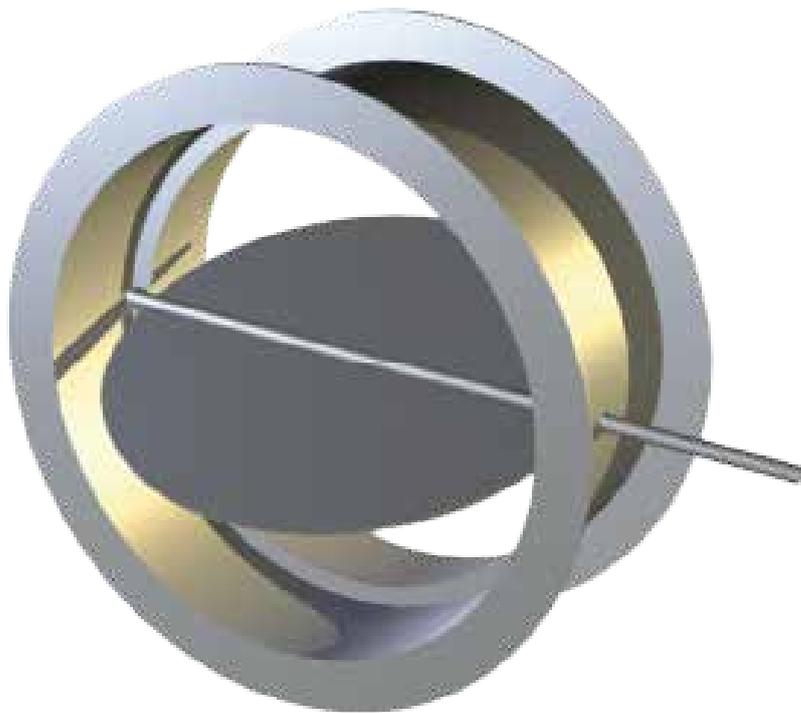


Industrial Dampers



CVSA 
DAMPER SERIES



**Industrial Airfoil Blade Control Damper
Model NAH-720-1**

Design / Application

Model **NAH-720-1** (Opposed Blade Operation) and **NAH-721-1** (Parallel Blade Operation) are Industrial Air Control Damper with Airfoil Shaped Blades. These models consist of a heavy duty flanged frames designed for direct attachment to the ductwork or equipment. **NAH Series** models are ideal for balancing and/or shut off HVAC applications in the industrial systems with many options to meet your needs.

STANDARD CONSTRUCTION:

FRAME:

8" x 2" x 12ga H.R.S. steel channel

BLADES:

Airfoil-shaped 16 ga H.R.S. double skin construction
5" to 8" wide.

AXLES:

Plated steel 1/2"Ø

LINKAGE:

9 ga galvanized jamb linkage

BEARINGS:

Bronze Oilite

FINISH:

Powder Coated (super durable polyester gray)

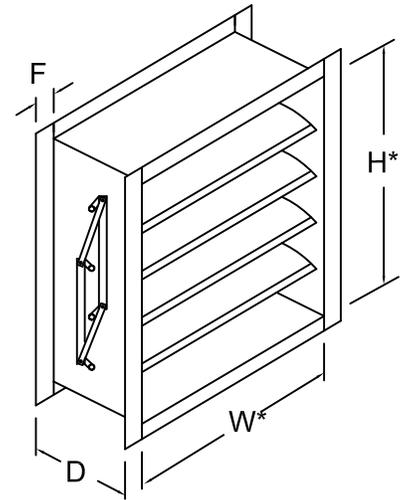
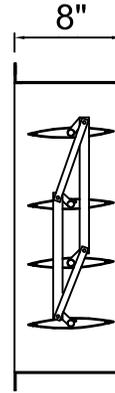
SIZE LIMITATIONS:

Maximum size: 60"w x 96"h
Minimum size: single blade 6"w x 8"h

RATINGS:

Pressure: 8-20" w.g.- differential pressure
Velocity: 2000-4500 fpm
Temperature: 180° - 400°

Note: Special blade clearances are required when temperatures exceed 250°F (121°C).



