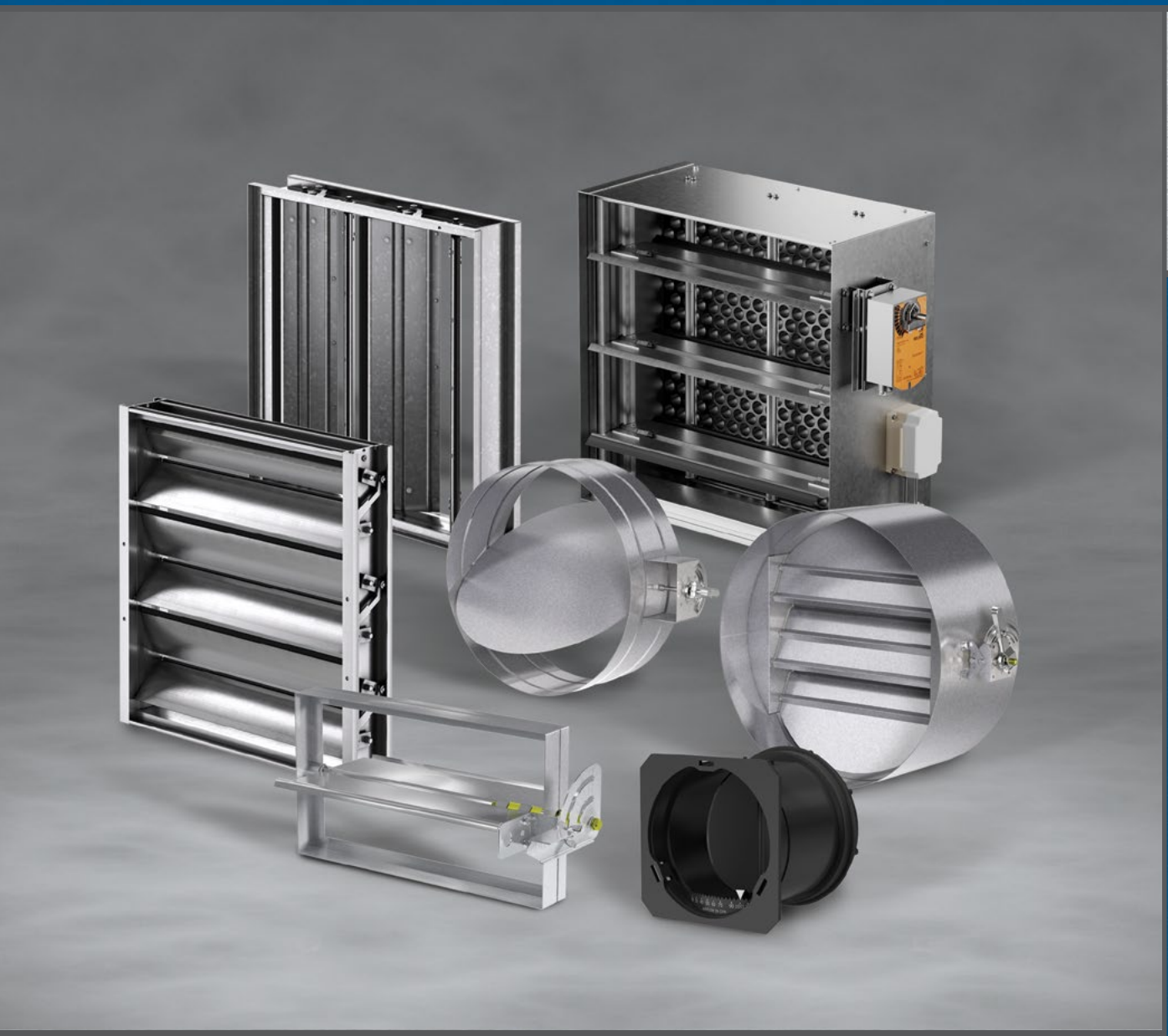
# HVAC Control & Balancing Dampers

• Control • Air Measuring • Balancing



GREENHECK®

*Building Value in Air.*

December
2025

# Control Dampers

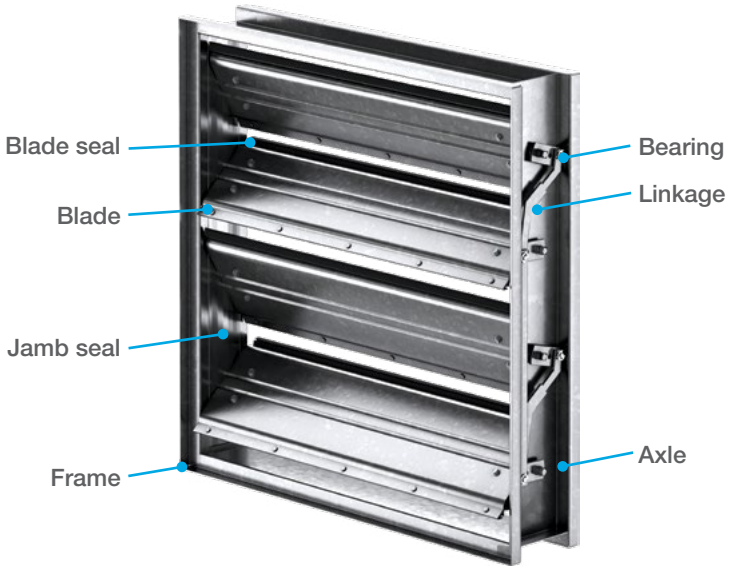
Commercial Control Dampers are used in buildings to regulate the flow of air in an HVAC system. They can be used in intake, exhaust, or mixed air applications.

There are three categories of control dampers:


**Control** pg 2- 9

**Air Measuring** pg 10-11

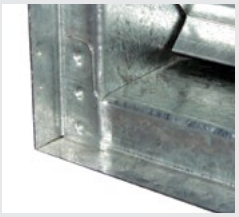
**Balancing** pg 12-17


## Frame - Tog-L-Loc® Advantage

Greenheck control dampers utilize a 5 in. x 1 in. (127 mm x 25 mm) hat channel frame. Each frame is built with four separate pieces of material and joined by our Tog-L-Loc® process. The Tog-L-Loc process provides a more rigid frame that resists "racking" better than welded construction.

Tog-L-Loc®
Reinforced Corner



## Maximize Performance - Low Profile Frame

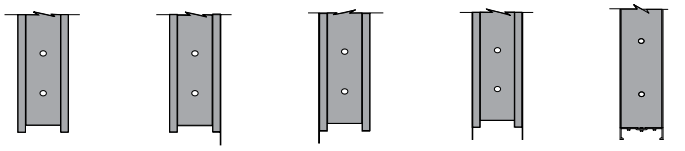
On dampers that are 17 in. (432 mm) high or less, Greenheck uses a low profile top and bottom frame section to maximize free area which allows for lower pressure drop and increases damper performance.




## Frame Options

There are five frame options available:

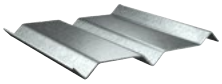
- Channel (standard) - allows damper to be insert mounted into an opening or duct
- Single flange or single reversed flange - can be insert mounted or directly mounted to the wall or mating surfaces such as a plenum wall
- Double flange - allows damper to be mounted on both sides directly to wall or duct
- Quick connect (VCD-43, -43V; ICD series) - designed to match up to a TDC, TDF, or Ductmate connection



**Channel Frame** | **Single Flange** (actuator side) | **Single Reverse Flange** (opposite actuator) | **Double Flange** | **Quick Connect**

**LEARN MORE**
Frame Options

## Blades



3V

- Fabricated from single thickness galvanized steel or stainless steel
- Three V-type grooves running the full length of the blade to increase strength
- Low to medium velocity and pressure applications



Steel Airfoil

- Constructed of double-skin galvanized steel or stainless steel
- Airfoil blade results in lower resistance to airflow and increased strength
- High velocity and pressure applications



Aluminum Airfoil

- Constructed of heavy-gauge extruded aluminum
- This blade design results in lower resistance to airflow and increased strength
- High velocity and pressure applications

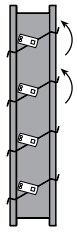


ICD

- Extruded aluminum airfoil blades with thermal breaks and insulated with polyurethane foam
- Used in harsh environments/high temperature differentials

## Parallel Versus Opposed Blade Operation

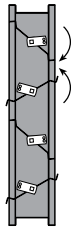
Greenheck control dampers are offered with either parallel or opposed blades. Each style has distinguishing characteristics in regard to the type of operation required.



Parallel Blades

### Parallel blade operation

This configuration requires the damper blades to rotate in the same direction, parallel to one another. Parallel blade orientation is typically used when the damper operates in two positions, open or closed.



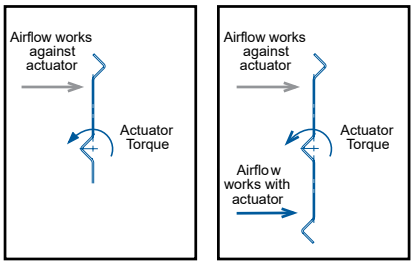
Opposed Blades

### Opposed blade operation

Adjacent damper blades rotate opposite one another under opposed blade configuration. Opposed blade configuration is typically used on dampers that modulate airflow.

## Variable Symmetric Blade Design (VSB) - a Greenheck Exclusive!

- Blades are symmetric about their axis
- Combination of 4, 5, 6, and 7 in. (102, 127, 152, and 178 mm) blade widths are used in a single damper
- Reduces the need for closure strips which optimize pressure drop performance
- Damper is bidirectional airflow rated
- Extensive testing has shown that utilizing various blade sizes will reduce the required actuator torque, which leads to reduction in the size and quantity of actuators needed to operate a damper. This ultimately results in lower initial costs for the building owner, as well as a reduction in ongoing electrical power consumption.




Unbalanced Blade Requires Higher Torque

Balanced Blade Requires Less Torque

## Seals

Seals are used for low leakage applications.

- **Blade seals:** Thermoplastic Elastomer (TPE) is standard. For extreme temperatures, select silicone seals.
- **Sweep seals:** Sweep seals are used on bottom of damper blades to eliminate the use of closure strips (size dependent).
- **Jamb seals:** Jamb seals are constructed of 304SS jamb seal to help reduce leakage along the blade ends. The ICD series have silicone jamb seals available for cold temperature applications.



## Linkage

Greenheck control dampers have blade linkages concealed in the frame to prevent additional pressure drop and unwanted noise. The linkage is engineered to accurately control each and every blade without need for adjustment.




