

Greenheck Control Dampers



Control Dampers

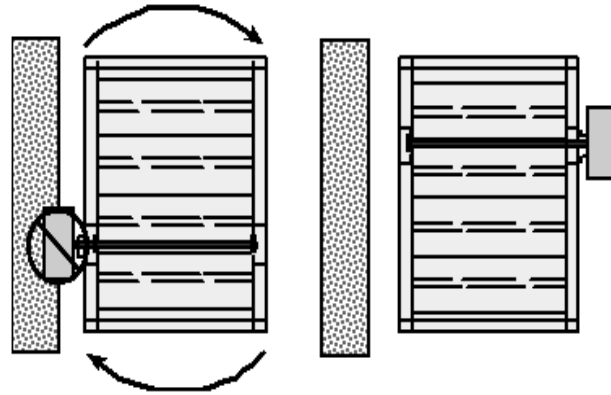
Purpose

- Regulate the flow of air
- Cut off air to a specific location
- Used in intake, exhaust, or mixed air applications

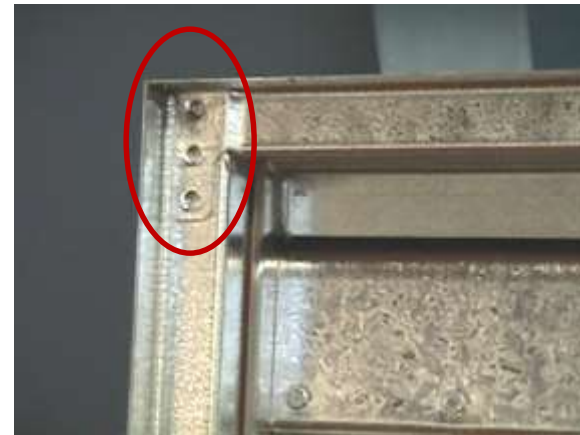


Frames

- No top or bottom

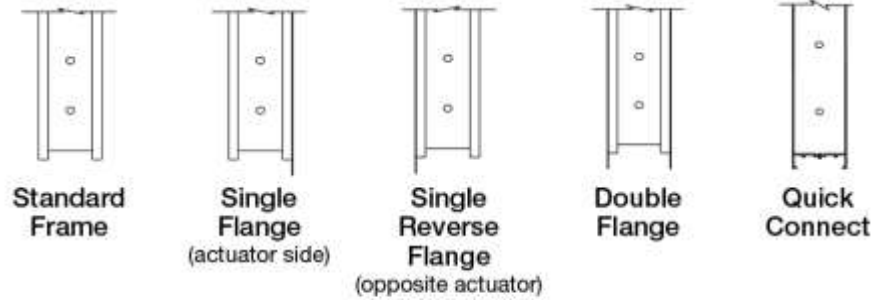
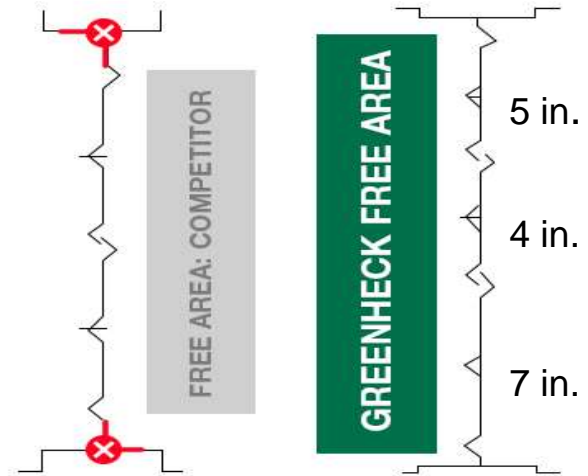


- Tog-L-Loc frame



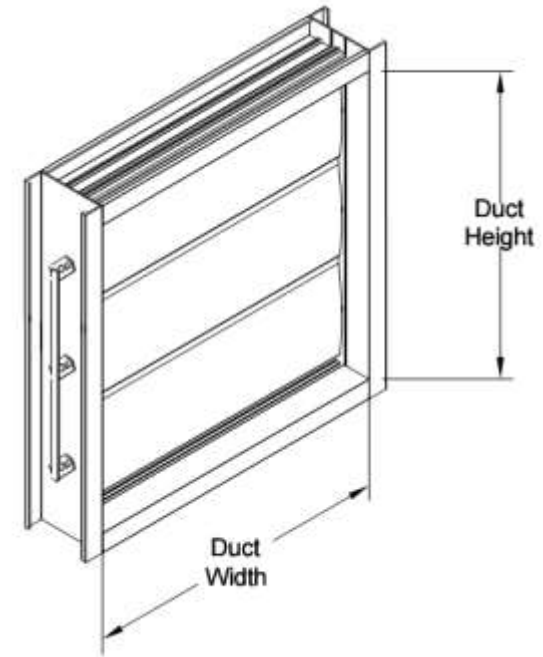
Frames

- Low profile frame
- Frame Types



Frames

- Quick connect frame
 - VCD-43, ICD-44 and ICD-45
- Quick connect frame is best suitable for flange to duct connections



Linkage

- Linkage Is In Jamb
 - Prevents added resistance to airflow
 - Provides protection for the linkage
 - Provides precision blade to blade operation (no sloppy linkage)
 - Reduces noise associated with airflow
- Linkage Materials
 - Plated steel (standard)
 - Stainless steel (corrosive environments)



Blades

- 3V blades
 - 3000 fpm
 - 5 in. wg
- Steel airfoil blades
 - 4000 fpm
 - 10 in. wg
- Aluminum airfoil blades
 - 6000 FPM
 - 10 in. wg. (VCD-43)
 - 6 in. wg. (VCD-40)

