

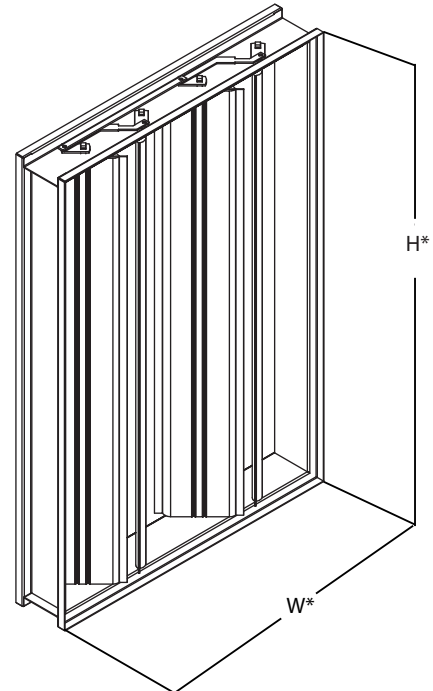
Application and Design

VCD-33V is an extremely low leakage damper with vertical blade orientation designed to meet the highest standards established for commercial control dampers. The VCD-33V is intended for application in medium to high pressure and velocity systems. This model also IECC (International Energy Conservation Code) compliant with a leakage rating of 3 cfm/ft² @ 1 in. wg (55 cmh/m² @ .25 kPa) or less.

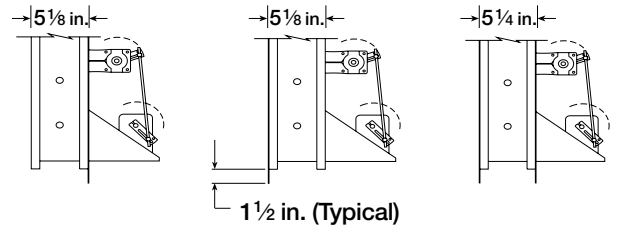
Ratings

- Pressure:** 3.0 - 8.0 in. wg (.75 kPa - 2 kPa) pressure differential
- Velocity:** 2500 fpm to 4000 fpm (12.7 m/s - 20.3 m/s)
- Leakage:** Class 1A @ 1 in. wg (.25 kPa)
Class 1 @ up to 10 in. wg (2.5 kPa)
- Temperature:** 200°F (93°C) to 250°F (121°C)

	Standard Construction	Optional Construction
Frame Material	Galvanized steel	304SS or Painted
Frame Material Thickness	16 ga. (1.5mm)	12 ga. or 14 ga. (2.7mm or 2mm)
Frame Type	5 in. x 1 in. (127mm x 25mm) hat channel	Single flange Single Reversed flange Double flange
Blade Action	Opposed	Parallel
Blade Material	Galvanized steel	304SS or Painted
Blade Material Thickness	14 ga. (2mm) equiavalent	-
Blade Type	Airfoil	-
Linkage	Plated steel out of airstream	304SS
Axle Bearings	Synthetic (acetal) with thrust washers	Bronze or 304SS with thrust washers
Axle Material	Plated steel	304SS
Blade Seals	TPE	Silicone
Jamb Seals	304SS	-



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



Single Flange

Single Reversed Flange

Double Flange

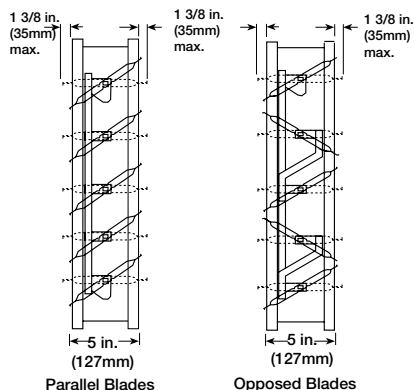
Features

- Airfoil shape reduces pressure drop and turbulence at velocities to 4000 fpm (20.3 m/s).
- Frames are constructed with reinforced corners. Low profile head and sill are used on sizes less than 17 in. (432mm).
- Removable control shaft extends 6 in. (152mm) beyond frame.

