

Louvers

- Stationary
- Wind-Driven rain louvers
- Combination
- Adjustable
- Acoustical
- Penthouse louvers

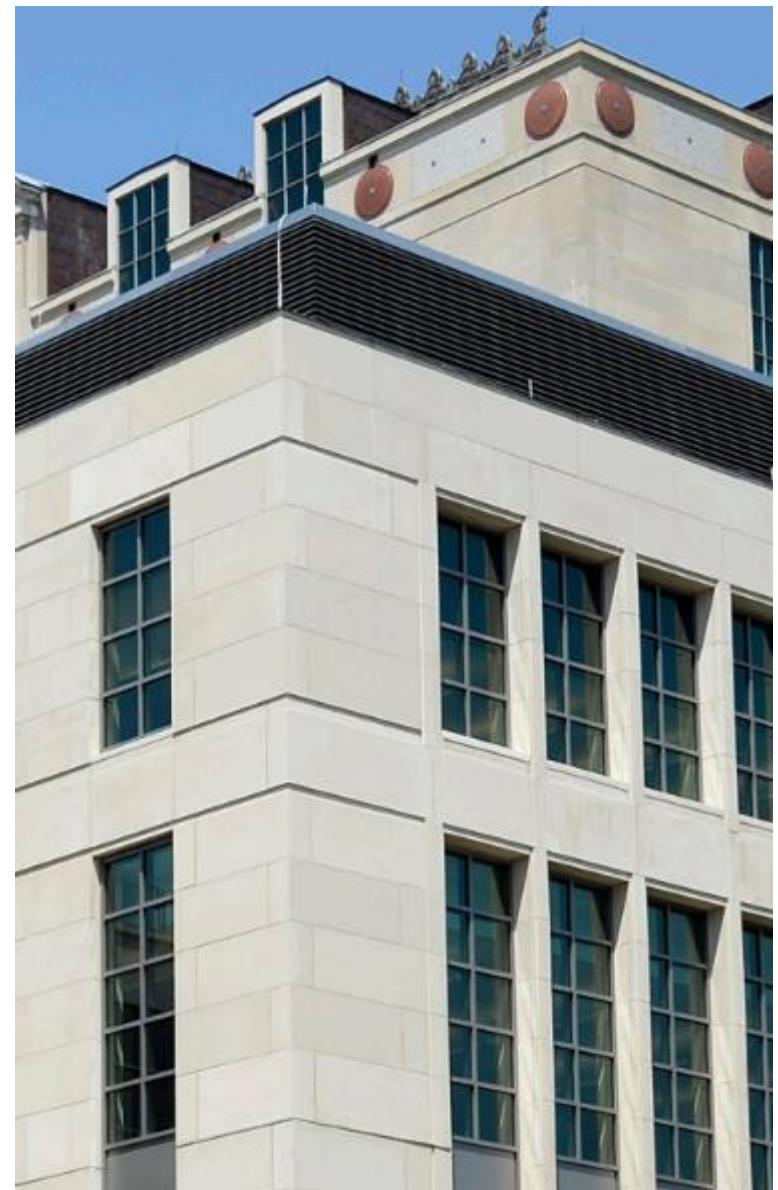


Dampers

- Commercial control, manual, and backdraft dampers
- Life Safety dampers



Louvers



Louvers

ADJUSTABLE LOUVERS



STATIONARY LOUVERS

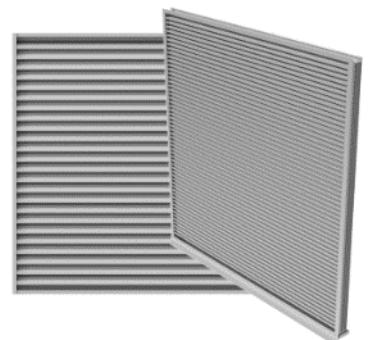


COMBINATION LOUVERS



SIGHT-PROOF LOUVERS

WIND-DRIVEN RAIN LOUVERS



GLAZING LOUVERS

ACOUSTICAL LOUVERS



HURRICANE LOUVERS

SPECIALTY LOUVERS

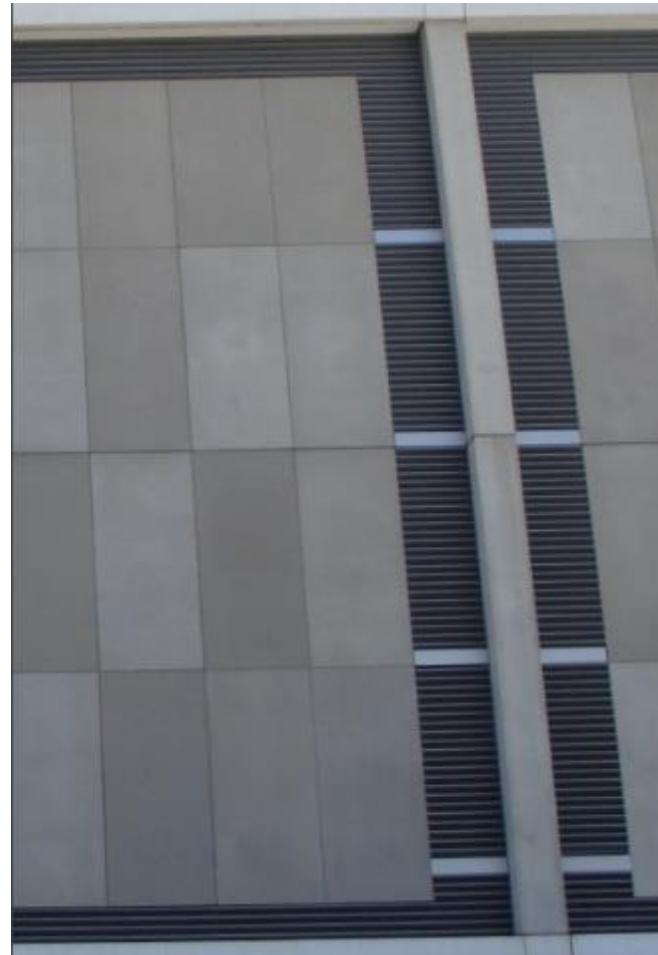
PENTHOUSE LOUVERS

Test standards

Third-party testing to validate manufacturing data

AMCA Standard 500D & 500L

- Pressure drop
- Airflow leakage
- Water penetration
- Wind-driven rain
- Wind-driven sand



ANSI/AMCA Standard 500-L

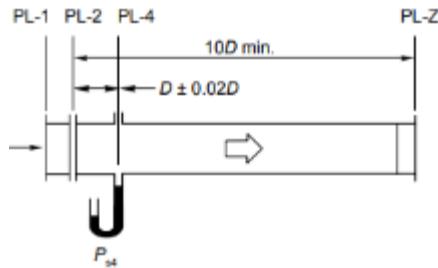
**Laboratory Methods
of Testing Louvers for Rating**



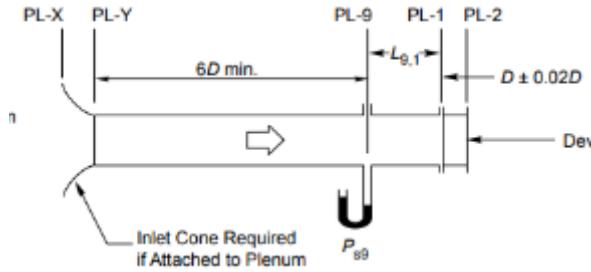
**Air Movement and Control
Association International**



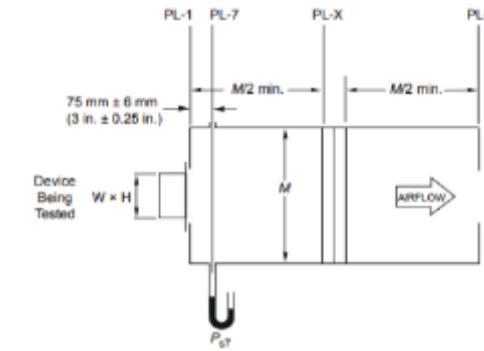
ANSI/AMCA Standard 500-L



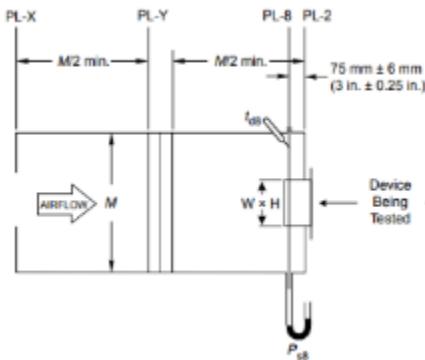
Test Figure 5.1 - Free Inlet, Ducted Outlet
Louver test setup with outlet duct



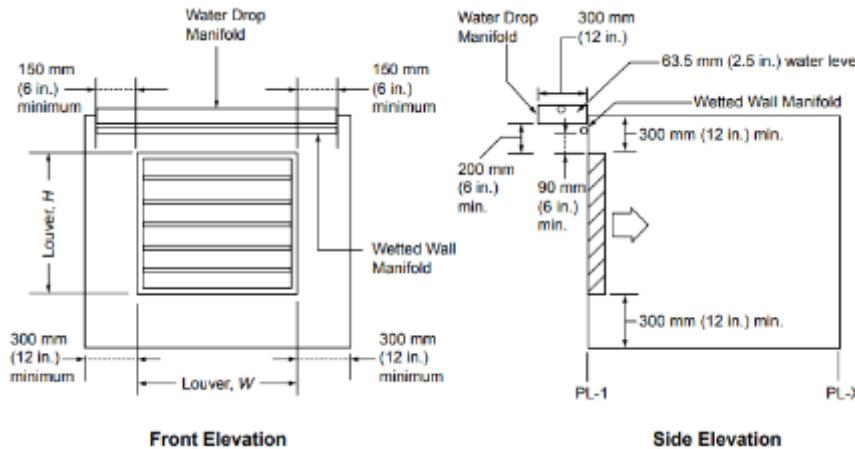
Test Figure 5.2 - Ducted Inlet, Free Outlet
Louver test setup with inlet duct



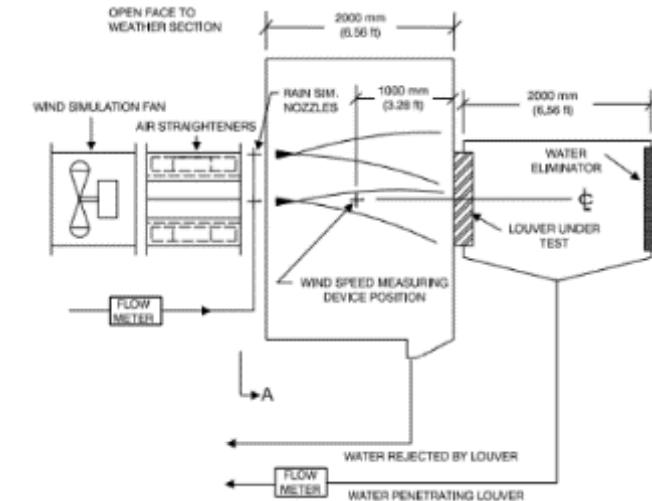
Test Figures 5.4 - Free Inlet, Free Outlet
Louver test setup with outlet chamber



Test Figures 5.5 - Free Inlet, Free Outlet
Louver test setup with inlet chamber



Test Figures 5.6 - Free Inlet, Free Outlet
Louver test setup with water penetration chamber



Test Figures 5.11 - Free Inlet, Free Outlet
Louver test Setup with Wind Driven Rain Chamber



**Laboratory Methods
of Testing Louvers for Rating**

- Tests conducted at ambient temperatures between 50°F and 104°F.
- Tested with airflow in both directions.
except products specifically labeled for airflow in only one direction
- Airflow rate \pm 5%
- 48" x 48" louver section (1 m x 1 m core for wind driven)
- Mill finish only
- No screen



**Laboratory Methods
of Testing Louvers for Rating**



screen pressure drop add



TABLE 401.5 OPENING SIZES IN LOUVERS, GRILLES AND SCREENS PROTECTING AIR INTAKE OPENINGS

OUTDOOR OPENING TYPE	MINIMUM AND MAXIMUM OPENING SIZES IN LOUVERS, GRILLES AND SCREENS ^a
Intake openings in residential occupancies	Not < $\frac{1}{4}$ inch and not > $\frac{1}{2}$ inch
Intake openings in other than residential occupancies	> $\frac{1}{4}$ inch and not > 1 inch



- 3% add for $\frac{1}{2}'' \times \frac{1}{2}''$ bird screen (~76% FA)
- 12% add for expanded metal bird screen (~72% FA)
- 16% add for mesh insect screen (~65% FA)

5/8 Inch .040 ALUM

1/2 Inch .063 AL

1/2 Inch 19G GLV

18-16 ALUM

18-16 FBRGLS

5/8 Inch .035 SS

1 Inch .080 ALUM

1/2 Inch .080 AL

1/4 Inch .047 AL

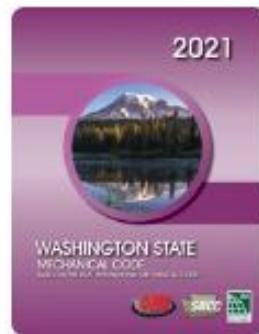
3/4 Inch .051 AL

1/2 Inch 12G GLV

1/2 Inch 16G GLV

1/2 Inch 16G SST

18-16 COPPER



2021 Washington State Mechanical Code



2022 Oregon Mechanical Specialty Code

Cut Sheet



ELF6350DMP

Drainable Stationary Louver
Extruded Aluminum

APPLICATION

The ELF6350DMP is a 6" deep extruded aluminum stationary louver that is designed to protect air intake and exhaust opening on exterior walls. This louver is designed with a drainable gutter system channeling water from the blades to downspouts in the jambs, where water is exhausted out of the front of the louver.

STANDARD CONSTRUCTION

Frame 6" (152) deep, 6063T6 extruded aluminum, .025" (0.2) nominal wall thickness. Downspouts and caulking surfaces provided.

Blades 6063T6 extruded aluminum with .090" (2.3) nominal wall thickness.

Drainable blades are positioned at 35° angle and spaced approximately 4" (102) center to center.

Screen 5/8" x .040" (16 x 1) expanded, flattened aluminum bird screen in removable frame. Screen adds approximately 1/2" (13) to louver depth.

Finish Mill.

Minimum Size 12" w x 12" h (305 x 305).

Approximate Shipping Weight 6 lbs./ft. (29.3 kg/m²).

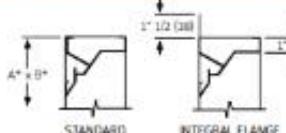
Maximum Factory Assembly Size Single sections shall not exceed 120" w x 90" h (3048 x 2286) or 90" w x 120" h (2286 x 3048). Louvers larger than the maximum factory assembly size will require field assembly of smaller sections.

Supports Louvers may be provided with rear mounted blade supports that increase overall louver depth depending on louver size, assembly configuration or windload.

FEATURES

- 62% Free Area
- Beginning point of water penetration above 1,250 fpm free area velocity
- Published performance ratings based on testing in accordance with AMCA Publication 511
- High performance frame system with drainable head collects and removes water to provide excellent water penetration performance
- Drain gutter in each blade minimizes water cascade between blades
- Continuous blades up to 120" (3048)
- All aluminum construction for low maintenance and high resistance to corrosion
- All welded construction

FRAME CONSTRUCTION



FREE AREA GUIDE

Free Area Guide shows free area in ft² and m² for various sizes of ELF6350DMP.