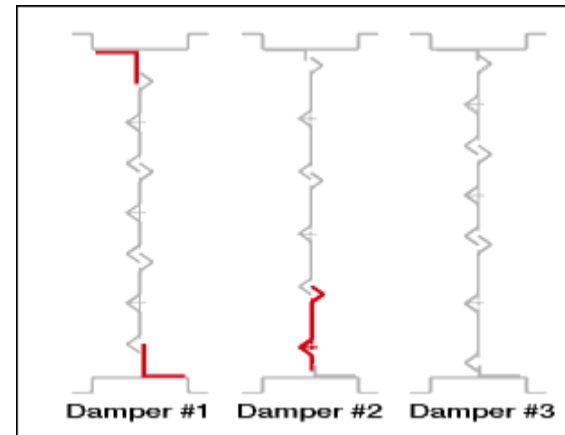


Blades

- Blade seals
 - TPE
 - Silicone

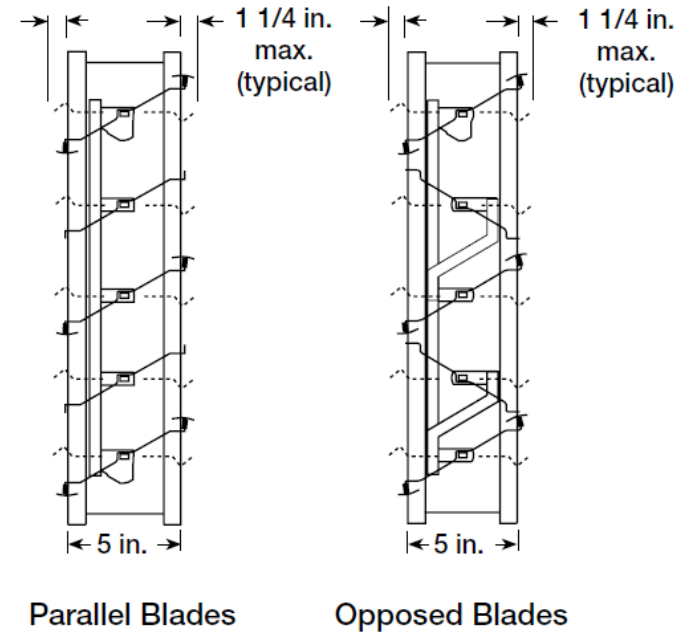


- Variable Blade Spacing

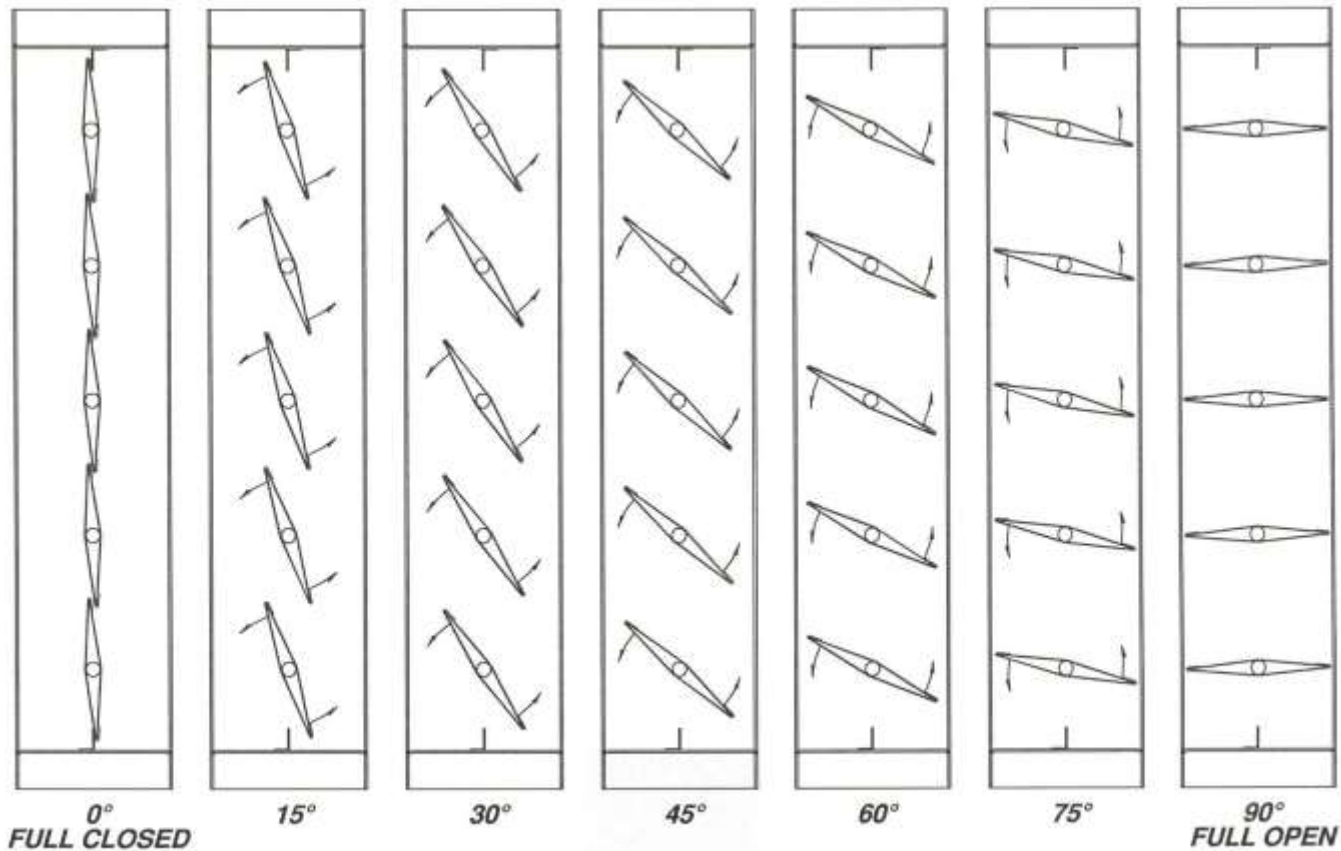


Blade Orientation

- Blade Orientation
 - Parallel blade
 - Opposed blade

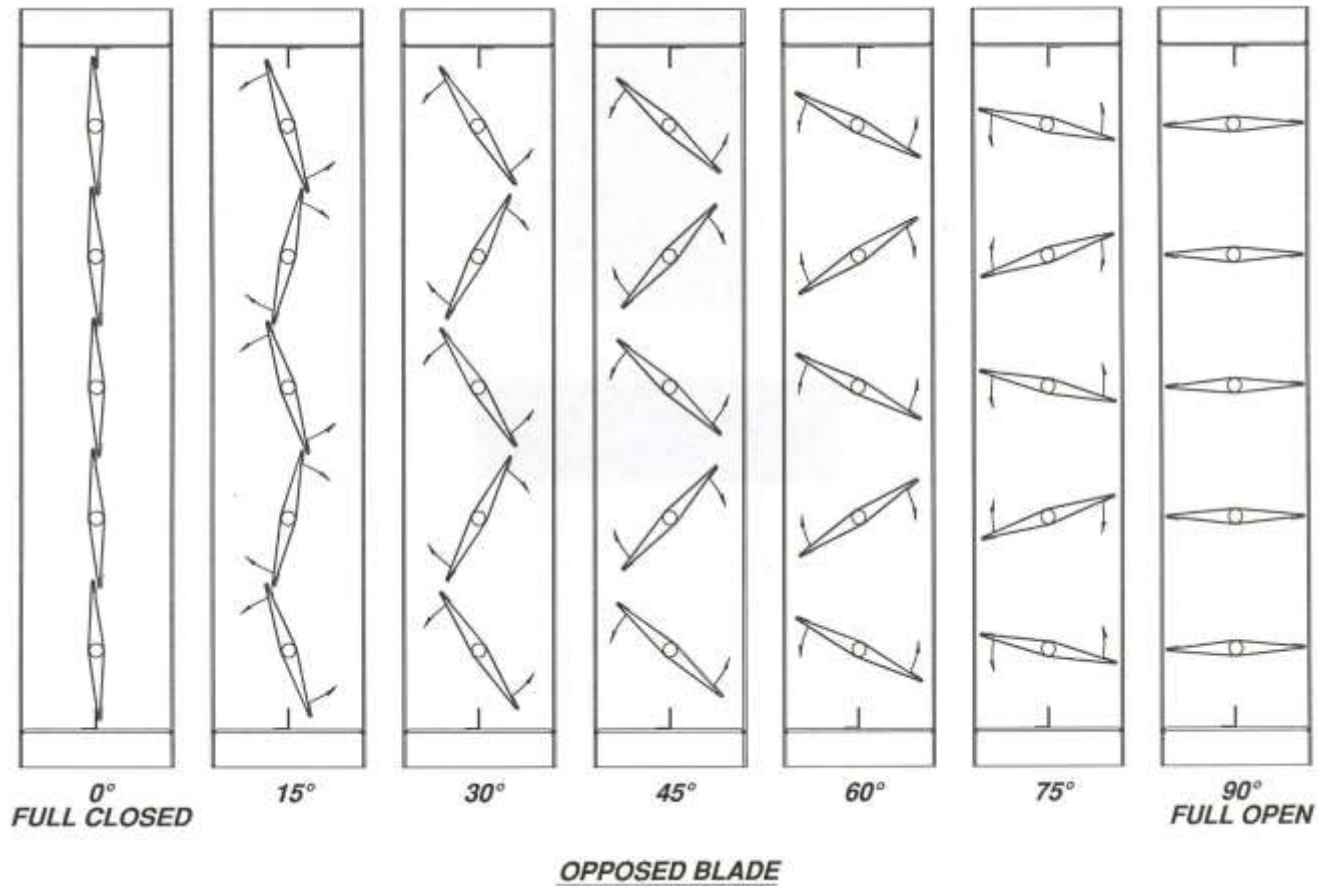


Progression of Parallel Blades



PARALLEL BLADE

Progression of Opposed Blades



Design

- Multiple section dampers
- Single section dampers
- Construction
 - Galvanized steel
 - Aluminum
 - 304 or 316 stainless steel
 - Painted



Paint Coatings

- Wide variety of coatings
- Purpose
- Using a coating on the damper
- Color match options available



Paint Coatings

- Examples of some of the coating colors



Damper Leakage

- Leakage is a measurement of how much air will get past a damper when it's in the closed position
- Measured in CFM at a specified pressure and temperature
- Can be specified as Total CFM, CFM/sq ft or % of flow
- AMCA helps define testing standard and assigns certain leakage classes

Maximum Leakage cfm/sq. ft. (cmh/sq.m)		
Model	Pressure	