NOTE: Damper blades **always** run horizontal and are always the first dimension (W) when ordering (example: always order W" x H").

***Inside Dimensions are Actual Size(not undersized)**



OPTIONS

- Stainless steel jamb seals
- Flange bolt holes
- EPDM blade seals 250° F
- Silicone blade seals 450° F
- 304 stainless steel construction
- 316 stainless steel construction
- Ball bearings: (2) hole flange style
 - Standard
 - Stainless steel
- Stuffing box seal
- Outboard bearing with shaft seal
- Linkage cover
- Central manifold grease system
- Hand Quadrant
- Actuator
- Powder Coated
- 1000° F (powder coated) resistance
- Insulated (Foam Filled Blades)

Quantity:	Max. Temp. (if higher than 250°F)	"W" Width	"H" Height	Frame Depth "D" 8" std.	Flange Width "F" 2" std.	Bolt Hole Information							REMARKS	
						J	N1	L Spacing	M Dia.	K	N2	C		

Job Name:	<input type="checkbox"/> Model NAH-720-1 (opposed blades) <input type="checkbox"/> Model NAH-721-1 (parallel blades)
Location:	
Architect:	
Engineer:	
Contractor:	

MODEL NAH-720-1 PERFORMANCE DATA

Imperial Units (Forward Flow)

Damper Width X Height	1 in. w.g. Class	4 in. w.g. Class	8 in. wg Class	*Torque (per sq. ft.)
12" x 12"	Class I	Class II	Class II	15 lbs/in
24" X 24"	Class I	Class I	Class I	12.59 lbs/in
36" X 36"	Class I	Class I	Class I	15 lbs/in
12" X 48"	Class III	Class III	Class II	12.59 lbs/in
48" X 12"	Class I	Class I	Class I	12.59 lbs/in
60" X 36"	Class II	Class II	Class II	15 lbs/in

Air leakage is based on operation between 50°F to 104°F. All data corrected to represent air density of 0.075 lbs/ft.³

*Torque applied to hold damper in closed position

Imperial Units (Back Flow)

Damper Width X Height	1 in. w.g. Class	4 in. w.g. Class	8 in. wg Class	*Torque (per sq. ft.)
12" x 12"	Class II	Class III	Class III	15 lbs/in
24" X 24"	Class I	Class I	Class II	12.59 lbs/in
36" X 36"	Class II	Class III	Class III	15 lbs/in
12" X 48"	Class III	Class III	Class III	12.59 lbs/in
48" X 12"	Class II	Class II	Class II	12.59 lbs/in
60" X 36"	Class III	Class III	Class II	15 lbs/in

*Torque applied to hold damper in closed position

		Leakage, ft ³ /min ² /ft			
		Required Rating		Extended Ranges (optional)	
Class	Pressure	1"	4"	8"	12"
		I	4	8	11
II	10	20	28	35	
III	40	80	112	140	

All data corrected to represent standard air at a density of 0.075 lbs/ft.

NAH-720 SOUND RATINGS								
Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12	2000	16	1500	11	1000	11	500	*
	3000	28	2250	21	1500	18	750	*
	4000	36	3000	29	2000	24	1000	*
18 x 18	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	31	1125	*
	6750	43	5063	37	3375	40	1688	15
24 x 24	4000	11	3000	10	2000	26	1000	*
	8000	33	6000	29	4000	37	2000	21
	12000	43	9000	42	6000	46	3000	31

NC = Noise criteria in Decibels is based on room effect and 10db of room attenuation.
* = Less than 10 NC