Options

- Actuators (120V, 24V, 230V, Pneumatic or Manual Quadrant)
- Face & Bypass
- OCI (Open Close Indicator)
- Paint Finishes
 - Baked Enamel
 - Epoxy
 - Hi Pro Polyester
 - Industrial Epoxy
 - Permatector™
- Retaining Angles
- Security Bars
- Sleeves
- Transitions (R, C, O)

W x H	Minimum Size	Maximum Size
		Single Section
Inches	6 x 6	74 x 60
mm	152 x 152	1880 x 1524



Parallel Blades

Opposed Blades

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 .075 lb/ft³ (1.201 kg/m³).

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 5.5 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.

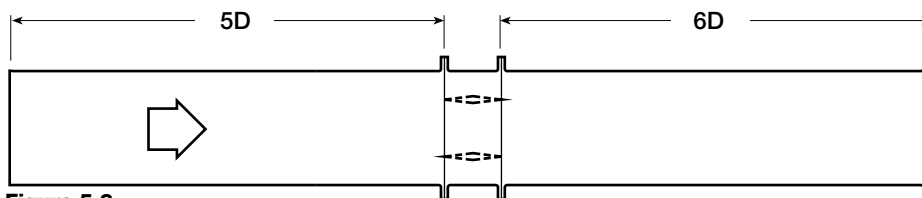


Figure 5.3

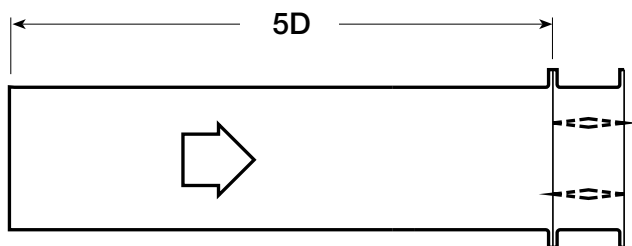


Figure 5.2

$$D = \sqrt{\frac{4(W)(H)}{3.14}}$$

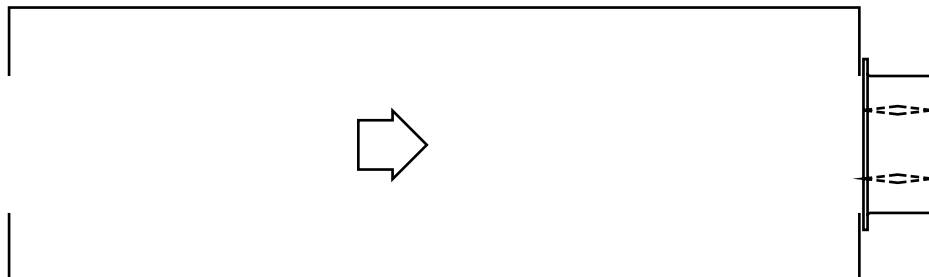
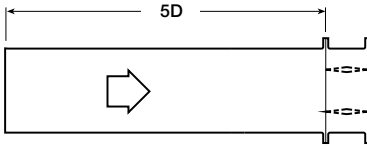


Figure 5.5

Pressure Drop Data

VCD-33V

AMCA 5.2



12 in. x 12 in. (305mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.07
2000	0.13
2500	0.19
3000	0.26
3500	0.35
4000	0.45

24 in. x 24 in. (610mm x 610mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.06
2000	0.10
2500	0.15
3000	0.21
3500	0.28
4000	0.36

36 in. x 36 in. (914mm x 914mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.04
2000	0.07
2500	0.11
3000	0.15
3500	0.20
4000	0.26

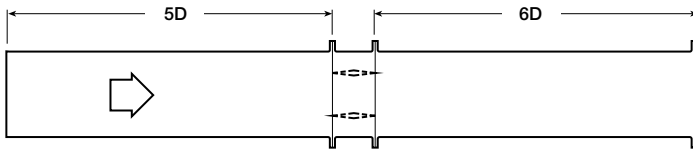
48 in. x 12 in. (1219mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.07
2000	0.11
2500	0.17
3000	0.23
3500	0.31
4000	0.39

