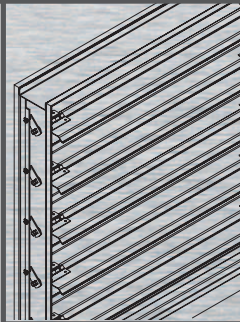
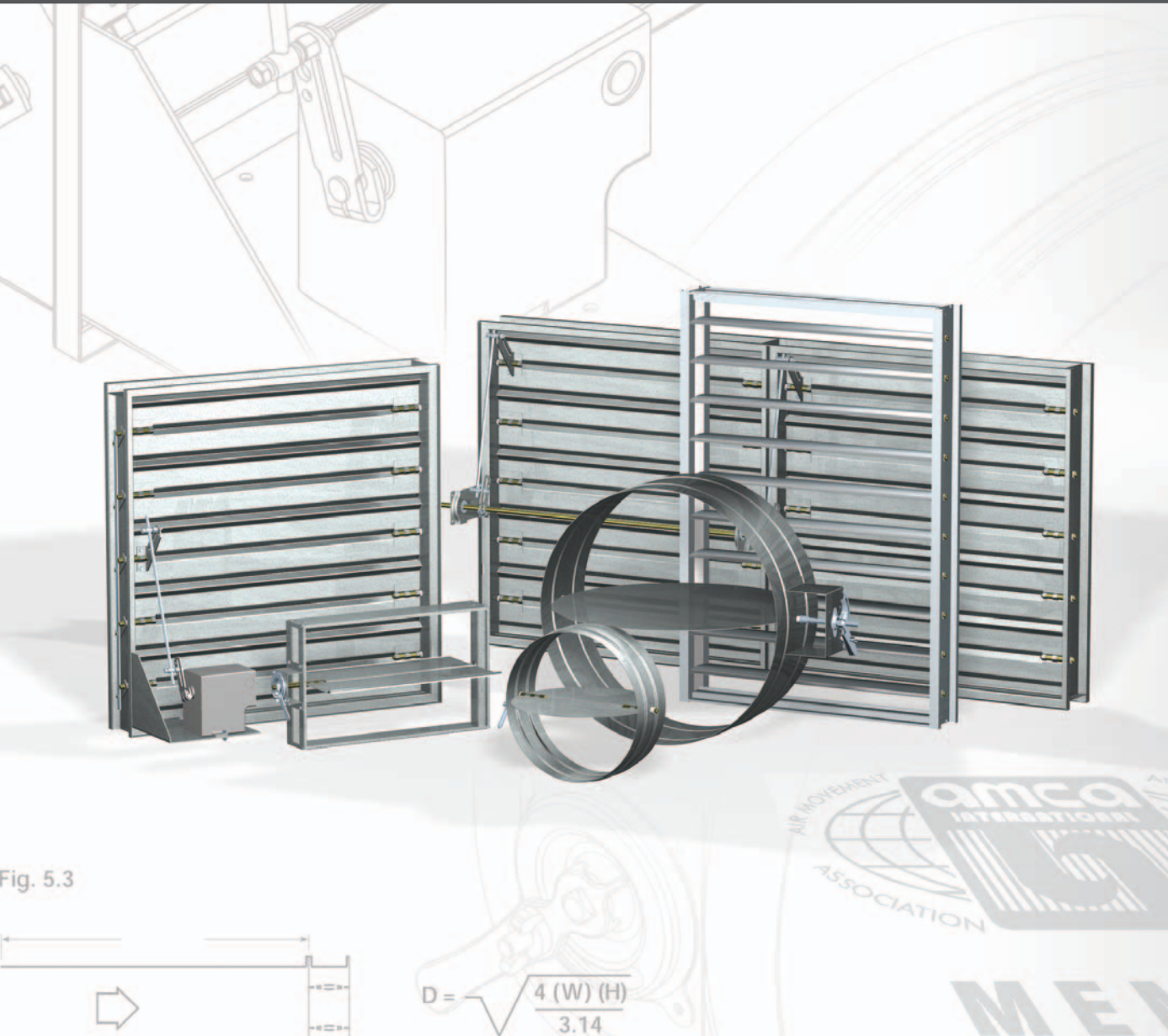


HVAC Control Damper Models VCD and MBD

- Selection • Construction • Performance



 **GREENHECK**
Building Value in Air.

November
2006

Greenheck HVAC control dampers bring the same quality engineering and manufacturing that has earned Greenheck its position as an industry leader over the past 50 years.

- Broadest line of damper products in the industry
- Extensive laboratory and testing facilities
- Comprehensive ongoing product improvement and testing programs
- Innovative **Variable Symmetric Blade (VSB)** design

Aggressive research, development, and testing keeps Greenheck a leader in the air movement and control industry.



Greenheck control dampers are a better choice

Greenheck's VSB design provides many benefits:

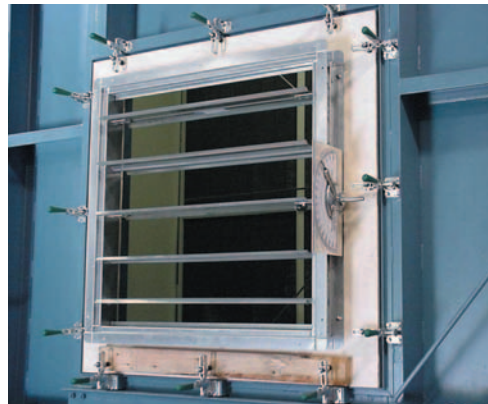
- High damper free area
- Lower pressure losses
- Low operating torque
- Operating torque not affected by airflow direction through damper

Low profile frame (on dampers under 17 in. [432mm] high) adds additional benefits:

- Further increases damper free area
- Minimizes pressure loss through smaller dampers

Products you can trust

Comprehensive state-of-the-art laboratory and testing facilities have always been important to Greenheck's continuing business success. Greenheck's laboratory facility, which is devoted exclusively to development and testing of damper related products, contains the HVAC industry's most extensive and modern equipment for testing to the latest versions of AMCA, ANSI, ASHRAE, UL, and other industry standards of performance. Greenheck uses these laboratory capabilities to provide the most comprehensive performance data, including leakage and pressure loss, over the widest range of sizes. Our actuator life cycle and endurance testing goes far beyond any current industry requirements.



Greenheck operates five manufacturing locations, eight national distribution centers, and three international distribution centers:

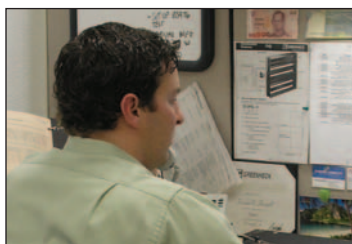


Quick Build and Delivery

Greenheck's Quick Build (QB) program, along with strategic manufacturing locations, ensure rapid response time. Products are manufactured the next day, or in three, five or ten days, then efficiently shipped to your job site. Sizes are in stock and can be shipped same day from any of our US Distribution Centers.