3

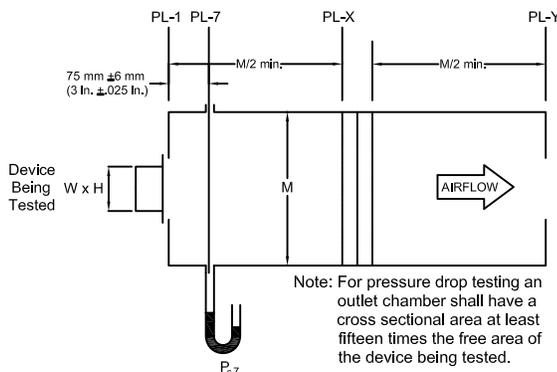


Figure 5.4- Test Device Setup with Outlet Chamber

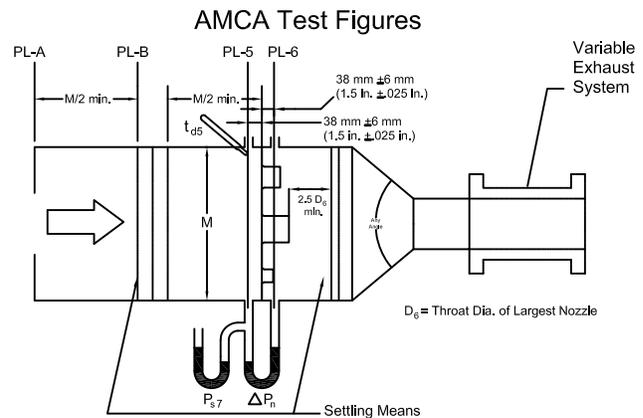


Figure 6.3- Airflow Rate Measurement Setup- Multiple Nozzle Chamber on Fan Inlet

MODEL NAH-720-1 PERFORMANCE DATA

Standard International Units (Forward Flow)

Damper Width X Height (mm)	250 Pa Class	1 KPa Class	2 KPa Class	*Torque
305 x 305	Class I	Class II	Class II	2,679 grams/cm
610 X 610	Class I	Class I	Class I	2,248 grams/cm
915 X 915	Class I	Class I	Class I	2,679 grams/cm
305 X 1220	Class III	Class III	Class II	2,248 grams/cm
1220 X 305	Class I	Class I	Class I	2,248 grams/cm
1525 X 915	Class II	Class II	Class II	2,679 grams/cm

Air leakage is based on operation between 10°C to 40°C. All data corrected to represent air density of 1.201 kg/m³

*Torque applied to hold damper in closed position

Standard International Units (Back Flow)

Damper Width X Height (mm)	250 Pa Class	1 KPa Class	2 KPa Class	*Torque
305 x 305	Class II	Class III	Class III	2,679 grams/cm
610 X 610	Class I	Class I	Class II	2,248 grams/cm
915 X 915	Class II	Class III	Class III	2,679 grams/cm
305 X 1220	Class III	Class III	Class III	2,248 grams/cm
1220 X 305	Class II	Class II	Class II	2,248 grams/cm
1525 X 915	Class III	Class III	Class II	2,679 grams/cm

*Torque applied to hold damper in closed position

		Leakage, L/s /m ²			
		Required Rating		Extended Ranges (optional)	
Class	Pressure	0.25 kPa	1.0 kPa	2.0 kPa	3.0 kPa
I		20.3	40.6	55.9	71.1
II		50.8	102	142	178
III		203	406	569	711

FRAME & BOLT HOLE CONSTRUCTION OPTIONS

Flange (F Dim): Standard - 2"
Optional - 1-1/2" to 4"

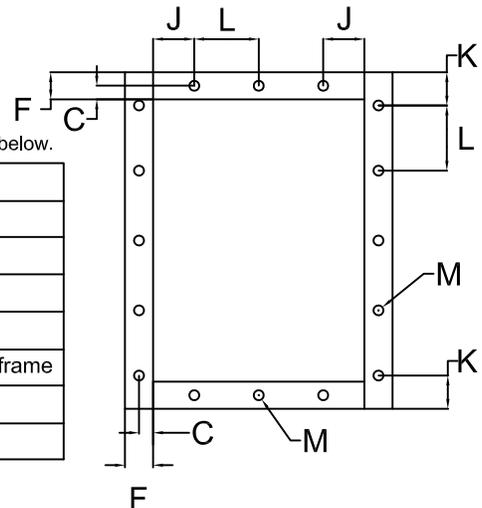
Bolt holes: (Standard construction is no bolt holes)