## Bearings

Synthetic - Standard on VCD series and ICD-44

304SS - Optional, used for extreme temperatures or environment

316SS - Used on SEVCD series

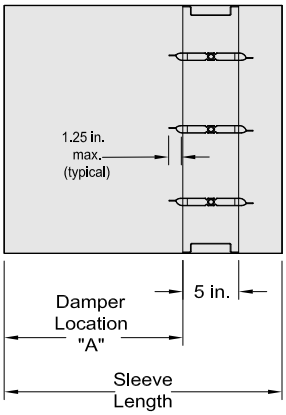
The ICD-45 uses a dual bearing with inner sleeve and flanged outer bearing that features no metal-to-metal or metal-to-plastic contact.




# Options and Accessories

## Factory Sleeve Option

Greenheck control dampers are available with factory-furnished sleeves in lengths up to 48 in. (1219 mm). When dampers are installed in factory sleeves, the “A” dimension specifies the location of the damper within the sleeve.



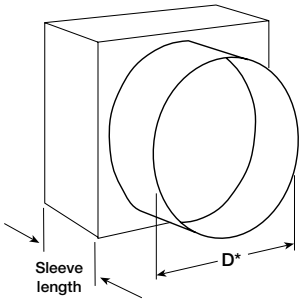

## Open Closed Indicator—OCI

The OCI provides positive open and closed signals when used in conjunction with remote indicator lights. Switches are physically linked to a damper blade and therefore give a true representation of the damper’s position.



## Round Transition

Greenheck control dampers can be supplied with a round transition option in applications where dampers require installation into round openings. The sleeve is transitioned at each end to the appropriate round size.




## Paint Finishes

A wide variety of paint finishes are available on ICD-44, ICD-45, VCD-40, VCD-43 and VCD-43V.

LEARN MORE

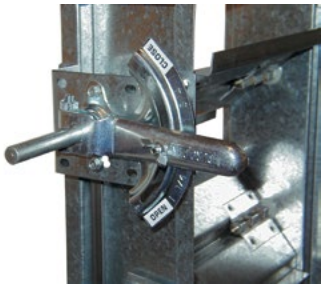
Damper Coatings



Actuators may be installed at the factory or shipped loose with the necessary linkage and brackets required for mounting. Actuators are tested after installation on the damper for proper operation.

## Manual Quadrant

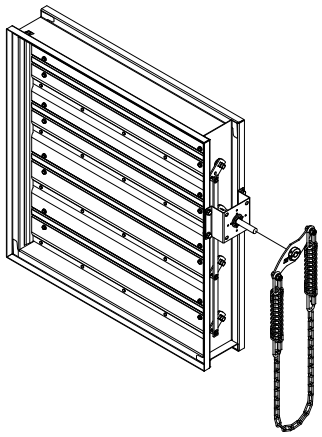
✓ **Location**
- Internal or External



Manual Quadrant

## Pull Chain

✓ **Location**
- Internal or External
- 20 foot loop



Pull Chain

## Electric Actuator Checklist

✓ **Power Supply**
- 24VDC, 24VAC, 120VAC, 240VAC

✓ **Operation**
- Spring Return: spring will drive damper to original starting point
- Power Open or Power Closed

✓ **Operating Mode**
- Two-position: damper position is open or closed
- Modulating: damper position determined by modulating control signal
- Floating: damper rotation can be stopped anywhere between open or closed

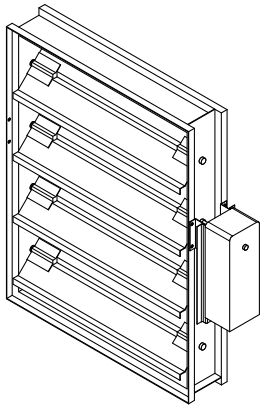
✓ **Fail Direction** (for signal return only)
- Open or Closed

✓ **Location**
- Internal or External

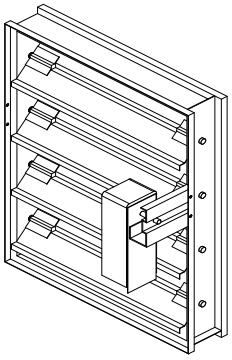
✓ **Control Signal** (for modulating only)
- 0-10 VDC, 2-10 VDC, or 4-20 mA DC

✓ **NEMA Enclosure**
- 1, 3, 4, 4X, or 7 (specify one per application)

✓ **Accessories**
- Auxiliary Switches
- Transformers



Electric - External Mount



Electric - Internal Mount

# Control Dampers
## Quick Selection Chart

GREENHECK
Building Value in Air.

| | | ICD-44 | ICD-45 | VCD-20 | VCD-23 | VCD-23V | VCD-33 | VCD-33V | VCD-34 | VCD-34V |
|---|---|---|---|---|---|---|---|---|---|---|
| Blade Profile | 3V | | | • | • | | | | | |
| | 3V-Vertical Blade | | | | | • | | | | |
| | Airfoil | | | | | | • | | | |
| | Airfoil-Vertical Blade | | | | | | | • | | |
| | Airfoil-Insulated | | | | | | | | • | |
| | Airfoil - Insulated Vertical Blade | | | | | | | | | • |
| | Insulated Thermally Broken Airfoil | • | • | | | | | | | |
| Frame Material | Galvanized | | | • | • | • | • | • | • | • |
| | 304 Stainless Steel | | | O | O | O | O | O | O | O |
| | Aluminum | • | | | | | | | | |
| | Insulated Thermally Broken Aluminum | | • | | | | | | | |
| Blade Material | Galvanized | | | • | • | • | • | • | • | • |
| | 304 Stainless Steel | | | O | O | O | O | O | O | O |
| | Aluminum | • | • | | | | | | | |
| Frame Gauge | 16 | | | • | • | • | • | • | • | • |
| | 12 | | | O | O | O | O | O | O | O |
| | Aluminum | .125 (3 mm) | | | | | | | | |
| Blade Seals | TPE | | | | • | • | • | • | • | • |
| | Silicone | • | • | | O | O | O | O | O | O |
| Jamb Seals | Stainless Steel | • | | | • | • | • | • | • | • |
| | Silicone | O | • | | | | | | | |
| Bearings | Synthetic | | | • | • | • | • | • | • | • |
| | 316 Stainless Steel | | | O | O | O | O | O | O | O |
| | Dual Bearing with Acetal Inner Sleeve | • | • | | | | | | | |
| Axles | Steel | • | • | • | • | • | • | • | • | • |
| | 316 Stainless Steel | O | O | O | O | O | O | O | O | O |
| Linkage Material | Steel | • | • | • | • | • | • | • | • | • |
| | 316 Stainless Steel | O | O | O | O | O | O | O | O | O |
| Accessories | Sleeves | | | O | O | O | O | O | O | O |
| | Transitions | | | O | O | O | O | O | O | O |
| | Actuators* | O | O | O | O | O | O | O | O | O |
| | Flanges** | O | O | O | O | O | O | O | O | O |
| | Retaining Angles | | | O | O | O | O | O | O | O |
| Sizing inches (mm) | Minimum Size | 8 x 7 (203 x 178) | 8 x 7 (203 x 178) | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) |
| | Maximum Single Section Size | 60 x 78 (1524 x 1981) | 60 x 78 (1524 x 1981) | 48 x 74 (1219 x 1880) | 48 x 74 (1219 x 1880) | 74 x 48 (1880 x 1219) | 60 x 74 (1524 x 1880) | 74 x 60 (1880 x 1524) | 60 x 74 (1524 x 1880) | 60 x 74 (1524 x 1880) |
| | Maximum Multi-Section Size | 180 x 156 (4572 x 3962) | 180 x 156 (4572 x 3962) | Unlimited | Unlimited | 148 x 96 (3759 x 2438) | Unlimited | 148 x 120 (3759 x 3048) | Unlimited | 148 x 120 (3759 x 3048) |
| Ratings | Max. Velocity ft/min. (m/s) | 4000 (20.3) | 4000 (20.3) | 3000 (15.2) | 3000 (15.2) | 3000 (15.2) | 4000 (20.3) | 4000 (20.3) | 4000 (20.3) | 4000 (20.3) |
| | Max. Pressure in. wg (kPa) | 8 (2) | 8 (2) | 5 (1.2) | 5 (1.2) | 5 (1.2) | 8 (2) | 8 (2) | 8 (2) | 8(2) |

*Actuators include manual, 24V, 120V, and 240V.
**Flanges include single, single reversed, and double flange.

• = Standard, O= Optional

On ICD-44 and ICD-45, sizing is shown for channel frame. When sizing quick connect frame, see www.greenheck.com

# Control Dampers
## Quick Selection Chart

GREENHECK
Building Value in Air.

| | | VCD-40 | VCD-42 | VCD-43 | VCD-43V | SEVCD-23 | SEVCD-33 | VCDR-50 | VCDR-53 | VCDRM-53 |
|---|---|---|---|---|---|---|---|---|---|---|
| Blade Profile | Single Blade | | | | | | | • | • | |
| | 3V | | | | | • | | | | • |
| | Airfoil | • | • | • | | | • | | | |
| | Airfoil-Vertical Blade | | | | • | | | | | |
| Frame Material | Galvanized | | • | | | | | • | • | • |
| | 304 Stainless Steel | | | | | | | O | O | O |
| | 316 Stainless Steel | | | | | • | • | | | |
| | Aluminum | • | | • | • | | | | | |
| Blade Material | Galvanized | | | | | | | • | • | • |
| | 304 Stainless Steel | | | | | | | O | O | O |
| | 316 Stainless Steel | | | | | • | • | | | |
| | Aluminum | • | • | • | • | | | | | |
| Frame Gauge | 20 | | | | | | | • | • | |
| | 16 | | • | | | • | • | O | O | |
| | 14 | | | | | | | | | • |
| | 12 | | O | | | | | | | |
| | 10 | | | | | | | | | O |
| | Aluminum | .125 (3.2) | | .125 (3.2) | .125 (3.2) | | | | | |
| Blade Seals | EPDM | | | | | | | | | Vinyl |
| | TPE | • | • | • | • | • | • | | | |
| | Silicone | O | O | O | O | O | O | | • | |
| Jamb Seals | Stainless Steel | • | • | • | • | | | | | • |
| | 316 Stainless Steel | | | | | • | • | | | |
| Bearings | Synthetic | • | • | • | • | | | | | |
| | Bronze | | | | | | | • | • | |
| | 316 Stainless Steel | O | O | O | O | • | • | O | O | |
| Axles | Steel | • | • | • | • | | | • | • | • |
| | 316 Stainless Steel | O | O | O | O | • | • | O | O | |
| Linkage Material | Steel | • | • | • | • | | | | | • |
| | 316 Stainless Steel | O | O | O | O | • | • | | | O |
| Accessories | Sleeves | | O | | | | | | | |
| | Transitions | | O | | | | | | | |
| | Actuators* | 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 | | | | | | | |
| Sizing inches (mm) | Minimum Size | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) | 6 x 6 (152 x 152) | 4 (102) | 4 (102) | 10 (254) |
| | Maximum Single Section Size | 60 x 74 (1524 x 1880) | 60 x 74 (1524 x 1880) | 60 x 78 (1524 x 1981) | 78 x 60 (1981 x 1524) | 48 x 74 (1219 x 1880) | 60 x 74 (1524 x 1880) | 24 (610) | 24 (610) | 48 (1219) |
| | Maximum Multi-Section Size | Unlimited | Unlimited | 288 x 234 (7315 x 5944) | 156 x 120 (3962 x 3048) | Unlimited | Unlimited | NA | NA | NA |
| Ratings | Max. Velocity ft/min. (m/s) | 6000 (30.5) | 6000 (30.5) | 6000 (30.5) | 6000 (30.5) | 3000 (15.2) | 4000 (20.3) | 3000 (15.2) | 3000 (15.2) | 2500 (12.7) |
| | Max. Pressure in. wg (kPa) | 6 (1.5) | 6 (1.5) | 8 (2) | 8 (2) | 5 (1.2) | 8 (2) | 4 (1) | 4 (1) | 5 (1.2) |

*Actuators include manual, 24V, 120V, and 240V.
**Flanges include single, single reversed, and double flange.