Leading Edge Technical Support

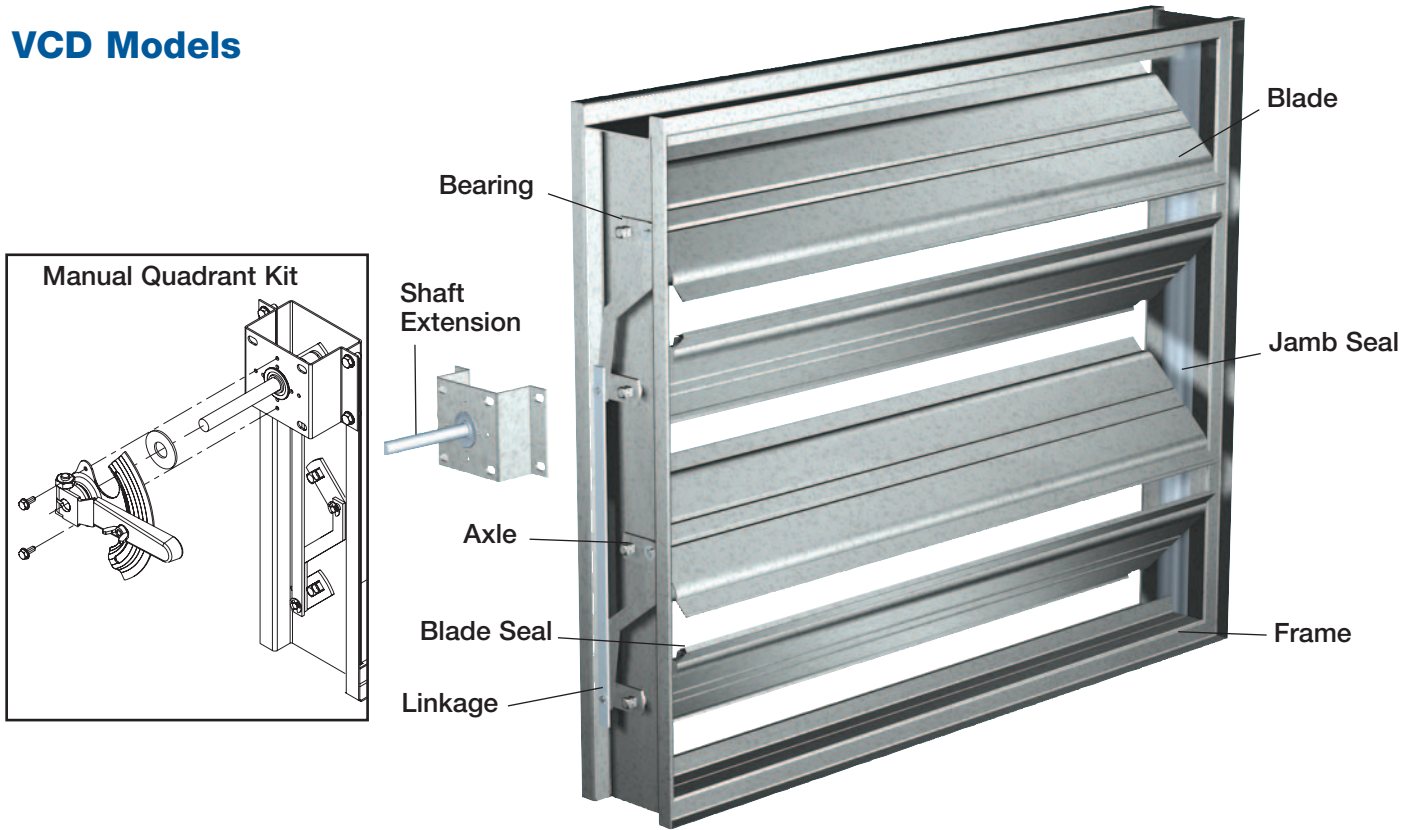
All Greenheck products are supported by the industry's best product literature, electronic media, and Computer Aided Product Selection program (CAPS). You'll also find extensive product information and Installation, Operation and Maintenance instructions and more on the Internet at www.greenheck.com



Outstanding Customer Service

Your local Greenheck representative has a wealth of industry and product knowledge to answer your questions. Our representatives receive the latest product information and can have orders processed directly to our factory. With our direct order processing system, we can ship orders as fast as the next day. With Greenheck's experienced staff, we can answer questions and provide solutions to your unique damper application.

VCD Models



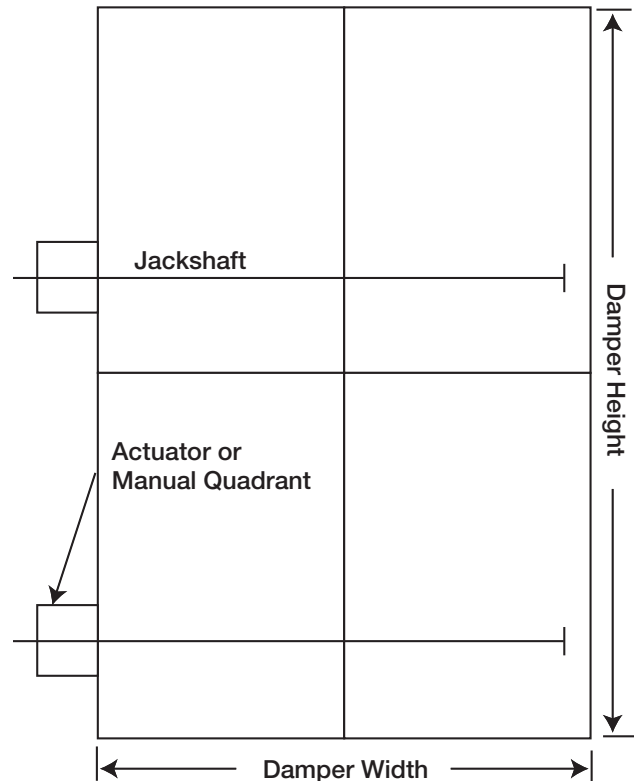
Drive Arrangement Definition

Each damper is given a drive arrangement code that helps describe the construction of the damper. The following breaks down what each number and letter represents.

22-2FEL-2

① ② ③ ④ ⑤ ⑥ ⑦

- ① Number of sections wide
- ② Number of sections high
- ③ Number of actuators or manual quadrants
- ④ Who supplies the actuators or manual quadrants
F - Factory
I - Customer Supplied (field mounted)
- ⑤ Actuator or manual quadrant mounting
E - External
I - Internal
B - Both internal and external
- ⑥ Actuator or manual quadrant location
L - Left-hand drive
R - Right-hand drive
B - Both right and left
- ⑦ Number of jackshafts



Variable Symmetric Blade Design (VSB)

Part of Greenheck's unique approach to damper construction, Variable Symmetric Blade Design (VSB) uses two principles to increase damper performance. First, all damper blades are symmetric about their axis. Second, any combination of 4, 5, 6, and 7 in. (102, 127, 152, and 178mm) blade widths are used in a single damper. These two features, part of Greenheck's standard construction, provide the following advantages:

- **Increases Mounting Flexibility** - Symmetrical blades have identical operating characteristics regardless of airflow direction. This allows a Greenheck control damper to be mounted in either direction of flow, an advantage when installing with space constraints.
- **Increases Free Area** - Traditional damper designs with a single blade width require oversized blade stops, limiting free area when the blades are open (Figure 1). Greenheck is able to reduce blade stop height, which maximizes free area, and increases damper performance (Figure 2).
- **Reduces Actuator Torque** - If an unsymmetrical blade closes against airflow, a large amount of torque is needed because the air distribution is unbalanced. Greenheck's VSB design balances airflow on each side of a symmetrical blade, reducing the torque required to operate the damper. The use of symmetrical blades has allowed Greenheck to reduce the sizes and quantities of actuators used on our dampers (Figure 3).

