully ducted damper. This configuration has the lowest pressure drop of the three test configurations because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

Figure 5.2 Illustrates a ducted damper exhausting air into an open area. This configuration has a lower pressure drop than Figure 5.5 because entrance losses are minimized by a straight duct run upstream of the damper.

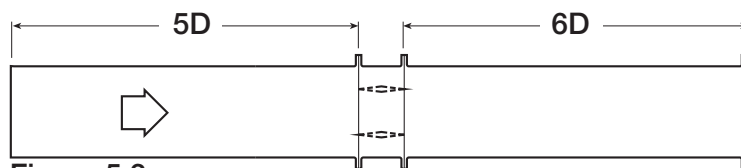


Figure 5.3

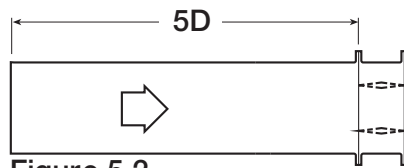


Figure 5.2

Figure 5.5 Illustrates a plenum mounted damper. This configuration has the highest pressure drop because of extremely high entrance and exit losses due to the sudden changes of area in the system.

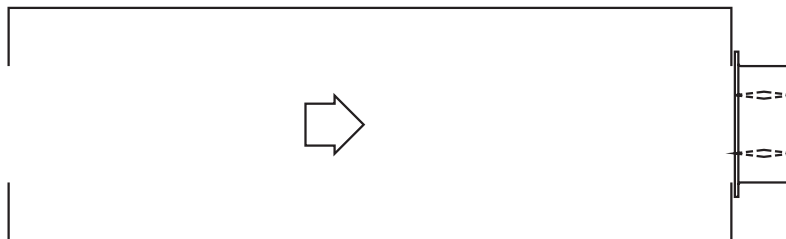


Figure 5.5

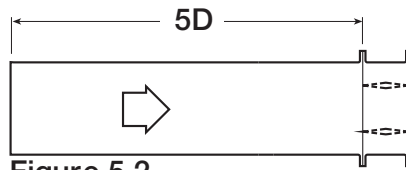


Figure 5.2

12 in. x12 in. (305mm x 305mm)		24x24 (610 mm x 610mm)		36x36 (914mm x 914mm)		12x48 (305mm x 1219mm)		48x12 (1219mm x 305mm)	
Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in wg)	Velocity (fpm)	Pressure Drop (in. wg)
500	.01	500	.01	500	.01	500	.01	500	.01
1000	.06	1000	.04	1000	.03	1000	.03	1000	.06
1500	.13	1500	.10	1500	.06	1500	.06	1500	.13
2000	.23	2000	.18	2000	.12	2000	.10	2000	.23
2500	.35	2500	.28	2500	.18	2500	.16	2500	.36
3000	.50	3000	.40	3000	.26	3000	.23	3000	.51
3500	.68	3500	.54	3500	.35	3500	.30	3500	.71
4000	.88	4000	.70	4000	.46	4000	.39	4000	.93

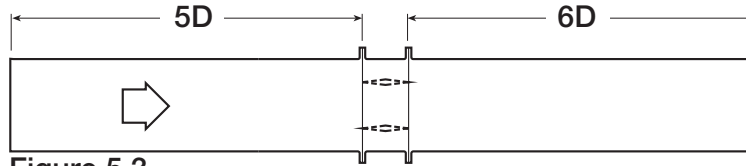


Figure 5.3

12 in. x12 in. (305mm x 305mm)		24x24 (610 mm x 610mm)		36x36 (914mm x 914mm)		12x48 (305mm x 1219mm)		48x12 (1219mm x 305mm)	
Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in wg)	Velocity (fpm)	Pressure Drop (in. wg)
500	.01	500	.01	500	.01	500	.01	500	.01
1000	.03	1000	.02	1000	.01	1000	.02	1000	.03
1500	.07	1500	.04	1500	.02	1500	.04	1500	.06
2000	.14	2000	.08	2000	.04	2000	.08	2000	.11
2500	.21	2500	.13	2500	.06	2500	.12	2500	.17
3000	.29	3000	.19	3000	.09	3000	.18	3000	.25
3500	.39	3500	.26	3500	.13	3500	.24	3500	.34
4000	.51	4000	.34	4000	.17	4000	.31	4000	.45