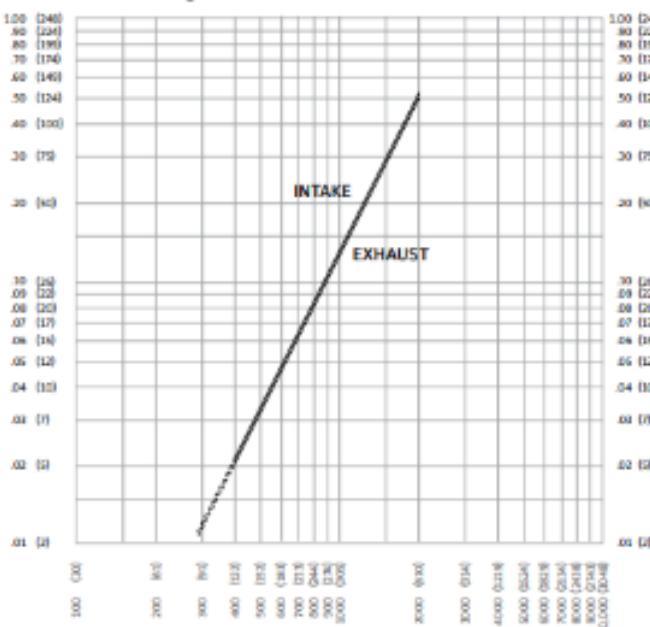
Width - Inches and Meters

HEIGHT	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120
12 0.30	0.29 0.03	0.46 0.04	0.64 0.06	0.81 0.08	0.98 0.09	1.16 0.11	1.33 0.12	1.50 0.14	1.68 0.16	1.85 0.17	2.02 0.19	2.20 0.20	2.37 0.22	2.54 0.24	2.71 0.25	2.89 0.27	3.06 0.28	3.23 0.30	3.41 0.32
18 0.45	0.63 0.06	1.01 0.09	1.38 0.13	1.76 0.16	2.14 0.20	2.51 0.23	2.89 0.27	3.26 0.30	3.64 0.34	4.02 0.37	4.39 0.41	4.77 0.44	5.15 0.48	5.52 0.51	5.90 0.55	6.27 0.58	6.65 0.62	7.03 0.65	7.40 0.69
24 0.60	0.97 0.09	1.55 0.14	2.13 0.20	2.71 0.25	3.29 0.31	3.87 0.36	4.45 0.41	5.03 0.47	5.61 0.52	6.19 0.58	6.76 0.63	7.34 0.68	7.92 0.74	8.50 0.79	9.08 0.84	9.66 0.90	10.24 0.95	10.82 1.01	11.40 1.06
30 0.75	1.23 0.11	1.97 0.18	2.70 0.25	3.44 0.32	4.17 0.39	4.90 0.46	5.64 0.52	6.37 0.59	7.11 0.66	7.84 0.73	8.58 0.80	9.31 0.87	10.05 0.93	10.78 1.00	11.51 1.07	12.25 1.14	12.98 1.21	13.72 1.28	14.45 1.34
36 0.90	1.57 0.15	2.51 0.23	3.45 0.32	4.38 0.41	5.32 0.49	6.26 0.58	7.20 0.67	8.13 0.76	9.07 0.84	10.01 0.93	10.95 1.02	11.88 1.11	12.82 1.19	13.76 1.28	14.70 1.37	15.63 1.45	16.57 1.54	17.51 1.63	18.45 1.72
42 1.05	1.83 0.17	2.93 0.27	4.02 0.37	5.11 0.48	6.20 0.58	7.30 0.68	8.39 0.78	9.48 0.81	10.57 0.91	11.67 1.07	12.76 1.17	13.85 1.25	14.94 1.34	16.04 1.43	17.13 1.51	18.22 1.59	19.31 1.67	20.41 1.75	21.50 1.80
48 1.20	2.17 0.20	3.47 0.32	4.76 0.44	6.06 0.56	7.36 0.68	8.65 0.80	9.95 0.93	11.1 1.01											
54 1.35	2.43 0.23	3.88 0.36	5.33 0.50	6.79 0.63	8.24 0.77	9.69 0.90	11.14 1.04	12.5 1.11											
60 1.50	2.77 0.26	4.43 0.41	6.08 0.57	7.74 0.72	9.39 0.87	11.04 1.03	12.70 1.18	14.3 1.31											
66 1.65	3.11 0.29	4.97 0.46	6.83 0.64	8.69 0.81	10.54 0.98	12.40 1.15	14.26 1.33	16.1 1.50											
72 1.80	3.37 0.31	5.39 0.50	7.40 0.69	9.41 0.88	11.42 1.06	13.44 1.25	15.45 1.44	17.4 1.61											
78 1.95	3.72 0.35	5.93 0.55	8.15 0.76	10.36 0.96	12.58 1.17	14.79 1.38	17.01 1.58	19.2 1.78											
84 2.10	3.98 0.37	6.35 0.59	8.72 0.81	11.09 1.03	13.46 1.25	15.83 1.47	18.20 1.69	20.5 1.91											
90 2.25	4.32 0.40	6.89 0.64	9.46 0.88	12.04 1.12	14.61 1.36	17.18 1.60	19.76 1.84	22.3 2.01											
96 2.40	4.58 0.43	7.30 0.68	10.03 0.93	12.76 1.19	15.49 1.44	18.22 1.69	20.95 1.95	23.6 2.21											
102 2.55	4.92 0.46	7.85 0.73	10.78 1.00	13.71 1.28	16.64 1.55	19.57 1.82	22.51 2.09	25.4 2.31											
108 2.70	5.26 0.49	8.39 0.78	11.53 1.07	14.66 1.36	17.80 1.65	20.93 1.95	24.06 2.24	27.2 2.51											
114 2.85	5.52 0.51	8.81 0.82	12.10 1.13	15.39 1.43	18.68 1.74	21.97 2.04	25.26 2.35	28.5 2.61											
120 3.00	5.86 0.54	9.35 0.87	12.84 1.19	16.34 1.52	19.83 1.84	23.32 2.17	26.81 2.49	30.3 2.81											

Height - Inches and Meters	Static Pressure Drop in inches w.g. and (Pa)
1.00 (248)	0.00 (0)
.90 (224)	0.00 (0)
.80 (199)	0.00 (0)
.70 (174)	0.00 (0)
.60 (149)	0.00 (0)
.50 (124)	0.00 (0)
.40 (100)	0.00 (0)
.30 (75)	0.00 (0)
.20 (50)	0.00 (0)
.10 (25)	0.00 (0)
.05 (12.5)	0.00 (0)
.02 (6.25)	0.00 (0)
.01 (3.125)	0.00 (0)

PRESSURE DROP

Test size 48" x 48" (1219 X 1219)
Ratings do not include the effect of a bird screen.



Air Velocity in feet and (meters) per minute through Free Area
(Data corrected to standard air density and AMCA figure or figures tested to 5.5)



Ruskin Manufacturing Company certifies that the ELF6350DMP louvers 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 Program. The AMCA Certified Ratings Seal applies to air performance ratings and water penetration ratings only.

HORIZONTAL BLADES

BLADE STYLES

A louver's blade style will determine the louver's performance and purpose. Non-drainable blades are favored by the architectural community because these blades give a louver a continuous sight line that is architecturally pleasing. Drainable blades help to channel water toward the jambs of a louver and down chutes built into the jambs. Wind-driven rain-style blades offer drainable protection and their design keeps wind-driven rain from infiltrating the louver. V-blades and Y-blades can be used as a sight screen to help hide equipment along with providing ventilation. Acoustical blades have an acoustical filler inside that helps to reduce noise.



VERTICAL BLADES



Main Menu

Louvers

Schedule

Rep Locator

/ Louvers



Stationary



Wind Driven



Hurricane



Adjustable



Combination



Acoustical

Louver Selection



[Home](#) / Louvers / Stationary

Required Inputs

Selection Method	Width (Inches)	Flow (CFM)	Max Pressure Drop (in. wg)	Intake/Exhaust
Width, Airflow, Pressure Drop	72.00	10000	0.10	Intake

Advanced Inputs

Certification	Louver Depth	Material	Blade Type
AMCA 500-L Air Performance, AMCA 500-L Water Penetration	4.00", 6.00", 5.00", 3.00"	Aluminium	Drainable - Single Drain

Water Penetration Factor
1.15

SEARCH

	Add To Schedule	Model	Material	Frame Thick.	Louver Depth	Blade	Width (in)	Height (in)	Free ↑ Area (ft²)	Free Area %	Free Area Vel (fpm)	Pressure Drop (w.g.)	Beginning Water Pen.(fpm)	Water Pen. Safety Factor	Cost Index	Sect. Width	Sect. Height
1	<button>ADD</button>	ELP6350DMP	Aluminium	0.125"	6"	Horiz - Drainable - Single Drain	72	44	13.74	62	728	0.07	1250	1.72	1.05	12"- 120"	12"- 120"
2	<button>ADD</button>	ELP6375DX	Aluminium	0.081"	6"	Horiz - Drainable - Single Drain	72	50	14.59	58	685	0.08	1023	1.49	1	12"- 120"	12"- 120"
3	<button>ADD</button>	ELP6375DXH	Aluminium	0.081"	6"	Horiz - Drainable - Single Drain	72	50	14.59	58	685	0.08	1023	1.49	1	12"- 120"	12"- 120"
4	<button>ADD</button>	ELP6375DFL	Aluminium	0.081"	6"	Horiz - Drainable - Single Drain	72	53	14.9	56	671	0.07	1023	1.52	1.06	12"- 120"	12"- 120"
5	<button>ADD</button>	ELF445DX	Aluminium	0.081"	4"	Horiz - Drainable - Single Drain	72	59	15.74	53	635	0.08	1075	1.69	1.29	12"- 120"	12"- 120"
6	<button>ADD</button>	ELF445DXH	Aluminium	0.125"	4"	Horiz - Drainable - Single Drain	72	59	15.74	53	635	0.08	1075	1.69	1.58	12"- 120"	12"- 120"
7	<button>ADD</button>	ELF375DX	Aluminium	0.081"	4"	Horiz - Drainable - Single Drain	72	58	15.99	55	626	0.08	873	1.4	1.49	12"- 120"	12"- 120"
8	<button>ADD</button>	ELF375DFL	Aluminium	0.081"	4"	Horiz - Drainable - Single Drain	72	58	15.99	55	626	0.08	873	1.4	1.49	12"- 120"	12"- 120"
9	<button>ADD</button>	ELF375DXH	Aluminium	0.125"	4"	Horiz - Drainable - Single Drain	72	58	16.08	56	622	0.08	873	1.4	1.49	12"- 120"	12"- 120"

Louvers - stationary



Home / Louvers / Stationary

Required Inputs

Selection Method	Width (Inches)	Height (Inches)	Flow (CFM)	Intake/Exhaust
Width, Height, Airflow	72.00	44.00	10000	Intake

Advanced Inputs

Certification	Louver Depth	Material	Blade Type
AMCA 500-L Air Performance, AMCA 500-L Water Penetration	4.00", 6.00", 5.00", 3.00"	Aluminium	Drainable - Single Drain

Water Penetration Factor

1.15

SEARCH

	Add To Schedule	Model	Material	Frame Thick.	Louver Depth	Blade	Width (in)	Height (in)	Free Area (ft²)	Free Area %	Free Area Vel (fpm)	Pressure + Drop (w.g.)	Beginning Water Pen.(fpm)	Water Pen. Safety Factor	Cost Index	Sect. Width	Sect. Height
1	<button>ADD</button>	ELF6350DMP	Aluminium	0.125"	6"	Horiz - Drainable - Single Drain	72	44	13.74	62	728	0.07	1250	1.72	1.19	12"- 120"	12"- 120"
2	<button>ADD</button>	ELF6375DFL	Aluminium	0.081"	6"	Horiz - Drainable - Single Drain	72	44	13.55	62	738	0.09	1023	1.39	1	12"- 120"	12"- 120"
3	<button>ADD</button>	ELF6375DX	Aluminium	0.081"	6"	Horiz - Drainable - Single Drain	72	44	12.64	58	791	0.1	1023	1.29	1	12"- 120"	12"- 120"
4	<button>ADD</button>	ELF6375DXH	Aluminium	0.081"	6"	Horiz - Drainable - Single Drain	72	44	12.64	58	791	0.1	1023	1.29	1	12"- 120"	12"- 120"
5	⚠	ELF375DXH	Aluminium	0.125"	4"	Horiz - Drainable - Single Drain	72	44	12.33	56	811	0.13	873	1.08	1.29	12"- 120"	12"- 120"
6	⚠	ELF375DX	Aluminium	0.081"	4"	Horiz - Drainable - Single Drain	72	44	12.03	55	831	0.14	873	1.05	1.29	12"- 120"	12"- 120"
7	⚠	ELF375DFL	Aluminium	0.081"	4"	Horiz - Drainable - Single Drain	72	44	12.03	55	831	0.14	873	1.05	1.29	12"- 120"	12"- 120"
8	<button>ADD</button>	ELF445DX	Aluminium	0.081"	4"	Horiz - Drainable - Single Drain	72	44	11.49	52	870	0.15	1075	1.24	1.1	12"- 120"	12"- 120"
9	<button>ADD</button>	ELF445DXH	Aluminium	0.125"	4"	Horiz - Drainable - Single Drain	72	44	11.49	52	870	0.15	1075	1.24	1.34	12"- 120"	12"- 120"

Required Inputs

Selection Method Width, Airflow, Pressure Drop	Width (Inches) 72.00	Flow (CFM) 10000	Max Pressure Drop (in. wg) 0.10	Intake/Exhaust Intake
---	-------------------------	---------------------	------------------------------------	--------------------------

Advanced Inputs

Certification AMCA 500-L Air Performance, AMCA 500-L Wind Driven Rain, ...	Louver Depth	Material Aluminium	Blade Type
Water Penetration Factor 1.15			

SEARCH

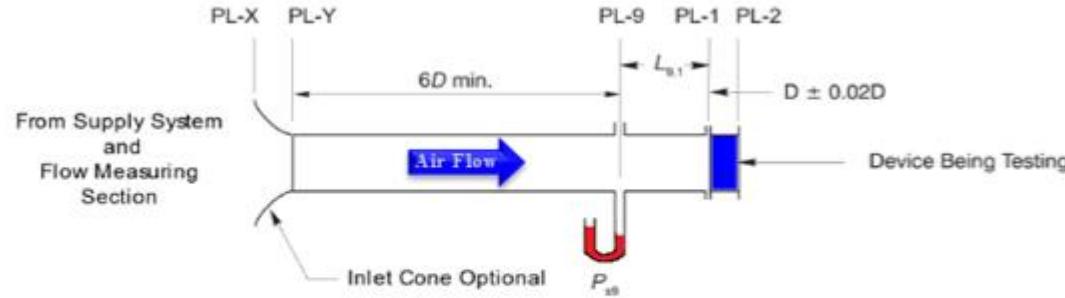
	Add To Schedule	Model	Material	Frame Thick.	Louver Depth	Blade	Width (in)	Height (in)	Free Area (ft ²)	Free Area %	Free Area Vel (fpm)	Pressure Drop (w.g.)	Beginning Water Pen.(fpm)	Water Pen. Safety Factor	Cost Index	Class A 29 MPH Wind VEL (fpm)	Class A 50 MPH Wind VEL (fpm)	Sect. Width	Sect. Height
		Contains...	Contains...	Equals...	Equals...	Contains...	Equals...	Equals...	Equals...	Equals...	Equals...	Equals...	Equals...	Equals...	Equals...	Equals...	Contains...	Contains...	Contains...
1	ADD	EME220DD	Aluminium	0.06"	2"	Horiz - Wind-Driven	72	77	17.27	45	579	0.1	680	N/A	1	1209	757	6"- 120"	6"- 120"
2	ADD	EME362S	Aluminium	0.06"	3"	Vert - Wind-Driven	72	47	10.45	45	957	0.1	2024	N/A	1.2	2010	2024	12"- 48"	12"- 96"
3	ADD	EME745	Aluminium	0.081"	7"	Horiz - Wind-Driven	72	54	14.31	53	699	0.1	874	N/A	1.23	874	N/A	12"- 120"	12"- 90"
4	ADD	EME420DD	Aluminium	0.081"	4"	Horiz - Wind-Driven	72	70	15.18	43	659	0.1	1067	N/A	1.42	1190	759	12"- 120"	6"- 120"
5	ADD	EME420DDE	Aluminium	0.081"	4"	Horiz - Wind-Driven	72	70	15.18	43	659	0.1	1067	1.62	1.42	1190	759	12"- 120"	12"- 120"
6	ADD	EME520DD	Aluminium	0.081"	5"	Horiz - Wind-Driven	72	56	13.59	49	736	0.1	1250	N/A	1.46	1361	778	12"- 120"	12"- 120"
7	ADD	EME520DDE	Aluminium	0.081"	5"	Horiz - Wind-Driven	72	56	13.59	49	736	0.1	1250	1.7	1.46	1361	778	12"- 120"	12"- 120"
8	ADD	EME520V	Aluminium	0.08"	5"	Vert - Wind-Driven	72	60	13.43	45	745	0.1	2261	3.04	1.57	2237	2261	12"- 120"	12"- 120"
9	ADD	EME620DD	Aluminium	0.081"	6"	Horiz - Wind-Driven	72	59	14.43	49	693	0.1	1250	1.8	1.64	N/A	N/A	8"- 120"	8"- 120"
10	ADD	EME662S	Aluminium	0.125"	6"	Vert - Wind-Driven	72	46	9.35	41	1070	0.1	2175	N/A	1.66	2149	2175	12"- 48"	12"- 96"

Dampers

RUSKIN
AUTHORITY IN AIR CONTROL

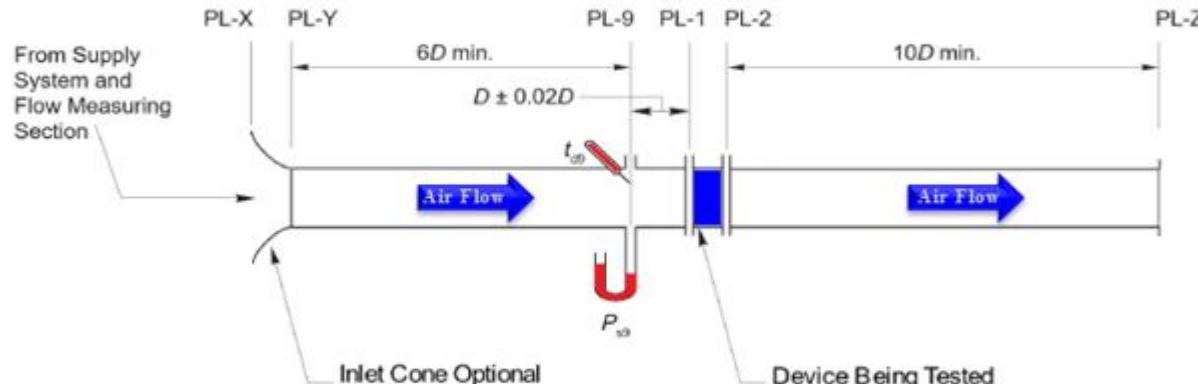


ANSI/AMCA Standard 500-D



Test Figure 5.2 — Test Damper Setup with Inlet Duct

ANSI/AMCA 500-D-18



Note: Less than 30% Blockage 70% or greater Free Area may use 4D upstream & 6D downstream.