Web (D Dim): Standard - 8"
Optional - 8" to 12"

Dim. "M": 7/16" dia. hole
Dim. "L": 6" Center to Center

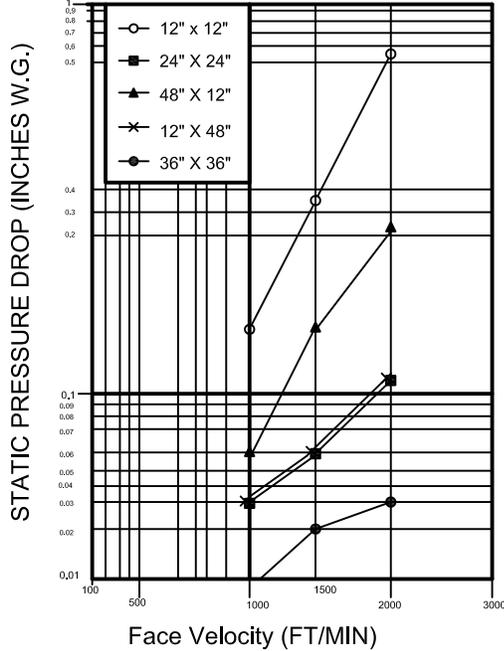
Note: Customer must be within Min. or Max limits on table below.

Dim.	Min or Max	Standard	Description
J	min. 3/4"		First/Last Space in <u>Head/Sill</u>
N1	min. 1.0"		No. of holes in <u>Head/Sill</u>
K	min. F/2"		First/Last Space in <u>Jamb</u>
N2	min. 1.0"		No. of holes in <u>Jamb</u>
C	.75*D" to 3/4"	F/(2*M)"	Centerline of bolt hole from inside edge of frame
L	2" to 12"	6.0"	Hole Spacing
M	1/4" to 11/16"	7/16"	Mounting hole Diameter



MODEL NAH-720-1 PERFORMANCE DATA

PRESSURE DROP

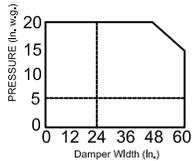


Face Velocity (FT/MIN)
Based on STANDARD AIR- .075 lb. per cubic foot.
NAH-720-1 sizes: 12x12, 24x24, 48x12, 12x48, 36x36
(305x305, 610x610, 1219x305, 305x1219, 914x914)

NAH-720-1

PRESSURE LIMITATIONS

The chart at the right shows conservative pressure limitations based on a maximum blade deflection of w/360.



TEMPERATURE LIMITATIONS

Blade Seals: EPDM -40° to +250°F
Silicone Rubber -40° to +450°F
Jamb Seals: Flexible stainless steel -40° to +400°F

VELOCITY LIMITATIONS

The chart at the right shows conservative velocity limitations based on damper size.

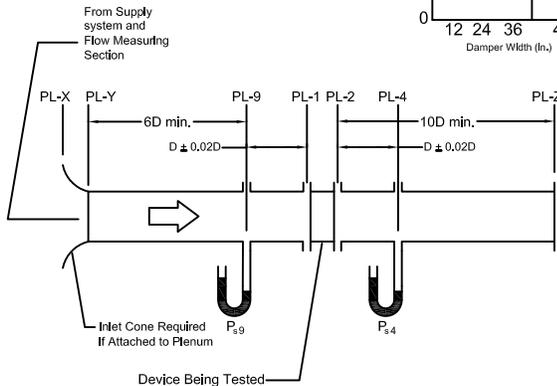
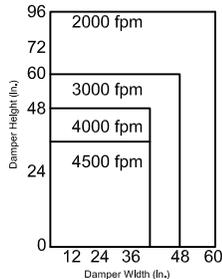


Figure 5.3- Test Device Setup with Inlet and Outlet Ducts

AMCA Test Figure 5.3

Figure 5.3 illustrates a fully ducted damper. This configuration has low pressure drop because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

Pressure Drop Data

This pressure drop data was conducted in accordance with AMCA Standard 500 using Test Figure 5.3. All data has been corrected to represent standard air at a density of .075 lb/cu.ft.