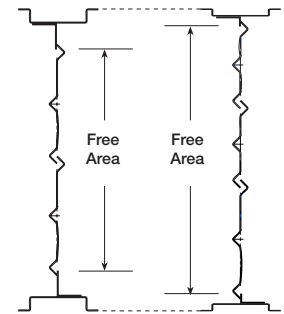


Figure 1 Figure 2

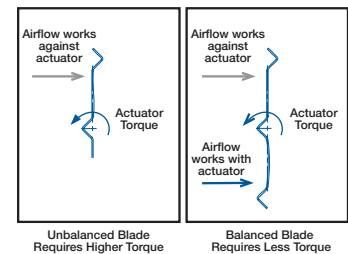
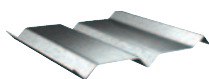


Figure 3

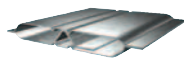
Blades

3V blades are fabricated from a single thickness of 16 ga. (1.5mm) galvanized steel incorporating three longitudinal V-Type grooves running the full length of the blade to increase strength. This blade is standard on models VCD-15, 18, 20, 20V, 23, 23V, and SEVCD-23, designed for low to medium velocity and pressure capabilities.

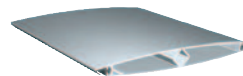
Airfoil blades are constructed of double skin galvanized steel or heavy gauge extruded aluminum. This blade design presents a lower resistance to airflow and strength that is typically used in high pressure systems. Airfoil blades are standard on models VCD-33, 33V, 34, 40, 42, 42V, 43, 43V and SEVCD-33.



3V Blade



Steel Airfoil Blade

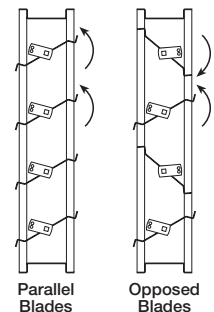


Aluminum Airfoil Blade

Parallel Versus Opposed Blade Operation

Greenheck control dampers are offered with either parallel or opposed blades. Each style has distinguishing characteristics in regards to the type of operation required.

- **Parallel blade operation** - This configuration requires the damper blades to open or close in the same direction, parallel to one another. Parallel blade orientation is typically used when the damper operates in two positions, open or close.
- **Opposed blade operation** - Adjacent damper blades will open or close opposite one another under opposed blade configuration. Opposed blade orientation is typically used on dampers that modulate airflow.



Parallel Blades

Opposed Blades

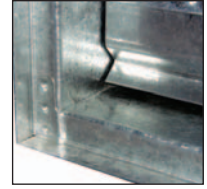
Linkage

Traditional damper linkages are found in the airstream, adding to the pressure drop of the damper blades and frame. Greenheck control dampers have blade linkage concealed in the frame to prevent additional pressure drop. With standard plated steel construction (stainless steel optional), linkage is engineered to accurately control each and every blade without need for adjustment.



Frame

Specifically designed for installation inside ductwork, Greenheck control dampers utilize a 5 in. x 1 in. (127mm x 25mm) hat channel frame made of 16 ga. (1.5mm) steel or 0.125 in. (3mm) aluminum. Each frame is built with four separate pieces of material and joined by our Tog-L-Loc® process with the following advantages:

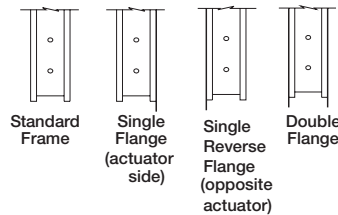


Tog-L-Loc®
Reinforced Corner

- **Rigid frame** - When two pieces of 16 ga. (1.5mm) steel are joined by the Tog-L-Loc® system, the joint has an equivalent thickness of 10 ga. (3.5mm) steel.
- **Increased corrosion resistance** - The high temperatures from welding will remove the galvanized finish from damper frames. As the Tog-L-Loc® process doesn't use heat, Greenheck damper frames have greater corrosion resistance by retaining the galvanized coating.
- **Optimal free area** - On all dampers that are 17 in. (432mm) high or less, Greenheck uses a low profile top and bottom frame section to maximize free area.
- **Square frame** - Many damper manufacturers construct each frame from a single piece of sheet metal, formed into shape by bending at three corners and spot welding in one. This type of construction can produce weak corners that are not necessarily 90°, resulting in a frame that is out of square. Symptoms of out-of-square frames include blades that do not close properly and reduced leakage performance. Using four separate frame components (top, bottom, and two sides), Greenheck's Tog-L-Loc® process results in four sturdy, 90° joints. This ensures that each Greenheck damper is square and provides optimum performance in the field.

Frame Options:

- Channel Frame (standard)
- Single Flange
- Single Reverse Flange
- Double Flange



No Top or Bottom

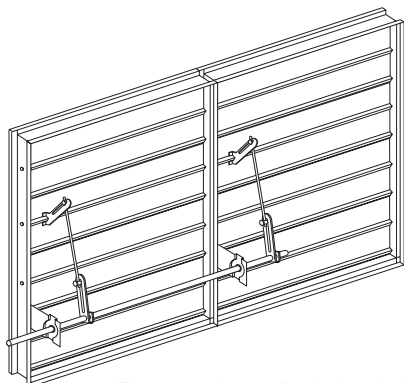
Greenheck's Control Dampers are designed for installation in any position with the blades horizontal. As shown in the drawing at the right, the damper can be turned over so the actuator is on the left or right side.



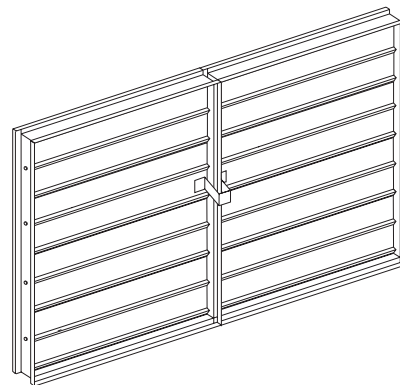
Multi-Section Dampers

Each of Greenheck's VCD Control Dampers have a maximum size for a single damper section or panel. These sections vary from 48 in. x 60 in. (1219mm x 1524mm) to 60 in. x 74 in. (1524mm x 1880mm). Dampers larger than a single section will be made up of equal size sections which, depending upon model and size, may be shipped as a single complete assembly or as separate sections for field assembly.

