

**Low Leakage CONTROL DAMPER**
**Application and Design**

The VCD-23V series is a vertical blade low leakage control damper intended for application in low to medium pressure and velocity systems. A wide range of electric and pneumatic actuators are available. This model is IECC (International Energy Consumption Code) compliant with a leakage rating of 3 cfm/ft<sup>2</sup> @ 1 in. wg (55 cmh/m<sup>2</sup> @ .25 kPa) or less.

**Ratings** (See page 4 for specific limitations)

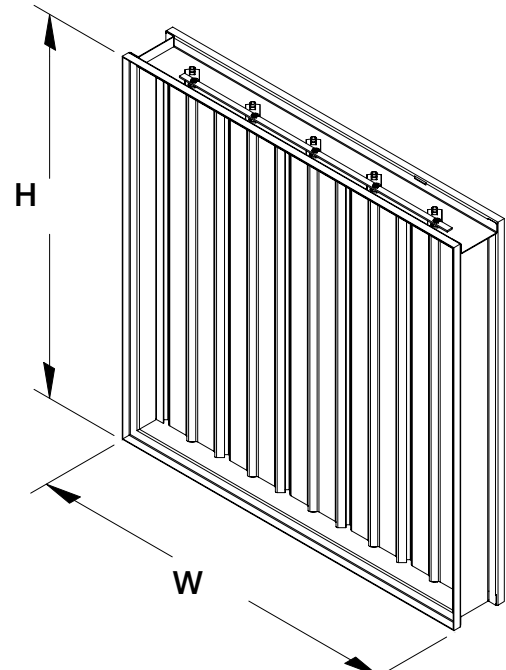
**Pressure:** 2.5 - 5.0 in. wg (0.62 kPa - 1.2 kPa) - pressure differential.

**Velocity:** 2000 to 3000 fpm (10.2 m/s - 15.2 m/s)

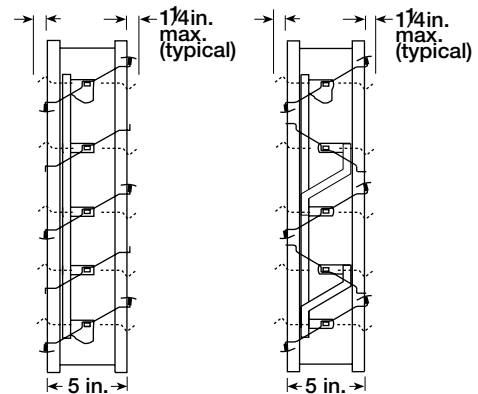
**Leakage:** Class 1A @ 1 in. wg (.25 kPa)  
Class 1 @ up to 5 in. wg (1.2 kPa)

**Temperature:** 200°F to 250°F (93°C to 121°C). Consult Greenheck for higher temperatures.

Construction	Standard	Optional
<b>Frame Material</b>	Galvanized steel	Aluminum or 304SS
<b>Frame Material Thickness</b>	16 ga. (1.5mm)	12 ga or 14 ga.
<b>Frame Type</b>	5 in. x 1 in. (127mm x 25mm) hat channel	Single flange, reversed flange or double flange
<b>Blade Material</b>	Galvanized steel	Aluminum or 304SS
<b>Blade Type</b>	3V	-
<b>Linkage</b>	Plated steel out of airstream, concealed in jamb	304SS
<b>Axle Bearings</b>	Synthetic with thrush washers	Bronze or 304SS with thrush washers
<b>Axle Material</b>	Plated steel	304SS
<b>Blade Seals</b>	TPE	Silicone
<b>Jamb Seals</b>	304SS	-
<b>Paint Finishes</b>	-	Baked Enamel, Epoxy, Hi Pro Polyester, Industrial Epoxy or Permatector



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

**Blade Operation**


Parallel Blades

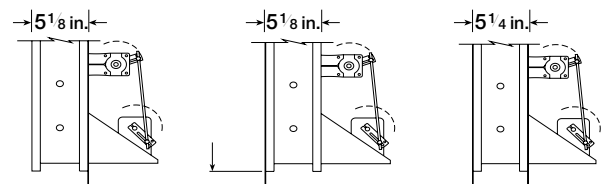
Opposed Blades

**Size Limitations**

W x H	Minimum Size	Maximum Size
		Single Section
Inches	6 x 6	74 x 48
mm	152 x 152	1880 x 1219