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

12 x 12	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.15 (38)
1500 (7.62)	0.33 (83)
2000 (10.16)	0.55 (139)

24 x 24	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.03 (7)
1500 (7.62)	0.06 (15)
2000 (10.16)	0.11 (27)

48 x 12	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.06 (15)
1500 (7.62)	0.15 (38)
2000 (10.16)	0.23 (58)

12 x 48	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.03 (7)
1500 (7.62)	0.06 (15)
2000 (10.16)	0.11 (27)

36 x 36	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.009 (2)
1500 (7.62)	0.02 (5)
2000 (10.16)	0.03 (7)

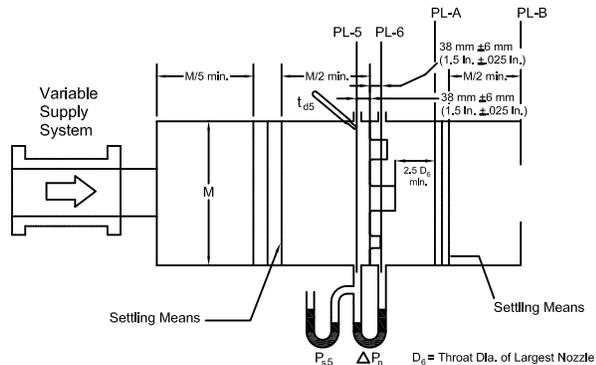


Figure 6.5- Airflow Rate Measurement Setup- Multiple Nozzle Chamber on Fan Outlet



Industrial Airfoil Blade Control Damper Model NAH-720-2

Design / Application

Model **NAH-720-2** (Opposed Blade Operation) and **NAH-721-2** (Parallel Blade Operation) are Industrial Air Control Damper with Airfoil Shaped Blades. These models consist of a heavy duty flanged frames designed for direct attachment to the ductwork or equipment. **NAH Series** models are ideal for balancing and/or shut off HVAC applications in the industrial systems with many options to meet your needs.

STANDARD CONSTRUCTION:

FRAME:

8" x 2" x 10ga H.R.S. steel channel

BLADES:

Airfoil-shaped 16 ga H.R.S. double skin construction
5" to 8" wide.

AXLES:

Plated steel 3/4"Ø

LINKAGE:

9 ga galvanized jamb linkage

BEARINGS:

Bronze Oilite

FINISH:

Powder Coated (super durable polyester gray)

SIZE LIMITATIONS:

Maximum size: 60"w x 96"h
Minimum size: single blade 6"w x 8"h

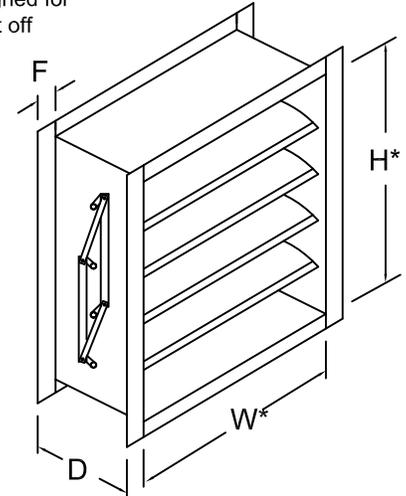
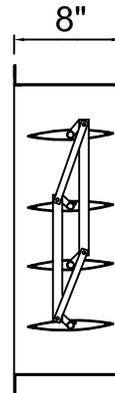
RATINGS:

Pressure: 10-30" w.g.- differential pressure

Velocity: 3000-6000 fpm

Temperature: 180° -400°

Note: Special blade clearances are required when temperatures exceed 250°F (121°C).



NOTE: Damper blades always run horizontal and are always the first dimension (W) when ordering (example: always order W" x H").