	@ 1 in. wg (.25 kPa)	@ 4 in. wg (1 kPa)
VCD-23V, 43V	Class 1A	Class 1
VCD-40	Class 1A	Class 1
VCD-33, 42, 42V	Class 1A	Class 1
VCDR-53	Class 1	Class 1
VCDRM-53	Class 1	Class 1

Table 3
Allowable Air Leakage to Achieve Classification

SI	Maximum Allowable Leakage, L/s/m ²		
	at 0.25 kPa ^[1]	at 1.0 kPa ^[1]	at x kPa ^[2]
1A	15.2	N/A	N/A
1	20	41	$2\sqrt{x} \times 20$
2	51	102	$2\sqrt{x} \times 51$
3	203	406	$2\sqrt{x} \times 203$

I-P	Maximum Allowable Leakage, cfm/ft ²		
	at 1 in. wg ^[1]	at 4 in. wg ^[1]	at x in. wg ^[2]
1A	3	N/A	N/A
1	4	8	$\sqrt{x} \times 4$
2	10	20	$\sqrt{x} \times 10$
3	40	80	$\sqrt{x} \times 40$

Notes:

[1] Required pressures; shall be cataloged

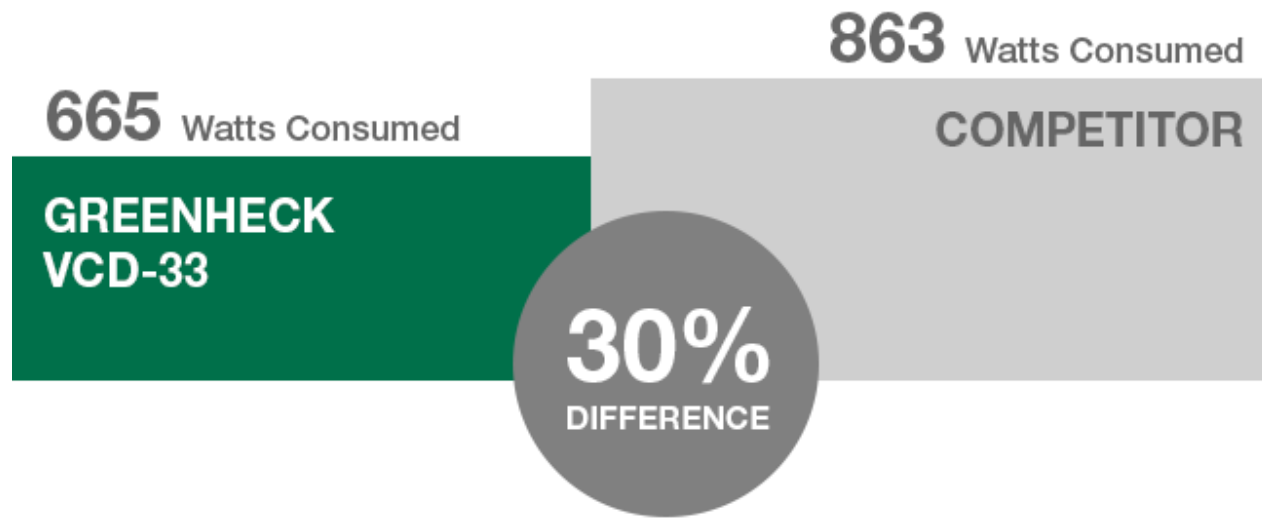
[2] Any other pressure may be cataloged using these formulas

Damper Efficiency Comparison

- Size – 12” x 12”
- Blade type – Fabricated Airfoil
- Volume – 2,000 CFM
- Greenheck vs. Competition



Energy Savings



**GREENHECK
VCD-33**

VS.

COMPETITOR

0.89

BHP

1.16

665

Watts

863

\$242.50

\$/yr

\$314.90

An annual savings of **\$72.40**
with Greenheck's VCD-33.