**Features and Options:**

- Blade seals - pressure activated to produce tighter sealing.
- Wide range of electric and pneumatic actuators available. Factory installation available.
- Low profile jambs are used on sizes less than 17 in. (432mm) wide.
- R, C or O transitions
- Sleeves available
- Open Close Indicator (OCI)

**Flange Options**


Single Flange

Single Reversed Flange

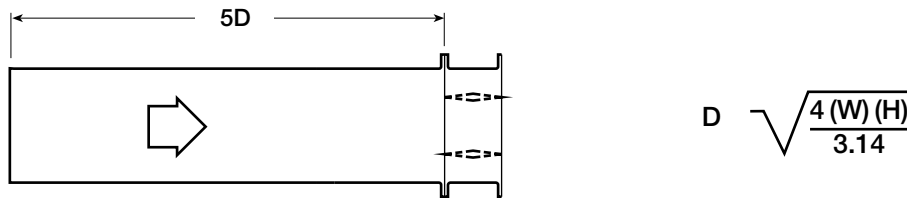
Double Flange

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<sup>3</sup> (1.201 kg/m<sup>3</sup>).

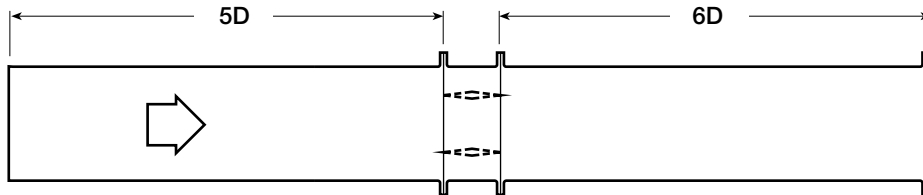
Actual pressure drop found in any HVAC system is a combination of many factors. This pressure drop information along with an analysis of other system influences should be used to estimate actual pressure losses for a damper installed in a given HVAC system.

## AMCA Test Figures

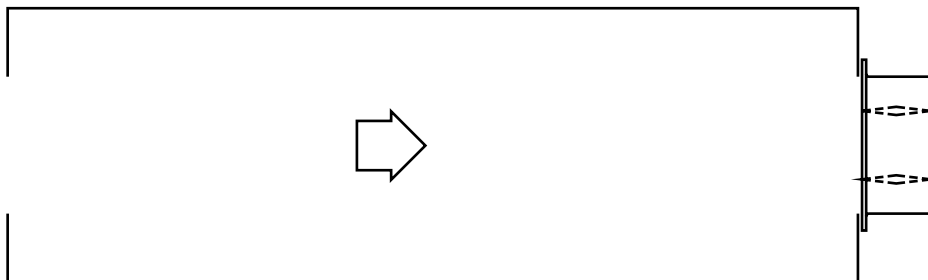
**Figure 5.2** Illustrates a ducted damper exhausting air into an open area. This configuration has a lower pressure drop than Figure 5.5 because entrance losses are minimized by a straight duct run upstream of the damper.



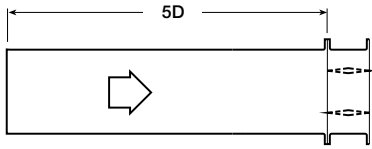
**Figure 5.3** Illustrates a fully ducted damper. This configuration has the lowest pressure drop of the three test configurations because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.



**Figure 5.5** 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.



## AMCA 5.2



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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.05
1500	0.11
2000	0.19
2500	0.29
3000	0.41
3500	0.55
4000	0.72

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	0.16
3000	0.23
3500	0.30
4000	0.40

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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.05
2000	0.09
2500	0.14
3000	0.19
3500	0.27
4000	0.35

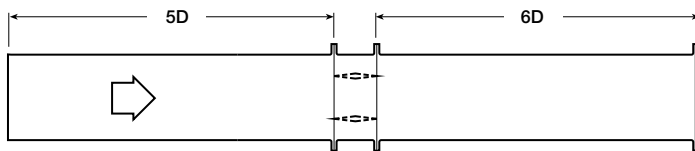
48 in. x 12 in. (1219mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.04
1500	0.08
2000	0.15
2500	0.22
3000	0.32
3500	0.43
4000	0.56

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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.07
2000	0.12
2500	0.18
3000	0.26
3500	0.36
4000	0.47

## AMCA 5.3



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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.08
2000	0.13
2500	0.20
3000	0.29
3500	0.40
4000	0.51