***Inside Dimensions are Actual Size(not undersized)**



OPTIONS

- Stainless steel jamb seals
- Flange bolt holes
- EPDM blade seals 250° F
- Silicone blade seals 450° F
- 304 stainless steel construction
- 316 stainless steel construction
- Ball bearings: (2) hole flange style
 - Standard
 - Stainless steel
- Stuffing box seal
- Outboard bearing with shaft seal
- Linkage cover
- Central manifold grease system
- Hand Quadrant
- Actuator
- Powder Coated
- 1000° F (powder coated) resistance
- Insulated (Foam Filled Blades)

Quantity:	Max. Temp. (if higher than 250°F)	"W" Width	"H" Height	Frame Depth "D" 8" std.	Flange Width "F" 2" std.	Bolt Hole Information							REMARKS	
						J	N1	L Spacing	M Dia.	K	N2	C		

Job Name: Location: Architect: Engineer: Contractor:	<input type="checkbox"/> Model NAH-720-2 (opposed blades) <input type="checkbox"/> Model NAH-721-2 (parallel blades)
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MODEL NAH-720-2 PERFORMANCE DATA

Imperial Units (Forward Flow)

Damper Width X Height	1 in. w.g. Class	4 in. w.g. Class	8 in. wg Class	*Torque (per sq. ft.)
12" x 12"	Class I	Class II	Class II	15 lbs/in
24" X 24"	Class I	Class I	Class I	12.59 lbs/in
36" X 36"	Class I	Class I	Class I	15 lbs/in
12" X 48"	Class III	Class III	Class II	12.59 lbs/in
48" X 12"	Class I	Class I	Class I	12.59 lbs/in
60" X 36"	Class II	Class II	Class II	15 lbs/in

Air leakage is based on operation between 50°F to 104°F. All data corrected to represent air density of 0.075 lbs/ft.³

*Torque applied to hold damper in closed position

Imperial Units (Back Flow)

Damper Width X Height	1 in. w.g. Class	4 in. w.g. Class	8 in. wg Class	*Torque (per sq. ft.)
12" x 12"	Class II	Class III	Class III	15 lbs/in
24" X 24"	Class I	Class I	Class II	12.59 lbs/in
36" X 36"	Class II	Class III	Class III	15 lbs/in
12" X 48"	Class III	Class III	Class III	12.59 lbs/in
48" X 12"	Class II	Class II	Class II	12.59 lbs/in
60" X 36"	Class III	Class III	Class II	15 lbs/in

*Torque applied to hold damper in closed position

		Leakage, ft ³ /min ² /ft			
		Required Rating		Extended Ranges (optional)	
Class	Pressure	1"	4"	8"	12"
	I		4	8	11
II		10	20	28	35
III		40	80	112	140

All data corrected to represent standard air at a density of 0.075 lbs/ft.

NAH-720 SOUND RATINGS								
Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12	2000	16	1500	11	1000	11	500	*
	3000	28	2250	21	1500	18	750	*
	4000	36	3000	29	2000	24	1000	*
18 x 18	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	31	1125	*
	6750	43	5063	37	3375	40	1688	15
24 x 24	4000	11	3000	10	2000	26	1000	*
	8000	33	6000	29	4000	37	2000	21
	12000	43	9000	42	6000	46	3000	31

NC = Noise criteria In Decibels Is based on room effect and 10db of room attenuation.
* = Less than 10 NC