Energy Rate (\$/kWh) 0.10 | Days/yr of operation 365 | Hrs/day of operation 10 | Qty of dampers 1



AMCA Licensed Pressure Drop Data

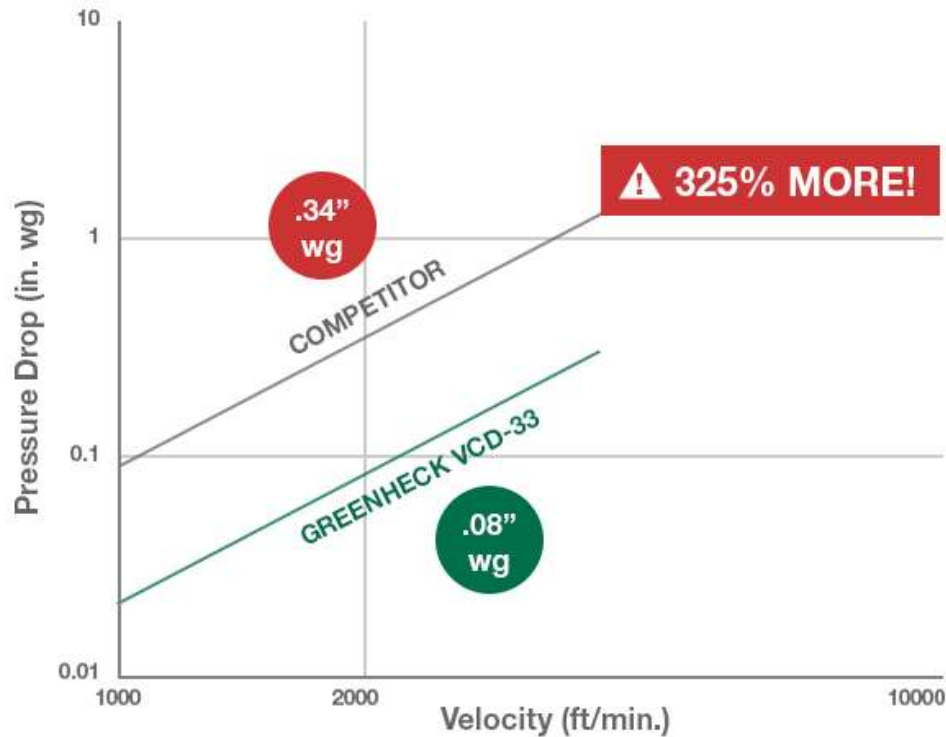
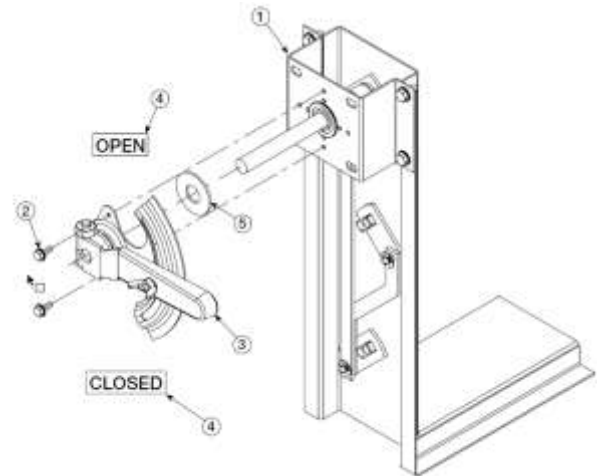


Figure 5.3
12-in. x 12-in.
fabricated
airfoil

Actuator Basics



Actuator Type

- Types
 - Pull chain
 - Manual quadrant
 - Actuators
 - Electric
 - Pneumatic



Electric



Pneumatic



Pull Chain



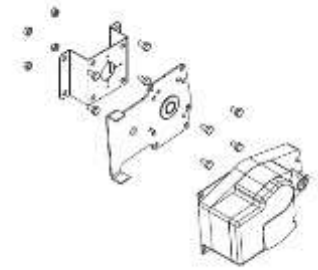
Manual
Quadrant

Actuator Mounting

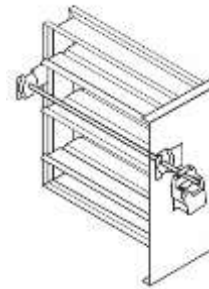
- Internal
 - Factory mounted
- External (factory mounted)
 - Sideplate
 - Sleeve
- External Kit



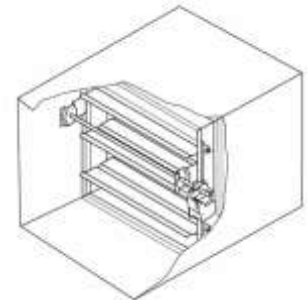
Internal



External Kit



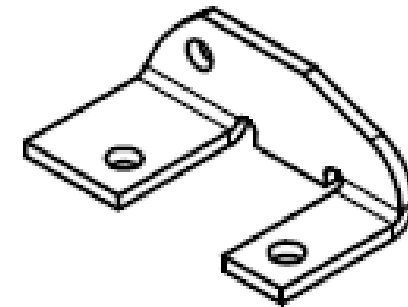
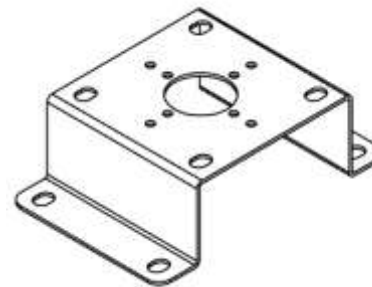
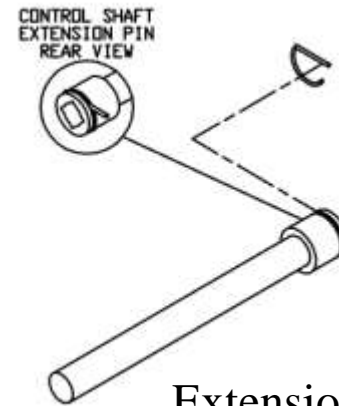
Sideplate



Sleeve

Customer Supplied Actuators

- No actuator mounting hardware
- Internal mount
 - blade drive lever
- External mount
 - extension pin
- Standoff bracket



NEMA Enclosures

- Nema 1
 - Indoor applications
- Nema 2
 - Indoor; drip proof
- Nema 3
 - Indoor or outdoor
 - Dust tight
 - Rain tight
- Nema 4
 - Indoor or outdoor
 - Water tight
 - Dust tight
 - Hose directed water
- Nema 4X
 - Same as Nema 4
 - Corrosion resistant
- Nema 7
 - Hazardous locations
 - Explosion resistant