12 in. x 48 in. (305mm x 1219mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.04
2000	0.08
2500	0.12
3000	0.16
3500	0.21
4000	0.27

AMCA 5.3



12 in. x 12 in. (305mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.05
2000	0.08
2500	0.12
3000	0.17
3500	0.23
4000	0.30

24 in. x 24 in. (610mm x 610mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.01
1500	0.03
2000	0.05
2500	0.09
3000	0.13
3500	0.17
4000	0.22

36 in. x 36 in. (914mm x 914mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.01
1500	0.02
2000	0.04
2500	0.06
3000	0.08
3500	0.12
4000	0.15

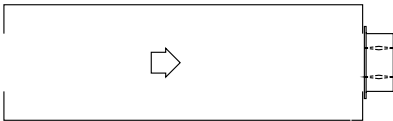
48 in. x 12 in. (1219mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.04
2000	0.08
2500	0.12
3000	0.17
3500	0.22
4000	0.29

12 in. x 48 in. (305mm x 1219mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.04
2000	0.07
2500	0.11
3000	0.15
3500	0.20
4000	0.25

AMCA 5.5



12 in. x 12 in. (305mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.12
1500	0.27
2000	0.48
2500	0.74
3000	1.07
3500	1.46
4000	1.91

24 in. x 24 in. (610mm x 610mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.11
1500	0.26
2000	0.45
2500	0.71
3000	1.02
3500	1.40
4000	1.89

36 in. x 36 in. (914mm x 914mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.02
1000	0.09
1500	0.21
2000	0.38
2500	0.58
3000	0.85
3500	1.15
4000	1.52

48 in. x 12 in. (1219mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.11
1500	0.24
2000	0.43
2500	0.67
3000	0.96
3500	1.31
4000	1.71

12 in. x 48 in. (305mm x 1219mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.11
1500	0.24
2000	0.44
2500	0.68
3000	0.97
3500	1.32
4000	1.73

Leakage Data

VCD-33V

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 7.0 in.lb./ft² (0.79 N·m) applied to close and seat the damper during the test.

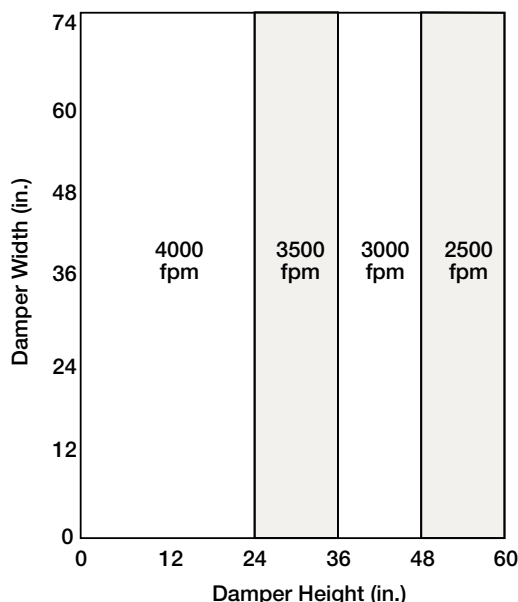
VCD-33V	Leakage Class				
Maximum Damper Height	1 in. wg (0.25 kPa)	4 in. wg (1 kPa)	6 in. wg (1.5 kPa)	8 in. wg (2 kPa)	10 in. wg (2.5 kPa)
60 in. (1524mm)	1A	1	1	NA	NA

*Leakage Class Definitions

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

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

Velocity Limitations



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: a 16 ga. (1.5mm) galvanized steel channel frame with 5 in. (127mm) depth; airfoil shaped, galvanized steel double skin construction blades (14 ga. [2mm] equivalent thickness); 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; 1/2 in. (6mm) dia. plated steel axles turning in synthetic (acetal) sleeve bearings; TPE blade seals for 200°F (93°C) maximum temperature; 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 10 in. wg (2.5 kPa), velocities to 4000 fpm (20.3 m/s) and temperatures to 250°F (121°C).

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

Basis of design is Greenheck model VCD-33V.