Test Figure 5.3 — Test Damper Setup with Inlet and Outlet Ducts

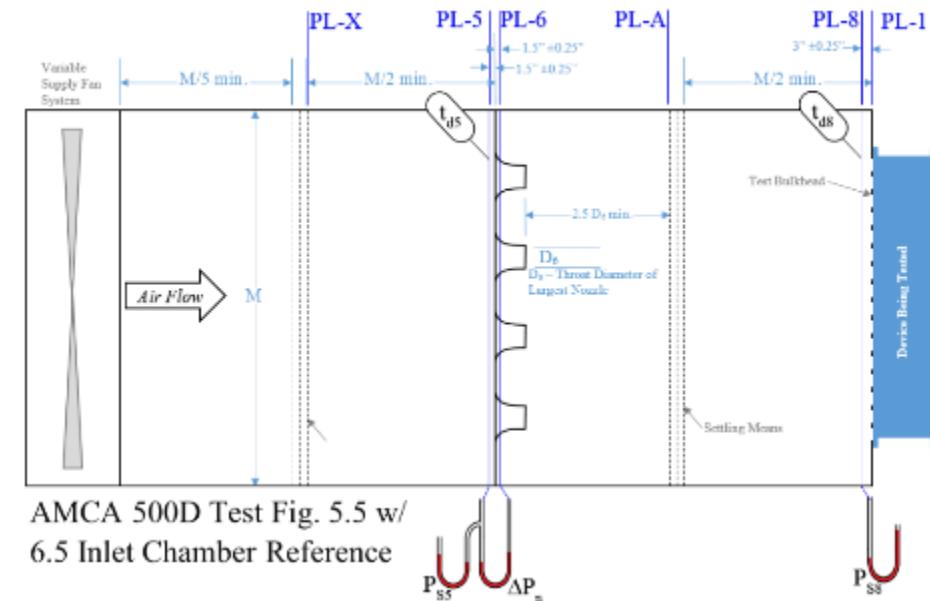
ANSI/AMCA 500-D-18

Exhaust Testing



ANSI/AMCA
Standard 500-D-18

Laboratory Methods of Testing
Dampers for Rating



AMCA 500D Test Fig. 5.5 w/
6.5 Inlet Chamber Reference



Rectangular

- 12" x 12"
- 24" x 24"
- 36" x 36"
- 12" x 48"
- 48" x 12"

Rectangular (backdraft)

- 24" x 24"

Round

- 12" dia.
- 24" dia.
- 36" dia.

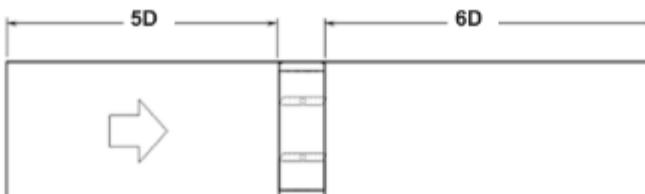
Round (backdraft)

- 24" dia.



Pressure Drop Data

CD60 air performance testing is performed in accordance with AMCA Standard 500-D configuration 5.3 as illustrated below. All data are corrected to standard air density of .075 lb/ft³ (1.201 kg/m³).



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

12" x 12" (305 x 305)	
Velocity (fpm)	Pressure Drop (in.wg)
499	0.02
869	0.06
1417	0.17
1980	0.34
2986	0.79

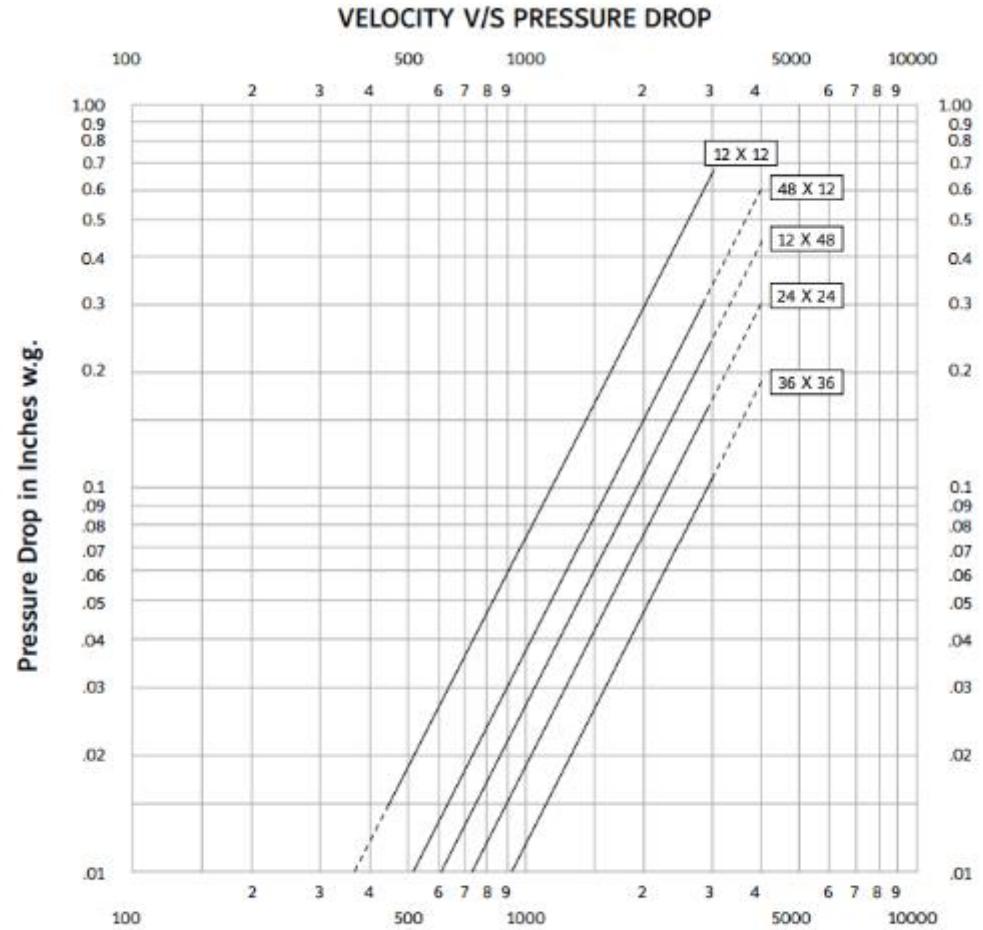
24" x 24" (610 x 610)	
Velocity (fpm)	Pressure Drop (in.wg)
506	0.005
998	0.03
1514	0.06
2012	0.11
2867	0.22

36" x 36" (914 x 914)	
Velocity (fpm)	Pressure Drop (in.wg)
517	0.005
1007	0.02
1519	0.06
2019	0.10
3004	0.12

12" x 48" (305 x 1219)	
Velocity (fpm)	Pressure Drop (in.wg)
508	0.005
1002	0.03
1519	0.06
2019	0.10
2883	0.21

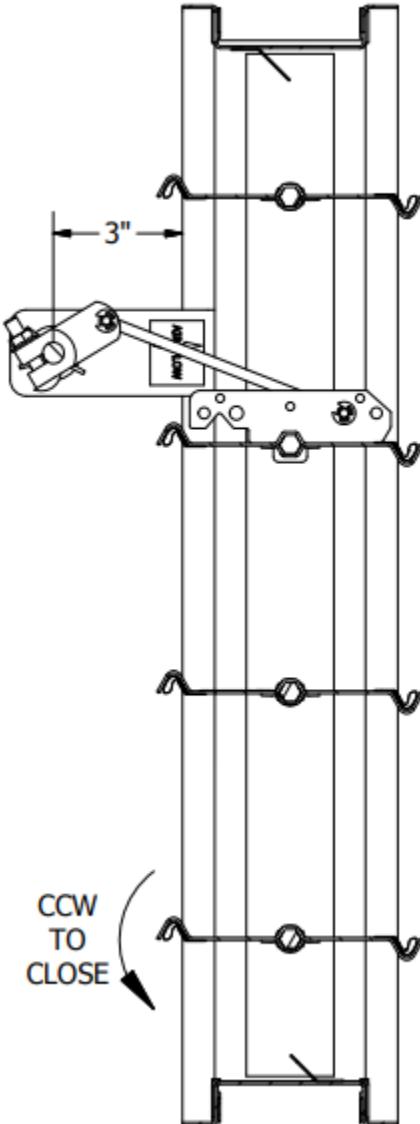
48" x 12" (1219 x 305)	
Velocity (fpm)	Pressure Drop (in.wg)
509	0.01
1005	0.04
1523	0.08
2024	0.16
2884	0.32

AMCA figure 5.3 was established to represent a fully ducted damper with straight duct upstream and downstream. With entrance and exit losses minimized by this straight duct arrangement, this configuration has the lowest pressure drop of all three configurations.

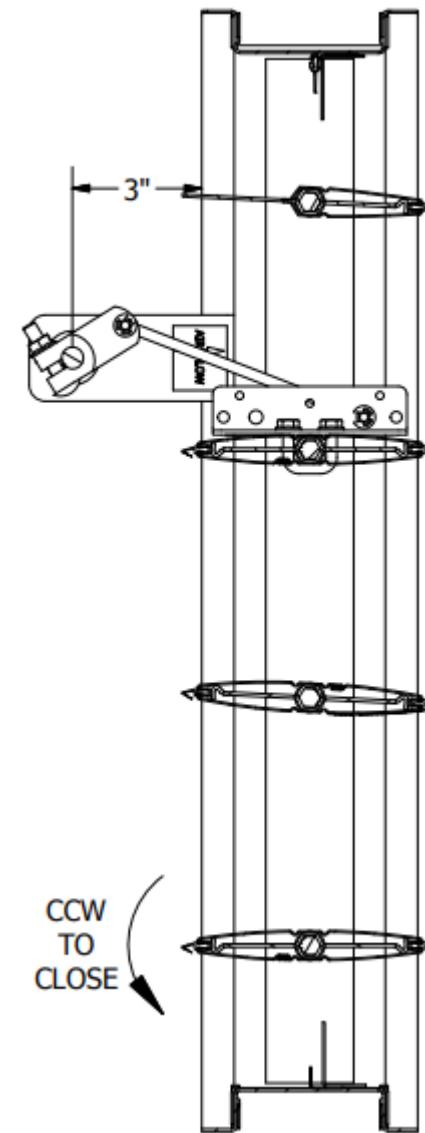
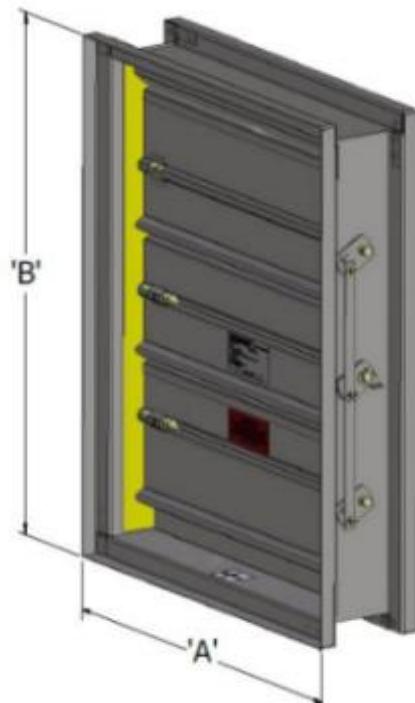


Face Velocity - Feet/Minute AMCA Fig. 5.3
CD50DC sizes 12 x 12, 24 x 24, 48 x 12, 12 x 48, 36 x 36 (305 x 305, 610 x 610, 1219 x 305, 305 x 1219, 914 x 914)
All data corrected to represent standard air at a density of 0.075 lbs/ft³.

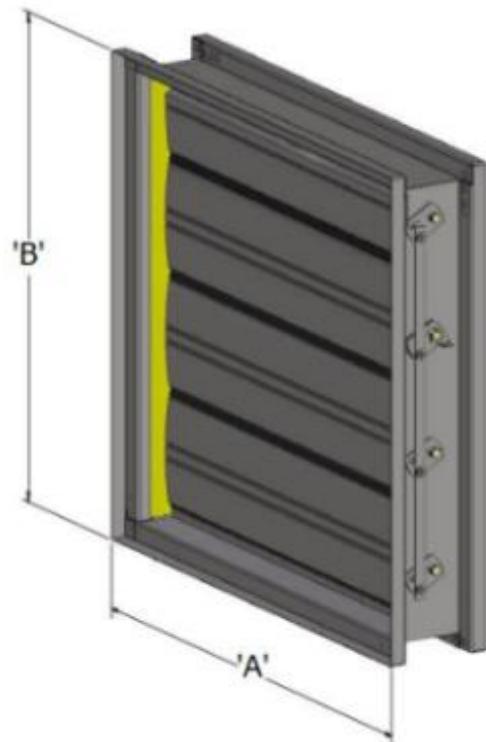
Commercial Control Dampers – Blade type



V-Groove Blades



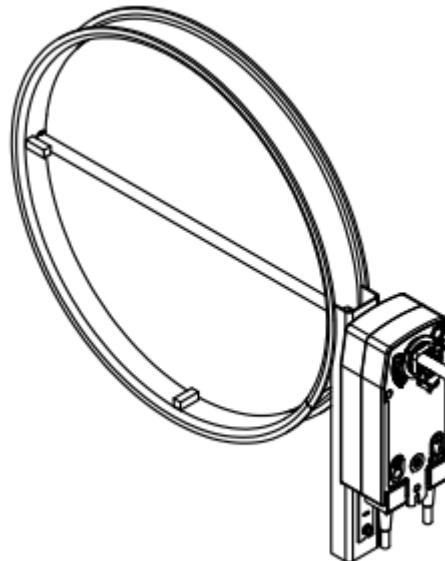
Airfoil Blades
~ 50 to 60 % less ΔP



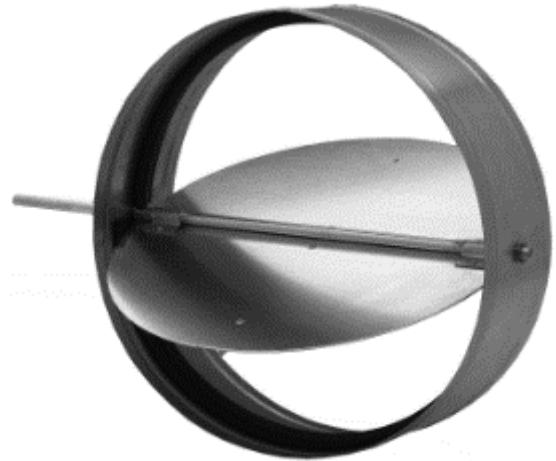
Commercial Control Dampers – Blade style