Greenheck
NEMA 4/4X



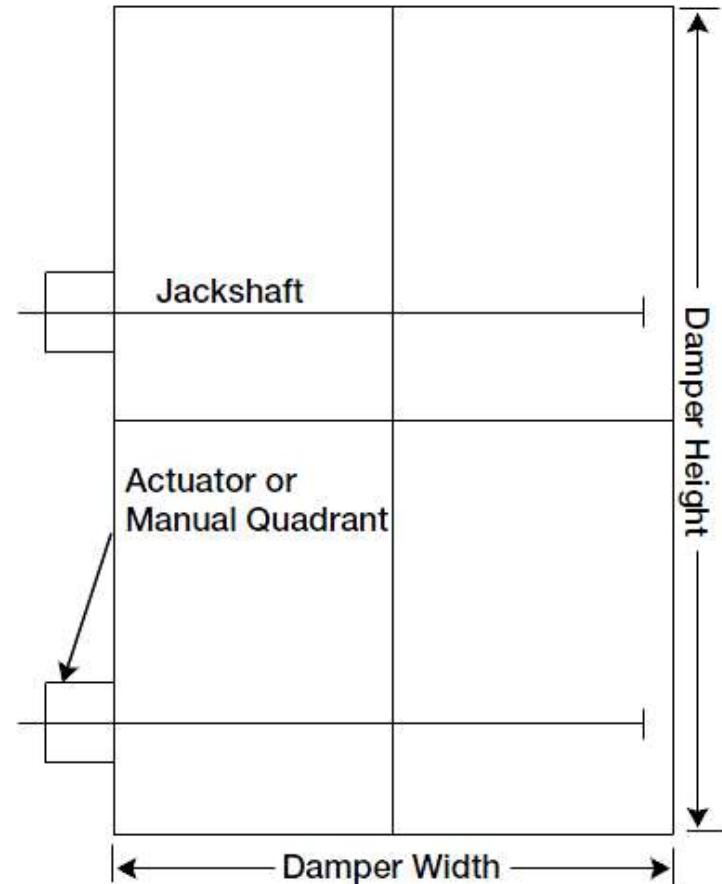
Greenheck
NEMA 7

Drive Arrangement

22-2FEL-2

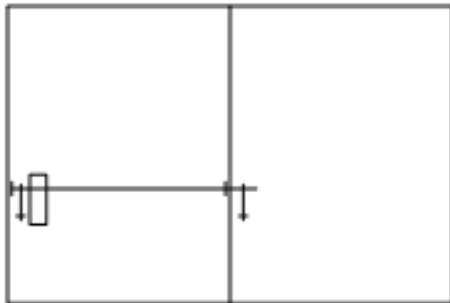
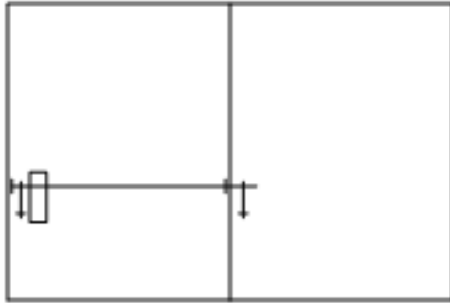
① ② ③ ④ ⑤ ⑥ ⑦

- 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
 - 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

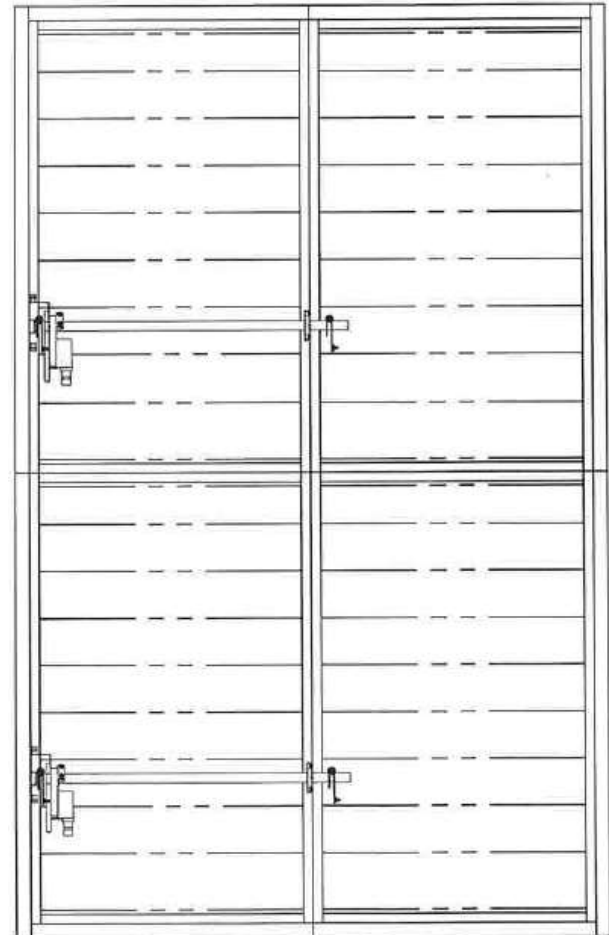


Drive Arrangement

- 22-2FIL-2



Shipping View



Specialty Control Dampers



Specialty Control Dampers

- ICD dampers
- FBH, FBV face and bypass dampers
- Manual balancing dampers
- Remote balancing dampers
- Vertical blade style dampers
- Round control dampers
- Severe Environment



ICD-44



MBDR-50



RBD-10

ICD's

- Purpose

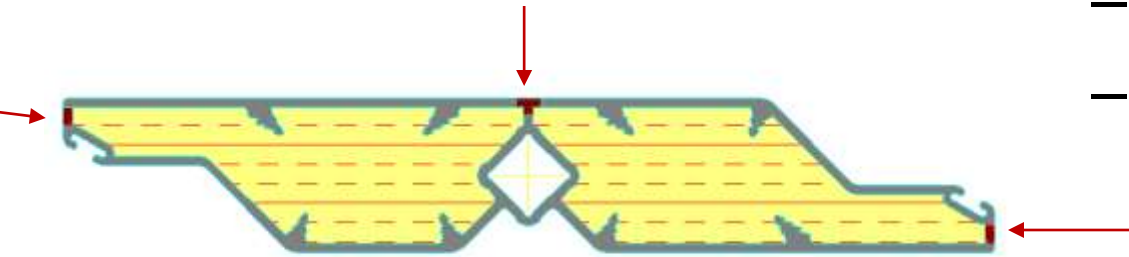
- Eliminate the transfer of heat or cold penetration
- Reduce condensation

- Construction

- Aluminum
 - ICD-44 optional
 - ICD-45 standard

- Thermal breaks

- Blades
- Frame (ICD-45)



Thermal breaks

Face and Bypass Dampers

- Two sections operating opposite of each other and consisting of a single actuator
- Greenheck models
 - Horizontal
 - FBH-23, FBH-33 and FBH-43
 - Vertical
 - FBV-23, FBV-33 and FBV-43