Most multi-section damper assemblies are supplied with a factory installed jackshaft so all sections operate together. Models VCD-15 and VCD-18 utilize a field-installed crossover bracket to connect adjacent sections.



Factory Installed Jackshaft

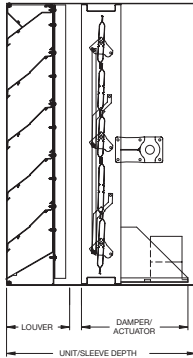
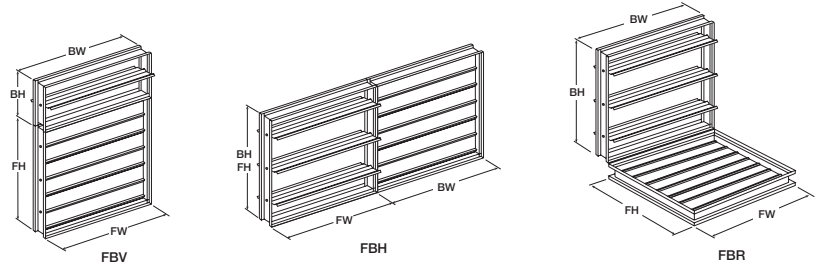


Field Installed Crossover Bracket

Damper assemblies (larger than one section) are not designed to be structurally self-supporting. Additional horizontal bracing is recommended to support the weight of the damper and vertical bracing should be installed if required to hold against system pressure.

Face & Bypass Dampers

Most VCD models can be supplied in a Face & Bypass configuration where the sections of the damper operate opposite from each other. Face & Bypass dampers are available in vertical, horizontal, and right angle arrangements as shown at the right.

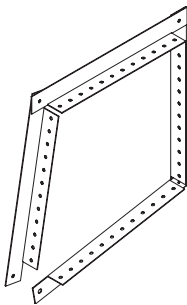
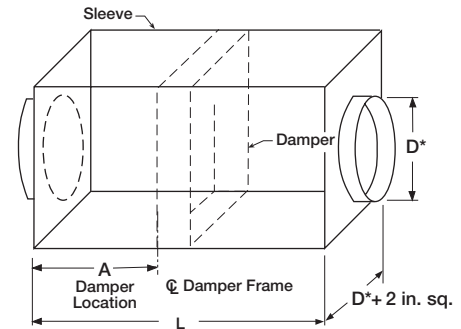


Damper/Louver in a Common Sleeve

Greenheck can provide a damper and louver in a common sleeve for your applications requiring single unit assembly. This assembly makes it convenient for installing in the field as one unit instead of dealing with multiple units (consult factory for more information).

Factory Sleeve Option

Greenheck control dampers are available in factory furnished sleeves in lengths up to 48 in. (1219mm). Sleeves are constructed out of 10 through 20 ga. (3.25 through 0.91 mm) galvanized steel. When dampers are installed in ductwork, the “A” dimension specifies location of damper within the sleeve.

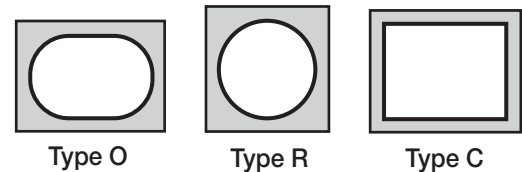


One Piece Retaining Angles

Greenheck's one piece retaining angle, the POC (literally named for being a “Piece of Cake”) makes control damper installation a breeze. The POC angle is designed by fastening four pieces together to form one piece. When installed the angle simply wraps around the sleeve of the damper and fastened in place.

Transitions

Greenheck control dampers can be supplied with the appropriate transition option, in applications where dampers require installation in round or oval openings. Rectangular dampers are constructed 1 inch (25mm), or 2 inches (51mm) larger than the dimensions provided and installed in a factory sleeve. The sleeve is transitioned at each end to the appropriate round, oval, or rectangular size.



Transition options available



Security Bars

When security becomes an issue, Greenheck offers optional factory installed security bars. Security bars are factory welded into a 10 ga. (3.5mm) sleeve.

Greenheck has a wide range of manual, electric, and pneumatic actuators for use with our control dampers. Actuators can be installed at the factory or shipped loose with the necessary linkage and brackets required for mounting. Each damper and actuator is cycle tested in our factory before the final product is shipped, ensuring Greenheck quality and trouble free operation in the field.

Manual Hand Quadrant See Figure 5

- ✓ Location
 - Internal or external

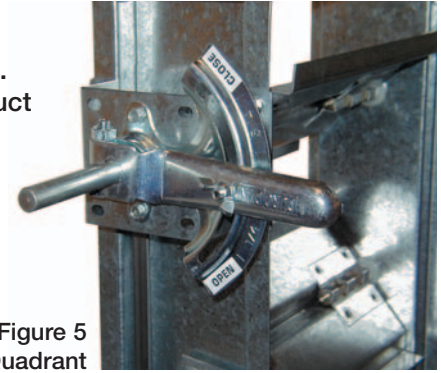


Figure 5
Manual Quadrant

Electric Actuator Checklist See Figures 6 & 7

- ✓ Power Supply
 - 24 Vdc, 24 Vac, 120 Vac, and 240 Vac
 - Frequency
- ✓ Operation
 - Spring Return (spring will drive damper to original starting point)
 - Power Open or Power Closed
- ✓ Operating Mode
 - Modulating (damper position determined by modulating control signal)
 - Floating (damper can be stopped anywhere between open and closed)
 - Two position (damper position is open or closed)
- ✓ Fail Direction (for spring return only)
 - Open or Closed
- ✓ Location
 - Internal or external
- ✓ Control Signal (for modulating only)
 - 0-10 Vdc, 4-20 mAdc, or 135 ohm
- ✓ NEMA Enclosure
 - 1, 3, 4, 4X, or 7 (specify one for specific application)
- ✓ Accessories
 - Auxiliary Switches
 - Transformers



Figure 7
Electric-Internal Mount

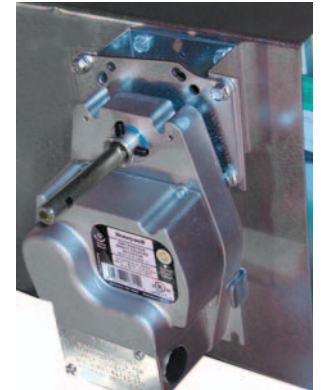


Figure 6
Electric-External Mount

Greenheck's most commonly used electric actuator manufacturers are Honeywell, Siemens, Belimo, Multi-Products, and Invensys. Call your Greenheck representative for other options.

Pneumatic Actuator Checklist See Figure 8

- ✓ Power Supply
 - 20 psi
- ✓ Operation
 - Spring Return (spring will drive damper to original starting point)
- ✓ Operating Mode
 - Modulating (damper position determined by modulating pressure signal)
 - Two Position (damper position is open or closed)
- ✓ Fail Direction (for spring return only)
 - Open or Closed
- ✓ Location
 - Internal or external
- ✓ Control Signal (for modulating only)
 - 3-15 psi
- ✓ Accessories
 - Solenoid Valves or Positioners

Greenheck's most commonly used pneumatic actuator manufacturers are Siemens and Invensys. Call your Greenheck representative for other options.