AMCA Test Figures

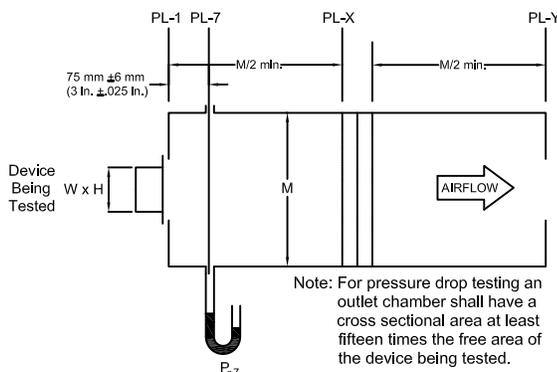


Figure 5.4- Test Device Setup with Outlet Chamber

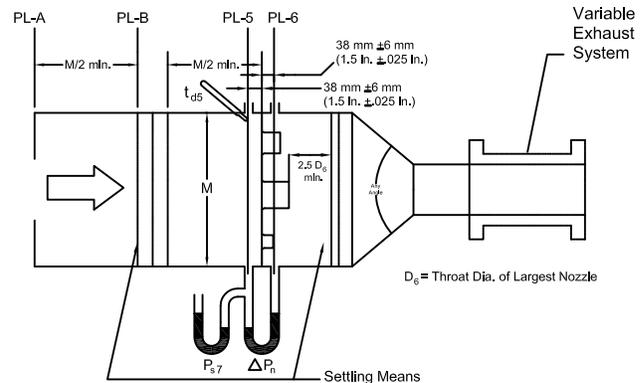


Figure 6.3- Airflow Rate Measurement Setup- Multiple Nozzle Chamber on Fan Inlet

MODEL NAH-720-2 PERFORMANCE DATA

Standard International Units (Forward Flow)

Damper Width X Height (mm)	250 Pa Class	1 KPa Class	2 KPa Class	*Torque
305 x 305	Class I	Class II	Class II	2,679 grams/cm
610 X 610	Class I	Class I	Class I	2,248 grams/cm
915 X 915	Class I	Class I	Class I	2,679 grams/cm
305 X 1220	Class III	Class III	Class II	2,248 grams/cm
1220 X 305	Class I	Class I	Class I	2,248 grams/cm
1525 X 915	Class II	Class II	Class II	2,679 grams/cm

Air leakage is based on operation between 10°C to 40°C. All data corrected to represent air density of 1.201 kg/m³.

*Torque applied to hold damper in closed position

Standard International Units (Back Flow)

Damper Width X Height (mm)	250 Pa Class	1 KPa Class	2 KPa Class	*Torque
305 x 305	Class II	Class III	Class III	2,679 grams/cm
610 X 610	Class I	Class I	Class II	2,248 grams/cm
915 X 915	Class II	Class III	Class III	2,679 grams/cm
305 X 1220	Class III	Class III	Class III	2,248 grams/cm
1220 X 305	Class II	Class II	Class II	2,248 grams/cm
1525 X 915	Class III	Class III	Class II	2,679 grams/cm

*Torque applied to hold damper in closed position

Class	Leakage, L/s /m ²			
	Required Rating		Extended Ranges (optional)	
	0.25 kPa	1.0 kPa	2.0 kPa	3.0 kPa
I	20.3	40.6	55.9	71.1
II	50.8	102	142	178
III	203	406	569	711

FRAME CONSTRUCTION OPTIONS

Flange (F Dim): Standard - 2"
Optional - 1-1/2" to 4"

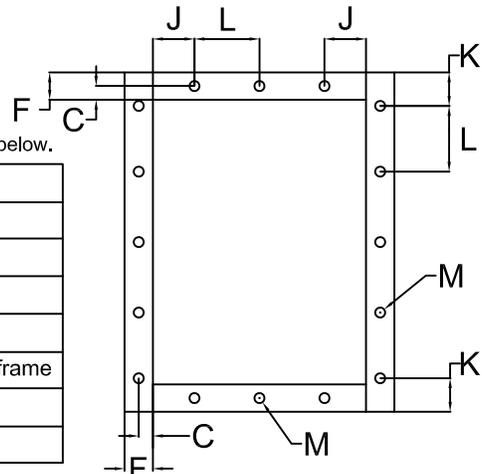
Bolt holes: (Standard construction is **no** bolt holes)