• = Standard, O= Optional

## Face & Bypass Damper

The face and bypass dampers are used in applications where two dampers are connected together allowing one damper to open while the other damper closes. The FBV-23 is a vertical style face and bypass damper with 3V blades.



FBV-23

| | | FBV-23 |
|---|---|---|
| Material | Galvanized | • |
| Blade Seals | TPE | • |
| | Silicone | O |
| Bearings | Synthetic | • |
| | 316 Stainless Steel | O |
| Axles | Steel | • |
| | 316 Stainless Steel | O |
| Linkage Material | Steel | • |
| | 316 Stainless Steel | O |
| Sizing inches (mm) | Minimum Size | 8 x 6 (203 x 152) |
| | Maximum Single Section Size | 48 x 74 (1219 x 1880) |
| | Maximum Multiple Section Size (Face Only) | 96 x 74 (2438 x 1880) |
| Ratings | Max. Velocity ft/min. (m/s) | 3000 (15.2) |
| | Max. Pressure in. wg (kPa) | 5 (1.2) |

• = Standard, O= Optional

## ICD - Insulated Control Damper

Greenheck's ICD dampers were developed for applications where it is necessary to minimize thermal transfer and reduce condensation. ICD series dampers can be used in applications down to -70°F (-56°C) and up to 200°F (93°C) for:

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



Cross section of thermally broken frame and blade

## AMCA Certified Energy Efficiency Performance

**Greenheck Model ICD-44 has a Thermal Efficiency Ratio of 593%.**
**Greenheck Model ICD-45 has a Thermal Efficiency Ratio of 941%.**

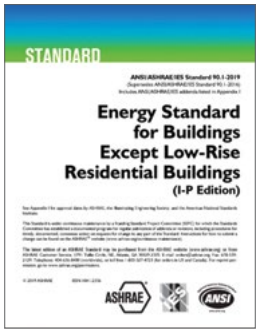
A damper's Thermal Efficiency Ratio (E) is a comparison of the thermal performance of the tested damper with that of a standard reference damper, which is a 3V blade damper with blade and jamb seals. A damper with the same thermal efficiency as the reference damper would have an E of 0%. A damper that is twice as efficient as the reference damper would have an E of 100%.

# Energy Codes and Revit®

Three common energy code standards that pertain to dampers are:

## ASHRAE 90.1

Energy Standard for Buildings except Low-Rise Residential Buildings




**(2019 edition)** states that maximum damper leakage at 1 in. wg for a:

- non-motorized damper is 20 cfm/ft$^2$ or
- motorized damper is 4 cfm/ft$^2$ (see Table 6.4.3.4.3 from ASHRAE Standard 90.1)

## California Title 24




**(2021 edition, section 140.4.4)** states that the dampers shall be certified in accordance with AMCA Publication 511 to have a maximum leakage of 10 cfm/ft$^2$ at 1 in. wg. The dampers have been tested and are able to open and close against the rated airflow and pressure of the system after 60,000 damper opening and closing cycles.

## IECC®

International Energy Conservation Code

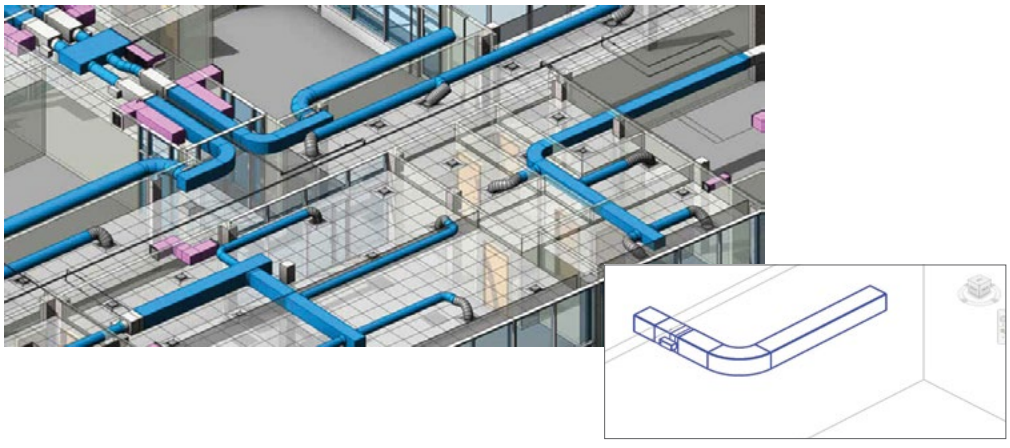



IECC (2021, section C403.7.7) states that the outdoor air supply and exhaust opening be supplied with Class 1A motorized dampers with a maximum leakage rate of 4 cfm/ft$^2$ at 1 in. wg when tested in accordance with AMCA 500D.

**Greenheck's volume control dampers meet the requirements of ASHRAE, California Title 24, and IECC.**

## Revit®

The latest edition of ASHRAE 90.1 mandates specific fan power limits based on CFM. By using Greenheck's Revit models with the most accurate and lowest certified pressure loss performance in the industry, engineers can analyze their designs to minimize system effects. Contact your local Greenheck representative to calculate the actual pressure loss based on your CFM or velocity.



## Differential Pressure Products

### How do differential pressure-based airflow measuring products work?

Differential pressure-based airflow measuring products use an array of air pressure pick-ups to compare the total pressure going through the airflow station with the static pressure in the station. The design of the pressure pick-up assembly amplifies the difference between these two pressures. The resulting differential pressure is an amplified "velocity pressure" which is proportional to the velocity going through the flow station.

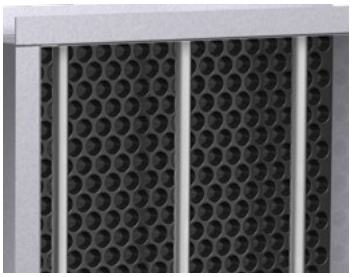
Airflow volume is then calculated using the formula:

$$Q = Area * K * P^{m}$$

- Q = airflow (CFM)
- Area = the face area of the damper
- K = a damper-specific flow coefficient that is provided with the unit
- P = amplified velocity pressure measured by the supplied pressure transducer
- m = a damper-specific exponent that is provided with the unit



Transducer


Pressure Pick-Up Tubes

## AMS - Airflow Measuring Station

The AMS is an accurate airflow measuring station furnished with a properly sized pressure transducer that outputs a 0-10 VDC signal proportional to the pressure. The pressure signal from the transducer can then be converted to CFM using the flow formula supplied with the unit.

A field-supplied or factory-supplied controller (see controls section) can position a damper's actuator to deliver a target CFM set point. An output from the controller can also communicate the measured airflow rate to a building management system, which can use that signal to regulate a fan's Variable Frequency Drive (VFD) or signal an under-ventilation alarm.

## AMD - Airflow Measuring Dampers

The AMD series combines the functionality of an accurate airflow measuring station and a low leakage control damper into one compact assembly that both measures and controls airflow volume to a target set point.

Available with 3V, steel airfoil or extruded airfoil blades, these models come standard with a modulating actuator and a properly sized pressure transducer that outputs a signal proportional to pressure. The pressure signal from the transducer can then be converted to CFM using the flow formula supplied with the unit.

A field-supplied or factory-supplied controller (see controls section) can position the damper's actuator to deliver a target CFM set point. An output from the controller can also communicate the measured airflow rate to a building management system, which can use that signal to regulate a fan's VFD or signal an under-ventilation alarm.


AMS


AMD-23


AMD-33


AMD-42V

## Factory-Supplied Controls

By adding a factory-supplied controller, the AMD series airflow measuring dampers become a turnkey solution for measuring and controlling the flow of air. A factory-supplied controller can also be added to an AMS airflow measuring station to convert the signal from the pressure transducer to CFM. The CFM signal can then be used to control a field-supplied damper, regulate a fan's VFD, or signal an under-ventilation alarm. Go to **www.greenheck.com** for complete instructions on this controller.

## Constant Volume Controller




Greenheck's Constant Volume Controller is a highly configurable analog-based controller. The controller can accept a CFM set point either remotely by way of an analog input or locally by using touch sensitive buttons on its cover. The controller then regulates the position of the AMD's actuator to deliver the requested CFM. An analog output on the controller also supplies a signal that is proportional to the real-time CFM.

The Constant Volume Controller features a two-line backlit LCD display to show the user the current CFM set point, the real-time CFM, the current pressure reading, and the AMD's actuator position.

| | | AMS | AMD-23 | AMD-33<br>AMD-42 | AMD-42V |
|---|---|---|---|---|---|
| Velocity Range ft/min (m/s) | Minimum | 300 (1.5) | 300 (1.5) | 300 (1.5) | 300 (1.5) |
| | Maximum | 3000 (15.2) | 2000 (10.2) | 3000 (10.2) | 3000 (15.2) |
| Accuracy | | 5% | 5% | 5% | 5% |
| Temperature Range °F (°C) | Minimum | -20° (-29°) | -20° (-29°) | -20° (-29°) | -20° (-29°) |
| | Maximum | 180° (82°) | 180° (82°) | 180° (82°) | 180° (82°) |
| Factory-Supplied Transducer | | • | • | • | • |
| Factory-Supplied Controller | | O | O | O | O |
| Airflow Straightener | | • | • | • | • |
| Blade Operation | | - | Parallel | Parallel | Parallel |
| Blade Orientation | | - | Horizontal | Horizontal | Vertical |
| Minimum Unit Depth inches (mm) | | 8 (203) | 12 (305) | 12 (305) | 12 (305) |
| Minimum Size - inches (mm) | | 6 x 6 (152 x 152) | | | |
| Maximum Size - inches (mm) | | 60 x 72 (1524 x 1829) | 144 x 148 (3658 x 3759) | 144 x 148 (3658 x 3759) | 74 x 48 (1880 x 1219) |
| Quick Build Program Available | | • | • | • | • |

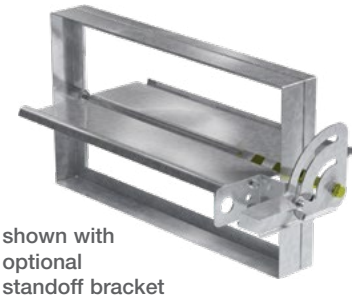
• = Standard, O= Optional

**LEARN MORE**
Air Measuring Station

**LEARN MORE**
Air Measuring Products

Manual balancing dampers are control dampers that regulate the flow of air but are not intended to be used in applications as a positive shut-off or for automatic control. These dampers are shipped with manual hand quadrants that can be locked in place.