Insulated
Less free area
Higher pressure drop



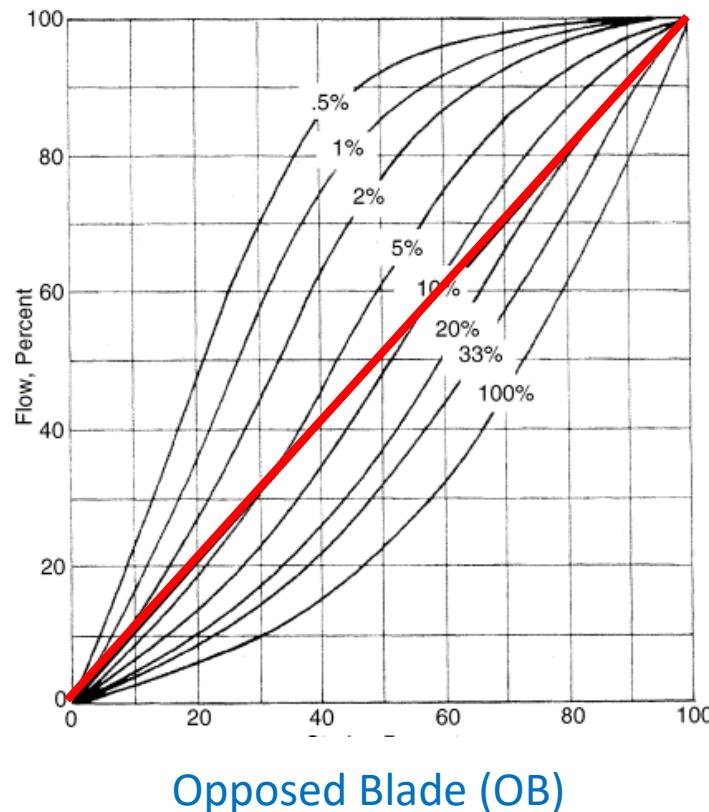
Single blade



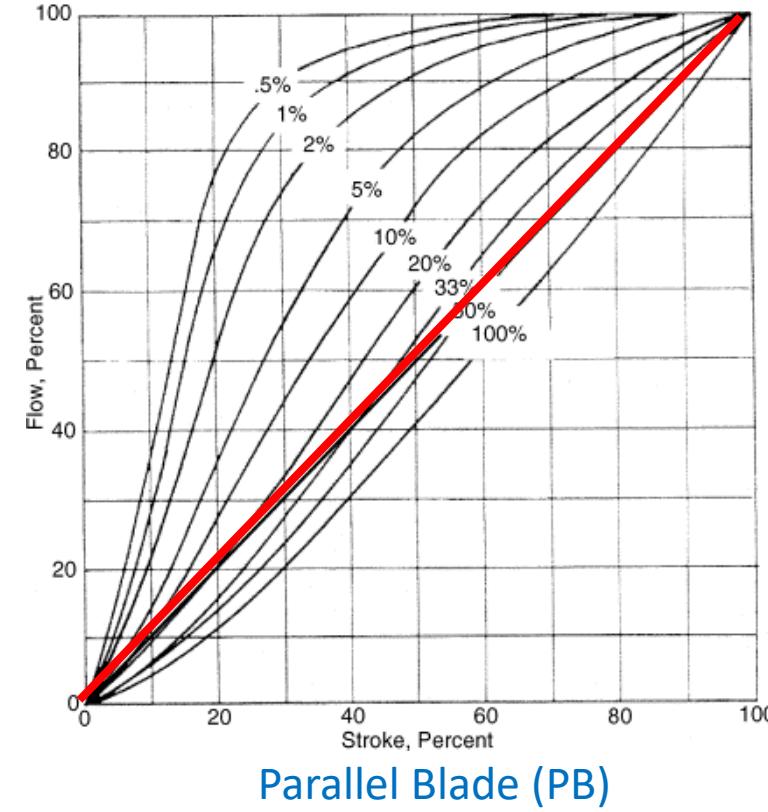
Dampers – Damper Authority

$$\text{Damper Authority (\%)} = \frac{\text{Open damper } \Delta P}{\text{Total system pressure drop}} \times 100\%$$

- Total system pressure not fan total static pressure
- Only where the damper controls the flow.
- Linear proportional control
 - Damper authority 10% to 15% - Go with OB
 - Damper authority 30% to 50% - Go with PB
- Higher velocity – Go with parallel blade



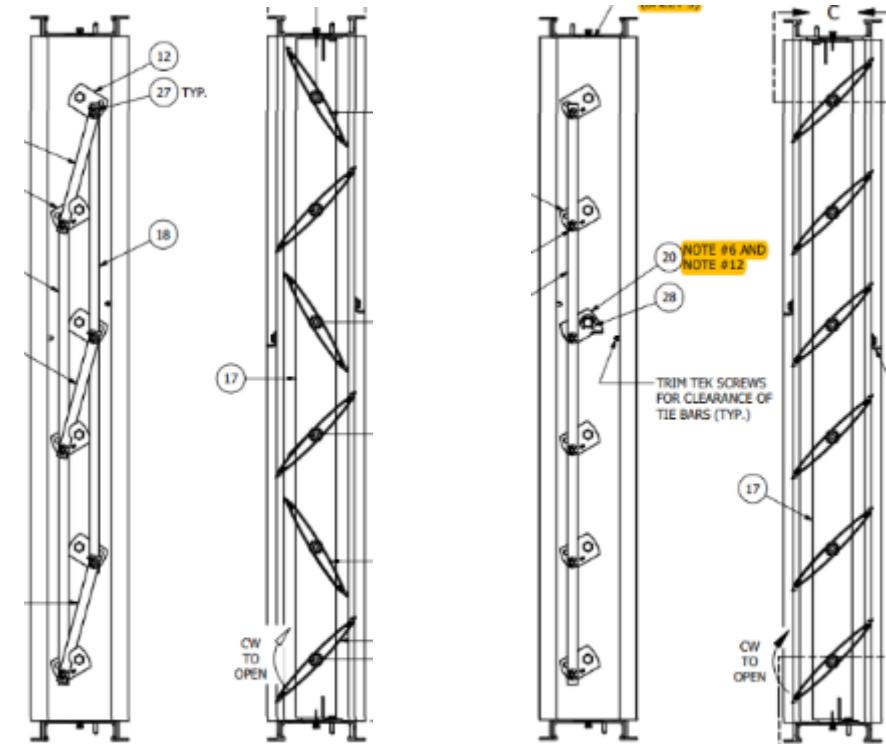
Opposed Blade (OB)



Parallel Blade (PB)

Dampers – Parallel vs. Opposed

Model	With Seals	Without Seals
CD35, CD355	5 in. lbs./sq. ft.	2 1/2 in. lbs./sq. ft.
CD36, CD356, IL35	7 in. lbs./sq. ft.	N/A
Opposed Blades: CD40, CD403, CD50, CD504, CD51, CD60, IL60	5 in. lbs./sq. ft.	N/A
Parallel Blades: CD40, CD403, CD50, CD504, CD51, CD60, IL60	7 in. lbs./sq. ft.	N/A
CDR25 (Diameter in inches)	$([4 \times \text{Dia.}] + 20)$ in. lbs.	$(1\frac{1}{2} \times \text{Dia.})$ in. lbs.
CDRS25 (Diameter in inches)	$([4 \times \text{Dia.}] + 20)$ in. lbs.	N/A
CDRS15 (Diameter in inches)	$(1\frac{1}{2} \times \text{Dia.})$ in. lbs.	$(1\frac{1}{2} \times \text{Dia.})$ in. lbs.
CD40x2	14 in. lbs./sq. ft.	N/A
CDT150, CDT150BF	11 in. lbs./sq. ft.	N/A
TED50, TED50XT	9 in. lbs./sq. ft.	N/A

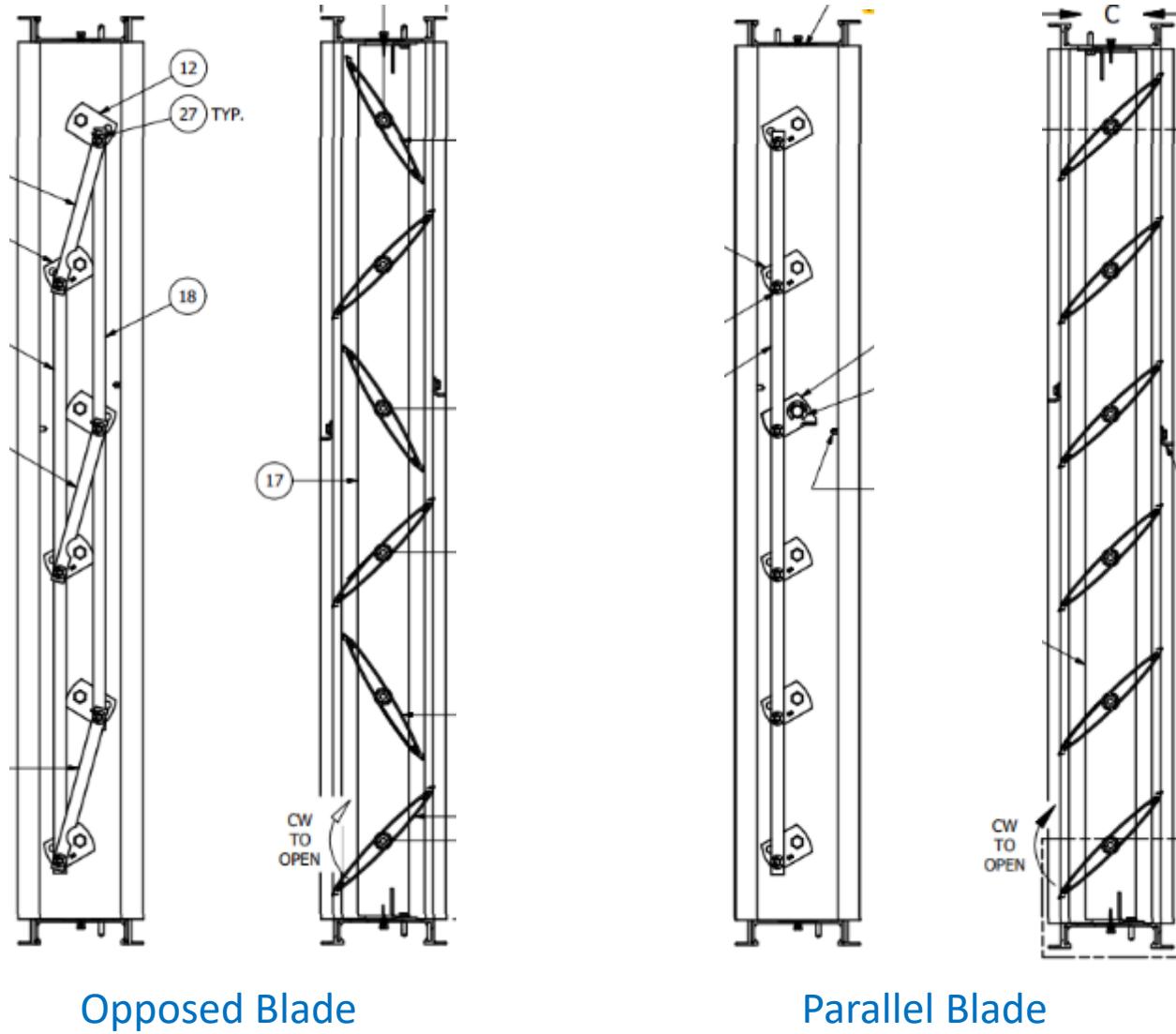
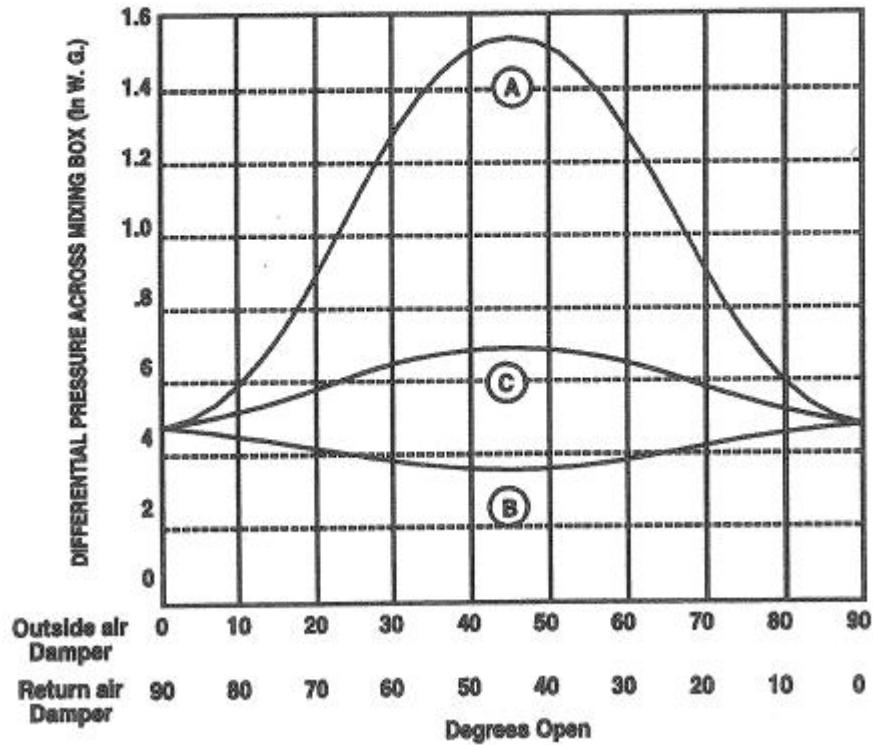


Opposed Blade

Parallel Blade

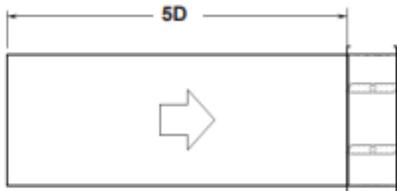
Dampers – Blade Action

- Curve (A) Opposed blade dampers
- Curve (B) Parallel blade dampers
- Curve (C) Ideal damper
(combination opposed & parallel blade)



Dampers Location

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



TED50
36"x36"
Q = 13K cfm
0.08" w.g./100 ft of duct

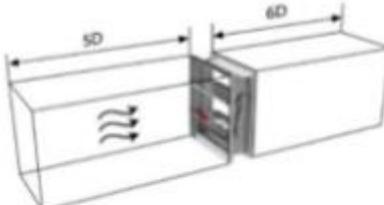
12 x 12 (305 x 305)		24 x 24 (610 x 610)		36 x 36 (914 x 914)		12 x 48 (305 x 1219)		48 x 12 (1219 x 305)	
Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)
500	0.09	500	0.03	500	0.02	500	0.03	500	0.05
1000	0.38	1000	0.11	1000	0.08	1000	0.13	1000	0.21
1500	0.85	1500	0.25	1500	0.18	1500	0.30	1500	0.47
2000	1.50	2000	0.44	2000	0.33	2000	0.52	2000	0.83
2500	2.35	2500	0.69	2500	0.51	2500	0.82	2500	1.30
3000	3.41	3000	1.00	3000	0.74	3000	1.18	3000	1.87
3500	4.64	3500	1.36	3500	1.02	3500	1.60	3500	2.51
4000	6.06	4000	1.78	4000	1.33	4000	2.09	4000	3.28



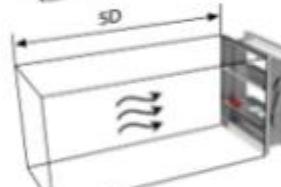
12 x 12 (305 x 305)		24 x 24 (610 x 610)		36 x 36 (914 x 914)		12 x 48 (305 x 1219)		48 x 12 (1219 x 305)	
Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)
500	0.06	500	0.01	500	0.01	500	0.02	500	0.03
1000	0.24	1000	0.06	1000	0.03	1000	0.08	1000	0.10
1500	0.54	1500	0.13	1500	0.08	1500	0.16	1500	0.24
2000	0.97	2000	0.22	2000	0.13	2000	0.28	2000	0.41
2500	1.51	2500	0.34	2500	0.20	2500	0.44	2500	0.54
3000	2.18	3000	0.49	3000	0.29	3000	0.62	3000	0.93
3500	2.96	3500	0.65	3500	0.39	3500	0.84	3500	1.27
4000	3.86	4000	0.86	4000	0.51	4000	1.07	4000	1.65

AMCA figure 5.3 was established to represent a fully ducted damper with straight duct upstream and downstream. With entrance and exit losses minimized by this straight duct arrangement, this configuration has the lowest pressure drop of all three configurations

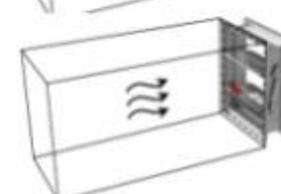
12 x 12 (305 x 305)		24 x 24 (610 x 610)		36 x 36 (914 x 914)		12 x 48 (305 x 1219)		48 x 12 (1219 x 305)	
Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)	Velocity (fpm)	Pressure Drop (in.wg)
500	0.11	500	0.05	500	0.05	500	0.19	500	0.20
1000	0.45	1000	0.45	1000	0.42	1000	0.77	1000	0.79
1500	0.95	1500	0.95	1500	0.42	1500	1.68	1500	1.71
2000	1.68	2000	1.68	2000	1.17	2000	2.66	2000	2.62
2500	2.66	2500	2.66	2500	1.66	2500	3.84	2500	3.46
3000	3.84	3000	3.84	3000	2.29	3000	5.22	3000	3.35
3500	5.22	3500	5.22	3500	2.26	3500	7.40	3500	4.37
4000	6.82	4000	6.82	4000	2.95	4000	9.58	4000	5.16



AMCA Figure 5.3 was established to represent a fully ducted damper with straight duct upstream and downstream. With entrance and exit losses minimized by this straight duct arrangement, this configuration has the lowest pressure drop of all three configurations.