Figure 8
Pneumatic

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.

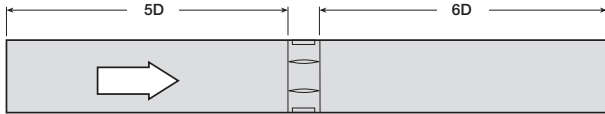


Figure 5.3

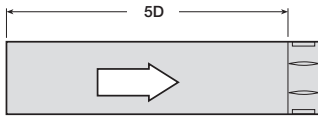


Figure 5.2

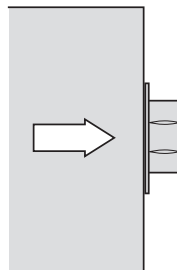


Figure 5.5


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

D=Duct length
 W=Damper width
 H=Damper height

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.

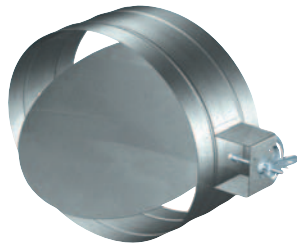
Figure 5.2 Illustrates a ducted damper exhausting air into an open area. This configuration has a lower pressure drop than Figure 5.5 because entrance losses are minimized by a straight duct run upstream of the damper.

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.



Greenheck Fan Corp. certifies that the models VCD-15, 18, 20, 23, and SEVCD-23 shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Programs. The AMCA Certified Ratings Seal applies to air performance only.

Pressure Drop Data



VCDR-50 & 53

- Insert type round single blade
- Blade seals VCDR-53

Models VCDR-50, 53



VCDRM-50 & 53

- Insert type round multi-blade
- Blade seals VCDRM-53

Models VCDRM-50, 53

Dimension inches	12			24			36		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (fpm)	Pressure Drop in. wg								
500	.01	.01	.02	.01	.01	.02	.01	.01	.02
1000	.06	.02	.10	.04	.01	.09	.03	.01	.09
1500	.13	.05	.22	.08	.03	.20	.07	.03	.20
2000	.23	.08	.38	.15	.06	.36	.13	.05	.35
2500	.37	.13	.60	.23	.09	.56	.21	.07	.55
3000	.53	.19	.86	.33	.13	.81	.30	.10	.88
3500	.72	.25	1.18	.45	.18	1.11	.41	.14	1.08
4000	.94	.33	1.54	.59	.23	1.45	.53	.18	1.41

Dimension inches	12			24			36		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (fpm)	Pressure Drop in. wg								
500	.04	.03	.05	.03	.02	.04	.05	.05	.06
1000	.15	.11	.19	.13	.10	.15	.19	.20	.25
1500	.33	.25	.42	.29	.21	.33	.42	.44	.57
2000	.59	.45	.75	.51	.38	.59	.75	.79	1.01
2500	.93	.70	1.18	.79	.60	.92	1.18	1.23	1.58
3000	1.34	1.02	1.69	1.14	.60	1.32	1.69	1.77	2.27
3500	1.82	1.38	2.31	1.56	1.17	1.80	2.31	2.41	3.09
4000	2.38	1.81	3.01	2.04	1.53	2.36	3.01	3.15	4.04



Models VCD-15, 18, 20, 23 & SEVCD-23

Dimension inches	12x12			24x24			36x36			12x48			48x12		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (fpm)	Pressure Drop in. wg														
500	.04	.02	.06	.02	.01	.03	.01	.01	.03	.01	.01	.03	.03	.02	.04
1000	.14	.09	.22	.07	.04	.14	.04	.03	.12	.06	.04	.13	.10	.07	.17
1500	.31	.20	.50	.16	.09	.31	.09	.06	.26	.13	.10	.30	.23	.16	.38
2000	.55	.36	.89	.29	.16	.54	.16	.11	.46	.23	.17	.53	.41	.29	.67
2500	.86	.56	1.39	.45	.25	.85	.25	.17	.73	.36	.27	.83	.63	.45	1.04
3000	1.24	.81	2.00	.65	.35	1.22	.36	.24	1.05	.52	.39	1.19	.91	.64	1.50
3500	1.69	1.10	2.72	.89	.48	1.66	.49	.33	1.42	.70	.53	1.62	1.24	.88	2.05
4000	2.20	1.44	3.55	1.16	.63	2.17	.64	.42	1.86	.92	.70	2.11	1.62	1.14	2.67

VCD-15, 18, 20, 23

- Galvanized 3V blade
- Economic VCD-15 & VCD-18
- Blade and jamb seals VCD-18 & 23

SEVCD-23

- 316 stainless steel 3V blade
- 316 stainless steel construction
- Blade and jamb seals

Models VCD-20V, 23V



Dimension inches	12x12			24x24			36x36			12x48			48x12		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (fpm)	Pressure Drop in. wg														
500	.04	.02	.06	.02	.01	.03	.01	.01	.03	.03	.02	.04	.01	.01	.03
1000	.14	.09	.22	.07	.04	.14	.04	.03	.12	.10	.07	.17	.06	.04	.13
1500	.31	.20	.50	.16	.09	.31	.09	.06	.26	.23	.16	.38	.13	.10	.30
2000	.55	.36	.89	.29	.16	.54	.16	.11	.46	.41	.29	.67	.23	.17	.53
2500	.86	.56	1.39	.45	.25	.85	.25	.17	.73	.63	.45	1.04	.36	.27	.83
3000	1.24	.81	2.00	.65	.35	1.22	.36	.29	1.05	.91	.64	1.50	.52	.39	1.19
3500	1.69	1.10	2.72	.89	.48	1.66	.49	.33	1.42	1.24	.88	2.05	.70	.53	1.62
4000	2.20	1.44	3.55	1.16	.63	2.17	.64	.42	1.86	1.62	1.14	2.67	.92	.70	2.11

VCD-20V & 23V

- Vertical 3V blade
- Blade and jamb seals VCD-23V



Models VCD-33, 34, & SEVCD-33

Dimension inches	12x12			24x24			36x36			12x48			48x12		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (fpm)	Pressure Drop in. wg														
500	.03	.01	.04	.01	.01	.03	.01	.01	.03	.01	.01	.03	.02	.01	.03
1000	.12	.06	.18	.06	.02	.13	.06	.02	.12	.05	.02	.12	.08	.04	.14
1500	.26	.13	.42	.12	.06	.29	.12	.05	.27	.12	.06	.27	.18	.10	.32
2000	.46	.23	.75	.22	.10	.52	.22	.09	.48	.21	.10	.49	.33	.18	.57
2500	.72	.37	1.17	.34	.16	.81	.34	.14	.75	.33	.16	.77	.51	.29	.89
3000	1.04	.53	1.68	.49	.23	1.17	.49	.21	1.08	.48	.24	1.11	.74	.42	1.28
3500	1.41	.73	2.29	.67	.32	1.60	.67	.29	1.48	.65	.33	1.51	1.0	.57	1.75
4000	1.84	.95	2.99	.87	.42	2.14	.88	.38	1.93	.85	.43	1.97	1.31	.74	2.29