There are three balancing damper models available.



* shown with optional standoff bracket





### MBD-10

- Single blade
- Manual quadrant shipped as a kit for field installation

### MBD-15

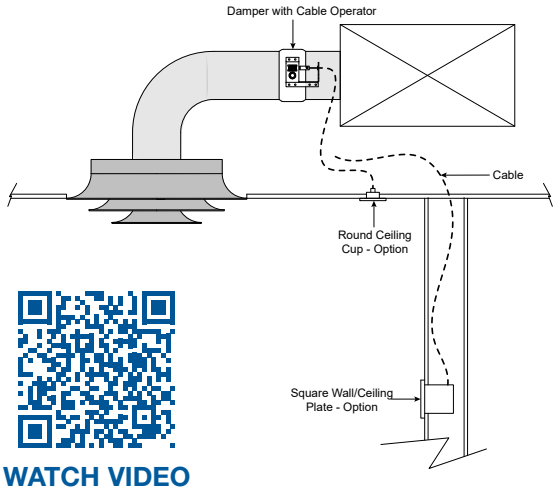
- Multiblade
- Manual quadrant shipped as a kit for field installation

### MBDR-50

- Round blade
- Factory-mounted manual quadrant

## Cable Operator Option

The cable operator is ideal for applications where it is difficult to get access to manually adjust the damper and balance airflow. They are adjusted via cable actuation using a 1/4 in. nut driver at the ceiling or wall.

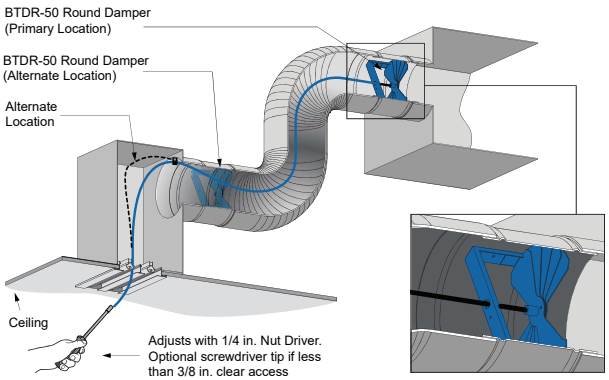



**WATCH VIDEO**

## Bowtie Damper

The BTDR-50 is a cable-operated radial blade balancing damper (also known as a bowtie damper) that is designed for easy airflow adjustment at an air outlet or plenum neck. They are adjusted using a nut driver or screwdriver.





Remote balancing dampers offer the same function as a manual balancing damper plus the added benefit of controlling the damper remotely at a diffuser or wall plate. These remote balancing dampers are ideal for applications where it is difficult to gain access to manually adjust the dampers to balance airflow. The “EZ Balance” remote control operates the damper motor by connecting to the wall, ceiling, or diffuser mounted RJ11 connector.

There are three remote balancing damper models available.



### RBD-10

- Single blade
- Actuator shipped as a field kit for installation



### RBD-15

- Multiblade
- Actuator shipped as a field kit for installation

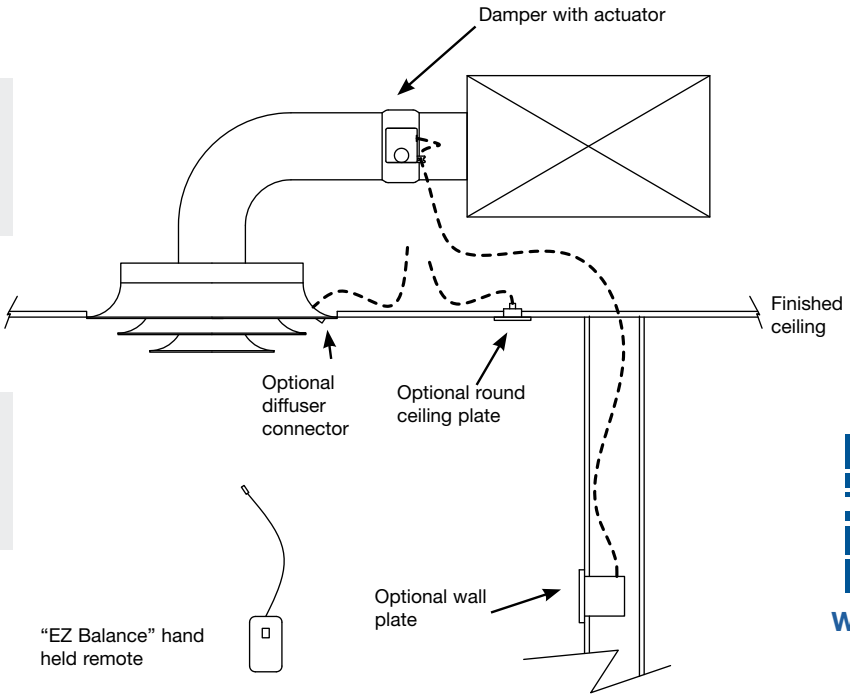


### RBDR-50

- Round blade
- Factory-mounted actuator

**Note:**
All wire connections are made with pre-wired RJ11 plugs and sockets. No additional wiring or tools required.

**Note:**
Utilizing any controller other than ‘EZ Balance’ remote to adjust the RBD-15 damper voids the actuator warranty.




WATCH VIDEO

## Accessories

A wide variety of accessories are available for the RBD and RBDR series.



Plenum rated cables



Round ceiling plate

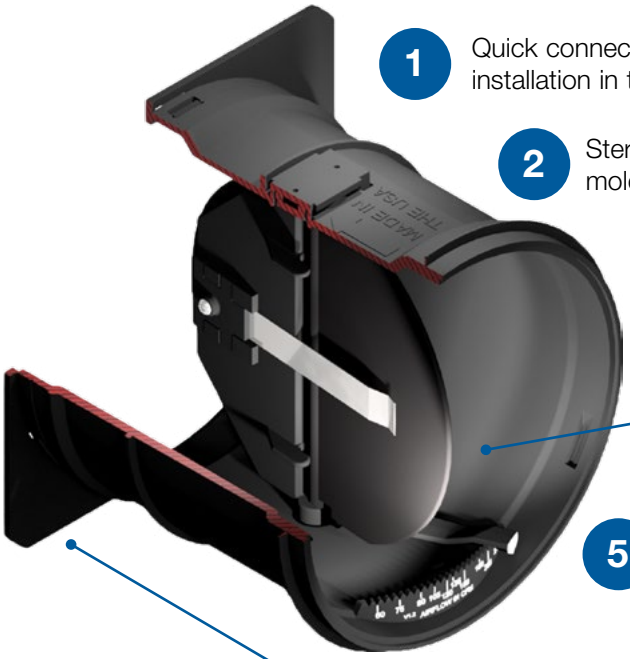


Wall plates with ports




EZ Balance remote

Automatic balancing dampers are designed to maintain a constant airflow volume in HVAC applications. These dampers can be used to balance HVAC systems eliminating the need for on-site balancing. The ABDs can be used in supply or exhaust applications.



1. Quick connect adapter ring for easy installation in the field
2. Steri-Balance™ antimicrobial to prevent mold and bacteria
3. Removable rubber gasket seal for insertion into round ductwork
4. Blade adjusts automatically to changes in pressure and velocity to hold the targeted airflow
5. Desired airflow is set by moving the set point adjustment arm to the desired airflow (CFM)



6. Flipping the damper 180 degrees, it changes from exhaust to supply

WATCH VIDEO

See complete marking on product.
UL 2043 Classification R39668
Classified by UL to UL 2043 for heat and visible smoke release (UL File R39668)

## Automatic Balancing Dampers

The automatic balancing dampers (ABD) automatically adjust to system pressure changes to maintain a constant airflow to compensate for changes in pressure reducing the amount of energy required to ventilate a space while improving the indoor air quality.




### Traditional Balancing System

Stand-alone balancing damper cannot adjust to changes in pressure resulting in incorrect airflows.