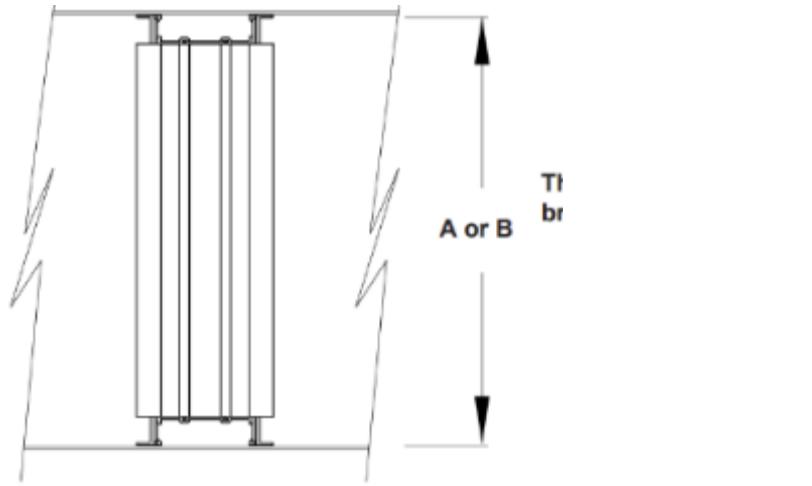
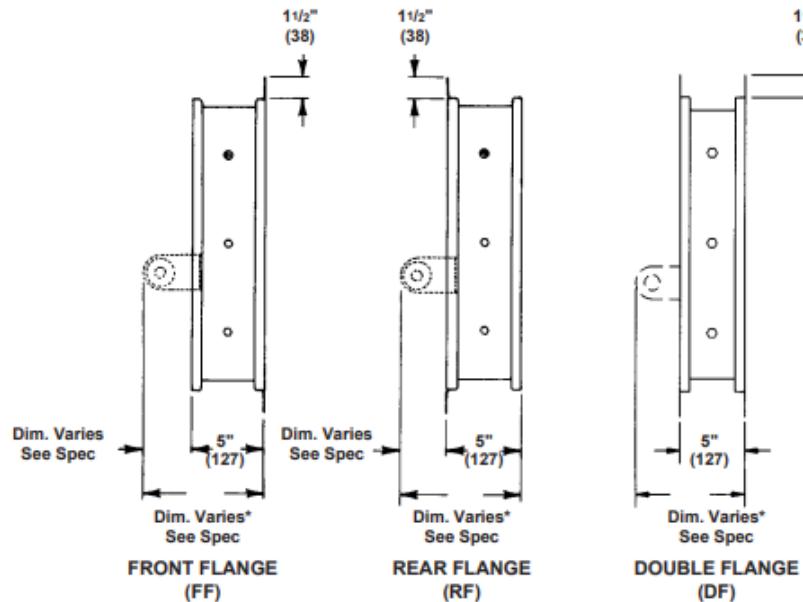
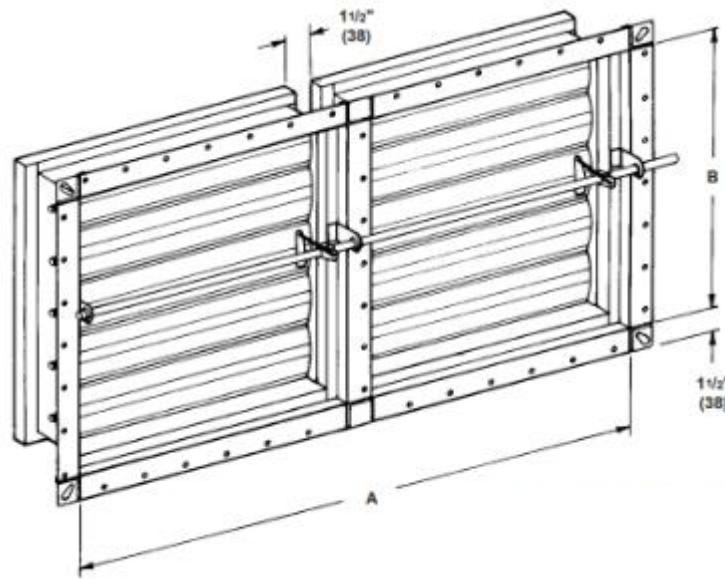


AMCA Figure 5.2 was established to represent a ducted damper that is exhausting into an open area. In this configuration, entrance losses are minimized by a straight duct run upstream of the damper.

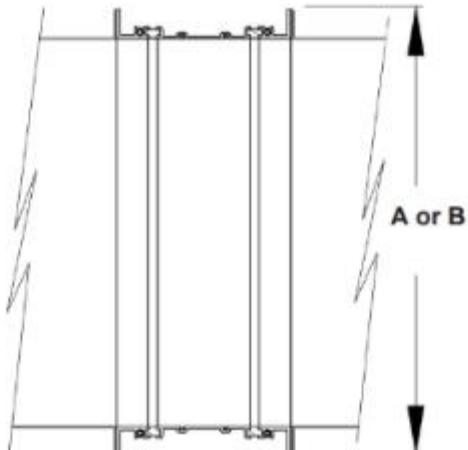


AMCA Figure 5.5 was established to represent a damper installed on a plenum wall. Sudden area changes entering and exiting the damper create extreme losses, making this the highest pressure drop of the three configurations tested.

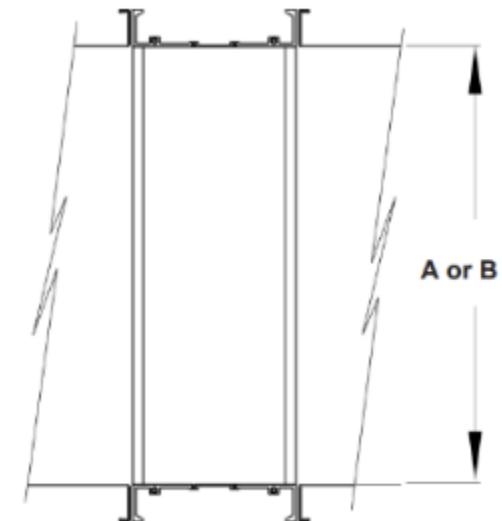
Dampers – duct mounted



Channel Frame In Duct Mounted
A x B dimensions are to O.D. of damper frame



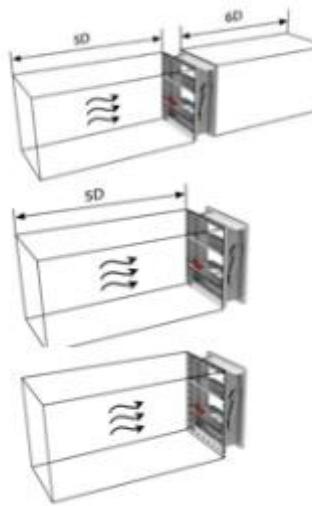
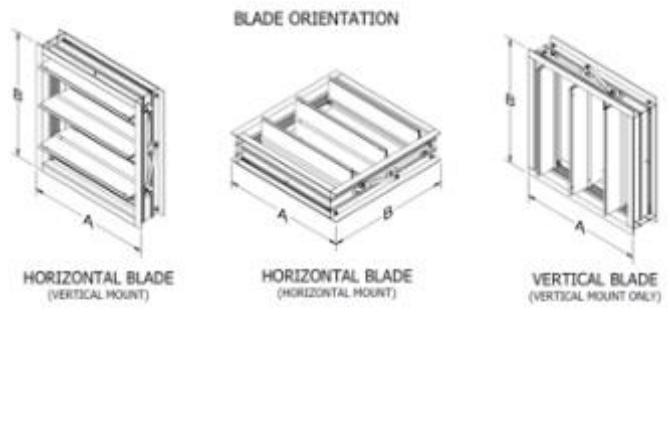
**Thermal Broke Frame
Flange Mounted**



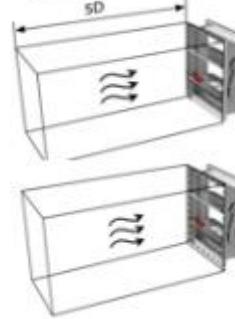
T-Flange Frame Mounting

Commercial Control Dampers

LINE#	MODEL	A DIM (WIDTH)	B DIM (HEIGHT)	TAG	BLADE ORIENTATION	VELOCITY FPM	AIRFLOW CFM	FREE AREA SQ.IN.	FREE AREA SQ.FT.	AMCA FIG. 5.3	AMCA FIG. 5.2	AMCA FIG. 5.5	SECTIONS
1	CD35	72	60		Horizontal	2000	60000	3611.97	25.08	0.107	0.000	0.000	(2 X 1)
2	CD36	72	60		Horizontal	2000	60000	3611.97	25.08	0.107	0.000	0.000	(2 X 1)
3	CD50	72	60		Horizontal	2000	60000	3450.60	23.96	0.049	0.278	0.605	(2 X 1)
4	CD60	72	60		Horizontal	2000	60000	3356.35	23.31	0.052	0.272	0.615	(2 X 1)
5	CD35V	72	60		Vertical	2000	60000	3418.41	23.74	0.124	0.000	0.000	(2 X 2)
6	CD40	72	60		Horizontal	2000	60000	3170.54	22.02	0.067	0.351	0.734	(2 X 1)
7	CD450	72	60		Horizontal	2000	60000	3403.26	23.63	0.090	0.268	0.730	(2 X 1)
8	CD50V	72	60		Vertical	2000	60000	3266.51	22.68	0.063	0.329	0.694	(2 X 2)
9	TED50	72	60		Horizontal	2000	60000	3060.14	21.25	0.088	0.230	0.606	(2 X 1)
10	TED50V	72	60		Vertical	2000	60000	2833.52	19.68	0.118	0.305	0.675	(2 X 2)



AMCA Figure 5.3 was established to represent a fully ducted damper with straight duct upstream and downstream. With entrance and exit losses minimized by this straight duct arrangement, this configuration has the lowest pressure drop of all three configurations.



AMCA Figure 5.2 was established to represent a ducted damper that is exhausting into an open area. In this configuration, entrance losses are minimized by a straight duct run upstream of the damper.

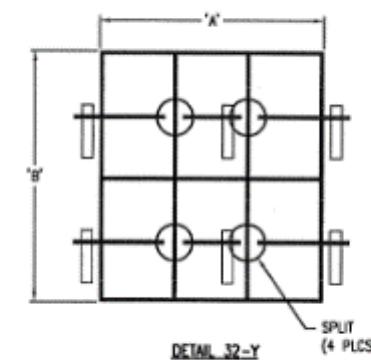
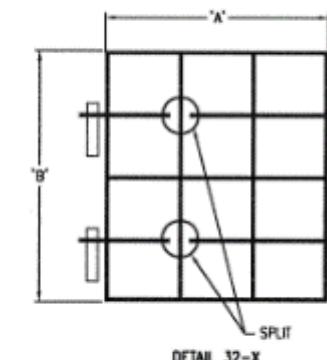
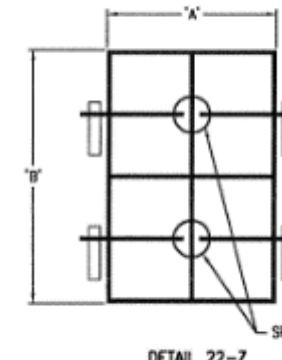
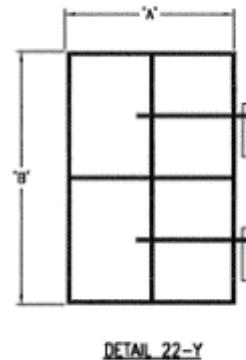
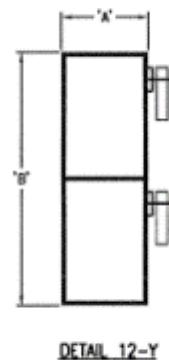
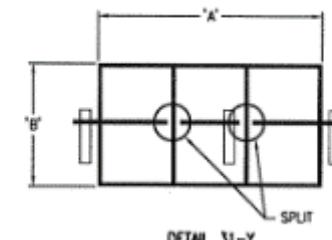
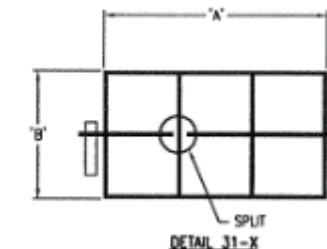
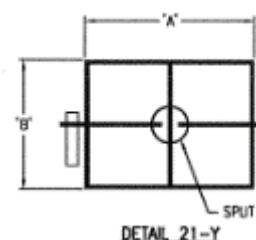
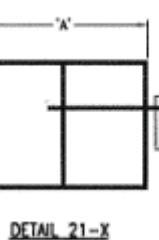
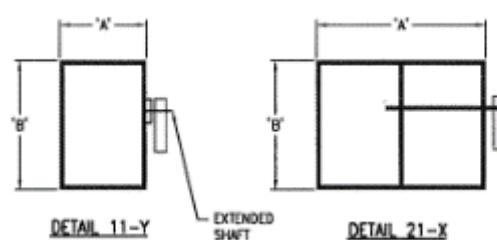


AMCA Figure 5.5 was established to represent a damper installed on a plenum wall. Sudden area changes entering and exiting the damper create extreme losses, making this the highest pressure drop of the three configurations tested.

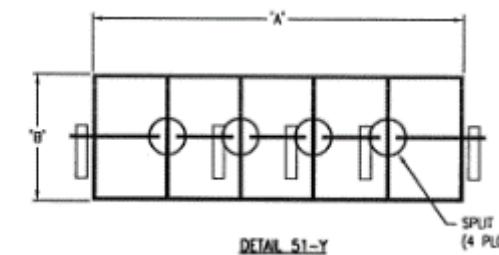
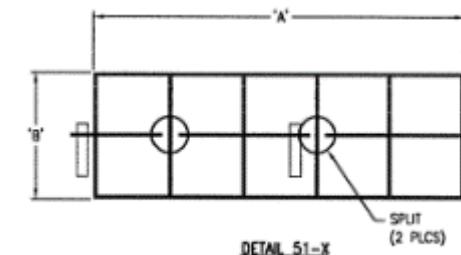
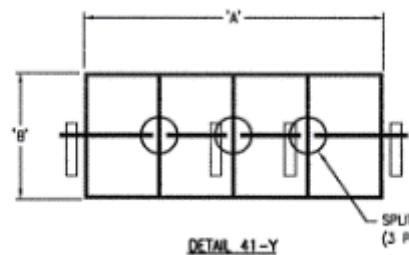
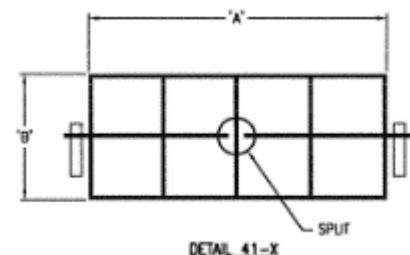
Commercial Control Dampers

To lower pressure drop

- Lower velocity
- Aspect ratio
- Location
- Blade type
- Blade action
- Jack shafting
- Linkage arrangement