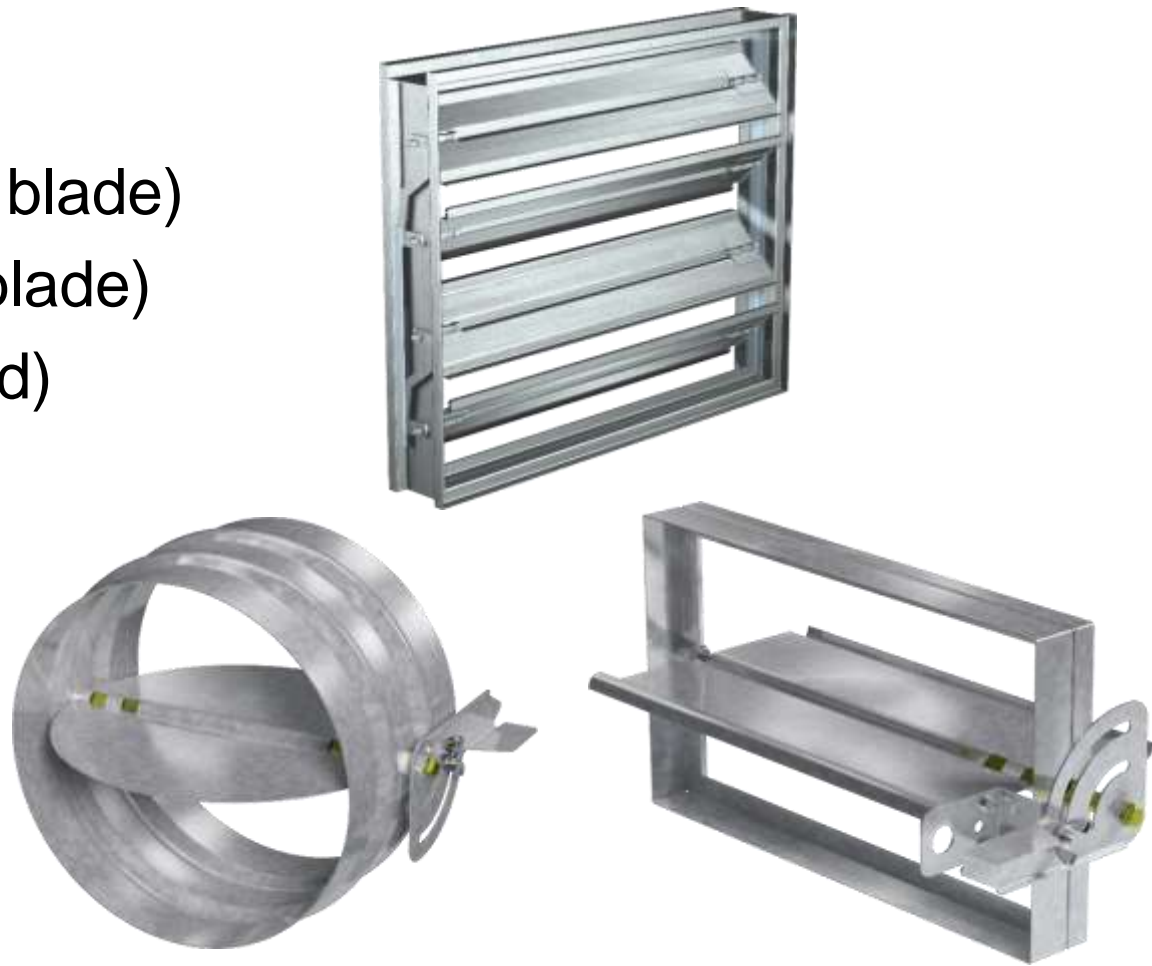
FBH



FBV

Manual Balancing Dampers

- MBD series
 - MBD-10 (single blade)
 - MBD-15 (multi blade)
 - MBDR-50 (round)

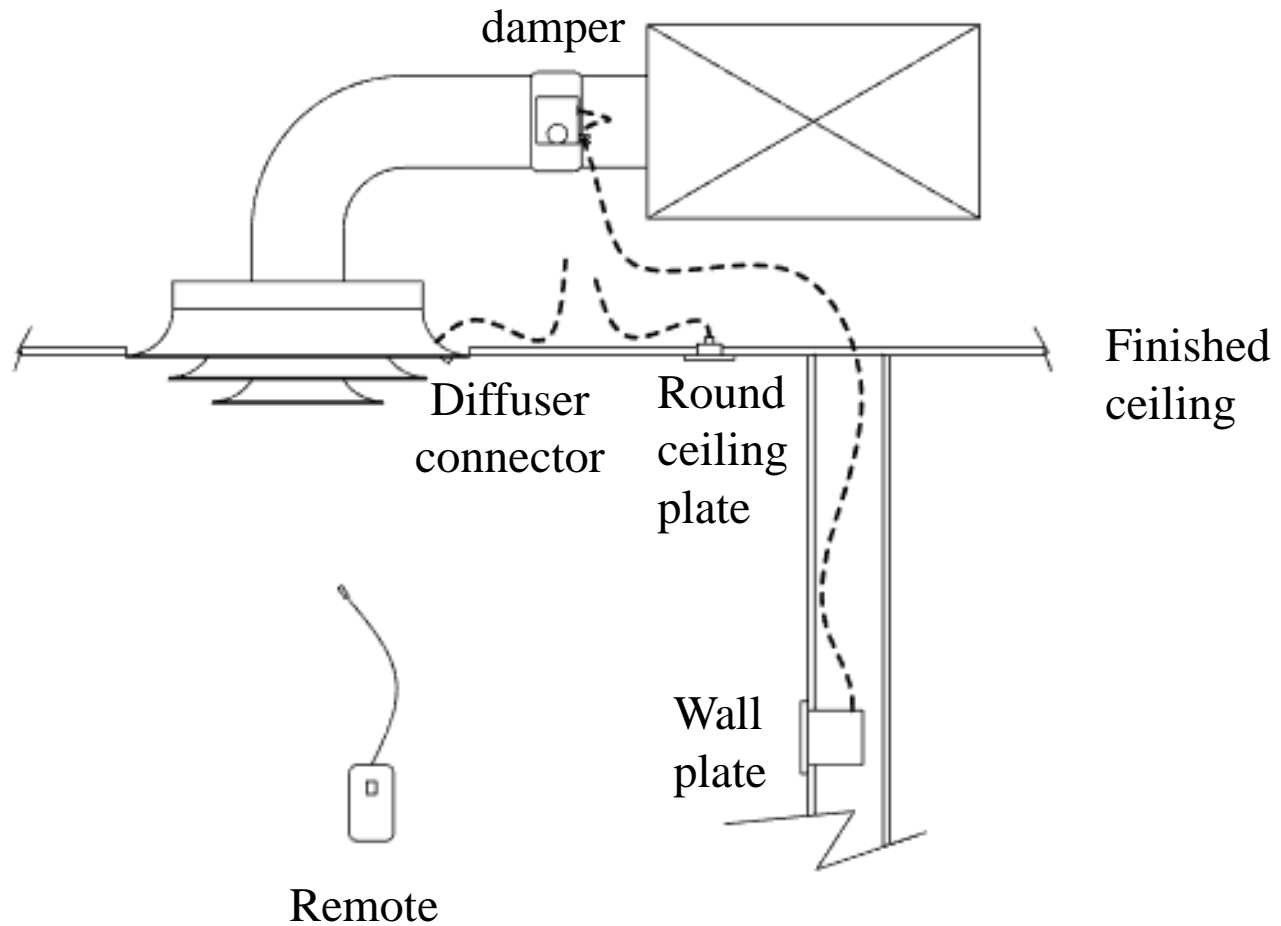


Remote Balancing Dampers

- Purpose
 - Used in applications where access is difficult
- Manual balancing dampers equipped with a 9V actuator kit
 - Remote control