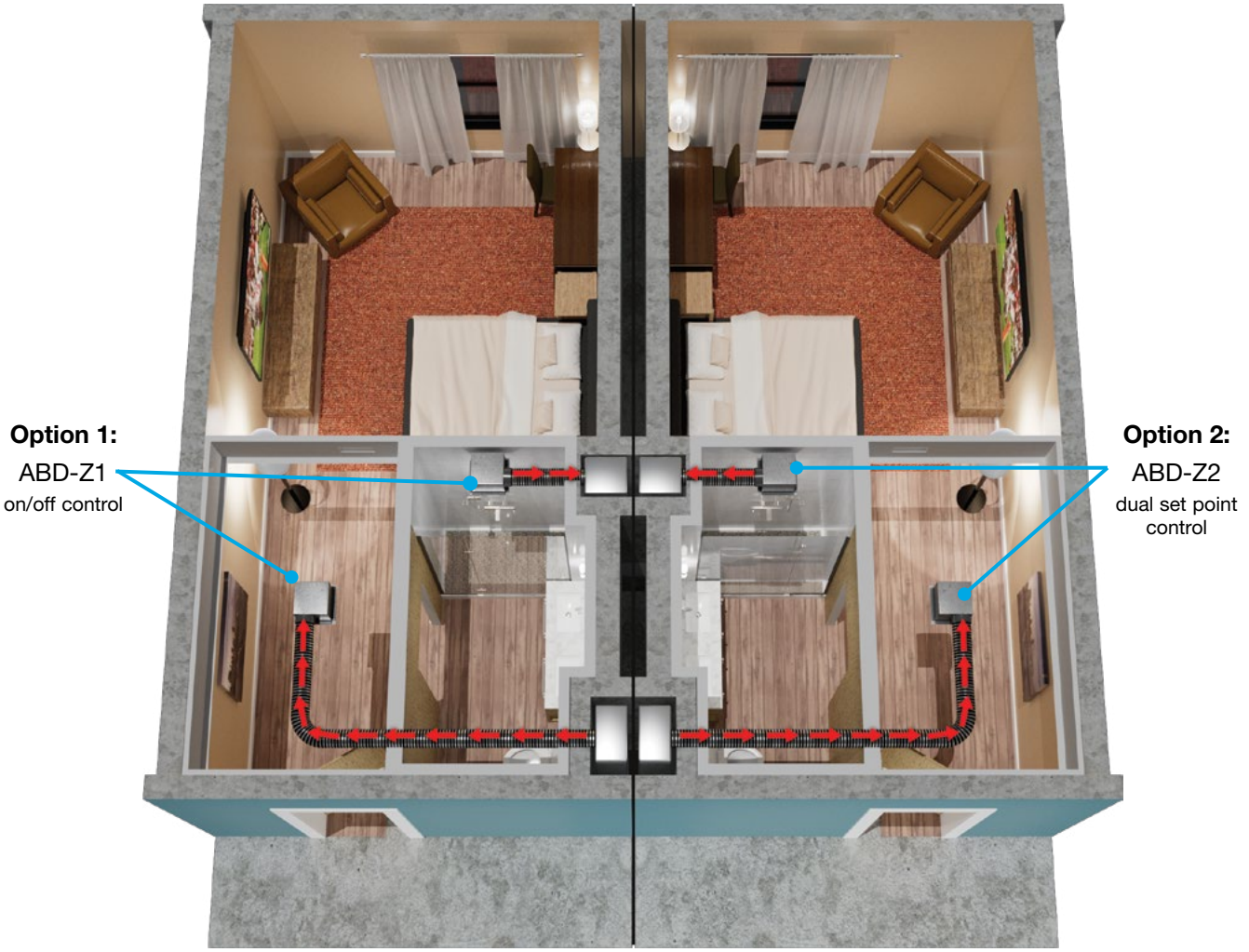



### Balanced System

Automatic balancing dampers automatically adjust the airflow to changes in the system pressure.

- Supply and exhaust air in offices
- Balancing exhaust/return and supply airflows in high-rise building duct risers, common areas, and living spaces
- Regulation of make-up air
- Clean room air supply balancing for ceiling filter modules. Maintains constant airflow even as filter resistance increases
- Bathroom exhaust
- Balancing supply airflow from packaged rooftop A/C units
- Balancing supply and exhaust/return of heat recovery ventilation systems
- Regulating outdoor air injections from central supply fan into individual room fan coil units or heat pumps

ABD-Z1s and Z2s are commonly used in hotel room applications. When the room is unoccupied, ABD-Z1s can be used to shut off ventilation and save energy. When the room is occupied, the actuator of the ABD-Z1 can be energized by a BAS, an occupancy sensor, or any type of switch to ventilate to the selected constant CFM set point of the ABD valve. ABD-Z2s can be used in the same way, but are used when a minimum CFM ventilation rate is desired when the space is unoccupied and then a boosted higher CFM ventilation rate is needed when the space is occupied.



## ABD

Model ABD is an automatic balancing damper designed to maintain constant airflow volume in HVAC applications. The damper blade is calibrated to automatically adjust to changing pressures. This damper can be used in supply or exhaust applications.



## ABD-FD

Model ABD-FD is an automatic balancing damper with a UL 555 rated 1½ or 3 hour static fire damper. The ABD-FD is designed to maintain a constant airflow volume in HVAC applications. The damper blade is calibrated to automatically adjust to changing pressures. The assembly will include a UL 2043 rated ABD, flanged sleeve, UL 555 rated curtain fire damper (FD-150 or FD-350), and optional grille.



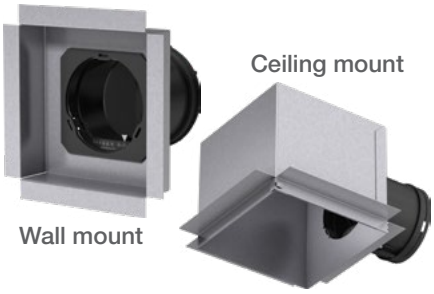
## ABD-T

Model ABD-T is an automatic balancing damper with a square transition. The transition can be removed and flipped to the other side of the damper using a factory-supplied quick adapter plate. The ABD-T can be used in both supply and exhaust applications.



## ABD-RB

Model ABD-RB combines an automatic balancing damper (model ABD) with the convenience of a factory-supplied register box. The ABD-RB can be configured for supply or exhaust applications and can be mounted in both walls and ceilings. In addition, the ABD can be mounted in either the side or the back of the register box. All ABD models maintain a constant CFM independent of the system pressure to prevent over or under ventilation. The ABD-RB is also available with a factory-supplied grille.




## ABD-Z1

Model ABD-Z1 is designed to provide on/off control to a ventilation system. The ABD-Z1 has a shutoff damper with an electric actuator, automatic balancing damper (ABD), and a plenum box as one assembly.



## ABD-Z2

The ABD-Z2 is an automatic balancing damper that includes a two-position actuator which allows the unit to toggle between two user defined constant CFM set point minimum and a boosted on demand CFM. The ABD-Z2 is ideal for helping achieve the requirements of ASHRAE 62.2 for acceptable indoor air quality.

Optional return/exhaust grille is available.



## ABD Installation for Supply and Exhaust Applications

The ABD may be installed with a UL 555C rated ceiling radiation damper (CRD). This allows for a compact assembly designed to maintain a constant airflow volume in HVAC applications, while also limiting the radiant heat transfer through openings in the ceiling membrane of fire resistance-rated floor/ceiling assemblies of three hours or less.



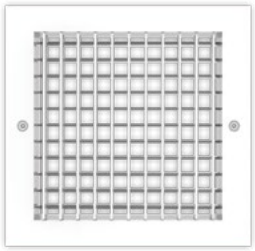
## Grilles

The following grilles are available on ABD-FD, ABD-RB, ABD-Z1, and ABD-Z2:

**Return/Exhaust Grille Surface Mount**



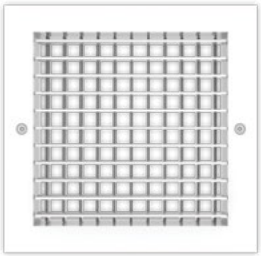
**Double Deflection Grille Vertical Blades**



**Single Deflection Grille Vertical Blades**



**Double Deflection Grille Horizontal Blades**



## Ratings

| | | ABD | ABD-FD | ABD-RB | ABD-T | ABD-Z1 | ABD-Z2 |
|---|---|---|---|---|---|---|---|
| **Pressure Rating** | 0.2 in. wg to 2 in. wg (0.05 kPa to 0.5 kPa) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Volume** | 25 cfm to 425 cfm (.012 $m^3/s$ to .201 $m^3/s$) | ✓ | | ✓ | ✓ | | |
| | 25 cfm to 275 cfm (.012 $m^3/s$ to .130 $m^3/s$) | | ✓ | | | ✓ | ✓ |
| **Temperature** | 25°F to 150°F (-4°C to 65°C) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## Airflow Range by Size

| ABD Diameter in. (mm) | Individual Set Points | Airflow Range CFM* ($m^3/s$) | ABD | ABD-FD | ABD-RB | ABD-T | ABD-Z1 | ABD-Z2 |
|---|---|---|---|---|---|---|---|---|
| 4 (102) | 20 | 25 to 130 (.012 to .061) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 (127) | 20 | 25 to 130 (.012 to .061) | ✓ | | ✓ | ✓ | | |
| 6 (152 mm) | 24 | 50 to 275 (.024 to .130) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 8 (203) Exhaust | 26 | 125 to 400 (.059 to .189) | ✓ | | ✓ | ✓ | | |
| 8 (203) Supply | 26 | 105 to 425 (.050 to .201) | ✓ | | ✓ | ✓ | | |

* Note: Airflow range determined through +/- 10% of average airflow over the pressure range.

## Pressure Drop Performance

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/ft$^3$(1.2 kg/m$^3$).

Actual pressure drop found in an 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 an HVAC system.

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.

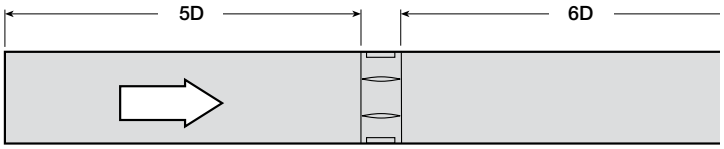


Figure 5.3

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.

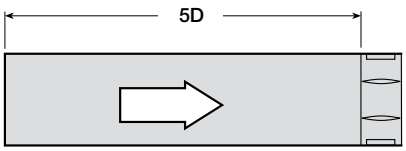
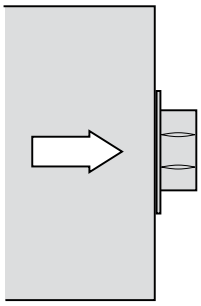


Figure 5.2

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

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

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


Figure 5.5

Greenheck Fan Corporation certifies that the model VCD-20 and VCD-40 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 ratings only.

Greenheck Fan Corporation certifies that the model AMD-23, AMD-33, VCD-23, 33, 34, 43, SEVCD-23 and 33 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 ratings only.

Greenheck Fan Corporation certifies that the model ICD-44 and ICD-45 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 ratings only.