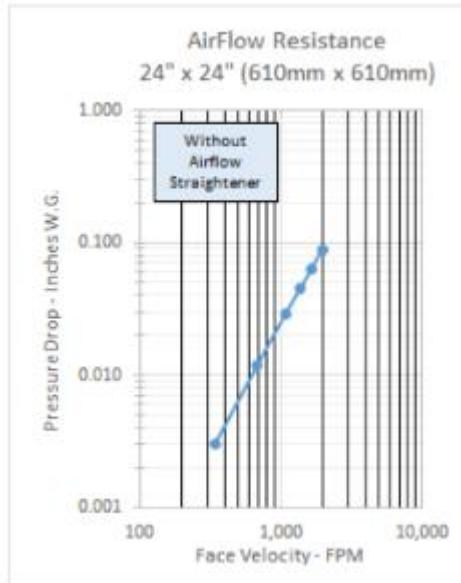
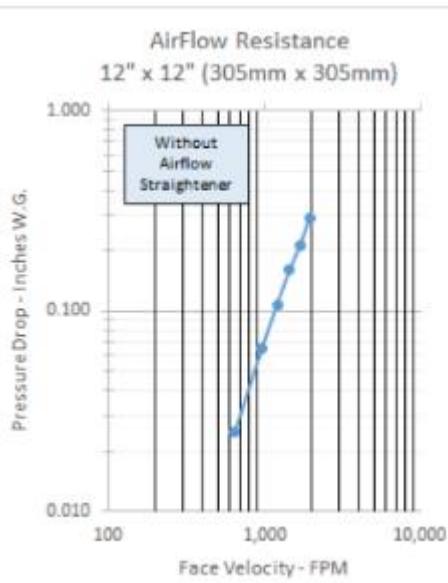
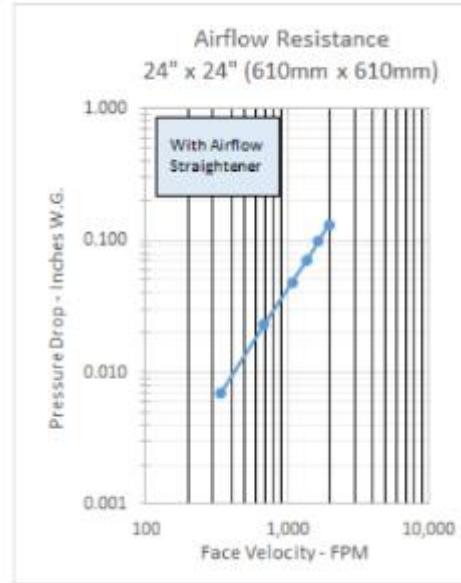
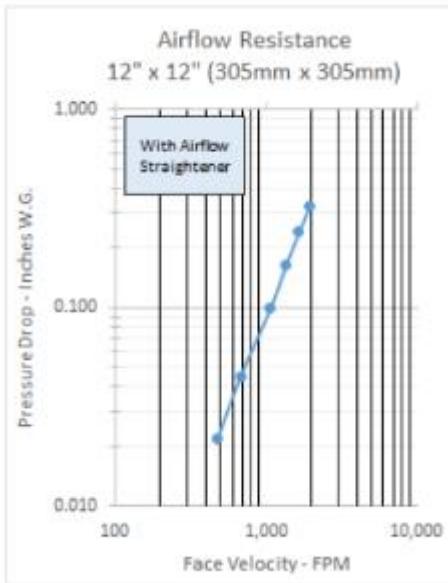


SPLIT
(4 PLCS)

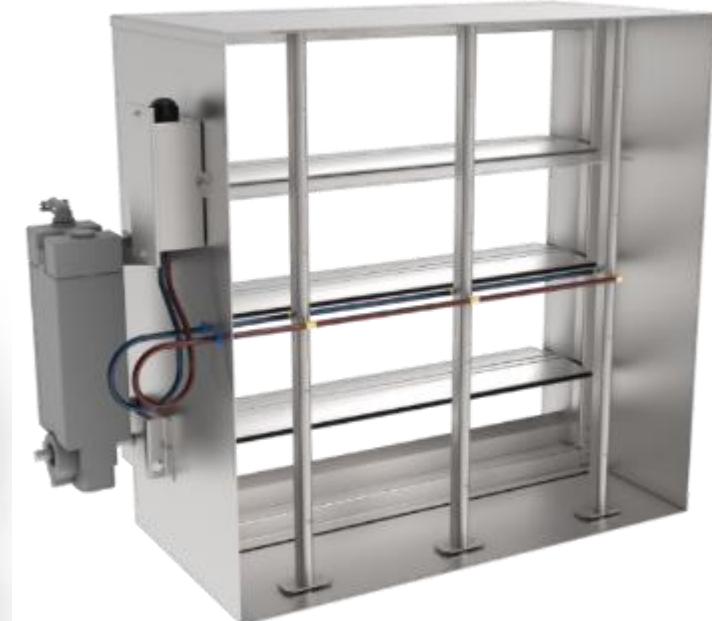


SPLIT
(4 PLCS)

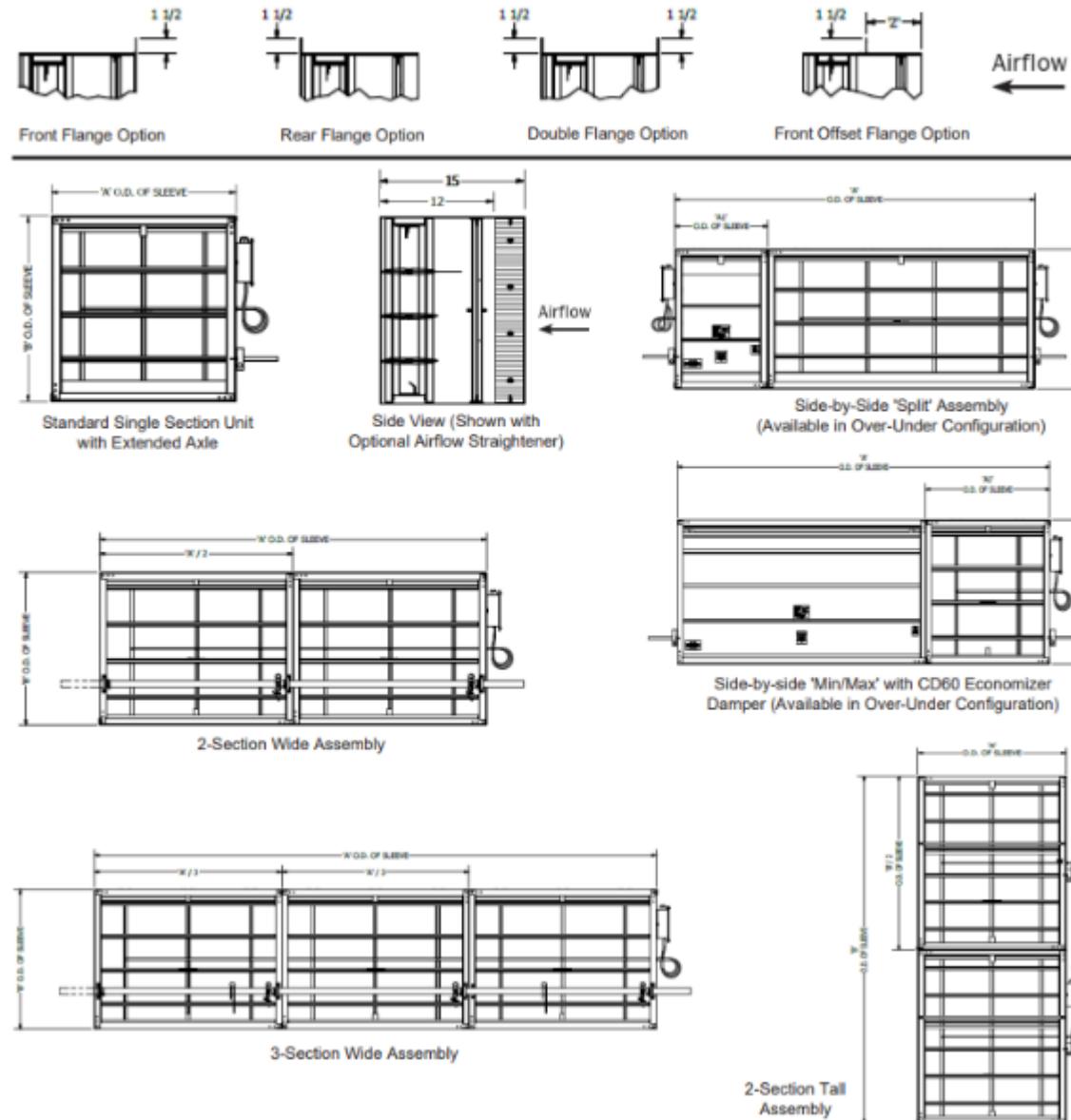
Airflow measurement



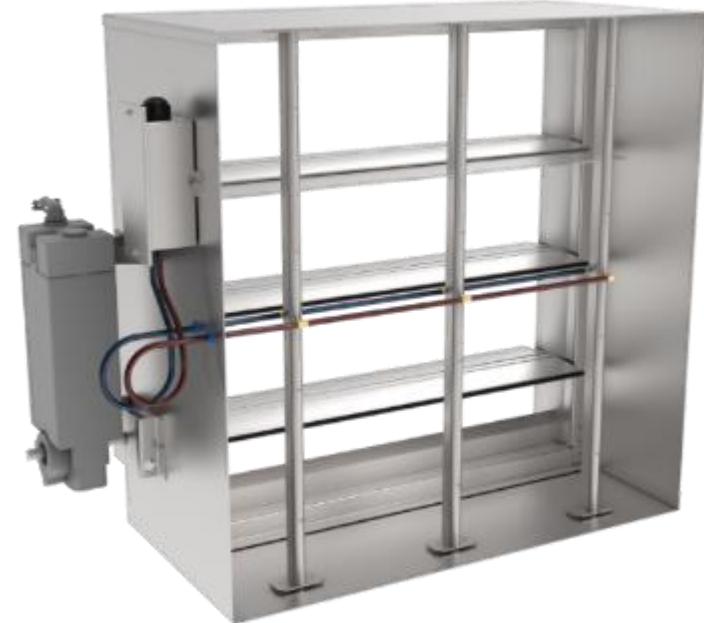
AMS060-CT
AIRFLOW MEASURING STATION WITH INTEGRAL CONTROL DAMPER



Airflow measurement



AMS060-CT AIRFLOW MEASURING STATION WITH INTEGRAL CONTROL DAMPER

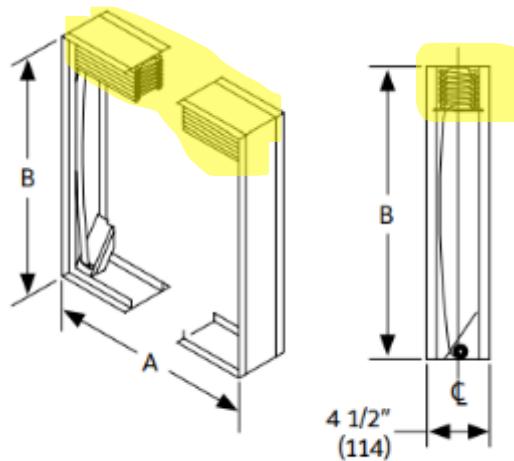


Life Safety Dampers

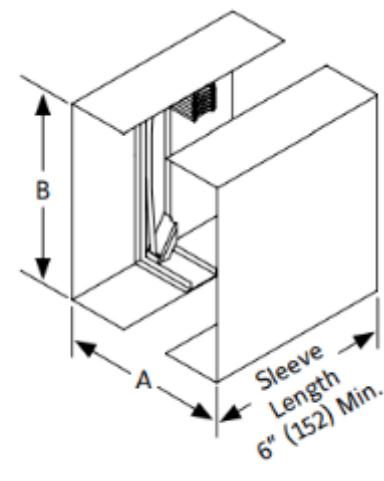
- » **Combination Fire/Smoke Dampers 1.5Hr**
- » **Combination Fire/Smoke Dampers 3Hr**
- » **Smoke Dampers**
- » **Corridor Dampers**
- » **1.5hr Dynamic Fire Dampers**
- » **3hr Dynamic Fire Dampers**
- » **1.5hr Static Fire Dampers**
- » **3hr Static Fire Dampers**
- » **Guillotine Fire Dampers**
- » **UL Classified Radiation Dampers for Wood Truss Assemblies**
- » **UL Classified Radiation Dampers for Wood Joist Assemblies**
- » **Warnock Hersey Classified Radiation Dampers for Wood Assemblies**
- » **UL Classified Radiation Dampers for Non-Wood Assemblies**



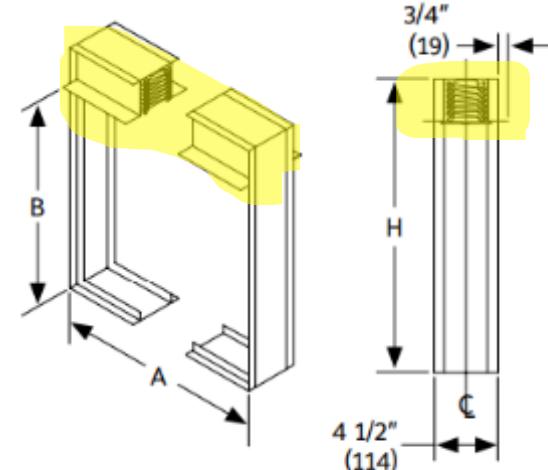
Curtain type Fire Dampers



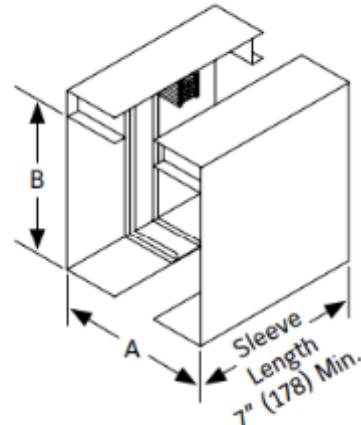
A Style w/o Sleeve



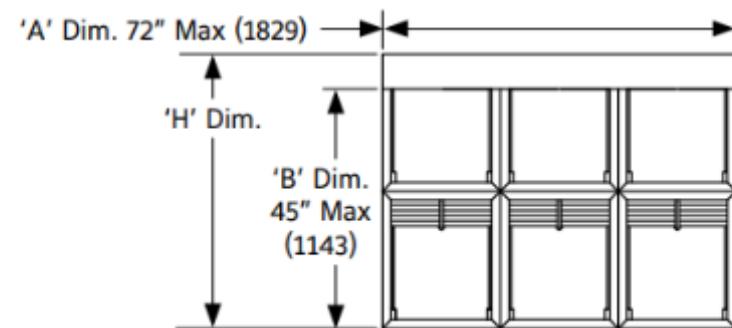
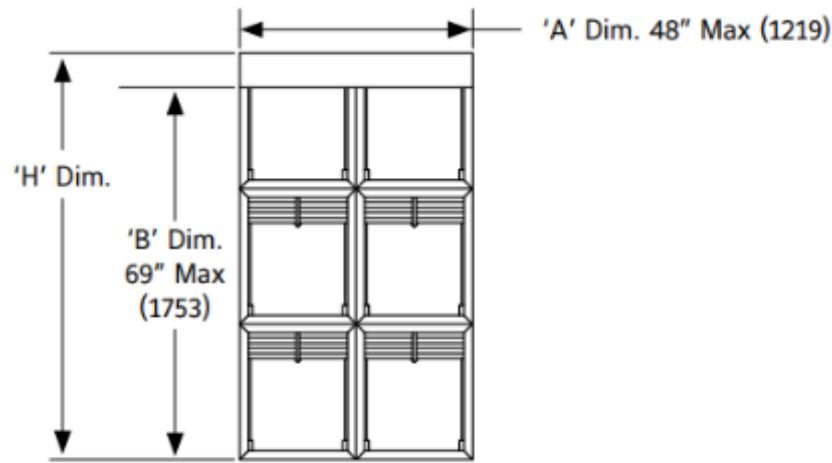
A Style w/Sleeve



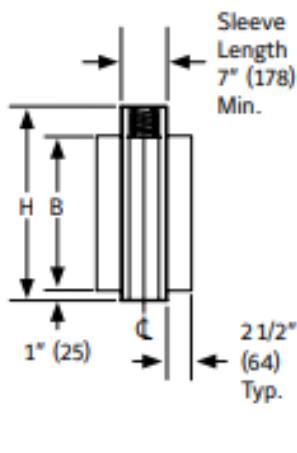
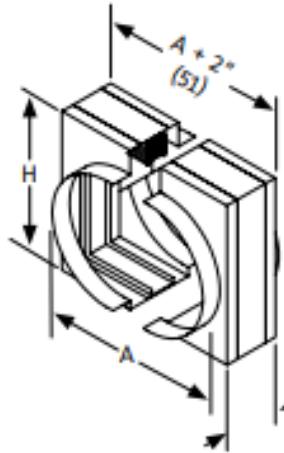
B Style w/o Sleeve



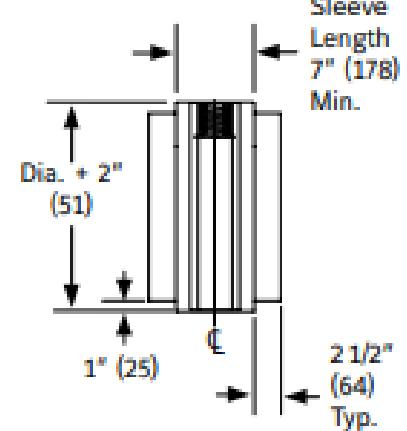
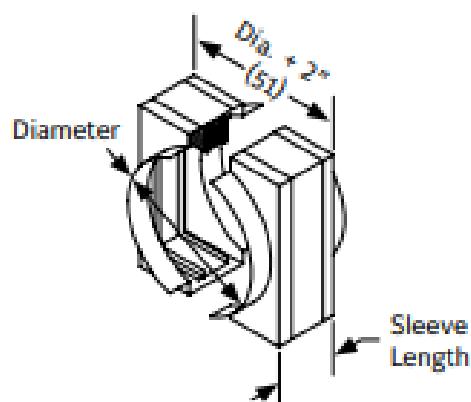
B Style w/Sleeve