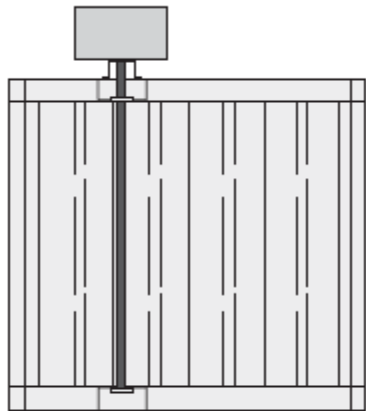


Remote Dampers



Vertical Blade Style Dampers

- Vertical blade style dampers
 - VCD-20V, -23V, - 33V, -42V, 43V

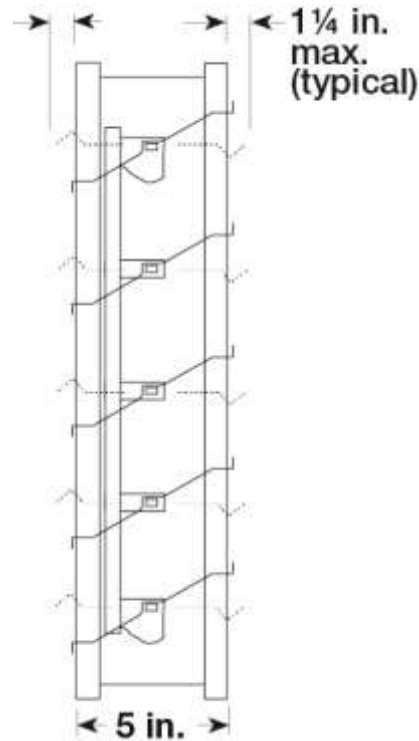


Vertical Blade

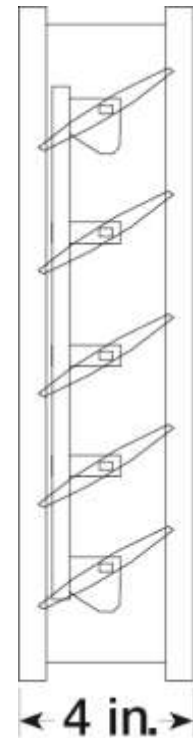


Narrowline Frame Damper

- Purpose
 - Keep the blades within the frame when open
- VCD-40



Typical VCD



VCD-40

Multiblade Round and Round Dampers

- Purpose
 - Used in round ductwork
- Multi-blade round
 - VCDRM-50
 - VCDRM-53 (blade seals)
 - Up to 48 in. diameter
- Round single blade dampers
 - VCDR-50
 - VCDR-53 (blade seal)



VCDRM



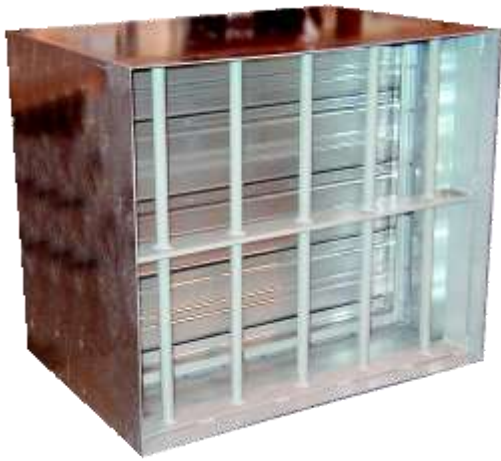
VCDR

Severe Environment Dampers

- Construction
 - 316 stainless steel
 - SEVCD-23
 - SEVCD-33
- Applications
 - Coastlines
 - Swimming pools
 - Labs
 - Wastewater treatment plants
 - Paper mills



Accessories



Accessories

- Security Bars
- OCI
- Retaining angles
- Tek screw construction
- Sleeves
- Sideplates



Security Bars

- Security bars
 - Crossed bar
 - Punched mid bar



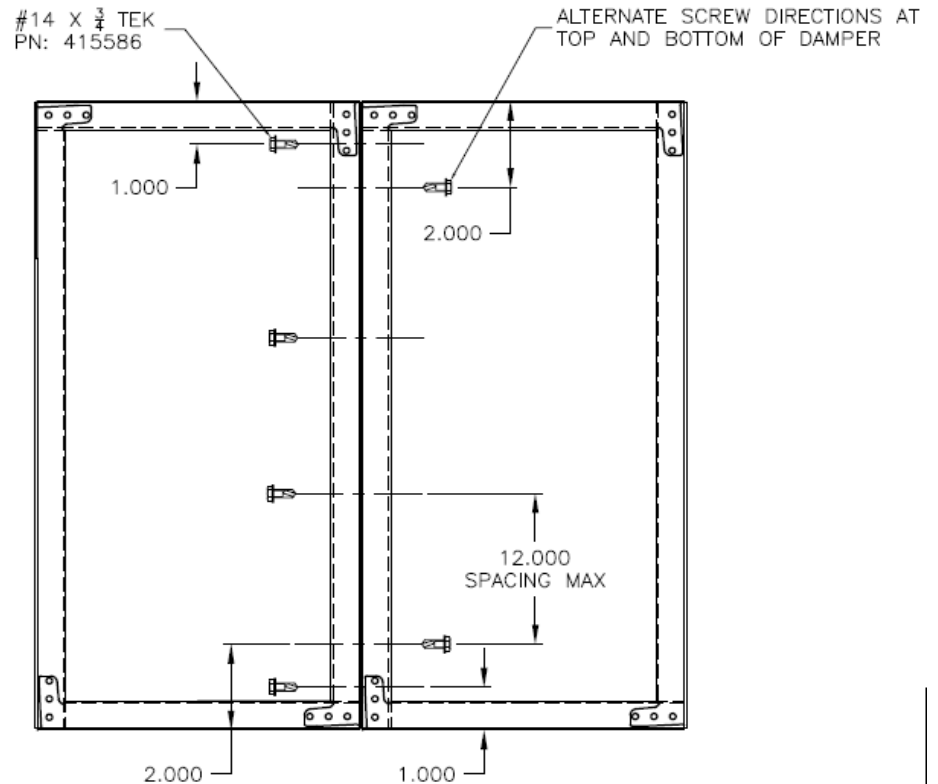
OCI and Retaining Angles

- OCI (Open Closed Indicator)
- Retaining angles



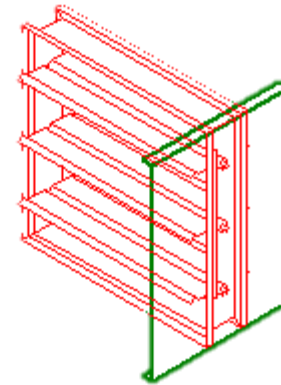
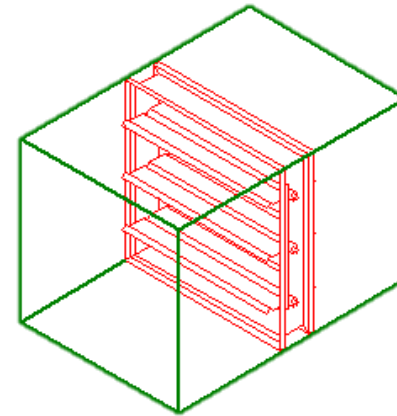
Tek Screw Construction