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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.04
2000	0.07
2500	0.11
3000	0.16
3500	0.21
4000	0.28

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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.03
2000	0.06
2500	0.09
3000	0.13
3500	0.19
4000	0.25

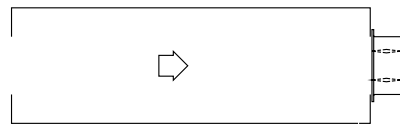
48 in. x 12 in. (1219mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.07
2000	0.12
2500	0.18
3000	0.26
3500	0.36
4000	0.46

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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.06
2000	0.10
2500	0.16
3000	0.22
3500	0.30
4000	0.39

## AMCA 5.5



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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.13
1500	0.30
2000	0.53
2500	0.82
3000	1.19
3500	1.62
4000	2.10

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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.12
1500	0.26
2000	0.47
2500	0.75
3000	1.04
3500	1.41
4000	1.90

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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.02
1000	0.10
1500	0.22
2000	0.40
2500	0.62
3000	0.90
3500	1.23
4000	1.62

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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.12
1500	0.27
2000	0.47
2500	0.75
3000	1.07
3500	1.45
4000	1.91

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

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.12
1500	0.28
2000	0.49
2500	0.77
3000	1.12
3500	1.53
4000	2.01

# Leakage Data

# VCD-23V

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./ft<sup>2</sup> (0.56 N·m) applied to close and seat the damper during the test.

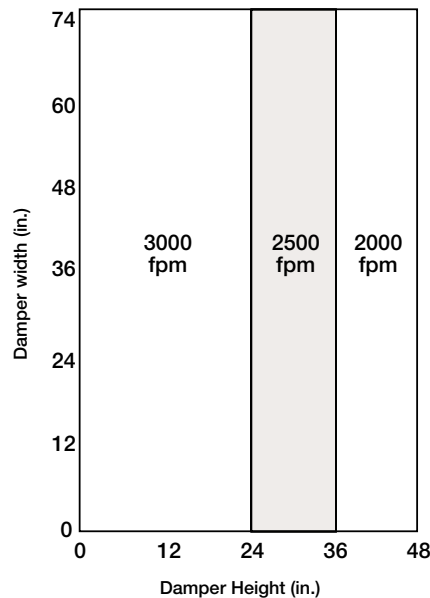
VCD-23V	Leakage Class*		
Maximum Damper Height	1 in. wg (0.25 kPa)	4 in. wg (1 kPa)	5 in. wg (1.2 kPa)
48 in. (1219mm)	1A	1	1

### \*Leakage Class Definitions

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

- Leakage Class 1A - 3 cfm/ft<sup>2</sup> @ 1 in. wg (class 1A is only defined at 1 in. wg).
- Leakage Class 1
  - 4 cfm/ft<sup>2</sup> @ 1 in. wg
  - 8 cfm/ft<sup>2</sup> @ 4 in. wg
  - 11 cfm/ft<sup>2</sup> @ 8 in. wg
  - 12.6 cfm/ft<sup>2</sup> @ 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.

Damper blades shall be 16 ga. (1.5mm) galvanized steel 3V type with three longitudinal grooves for reinforcement. Blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow and operation in either direction through the damper (blades that are non-symmetrical relative to their axle pivot point or utilize blade stops larger than ½ in. [12.7mm] are unacceptable). Blade seals shall be TPE for 180°F (82°C) maximum temperature. Linkage shall be blade-to-blade concealed in jamb (out of the airstream) to protect linkage and reduce pressure drop and noise.

Damper frame shall be 16 ga. (1.5mm) galvanized steel formed into a structural hat channel shape with reinforced corners to meet 11 ga. (3mm) criteria. Bearings shall be corrosion resistant, permanently

lubricated, synthetic (acetal) sleeve type rotating in extruded holes in the damper frame for maximum service. Axles shall be square and positively locked into the damper blade. Jamb seals shall be flexible stainless steel compression type to prevent leakage between blade end and damper frame.

Damper manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for pressures to 5 in. wg, (1.2 kPa) velocities to 3000 fpm (15.2 m/s) and temperatures to 250°F (121° C).

Damper manufacturer's printed performance data showing standard air leakage less than 6 cfm/ft<sup>2</sup> @ 4 in. wg (110 cmh/m<sup>2</sup> @ 1 kPa) shall be submitted for approval.

Basis of design is Greenheck model VCD-23V.