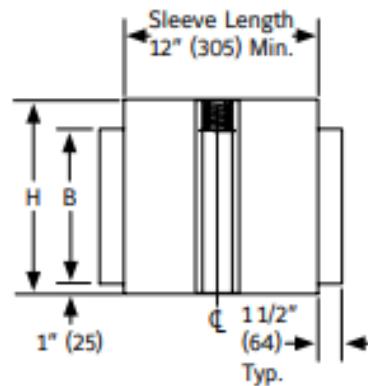
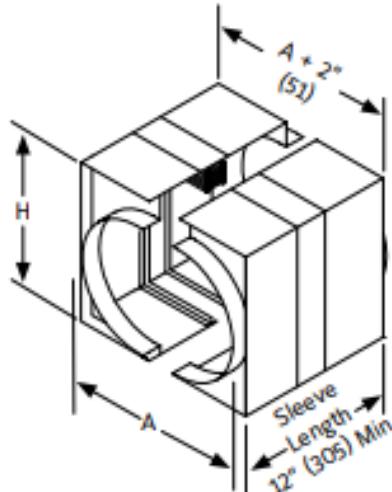
Curtain type Fire Dampers



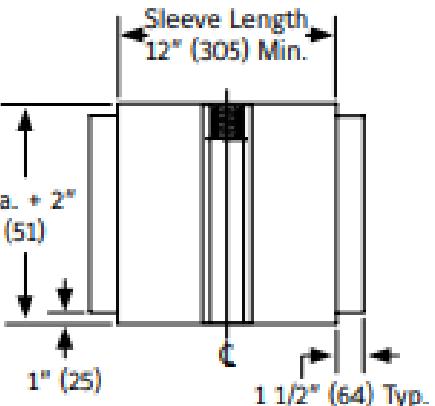
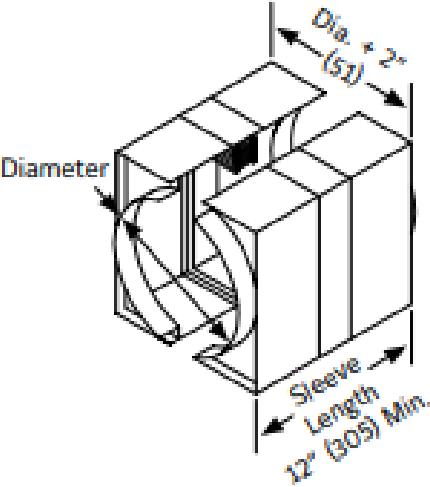
LO Style



R Style

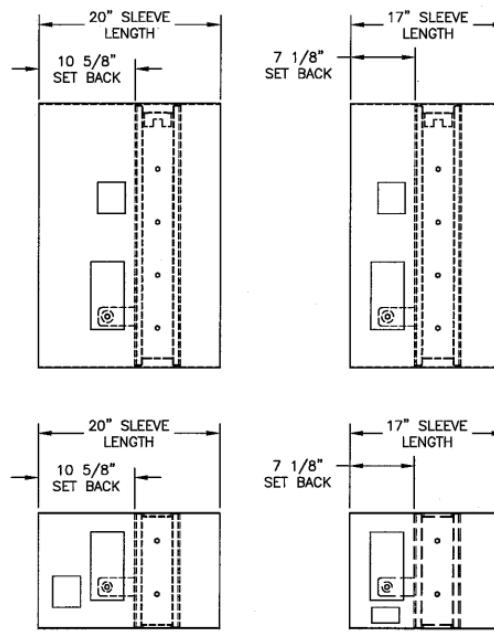
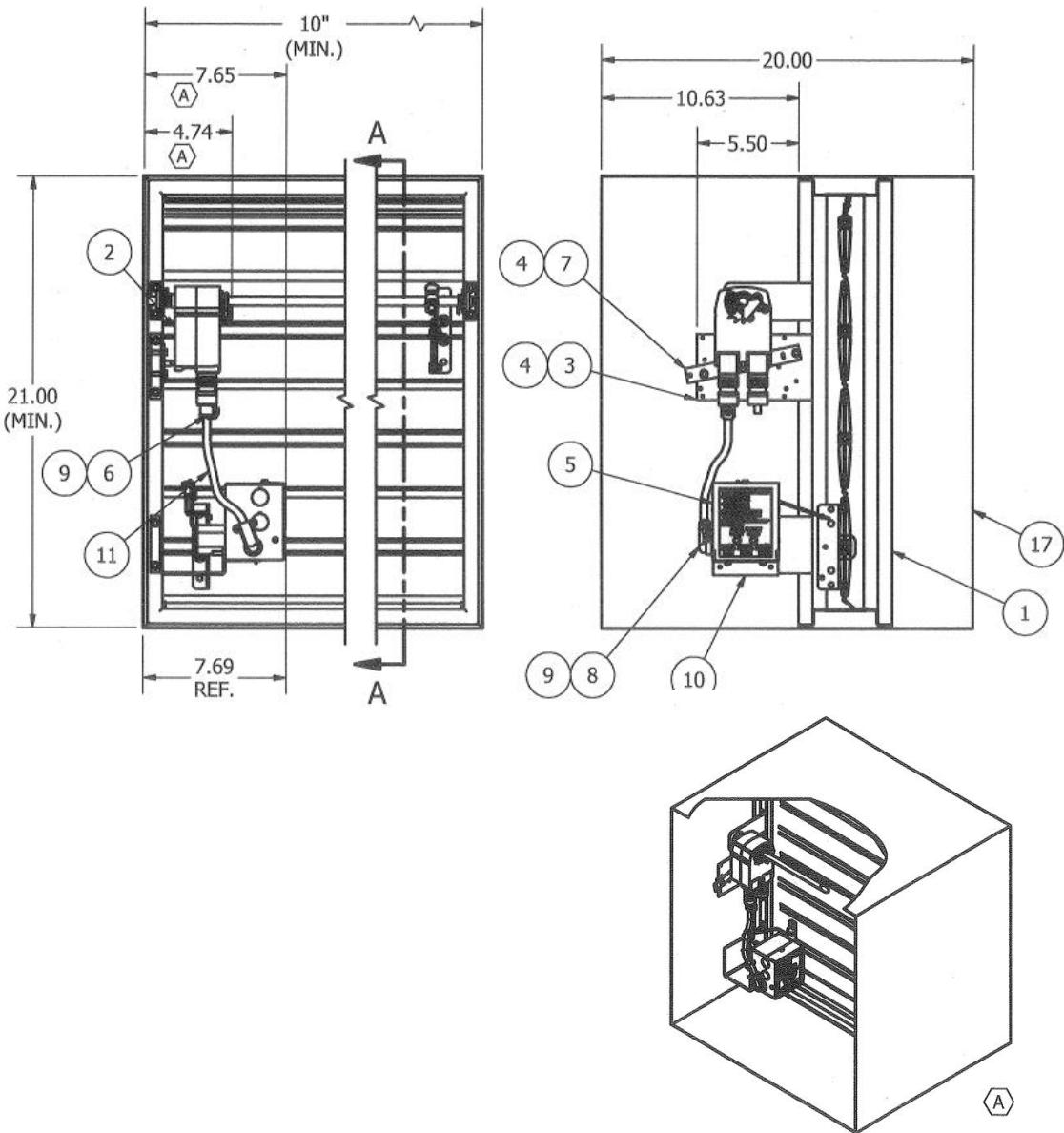