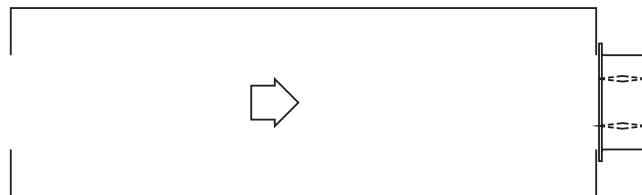


Figure 5.5

12 in. x12 in. (305mm x 305mm)		24x24 (610 mm x 610mm)		36x36 (914mm x 914mm)		12x48 (305mm x 1219mm)		48x12 (1219mm x 305mm)	
Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in wg)	Velocity (fpm)	Pressure Drop (in. wg)
500	.04	500	.03	500	.03	500	.03	500	.03
1000	.14	1000	.12	1000	.10	1000	.11	1000	.11
1500	.31	1500	.27	1500	.22	1500	.26	1500	.25
2000	.55	2000	.48	2000	.39	2000	.46	2000	.46
2500	.86	2500	.75	2500	.61	2500	.72	2500	.72
3000	1.23	3000	1.07	3000	.87	3000	1.02	3000	1.02
3500	1.67	3500	1.47	3500	1.19	3500	1.40	3500	1.40
4000	2.19	4000	1.91	4000	1.56	4000	1.83	4000	1.83

Leakage Data and Limitations

VCD-43V

Leakage Data

Air leakage is based on operation between 32°F (0°C) and 120°F (49°C).

Tested for leakage in accordance with ANSI/AMCA Standard 500-D, Figure 5.5.

Tested for air performance in accordance with ANSI/AMCA Standard 500-D, Figures 5.2, 5.3 and 5.5.

Torque

Data are based on a torque of 5.0 in.lb./ft² (0.56 N·m) applied to close and seat the damper during the test.

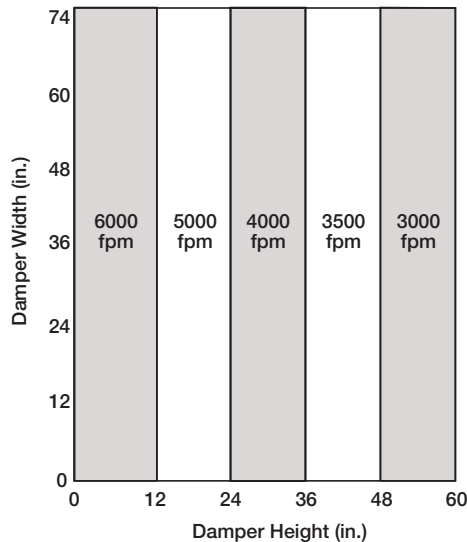
VCD-43V	Leakage Class*		
Maximum Damper Width	1 in. wg (0.25 kPa)	4 in. wg (1 kPa)	8 in. wg (2 kPa)
60 in. (1524mm)	1A	1	1
* applies to opposed blades only			

*Leakage Class Definitions

The *maximum* allowable leakage is defined as the following:

- Leakage Class 1A - 3 cfm/ft² at 1 in. wg (class 1A is only defined at 1 in. wg).
- Leakage Class 1
 - 4 cfm/ft² at 1 in. wg
 - 8 cfm/ft² at 4 in. wg
 - 11 cfm/ft² at 8 in. wg
 - 12.6 cfm/ft² at 10 in. wg

Velocity Limitations



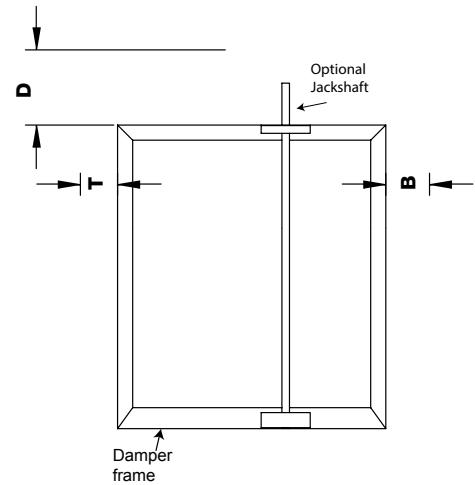
Temperature Limitations

Blade Seal	Temperature Range
TPE	-10°F to 180°F (-23°C to 82°C)
Silicone	-40°F to 250°F (-40°C to 121°C)
No Seal	-40°F to 250°F (-40°C to 121°C)

Space Envelopes

VCD-43V

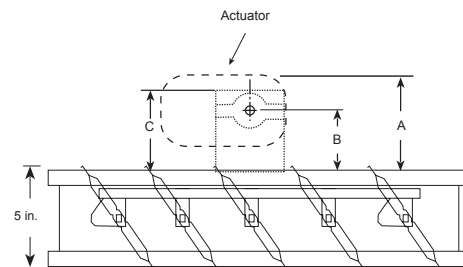
On dampers less than 18 in. (457mm) high, actuators may also require clearances above and/or below the damper frame. **“B” and “T” dimensions are worst case clearance requirements for some dampers less than 18 in. (457mm) high.** All damper sizes under 18 in. (457mm) high do not require these worst case clearances. If space availability above or below the damper is limited, each damper size should be individually evaluated.