## AMD-23

- Air measuring station
- Blade and jamb seals
- Galvanized 3V blade

| Dimension inches | 12 x 12 | | | 24 x 24 | | | 36 x 36 | | | 12 x 48 | | | 48 x 12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 (ft/min) | Pressure Drop in. wg | | | | | | | | | | | | | | |
| 500 | .05 | .04 | .07 | .03 | .03 | .05 | .03 | .03 | .05 | .04 | .03 | .06 | .03 | .03 | .05 |
| 1000 | .15 | .12 | .25 | .10 | .09 | .20 | .09 | .07 | .17 | .11 | .10 | .20 | .11 | .09 | .20 |
| 1500 | .31 | .24 | .54 | .21 | .17 | .41 | .18 | .14 | .36 | .23 | .20 | .43 | .22 | .19 | .42 |
| 2000 | .52 | .40 | .92 | .36 | .28 | .71 | .31 | .23 | .62 | .39 | .34 | .74 | .38 | .33 | .72 |
| 2500 | .80 | .60 | 1.41 | .54 | .43 | 1.10 | .46 | .35 | .96 | .58 | .51 | 1.13 | .57 | .50 | 1.11 |
| 3000 | 1.12 | .84 | 2.02 | .76 | .60 | 1.54 | .64 | .48 | 1.36 | .81 | .72 | 1.59 | .79 | .71 | 1.56 |
| 3500 | 1.51 | 1.12 | 2.73 | 1.01 | .80 | 2.09 | .86 | .64 | 1.84 | 1.10 | .97 | 2.14 | 1.06 | .96 | 2.12 |
| 4000 | 1.92 | 1.44 | 3.53 | 1.32 | 1.03 | 2.76 | 1.12 | .82 | 2.40 | 1.43 | 1.26 | 2.78 | 1.38 | 1.24 | 2.77 |



## AMD-33

- Air measuring station
- Blade and jamb seals
- Galvanized airfoil blade

| Dimension inches | 12 x 12 | | | 24 x 24 | | | 36 x 36 | | | 12 x 48 | | | 48 x 12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 (ft/min) | Pressure Drop in. wg | | | | | | | | | | | | | | |
| 500 | .04 | .04 | .07 | .03 | .03 | .05 | .03 | .03 | .05 | .03 | .03 | .06 | .04 | .03 | .05 |
| 1000 | .13 | .12 | .24 | .10 | .09 | .19 | .08 | .07 | .16 | .10 | .10 | .19 | .10 | .09 | .19 |
| 1500 | .27 | .24 | .50 | .22 | .17 | .41 | .16 | .14 | .34 | .21 | .20 | .41 | .21 | .19 | .41 |
| 2000 | .44 | .40 | .86 | .39 | .28 | .71 | .26 | .23 | .57 | .36 | .34 | .71 | .36 | .33 | .71 |
| 2500 | .66 | .60 | 1.33 | .62 | .43 | 1.10 | .39 | .35 | .88 | .54 | .51 | 1.09 | .55 | .50 | 1.10 |
| 3000 | .93 | .84 | 1.89 | .89 | .60 | 1.56 | .53 | .48 | 1.24 | .76 | .72 | 1.54 | .77 | .71 | 1.55 |
| 3500 | 1.25 | 1.12 | 2.57 | 1.21 | .80 | 2.13 | .71 | .64 | 1.67 | 1.02 | .97 | 2.08 | 1.03 | .96 | 2.10 |
| 4000 | 1.59 | 1.44 | 3.30 | 1.58 | 1.03 | 2.80 | .91 | .82 | 2.19 | 1.33 | 1.26 | 2.70 | 1.34 | 1.24 | 2.75 |



## ICD-44 and ICD-45

- Extruded aluminum airfoil blades with thermal breaks and insulated with polyurethane foam
- Extruded frame (ICD-44) with thermal breaks (ICD-45)

| 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 (ft/min.) | Pressure Drop in. wg | | | | | | | | | | | | | | |
| 500 | .03 | .01 | .05 | .02 | .01 | .05 | .01 | .01 | .04 | .01 | .01 | .04 | .03 | .01 | .05 |
| 1000 | .11 | .04 | .23 | .08 | .03 | .21 | .05 | .02 | .14 | .06 | .02 | .18 | .14 | .06 | .22 |
| 1500 | .25 | .09 | .52 | .19 | .08 | .47 | .11 | .04 | .33 | .14 | .06 | .42 | .32 | .14 | .51 |
| 2000 | .45 | .17 | .93 | .34 | .14 | .84 | .21 | .08 | .58 | .25 | .10 | .74 | .57 | .25 | .90 |
| 2500 | .71 | .26 | 1.44 | .53 | .22 | 1.32 | .33 | .12 | .91 | .40 | .17 | 1.16 | .89 | .40 | 1.41 |
| 3000 | 1.03 | .38 | 2.08 | .77 | .32 | 1.90 | .47 | .18 | 1.31 | .57 | .24 | 1.68 | 1.29 | .58 | 2.04 |
| 3500 | 1.40 | .52 | 2.83 | 1.05 | .43 | 2.59 | .64 | .24 | 1.79 | .78 | .33 | 2.28 | 1.76 | .79 | 2.78 |
| 4000 | 1.83 | .67 | 3.70 | 1.37 | .57 | 3.39 | .84 | .32 | 2.34 | 1.02 | .43 | 2.98 | 2.30 | 1.03 | 3.70 |



## VCD-20, 23

- Galvanized 3V blade
- Blade and jamb seals (VCD-23)

## SEVCD-23

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

| 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 (ft/min.) | Pressure Drop in. wg | | | | | | | | | | | | | | |
| 500 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .02 | .01 | .01 | .03 | .01 | .01 | .03 |
| 1000 | .05 | .03 | .13 | .03 | .02 | .12 | .02 | .02 | .10 | .04 | .03 | .14 | .03 | .03 | .12 |
| 1500 | .11 | .08 | .30 | .06 | .04 | .26 | .05 | .03 | .22 | .08 | .07 | .32 | .07 | .06 | .28 |
| 2000 | .19 | .13 | .53 | .10 | .07 | .47 | .09 | .06 | .40 | .15 | .12 | .57 | .12 | .10 | .49 |
| 2500 | .29 | .20 | .82 | .16 | .11 | .75 | .14 | .09 | .62 | .22 | .18 | .90 | .18 | .16 | .77 |
| 3000 | .41 | .29 | 1.19 | .23 | .16 | 1.04 | .19 | .13 | .90 | .32 | .26 | 1.29 | .26 | .22 | 1.12 |
| 3500 | .55 | .40 | 1.62 | .30 | .21 | 1.41 | .27 | .19 | 1.23 | .43 | .36 | 1.76 | .36 | .30 | 1.53 |
| 4000 | .72 | .51 | 2.10 | .40 | .28 | 1.90 | .35 | .25 | 1.62 | .56 | .46 | 2.30 | .47 | .39 | 2.01 |



## VCD-33 and 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

| 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 (ft/min.) | Pressure Drop in. wg | | | | | | | | | | | | | | |
| 500 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .02 | .01 | .01 | .03 | .01 | .01 | .03 |
| 1000 | .03 | .02 | .12 | .03 | .01 | .11 | .02 | .01 | .09 | .03 | .02 | .11 | .02 | .02 | .11 |
| 1500 | .07 | .05 | .27 | .06 | .03 | .26 | .04 | .02 | .21 | .07 | .04 | .24 | .04 | .04 | .24 |
| 2000 | .13 | .08 | .48 | .10 | .05 | .45 | .07 | .04 | .38 | .11 | .08 | .43 | .08 | .07 | .44 |
| 2500 | .19 | .12 | .74 | .15 | .09 | .71 | .11 | .06 | .58 | .17 | .12 | .67 | .12 | .11 | .68 |
| 3000 | .26 | .17 | 1.07 | .21 | .13 | 1.02 | .15 | .08 | .85 | .23 | .17 | .96 | .16 | .15 | .97 |
| 3500 | .35 | .23 | 1.46 | .28 | .17 | 1.40 | .20 | .12 | 1.15 | .31 | .22 | 1.31 | .21 | .20 | 1.32 |
| 4000 | .45 | .30 | 1.91 | .36 | .22 | 1.89 | .26 | .15 | 1.52 | .39 | .29 | 1.71 | .27 | .25 | 1.73 |



## VCD-40

- Extruded aluminum airfoil blades
- Blade and jamb seals
- Blades contained within the frame

| 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 (ft/min.) | Pressure Drop in. wg | | | | | | | | | | | | | | |
| 500 | .08 | .05 | .10 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 | .06 | .03 | .08 |
| 1000 | .31 | .20 | .40 | .05 | .02 | .12 | .04 | .02 | .11 | .05 | .03 | .12 | .23 | .13 | .29 |
| 1500 | .69 | .45 | .88 | .11 | .05 | .29 | .09 | .04 | .26 | .11 | .07 | .27 | .52 | .29 | .63 |
| 2000 | 1.19 | .76 | 1.54 | .19 | .10 | .52 | .16 | .07 | .46 | .20 | .12 | .49 | .91 | .51 | 1.12 |
| 2500 | 1.84 | 1.19 | 2.41 | .30 | .15 | .80 | .24 | .10 | .72 | .30 | .19 | .76 | 1.43 | .81 | 1.76 |
| 3000 | 2.67 | 1.70 | 3.45 | .43 | .22 | 1.14 | .35 | .15 | 1.04 | .43 | .26 | 1.11 | 2.05 | 1.16 | 2.52 |
| 3500 | 3.59 | 2.29 | 4.75 | .58 | .30 | 1.60 | .48 | .20 | 1.43 | .59 | .36 | 1.53 | 2.82 | 1.59 | 3.40 |
| 4000 | 4.64 | 2.97 | 6.09 | .76 | .40 | 2.14 | .62 | .27 | 1.87 | .77 | .46 | 2.00 | 3.69 | 2.09 | 4.52 |



## VCD-43

- Extruded aluminum airfoil blade
- Aluminum frame
- Blade and jamb seals

| 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 (ft/min.) | Pressure Drop in. wg | | | | | | | | | | | | | | |
| 500 | .01 | .01 | .04 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 |
| 1000 | .06 | .03 | .14 | .04 | .02 | .12 | .03 | .01 | .10 | .06 | .03 | .11 | .03 | .02 | .11 |
| 1500 | .13 | .07 | .31 | .10 | .04 | .27 | .06 | .02 | .22 | .13 | .06 | .25 | .06 | .04 | .26 |
| 2000 | .23 | .14 | .55 | .18 | .08 | .48 | .12 | .04 | .39 | .23 | .11 | .46 | .10 | .08 | .46 |
| 2500 | .35 | .21 | .86 | .28 | .13 | .75 | .18 | .06 | .61 | .36 | .17 | .72 | .16 | .12 | .72 |
| 3000 | .50 | .29 | 1.23 | .40 | .19 | 1.07 | .26 | .09 | .87 | .51 | .25 | 1.05 | .23 | .18 | 1.02 |
| 3500 | .68 | .39 | 1.67 | .54 | .26 | 1.47 | .35 | .13 | 1.19 | .71 | .34 | 1.43 | .30 | .24 | 1.40 |
| 4000 | .88 | .51 | 2.19 | .70 | .34 | 1.91 | .46 | .17 | 1.56 | .93 | .45 | 1.87 | .39 | .31 | 1.83 |



## AMD-42

- Air measuring station
- Blade and jamb seals
- Extruded aluminum airfoil blades

| Dimension inches | 12 x 12 | | | 24 x 24 | | | 36 x 36 | | | 12 x 48 | | | 48 x 12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 (ft/min) | 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 | 1.00 | .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 |