LO Style w/Sleeve

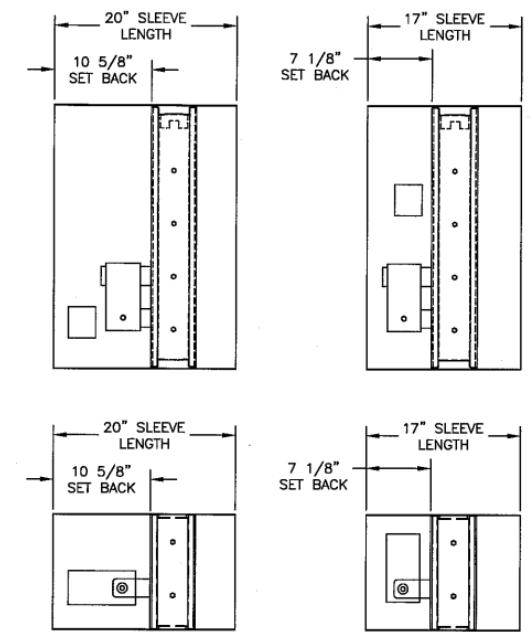


R Style w/Sleeve

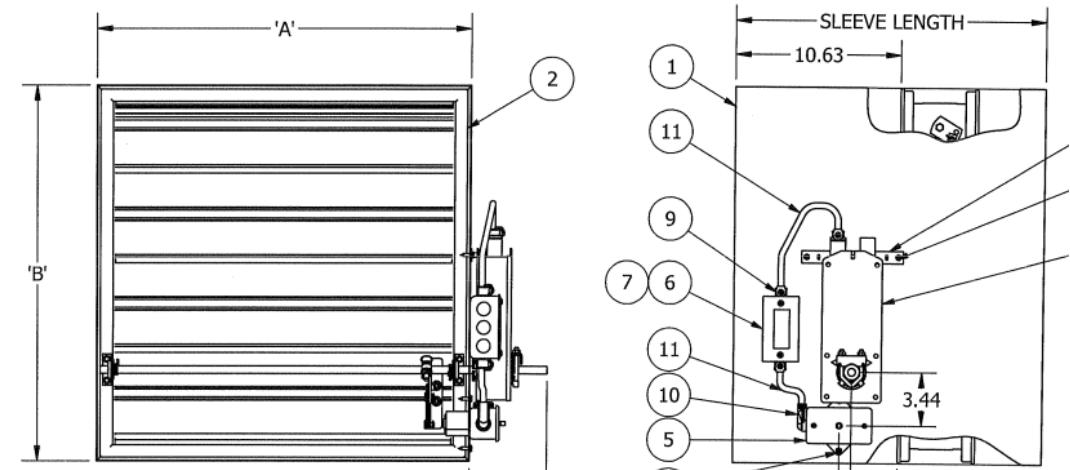
Life Safety Dampers



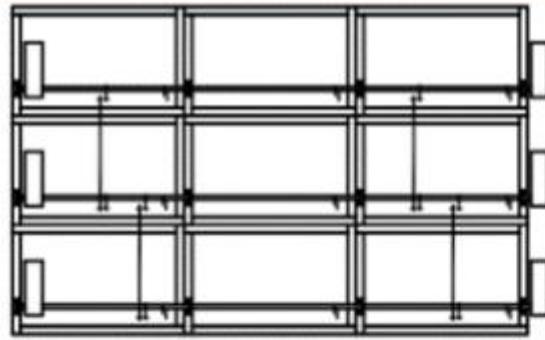
EXTERNAL MOUNT ACTUATORS



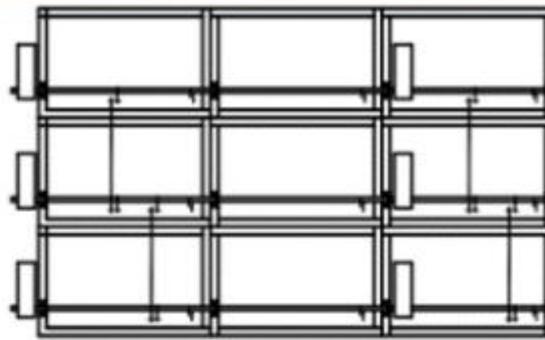
INTERNAL MOUNT ACTUATORS



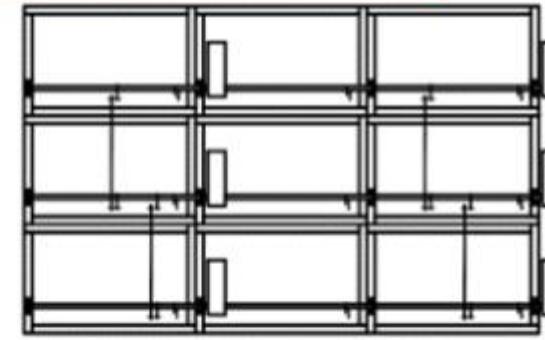
Life Safety Dampers



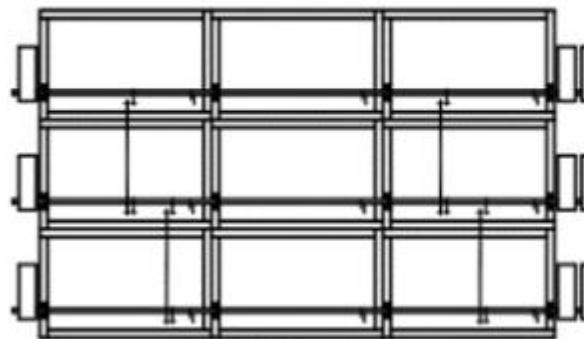
33-E002-6



33-E003-6



33-E004-6



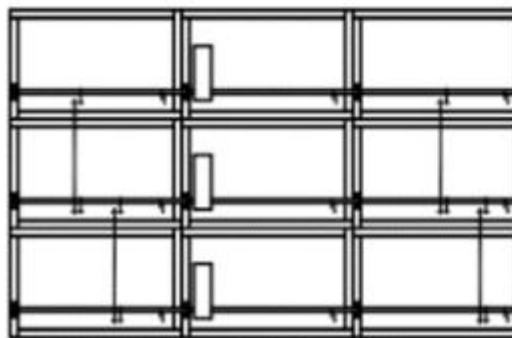
33-EP001-9



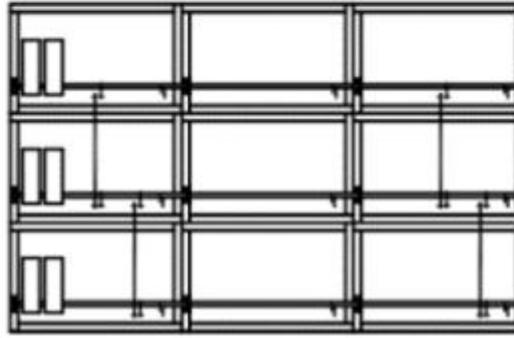
33-EP002-9



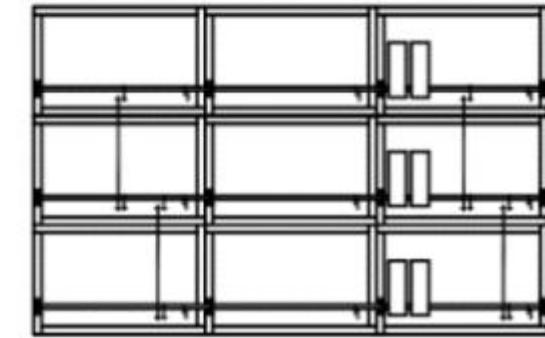
33-N001-3



33-N003-3

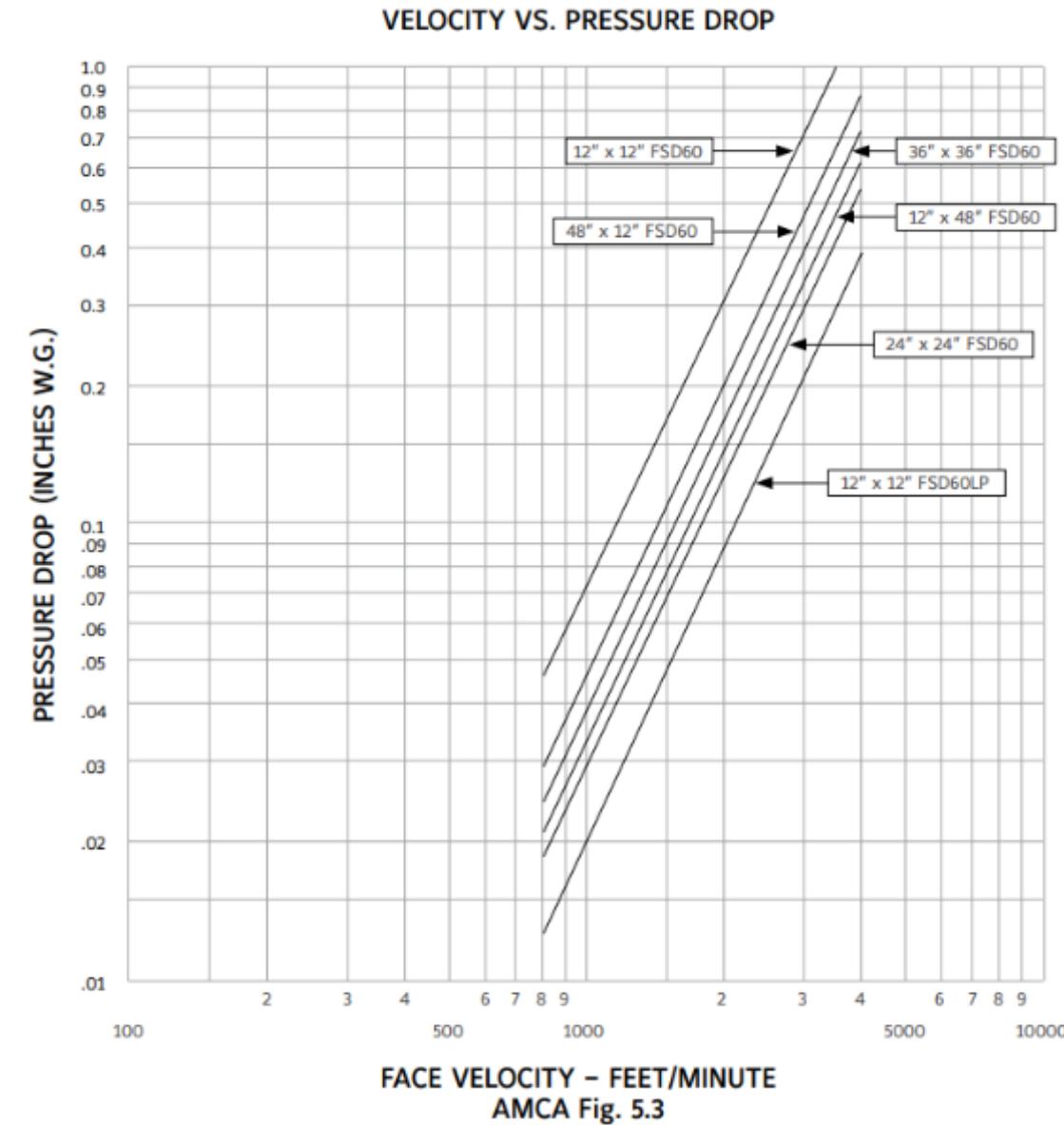
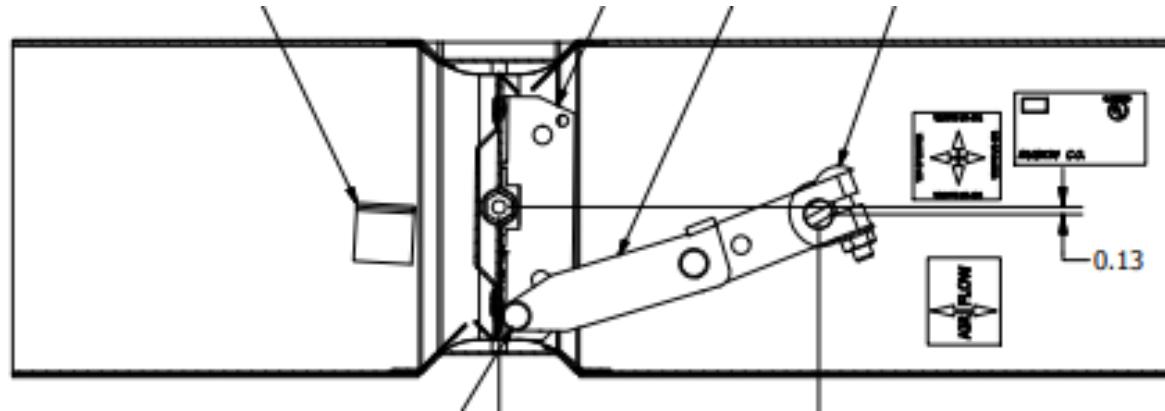


33-NP001-6

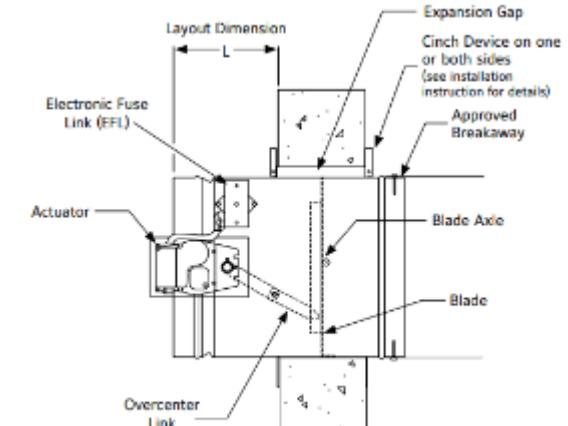
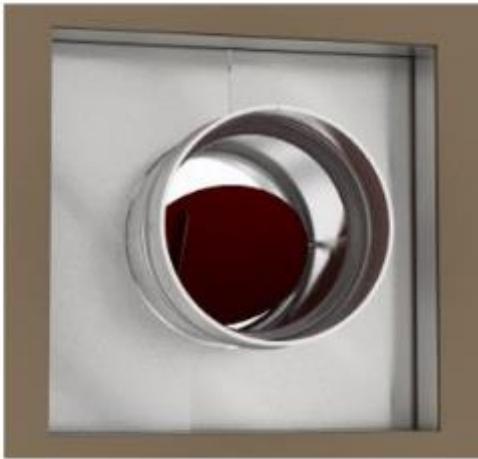
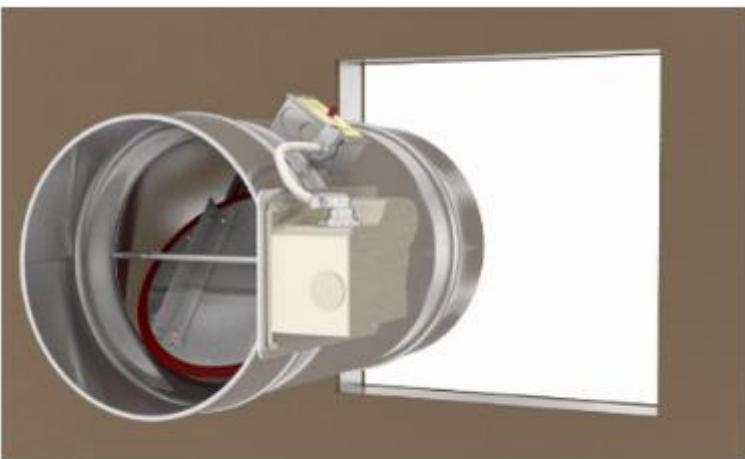


33-NP002-6

Life Safety Dampers – low profile



Life Safety Dampers - Round is great



METAL/WOOD/MASONRY WALL
OR CONCRETE FLOOR INSTALLATION

AMCA TEST FIGURE

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.

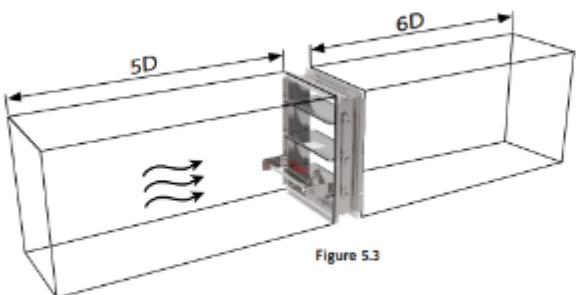


Figure 5.3

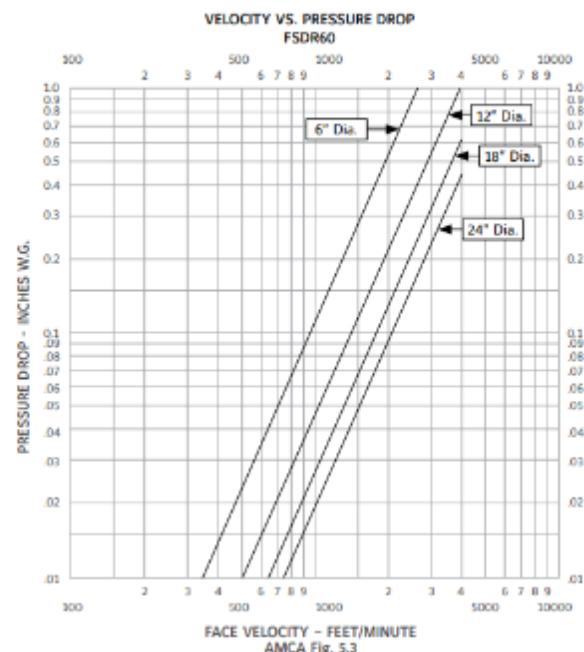


Figure 5.2 illustrates a ducted damper exhausting air into an open area. This configuration has a lower pressure drop than Figure 5.3 because entrance losses are minimized by a straight duct run upstream of the damper.

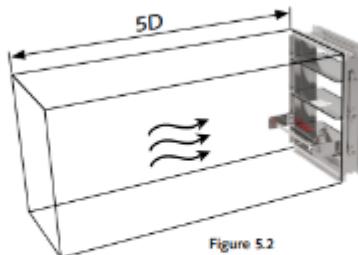
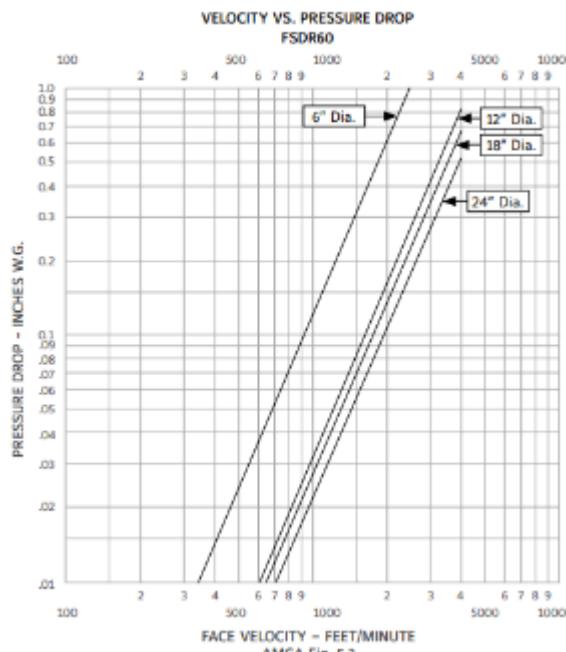


Figure 5.2



Life Safety Dampers - In the airstream



Grille Access



Front Access



Life Safety Dampers – Modulating Damper



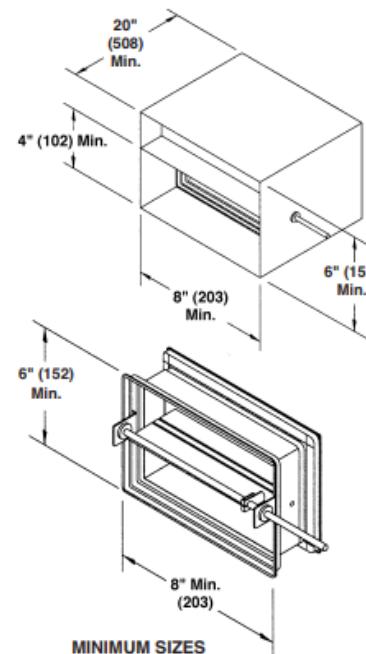
FSD60M

**COMBINATION FIRE SMOKE DAMPER AND VOLUME CONTROL DAMPER
1½ HOUR UL555 RATED, UL555S LEAKAGE CLASS 1**

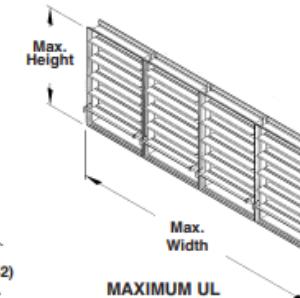


APPLICATION

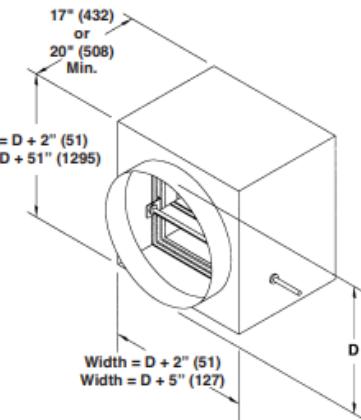
The FSD60M is a combination fire and smoke damper designed with airfoil blades (for lowest pressure drop) and equipped with a modulating electric actuator so it can also be used as a volume control damper. It can be installed vertically in walls or horizontally in concrete floors in HVAC systems with velocities to 2,000 fpm and pressures to 4" w.g.



Nominal – 8" w x 6" h (203 x 152).
Actual – 7 3/4" w x 5 3/4" h (197 x 146).
Dampers with heights (B dimension) less than 6" (152) require Style B transitions and a sleeve.
The damper itself remains 6" (152) high.



**MAXIMUM UL
CLASSIFIED SIZE**
Single Section:
32" w x 48" h (813 x 1219)
Multiple Section Assembly:
See sizes listed below.



ROUND, OVAL OR RECTANGULAR DUCT TRANSITION CONNECTION

FSD60M dampers supplied with round connections (R for low pressure, CR for medium pressure or WR welded for high pressure) are:

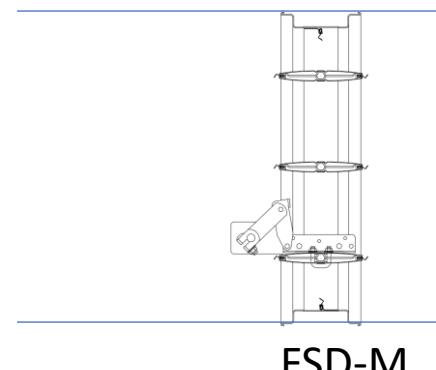
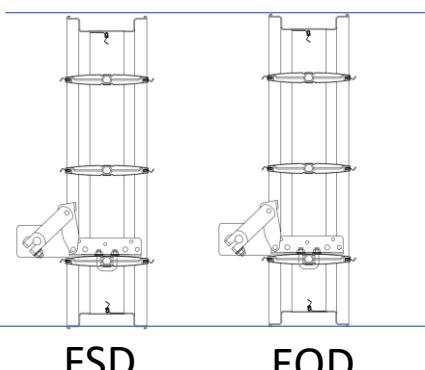
Minimum 4" (102) in diameter
Maximum 46" (1168) in diameter

The square size of the damper will be 2" (51) larger than the diameter dimension ordered.

FSD60M dampers supplied with rectangular or oval connections (C, CO, LO for low to medium pressure or WC, WO welded for high pressure) are:

Minimum 6" w x 4" h (152 x 102)
Maximum 118" w x 46" h (2997 x 1168)

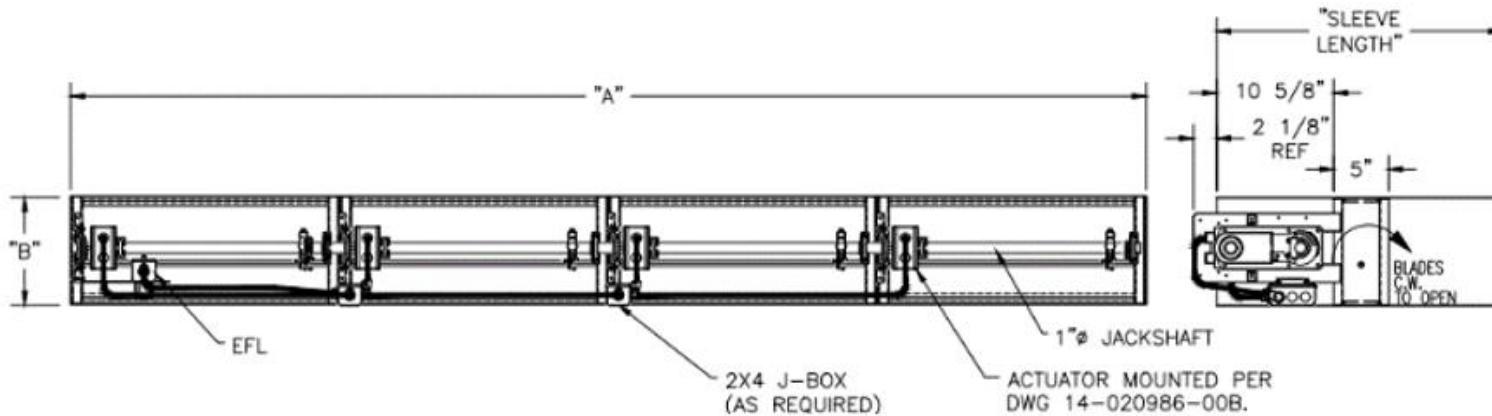
The square size of the damper will be 2" (51) larger than the width and height of the damper A x B dimensions.



Life Safety Dampers – Modulating Damper



MODEL NO.: FSD60M						STYLE: A	BLADE WIDTH: STD <input checked="" type="checkbox"/> 6" MAX <input type="checkbox"/>	DEDUCT <input checked="" type="checkbox"/>	ACTUAL <input type="checkbox"/>				
LINE ITEM	QTY.	A	B	MOUNTED	TEMP	ACTUATOR		SLEEVE		BLADE ACT.	SHIP SECT.	TAG	
						MODEL	QTY.	FAIL SIDE	LENGTH	GA.			
3	1	98	10	VERTICAL	165°F	FSAFB24-SR-S	4	CL	IN	26	18	08	1



Life Safety Dampers - Out of Wall