VCD-33 & 34

- Galvanized airfoil blade
- Insulated airfoil VCD-34
- Blade and jamb seals

SEVCD-33

- 316 stainless steel airfoil blade
- 316 stainless steel construction
- Blade and jamb seals

Model VCD-33V

Dimension inches	12x12			24x24			36x36			12x48			48x12		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (fpm)	Pressure Drop in. wg														
500	.03	.01	.04	.01	.01	.03	.01	.01	.03	.02	.01	.03	.01	.01	.03
1000	.12	.06	.18	.06	.02	.13	.06	.02	.12	.08	.04	.14	.05	.02	.12
1500	.26	.13	.42	.12	.06	.29	.12	.05	.27	.18	.10	.32	.12	.06	.27
2000	.46	.23	.75	.22	.10	.52	.22	.09	.48	.33	.18	.57	.21	.10	.49
2500	.72	.37	1.17	.34	.16	.81	.34	.14	.75	.51	.29	.89	.74	.16	.77
3000	1.04	.52	1.68	.49	.23	1.17	.49	.21	1.08	.74	.42	1.28	.48	.24	1.11
3500	1.41	.73	2.29	.67	.32	1.60	.67	.29	1.48	1.0	.57	1.75	.65	.33	1.51
4000	1.84	.95	2.09	.87	.42	2.14	.88	.38	1.93	1.31	.74	2.29	.85	.43	1.97



VCD-33V

- Vertical galvanized airfoil blade
- Blade and jamb seals

Models VCD-40, 42, 43

Dimension inches	12x12			24x24			36x36			12x48			48x12		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (fpm)	Pressure Drop in. wg														
500	.05	.03	.07	.01	.01	.04	.01	.01	.02	.01	.01	.03	.03	.02	.05
1000	.18	.12	.28	.05	.03	.17	.04	.02	.12	.01	.04	.18	.11	.06	.19
1500	.43	.28	.62	.12	.06	.37	.09	.05	.28	.14	.09	.40	.25	.14	.44
2000	.76	.49	1.11	.22	.11	.66	.17	.08	.50	.25	.16	.72	.44	.25	.78
2500	1.19	.77	1.73	.34	.17	1.04	.26	.13	.78	.39	.25	1.12	.69	.39	1.21
3000	1.71	1.11	2.50	.49	.24	1.50	.38	.19	1.13	.57	.36	1.62	1.0	.57	1.75
3500	2.33	1.51	3.41	.66	.33	2.04	.51	.26	1.53	.77	.49	2.21	1.36	.77	2.38
4000	3.04	1.98	4.45	.87	.43	2.66	.67	.34	2.01	1.01	.64	2.88	1.78	1.01	3.11



VCD-40

- Extruded aluminum airfoil blade
 - Blades contained within the frame
 - Blade and jamb seals
- VCD-42 & 43**
- Extruded aluminum airfoil blade
 - Galvanized frame - VCD-42
 - Aluminum frame - VCD-43
 - Blade and jamb seals

Models VCD-42V, 43V

Dimension inches	12x12			24x24			36x36			12x48			48x12		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (fpm)	Pressure Drop in. wg														
500	.05	.03	.07	.01	.01	.04	.01	.01	.02	.03	.02	.05	.01	.01	.03
1000	.18	.12	.28	.05	.03	.17	.04	.02	.12	.11	.06	.19	.01	.04	.18
1500	.43	.28	.62	.12	.06	.37	.09	.05	.28	.25	.14	.44	.14	.09	.40
2000	.76	.49	1.11	.22	.11	.66	.17	.08	.50	.44	.25	.78	.25	.16	.72
2500	1.19	.77	1.73	.34	.17	1.04	.26	.13	.78	.69	.39	1.21	.39	.25	1.12
3000	1.71	1.11	2.50	.49	.24	1.50	.38	.19	1.13	1.0	.57	1.75	.57	.36	1.62
3500	2.33	1.51	3.41	.66	.33	2.04	.51	.26	1.53	1.36	.77	2.38	.77	.49	2.21
4000	3.04	1.98	4.45	.87	.43	2.66	.67	.34	2.01	1.78	1.01	3.11	1.04	.64	2.88



VCD-42V, 43V

- Vertical extruded aluminum airfoil blade
- Blade and jamb seals

Volume Control Dampers Quick Selection Chart



X=standard O=optional		VCD-15	VCD-18	VCD-20	VCD-20V	VCD-23	VCD-23V	VCD-33	VCD-33V	VCD-34	VCD-40
Blade Profile	Single Blade										
	3V	X	X	X		X					
	3V-Vertical Blade				X		X				
	Airfoil							X			X
	Airfoil-Vertical Blade								X		
	Airfoil-Insulated									X	
Frame Material	Galvanized	X	X	X	X	X	X	X	X	X	
	304 Stainless Steel			O	O	O	O	O	O	O	
	316 Stainless Steel										
	Aluminum			O	O	O	O				X
Blade Material	Galvanized	X	X	X	X	X	X	X	X	X	
	304 Stainless Steel			O	O	O	O	O	O	O	
	316 Stainless Steel										
	Aluminum			O	O	O	O				X
Frame Gauge (in mm)	20 (1.0)										
	16 (1.5)	X	X	X	X	X	X	X	X	X	
	14 (2)			O	O	O	O	O	O	O	
	12 (2.8)			O	O	O	O	O	O	O	.125 (3.2)
Blade Seals	Vinyl		X			X	X				
	Silicone					O	O	X	X	X	X
Jamb Seals	304 Stainless Steel		X			X	X	X	X	X	X
	316 Stainless Steel										
Bearings	Synthetic	X	X	X	X	X	X	X	X	X	X
	Bronze	O	O	O	O	O	O	O	O	O	O
	304 Stainless Steel	O	O	O	O	O	O	O	O	O	O
	316 Stainless Steel										
Axles	Steel	X	X	X	X	X	X	X	X	X	X
	304 Stainless Steel			O	O	O	O	O	O	O	O
	316 Stainless Steel										
Linkage Material	Steel	X	X	X	X	X	X	X	X	X	X
	304 Stainless Steel			O	O	O	O	O	O	O	O
	316 Stainless Steel										
Accessories	Sleeves	O	O	O	O	O	O	O	O	O	
	Transitions	O	O	O	O	O	O	O	O	O	
	Actuators*	O	O	O	O	O	O	O	O	O	O
	Flanges**	O	O	O	O	O	O	O	O	O	O
	Retaining Angles	O	O	O	O	O	O	O	O	O	
	Security Bars	O	O	O	O	O	O	O	O	O	
Paint Finishes	Baked Enamel			O	O	O	O	O***	O***	O***	O***
	Epoxy			O	O	O	O	O***	O***		O***
	Hi Pro Polyester			O	O	O	O	O***	O***		O***
Sizing inches (mm)	Minimum Size	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)
	Maximum Single Section Size	48x60 (1219x1524)	48x60 (1219x1524)	48x74 (1219x1880)	74x48 (1880x1219)	48x74 (1219x1880)	74x48 (1880x1219)	60x74 (1524x1880)	74x60 (1880x1524)	60x74 (1524x1880)	60x74 (1524x1880)
	Maximum Multi Section Size	84x60 (2134x1524)	84x60 (2134x1524)	Unlimited	NA	Unlimited	NA	Unlimited	NA	Unlimited	Unlimited

* Actuators include manual, 24V, 120V, 240V, and pneumatic.
 ** Flanges include single, single reverse, and double flange.
 *** On airfoil blade dampers, the inside of the blade is not painted.