- Tek screw construction

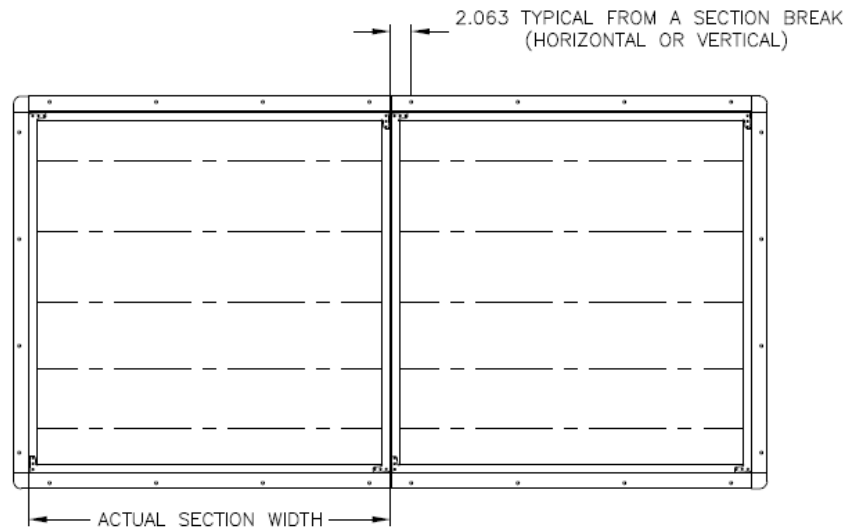
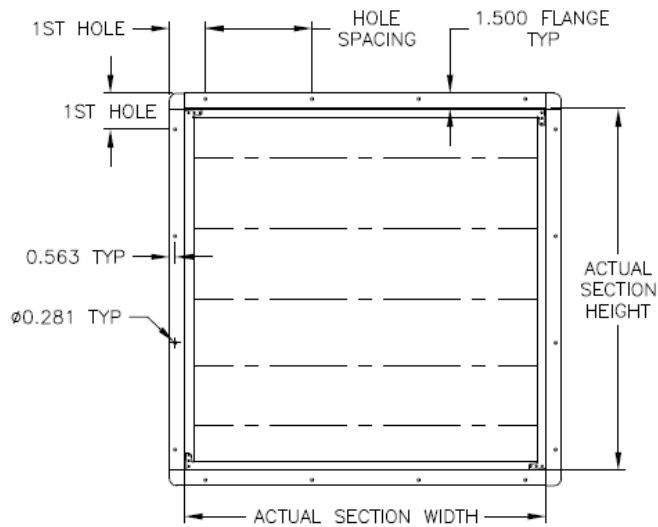


Sleeves/Sideplates

- Sleeves
- External sideplate



Mounting Holes



THE SAME FORMULAS/LOCATIONS ARE USED IN THE HORIZONTAL & VERTICAL DIRECTIONS

ACTUAL SECTION DIMENSION	FLANGE HOLE QUANTITY
<7.75	1
>=7.75 & <24.75	2
>=24.75 & <40.75	3
>=40.75 & <56.75	4
>=56.75	5

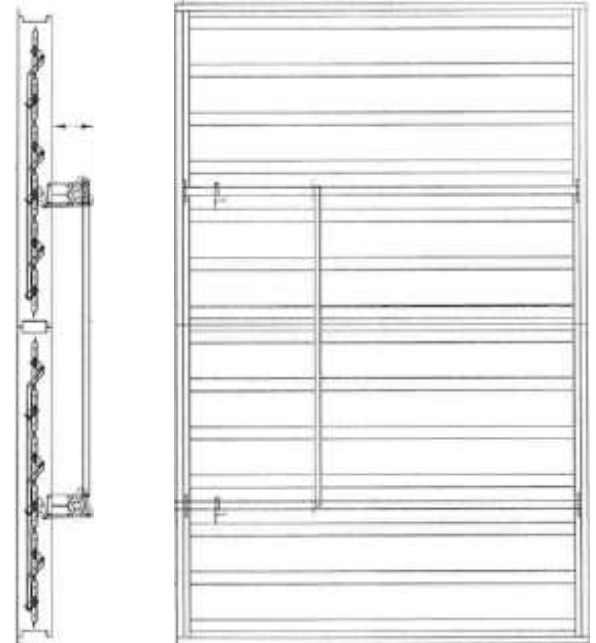
ACTUAL SECTION DIMENSION	1ST HOLE FROM EDGE OF FLANGE (ACTUAL SECTION DIMENSION / 2) + 1.5
<7.75	3.563
>=7.75	

ACTUAL SECTION DIMENSION	HOLE SPACING
<7.75	N/A
>=7.75	HOLES EVENLY SPACED ACROSS SECTION

ZZ2003256					
PART NO.	MATL	GUAGE	DESCRIPTION		
			FEUTZ	DATE	SCALE
			05/08/2014	1/10	
VCD-2X/3X FLANGE HOLE PATTERN			ZZ2003256		

Interconnecting Linkage

- Interconnecting linkage can be used to operate a top and bottom section with the use of one actuator
- This configuration can be done as a special design request



Installation

- Multiple section dampers
 - Tek screwed or spot welded together
- Mullions
 - Recommended for support if the dampers are two sections high or more. (customer supplied)
- Vertical damper installations
 - must be installed with the blades running horizontally. Turning the damper on its side will affect performance of the jamb seal and affect the performance of the damper .
- Cycle test dampers
 - After installation to affirm proper operation and to assure the assembly is free from bending or binding
- Opening needs to be square or level

Field Modifications

- It is acceptable to make changes in the field to control dampers
- The most common field modification is changing from internal to external mount and vice versa

872908	KIT,VCD,ACT BRKT,EXT,JACKSHAFTED	External Mount Kit 1" Jackshafed-Not to be used with SEVCD products consult dampers
872907	KIT,VCD,ACT BRKT,EXT,DIRECT DRIVE	External Mount Kit 1/2" Extension Pin-Not to be used with SEVCD products consult dampers
872700	KIT,VCD,ACT BRKT,.50IN,INT,90DEG	Internal Mount Kit 1/2" Extension Pin-Not to be used with SEVCD products consult dampers
872701	KIT,VCD,ACT BRKT,1IN,INT,90DEG	Internal Mount Kit 1" Jackshafed-Not to be used with SEVCD products consult dampers

- These consolidated kits were put together to convert dampers in the field



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