Actuator Type/Model	Width	T	B	D
	Inches			
AFBUP (-S) and FSNF Series, Belimo MSxx20 Series, Honeywell	≥6 to <10	0	12¾	6
	≥10 to <18	0	2	6
	≥18	0	0	10
FSLF, LF and TFB Series, Belimo	≥6 to <10	0	3½	6
	≥10	0	0	6
MSxx04 & MSxx09 Series, Honeywell	≥6 to <9	0	4¾	6
	≥9	0	0	6
MS75xx Series, Honeywell	≥6 to <10	0	12¾	6
	≥10 to <18	0	7	6
	≥18	0	0	6

Internal mount only Actuator model	A	B	C
All except - EFB & EFCX Series	7¾ in. (197 mm)	3¾ in. (95 mm)	5⅜ in. (136.5 mm)
EFB & EFCX Series	8½ in. (216 mm)	6 in. (152mm)	8½ in. (216 mm)

This drawing depicts the worst case clearance requirements for an actuator with a jackshaft.



Mounting

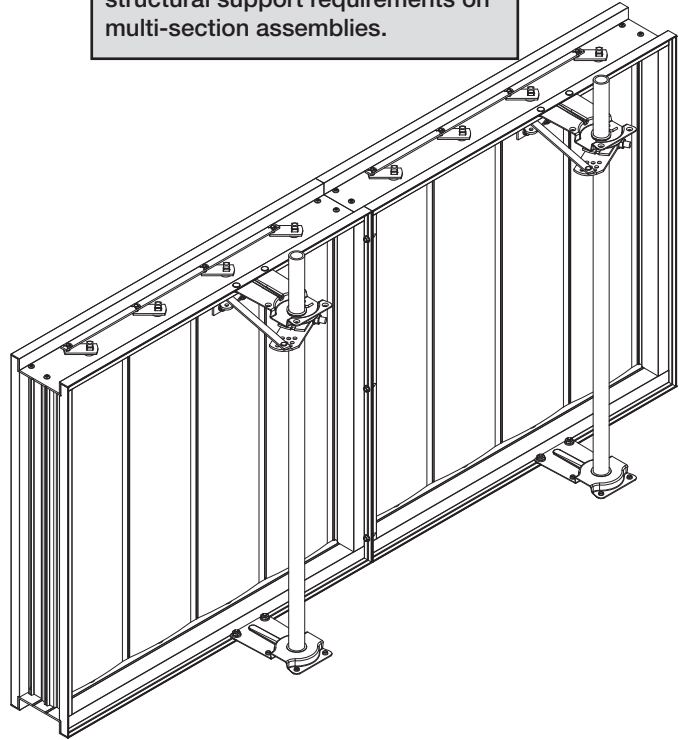
- External - includes extension pin (standoff bracket optional)
- External kit - actuator and all mounting hardware
- Internal - blade lever

Multi-Section Assembly

Dampers larger than the maximum single section size, will be made up of a multiple of equal size sections. Multiple section dampers can be jackshafted together so that all sections operate together as shown below.

NOTE: Dampers larger than 74 in. x 60 in. (1880mm x 1524mm) are not intended to be structurally self supporting. Additional horizontal bracing is recommended to support the weight of the damper and vertical bracing should be installed as required to hold against system pressure.

Refer to IOM document 483509 for structural support requirements on multi-section assemblies.



Specifications

Control dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules.

Dampers shall consist of: heavy gauge aluminum frame (0.125 in. [3.2mm] thick) with 5 in. (127mm) depth formed into a structural hat channel shape with reinforced corners; airfoil shaped, extruded aluminum blades (0.063 in. [1.6mm] thick) with metal blade to blade overlap (seal to seal only contact is not acceptable); blades shall be completely symmetrical relative to their axle point, presenting identical resistance to airflow in either direction or pressure on either side of the damper; ½ in. (13mm) dia. plated steel axles turning in synthetic (acetal) sleeve bearings; TPE blade seals ; flexible stainless steel jamb

seals; and external (out of the airstream) blade-to-blade linkage.

Damper manufacturer's printed application and performance data including pressure, velocity, leakage, and temperature limitations shall be submitted for approval showing damper suitable for pressures to 8 in. wg (2 kPa), velocities to 6000 fpm (30.5 m/s) and temperatures to 250°F (121°C).

Damper leakage for approval showing standard air leakage less than 6 cfm/sq.ft. at 4 in. wg (110cmh/m sq. at 1 kPa). Testing and ratings to be in accordance with AMCA Standard 500-D.

Basis of design is model VCD-43V.