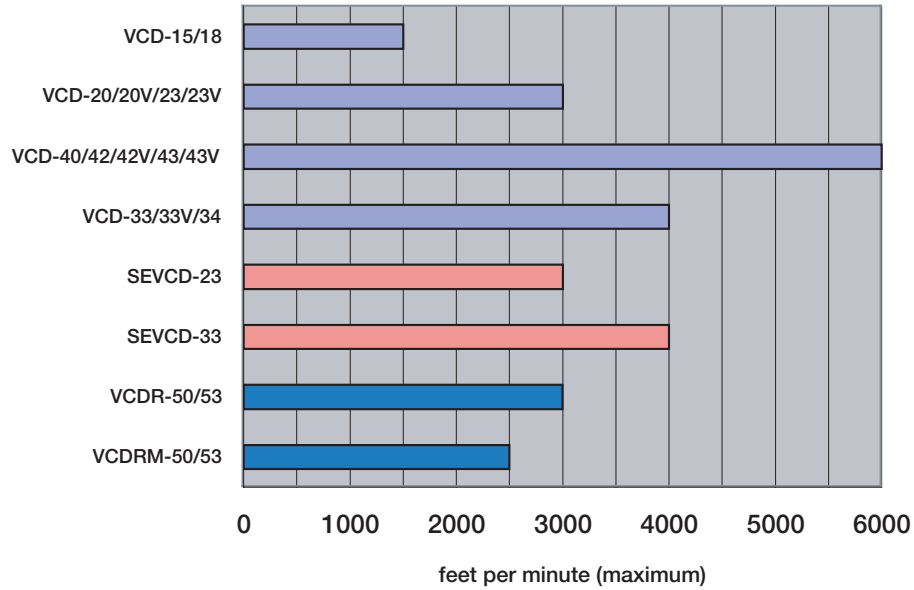
X=standard O=optional		VCD-42	VCD-42V	VCD-43	VCD-43V	SEVCD-23	SEVCD-33	VCDR-50	VCDR-53	VCDRM-50	VCDRM-53
Blade Profile	Single Blade							X	X		
	3V					X				X	X
	3V-Vertical Blade										
	Airfoil	X		X			X				
	Airfoil-Vertical Blade		X		X						
	Airfoil-Insulated										
Frame Material	Galvanized	X	X					X	X	X	X
	304 Stainless Steel							O	O	O	O
	316 Stainless Steel					X	X				
	Aluminum			X	X						
Blade Material	Galvanized							X	X	X	X
	304 Stainless Steel							O	O	O	O
	316 Stainless Steel					X	X				
	Aluminum	X	X	X	X						
Frame Gauge (in mm)	20 (1.0)							X	X		
	16 (1.5)	X	X			X	X				
	14 (2)	O	O							X	X
	12 (2.8)	O	O	.125 (3.2)	.125 (3.2)					.125 (3.2)	.125 (3.2)
Blade Seals	Vinyl					X					X
	Silicone	X	X	X	X	O	X		X		
Jamb Seals	304 Stainless Steel	X	X	X	X						X
	316 Stainless Steel					X	X				
Bearings	Synthetic	X	X	X	X						
	Bronze	O	O	O	O					X	X
	304 Stainless Steel	O	O	O	O			X	X	O	O
	316 Stainless Steel					X	X				
Axles	Steel	X	X	X	X			X	X	X	X
	304 Stainless Steel	O	O	O	O			O	O	O	O
	316 Stainless Steel					X	X				
Linkage Material	Steel	X	X	X	X					X	X
	304 Stainless Steel	O	O	O	O					O	O
	316 Stainless Steel					X	X				
Accessories	Sleeves	O	O			O	O				
	Transitions	O	O			O	O				
	Actuators*	O	O	O	O	O	O	O	O	O	O
	Flanges**	O	O	O	O	O	O				
	Retaining Angles	O	O			O	O				
	Security Bars	O	O			O	O				
Paint Finishes	Baked Enamel	O***	O***	O***	O***			O	O		
	Epoxy	O***	O***	O***	O***			O	O		
	Hi Pro Polyester	O***	O***	O***	O***			O	O		
Sizing inches (mm)	Minimum Size	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	6x6 (152x152)	5 (127)	5 (127)	10 (254)	10 (254)
	Maximum Single Section Size	60x74 (1524x1880)	74x60 (1880x1524)	60x74 (1524x1880)	74x60 (1880x1524)	48x74 (1219x1880)	60x74 (1524x1880)	24 (610)	24 (610)	36 (914)	36 (914)
	Maximum Multi Section Size	Unlimited	NA	Unlimited	NA	Unlimited	Unlimited	NA	NA	NA	NA

* Actuators include manual, 24V, 120V, 240V, and pneumatic.

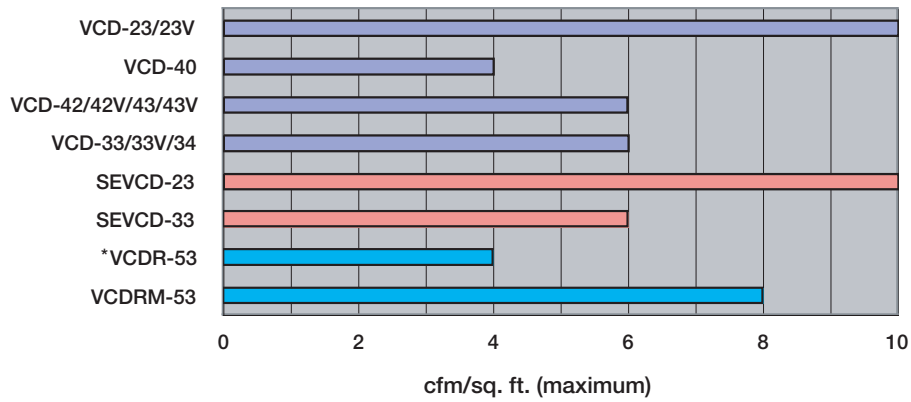
** Flanges include single, single reverse, and double flange.