## AMD-42V

- Air measuring station
- Blade and jamb seals
- Vertical extruded aluminum airfoil blades

| Dimension inches | 12 x 12 | | | 24 x 24 | | | 36 x 36 | | | 12 x 48 | | | 48 x 12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 (ft/min) | 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 | 2.5 | .49 | .24 | 1.5 | .38 | .19 | 1.13 | 1.00 | .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 | 1.79 | 1.04 | 3.11 | 1.04 | .64 | 2.88 |



## VCDR-50 and 53

- Insert type round single blade
- Blade seals included on the VCDR-53

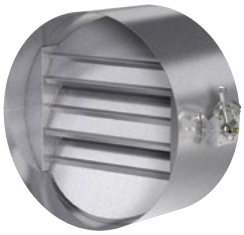
| Dimension inches | 12 | | | 24 | | |
|---|---|---|---|---|---|---|
| AMCA figure | 5.2 | 5.3 | 5.5 | 5.2 | 5.3 | 5.5 |
| Velocity (ft/min.) | Pressure Drop in. wg | | | | | |
| 500 | .01 | .01 | .02 | .01 | .01 | .02 |
| 1000 | .06 | .02 | .10 | .04 | .01 | .09 |
| 1500 | .13 | .05 | .22 | .08 | .03 | .20 |
| 2000 | .23 | .08 | .38 | .15 | .06 | .36 |
| 2500 | .37 | .13 | .60 | .23 | .09 | .56 |
| 3000 | .53 | .19 | .86 | .33 | .13 | .81 |



## VCDRM-53

- Insert type round multiblade
- Blade seals

| 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 (ft/min.) | 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 |



## VCD-23V

- Vertical 3V blades
- Blade and jamb seals

| 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 (ft/min.) | Pressure Drop in. wg | | | | | | | | | | | | | | |
| 500 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 |
| 1000 | .05 | .03 | .13 | .03 | .02 | .12 | .02 | .02 | .12 | .03 | .03 | .12 | .04 | .03 | .14 |
| 1500 | .11 | .08 | .30 | .06 | .04 | .26 | .05 | .03 | .28 | .07 | .06 | .28 | .08 | .07 | .32 |
| 2000 | .19 | .13 | .53 | .10 | .07 | .47 | .09 | .06 | .50 | .12 | .10 | .49 | .15 | .12 | .57 |
| 2500 | .29 | .20 | .82 | .16 | .11 | .75 | .14 | .09 | .78 | .18 | .16 | .77 | .22 | .18 | .90 |
| 3000 | .41 | .29 | 1.19 | .23 | .16 | 1.04 | .19 | .13 | 1.12 | .26 | .22 | 1.12 | .32 | .26 | 1.29 |
| 3500 | .55 | .40 | 1.62 | .30 | .21 | 1.41 | .27 | .19 | 1.53 | .36 | .30 | 1.53 | .43 | .36 | 1.75 |
| 4000 | .72 | .51 | 2.10 | .40 | .28 | 1.90 | .35 | .25 | 2.00 | .47 | .39 | 2.01 | .56 | .46 | 2.30 |



## VCD-33V and VCD-34V

- Vertical galvanized airfoil blades
- Blade and jamb seals

| 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 (ft/min.) | Pressure Drop in. wg | | | | | | | | | | | | | | |
| 500 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 |
| 1000 | .03 | .02 | .13 | .03 | .02 | .12 | .02 | .01 | .12 | .02 | .02 | .12 | .03 | .02 | .12 |
| 1500 | .07 | .05 | .30 | .06 | .03 | .26 | .04 | .02 | .28 | .04 | .04 | .28 | .07 | .04 | .27 |
| 2000 | .13 | .08 | .53 | .10 | .05 | .47 | .07 | .04 | .50 | .08 | .07 | .49 | .11 | .08 | .47 |
| 2500 | .19 | .12 | .82 | .15 | .09 | .75 | .11 | .06 | .78 | .12 | .11 | .77 | .17 | .12 | .75 |
| 3000 | .26 | .17 | 1.19 | .21 | .13 | 1.04 | .15 | .08 | 1.12 | .16 | .15 | 1.12 | .23 | .17 | 1.07 |
| 3500 | .35 | .23 | 1.62 | .28 | .17 | 1.41 | .20 | .12 | 1.53 | .21 | .20 | 1.53 | .31 | .22 | 1.45 |
| 4000 | .45 | .30 | 2.10 | .36 | .22 | 1.90 | .26 | .15 | 2.00 | .27 | .25 | 2.01 | .39 | .29 | 1.91 |



## VCD-42

- Extruded aluminum airfoil blade
- Blade and jamb seals
- Galvanized steel frame



| 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 (ft/min.) | 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-43V

- Vertical extruded aluminum airfoil blade
- Blade and jamb seals
- Aluminum frame



| 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 (ft/min.) | Pressure Drop in. wg | | | | | | | | | | | | | | |
| 500 | .01 | .01 | .04 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 | .01 | .01 | .03 |
| 1000 | .06 | .03 | .14 | .04 | .02 | .12 | .03 | .01 | .10 | .03 | .02 | .11 | .06 | .03 | .11 |
| 1500 | .13 | .07 | .31 | .10 | .04 | .27 | .06 | .02 | .22 | .06 | .04 | .26 | .13 | .06 | .25 |
| 2000 | .23 | .14 | .55 | .18 | .08 | .48 | .12 | .04 | .39 | .10 | .08 | .46 | .23 | .11 | .46 |
| 2500 | .35 | .21 | .86 | .28 | .13 | .75 | .18 | .06 | .61 | .16 | .12 | .72 | .36 | .17 | .72 |
| 3000 | .50 | .29 | 1.23 | .40 | .19 | 1.07 | .26 | .09 | .87 | .23 | .18 | 1.02 | .51 | .25 | 1.02 |
| 3500 | .68 | .39 | 1.67 | .54 | .26 | 1.47 | .35 | .13 | 1.19 | .30 | .24 | 1.40 | .71 | .34 | 1.40 |
| 4000 | .88 | .51 | 2.19 | .70 | .34 | 1.91 | .46 | .17 | 1.56 | .39 | .31 | 1.83 | .93 | .45 | 1.83 |

Air leakage is based on operation between 32° and 120°F (0 and 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 is based on a torque of 5.0 in-lb/ft² (0.56 N·m) applied to close and seat the damper during the test.

| AMD-23, VCD-23, SEVCD-23 | Leakage Class* | | |
|---|---|---|---|
| Maximum Damper Width | 1 in. wg (0.25 kPa) | 4 in. wg (1 kPa) | 5 in. wg (1.2 kPa) |
| 48 in. (1219 mm) | 1A | 1 | 1 |

| VCD-43 | Leakage Class* | | |
|---|---|---|---|
| Maximum Damper Width | 1 in. wg (0.25 kPa) | 4 in. wg (1 kPa) | 8 in. wg (2 kPa) |
| 60 in. (1524 mm) | 1A | 1 | 1 |

Data is based on a torque of 7.0 in-lb/ft² (0.79 N·m) applied to close and seat the damper during the test.

| AMD-33, VCD-33, VCD-34, SEVCD-33 | Leakage Class* | | |
|---|---|---|---|
| Maximum Damper Width | 1 in. wg (0.25 kPa) | 4 in. wg (1 kPa) | 8 in. wg (2 kPa) |
| 60 in. (1524 mm) | 1A | 1 | 1 |

Data is based on a torque of 9.0 in-lb/ft² (1.02 N·m) applied to close and seat the damper during the test.

| ICD-44, 45 | Leakage Class* | | |
|---|---|---|---|
| Maximum Damper Width | 1 in. wg (0.25 kPa) | 4 in. wg (1 kPa) | 8 in. wg (2 kPa) |
| 48 in. (1219 mm) | 1A | 1 | 1 |

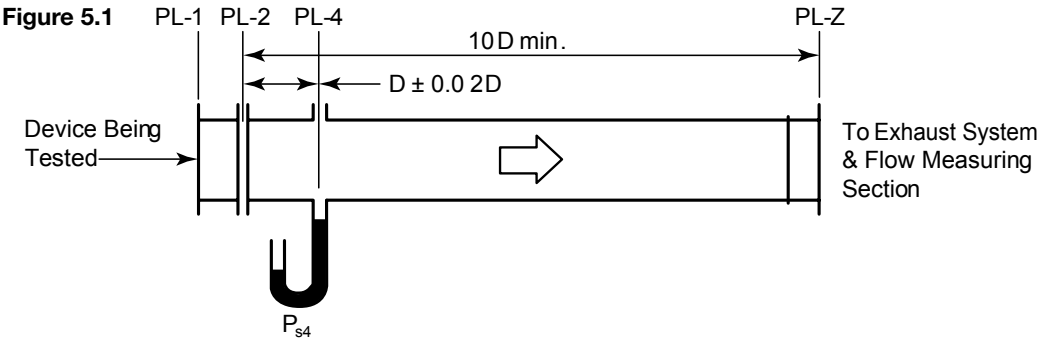
***Leakage Class Definitions**

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

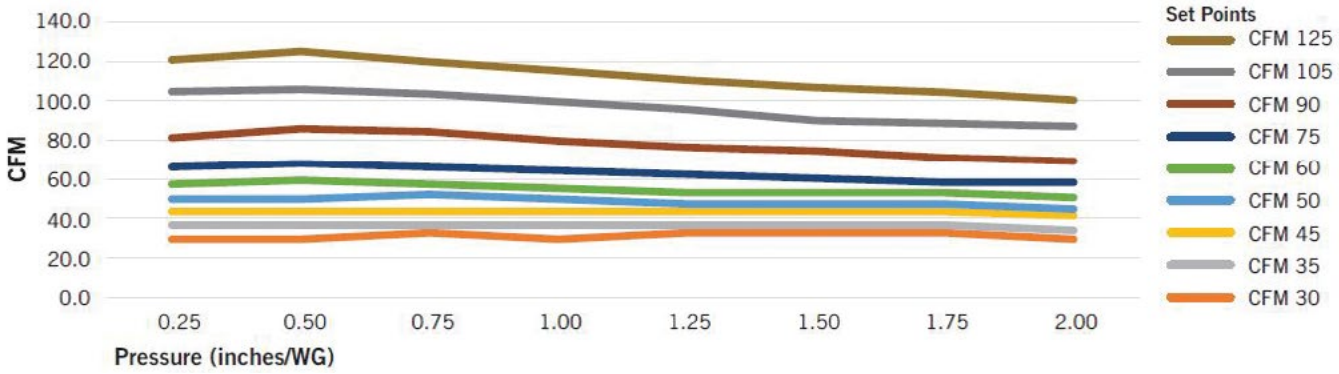
- Leakage Class 1A - 3 cfm/ft² @ 1 in. wg (Class 1A is only defined at 1 in. wg).
- Leakage Class 1
  - 4 cfm/ft² @ 1 in. wg
  - 8 cfm/ft² @ 4 in. wg
  - 11 cfm/ft² @ 8 in. wg
  - 12.6 cfm/ft² @ 10 in. wg

| Maximum Leakage cfm/sq. ft. (cmh/sq. m) | | |
|---|---|---|
| Model | Pressure | |
| | @ 1 in. wg (0.25 kPa) | @ 4 in. wg (1 kPa) |
| AMD-42, AMD-42V, VCD-23V, 33V, 34V, 43V, VCD-40 | Class 1A | Class 1 |
| VCDR-53, VCDRM -53 | Class 1 | Class 1 |

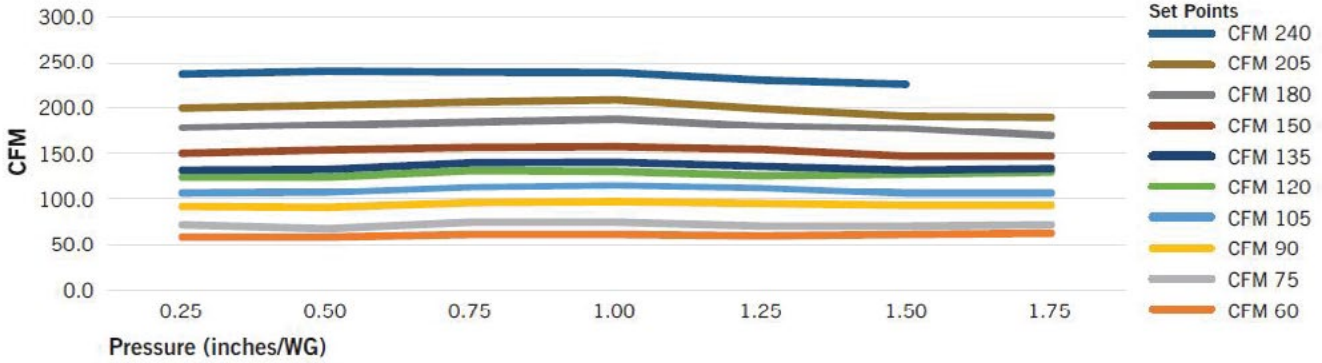
**AMCA Figure 5.1**



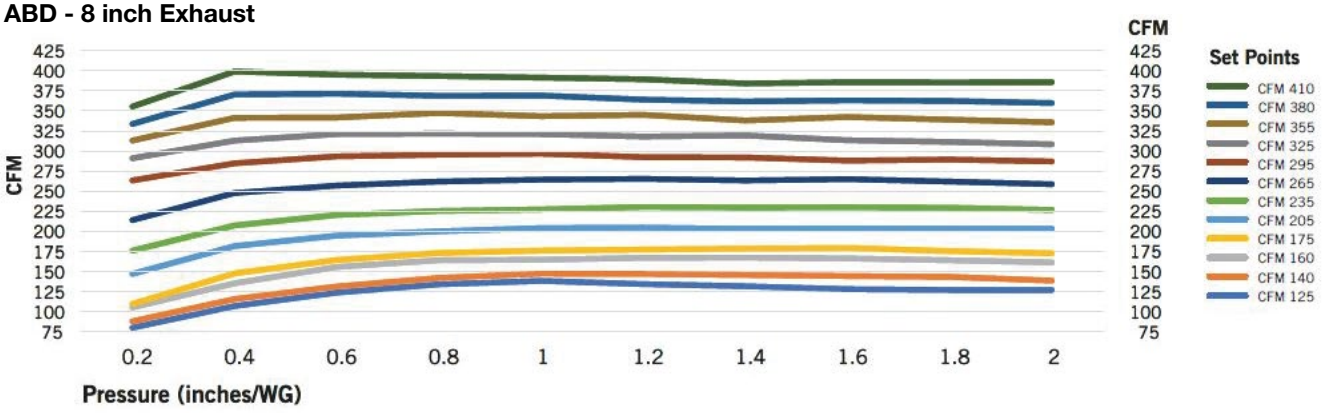

**ABD - 4 and 5 inch**



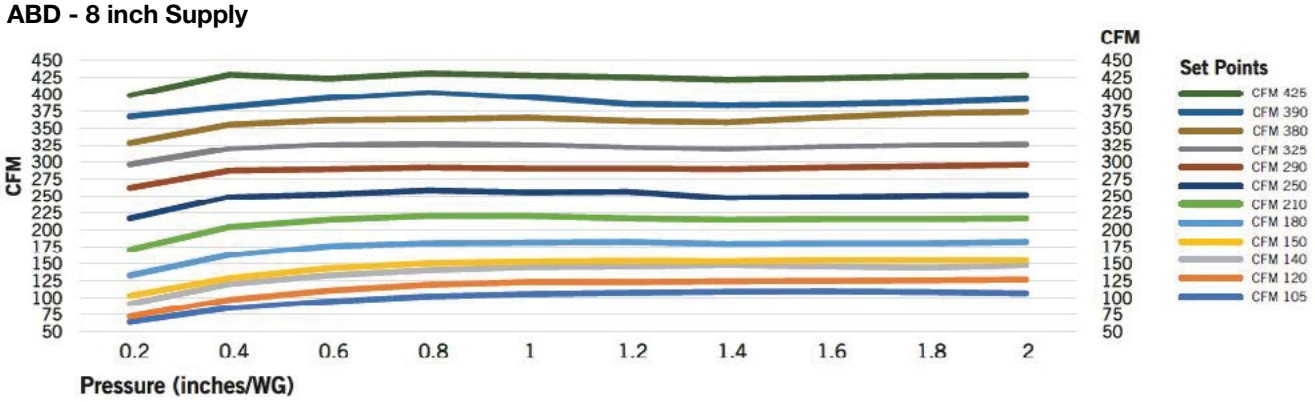

**ABD - 6 inch**




**ABD - 8 inch Exhaust**



**ABD - 8 inch Supply**




## Sound Performance Data - Noise Criterion (NC)

| 4 and 5 inch | | NC values at CFM | | | | | |
|---|---|---|---|---|---|---|---|
| | | 30 | 45 | 60 | 75 | 90 | 105 |
| Pressure (in. wg) | 0.25 | 27 | 26 | 27 | 26 | 27 | 28 |
| | 0.5 | 36 | 41 | 39 | 39 | 38 | 40 |
| | 0.75 | 40 | 44 | 43 | 42 | 42 | 43 |
| | 1 | 45 | 47 | 46 | 45 | 46 | 46 |
| | 1.5 | 48 | 49 | 50 | 49 | 49 | 50 |
| | 1.75 | 50 | 51 | 52 | 52 | 51 | 52 |
| | 2 | 52 | 53 | 53 | 52 | 53 | 54 |

| 6 inch | | NC values at CFM | | | | |
|---|---|---|---|---|---|---|
| | | 75 | 105 | 135 | 170 | 205 |
| Pressure (in. wg) | 0.25 | 27 | 28 | 29 | 28 | 30 |
| | 0.5 | 36 | 36 | 36 | 36 | 38 |
| | 0.75 | 42 | 41 | 41 | 41 | 42 |
| | 1 | 45 | 45 | 46 | 45 | 45 |
| | 1.5 | 47 | 51 | 52 | 52 | 51 |
| | 1.75 | 48 | 52 | 53 | 53 | 53 |
| | 2 | 50 | 53 | 54 | 55 | 56 |

| 8 inch | | NC values at CFM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 125 | 140 | 160 | 175 | 205 | 235 | 265 | 295 | 325 | 355 | 380 | 410 |
| Pressure (in. wg) | 0.2 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| | 0.4 | 20 | 20 | 20 | 21 | 21 | 21 | 22 | 22 | 21 | 21 | 20 | 20 |
| | 0.6 | 24 | 24 | 24 | 24 | 24 | 24 | 25 | 25 | 25 | 26 | 26 | 26 |
| | 0.8 | 24 | 25 | 25 | 25 | 26 | 26 | 27 | 27 | 27 | 27 | 27 | 27 |
| | 1 | 27 | 28 | 28 | 29 | 30 | 30 | 30 | 31 | 31 | 32 | 32 | 33 |
| | 1.2 | 29 | 30 | 31 | 31.5 | 32 | 32 | 32 | 32 | 34 | 35 | 35 | 36 |
| | 1.4 | 30 | 31 | 31 | 32 | 33 | 34 | 35 | 36 | 36 | 37 | 37 | 38 |
| | 1.6 | 30 | 31 | 31 | 32 | 33 | 34 | 35 | 36 | 36 | 37 | 37 | 38 |
| | 1.8 | 31 | 31 | 32 | 33 | 34 | 35 | 37 | 38 | 38 | 38 | 39 | 39 |
| | 2 | 31 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 39 | 40 | 40 | 41 |

Sound data is for ABD only (doesn't include grille or register box).

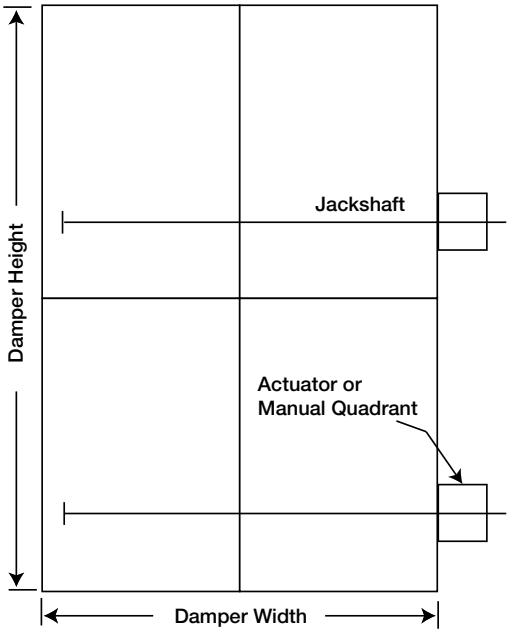
# Drive Arrangement Definition

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

**22-2FER-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
   - C - 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

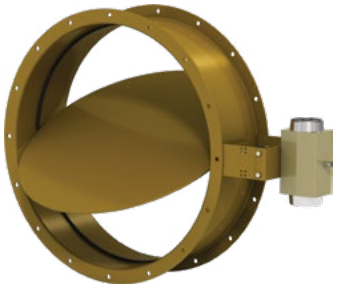



## Heavy-Duty Industrial Control Dampers

Industrial control dampers are for control and shut-off applications. There is a wide variety of configurations, options, accessories, and actuators available. These control dampers are capable of pressures up to 30 in. wg and velocities up to 7000 fpm.



HCD Series



HCDR Series

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00.DMP.1004 R11 12-2025
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