*** On airfoil blade dampers, the inside of the blade is not painted.

Velocity

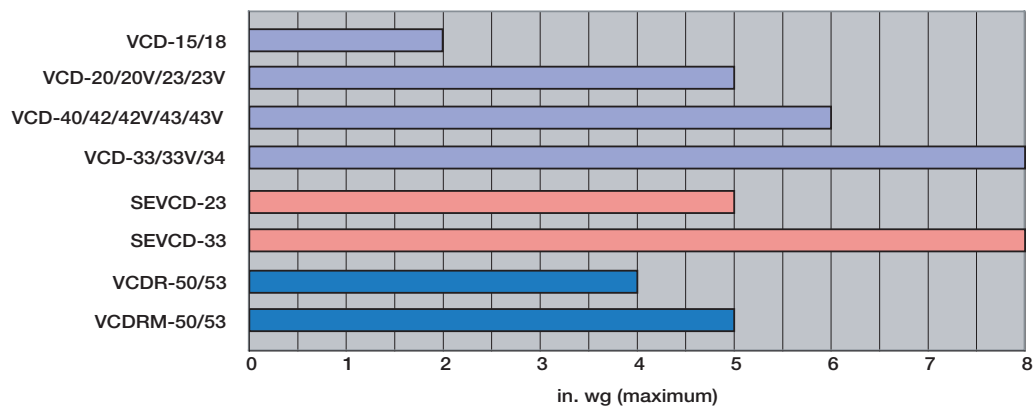


Leakage



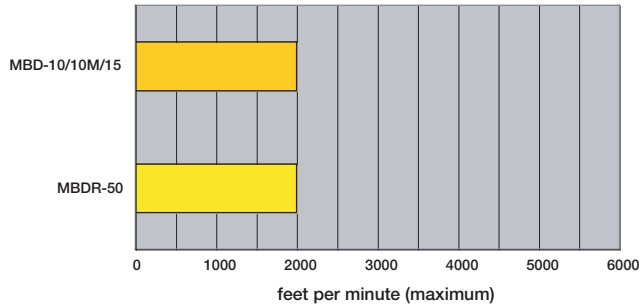
Leakage rating based on 4 in. wg.
 *VCDR-53 is based on 1 in. wg.

Pressure

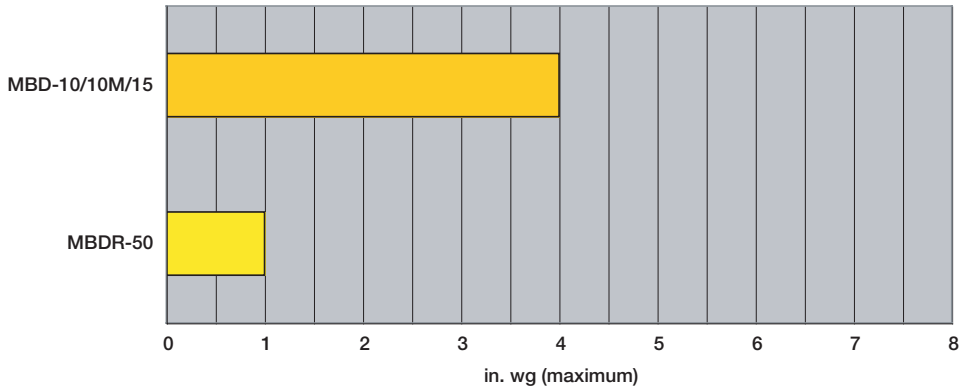


Manual balancing dampers are designed to regulate flow of air in a HVAC system. Manual balancing dampers are not intended to be used in applications for positive shut off or for automatic control.

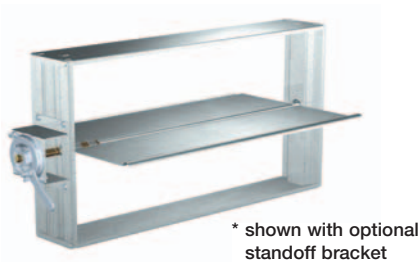
Velocity



Pressure



X=standard O=optional	Blade Profile		Material	Frame Gauge (in mm)			Bearings		Axles	Linkage Material	Actuator		Sizing inches (mm)		
	Single Blade	3V		20 (1.0)	18 (1.3)	16 (1.5)	Synthetic	Bronze			Steel	Steel	Manual Quadrant	1 1/2 in. Standoff Bracket	Maximum Multi-section Size
MBD-10	X		X		X						X	O	NA	36x12 (914x305)	6x4 (152x102)
MBD-10M	X		X		X						X	O	NA	36x12 (914x305)	8x4 (203x102)
MBD-15		X	X			X	X	O	X	X	X	X	96x96 (2438x2438)	48x60 (1219x1524)	6x6 (152x152)
MBDR-50	X		X	X			X		X		X	O	NA	24 (610)	5 (127)



MBD-10

- Single Blade



MBD-15

- Multi-blade
- Meets SMACNA recommended construction requirements



MBDR-50

- Round Blade

IAQ-42 — Air Flow Measuring Control Damper

Greenheck's IAQ-42 is an air measuring control damper that utilizes patented Speciflow™ technology. The IAQ-42 will control air to prevent:

- Over ventilation
- Provide energy savings during low occupancy periods
- Under ventilation

The Speciflow™ technology built into the controller measures the pressure, position of the damper blades, and temperature of the air flowing through the damper.

The IAQ-42 can help buildings meet the indoor/outdoor air requirements of ASHRAE Standard 62 or California Title 24 by providing accurate monitoring and control of outside air. You can earn LEED-EB credits for air monitoring, increased ventilation, and ultra low leakage.

The IAQ-42 is provided with a factory supplied honeycomb air straightener (4 or 6 in. louver is optional), 24 Vac modulating actuator, air pressure pickups mounted on the damper blades, temperature sensors to allow the controller to correct airflow rate, and factory calibrated controller (without controller is optional).



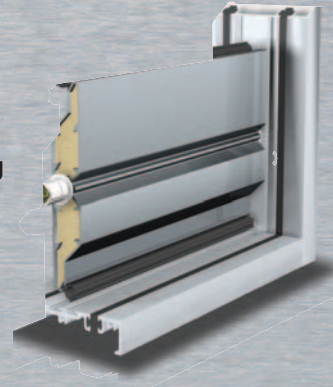
ICD — Insulated Control Damper

Greenheck's ICD series of dampers was developed for applications where it is necessary to minimize the transfer of heat or cold penetration and reduce condensation. ICD series dampers can be used in applications down to -70°F for:

- Cold food storage warehouses
- Buildings/warehouse
- Rooftop intake or exhaust

The ICD-45 features:

- Insulated thermally broken hat channel frame which provides an insulating barrier from the ductwork
- Insulated thermally broken airfoil shaped blades that separates the outside air from the inside of the ductwork
- Silicone blade and jamb seals provide superior leakage protection
- Dual bearing construction features no metal-to-metal or metal-to-plastic contact
- AMCA certified performance and
- Meets AMCA Class 1A leakage of less than 3 cfm/sq. ft. @ 1 in. wg.



Our Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid. 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.

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