Dim. "M": 7/16" dia. hole
Dim. "L": 6" Center to Center

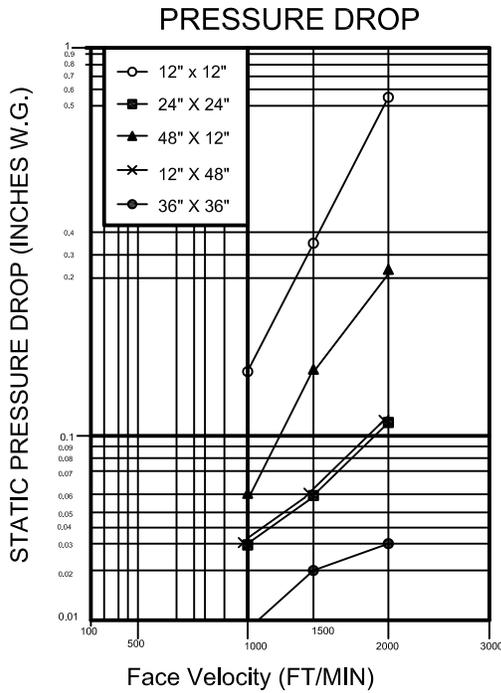
Web (D Dim): Standard - 8"
Optional - 8" to 12"

Note: Customer must be within Min. or Max limits on table below.

Dim.	Min or Max	Standard	Description
J	min. 3/4"		First/Last Space in Head/Sill
N1	min. 1.0"		No. of holes in Head/Sill
K	min. F/2"		First/Last Space in Jamb
N2	min. 1.0"		No. of holes in Jamb
C	.75*D" to 3/4"	F/(2*M)"	Centerline of bolt hole from inside edge of frame
L	2" to 12"	6.0"	Hole Spacing
M	1/4" to 11/16"	7/16"	Mounting hole Diameter



MODEL NAH-720-2 PERFORMANCE DATA



Face Velocity (FT/MIN)

Based on STANDARD AIR- .075 lb. per cubic foot.

NAH-720-2 sizes: 12x12, 24x24, 48x12, 12x48, 36x36
(305x305, 610x610, 1219x305, 305x1219, 914x914)

NAH-720-2

PRESSURE LIMITATIONS

The chart at the right shows conservative pressure limitations based on a maximum blade deflection of $w/360$.

TEMPERATURE LIMITATIONS

Blade Seals: EPDM -40° to $+250^{\circ}$ F
Silicone Rubber -40° to $+450^{\circ}$ F
Jamb Seals: Flexible stainless steel -40° to $+400^{\circ}$ F

VELOCITY LIMITATIONS

The chart at the right shows conservative velocity limitations based on damper size.

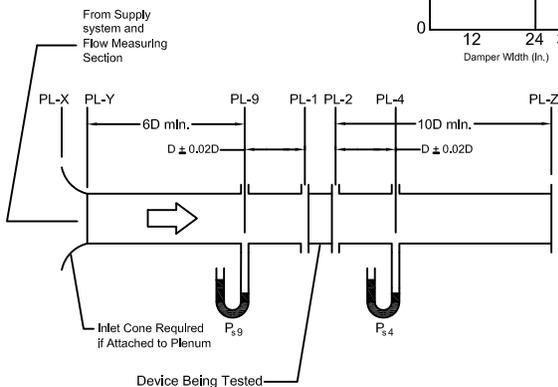
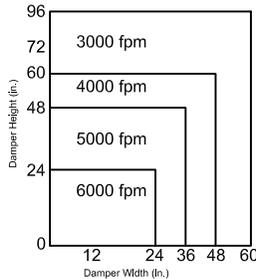
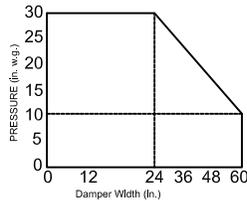


Figure 5.3- Test Device Setup with Inlet and Outlet Ducts

AMCA Test Figure 5.3

Figure 5.3 illustrates a fully ducted damper. This configuration has low pressure drop because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

Pressure Drop Data

This pressure drop data was conducted in accordance with AMCA Standard 500 using Test Figure 5.3. All data has been corrected to represent standard air at a density of .075 lb/cu.ft.

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

12 x 12

Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.15 (38)
1500 (7.62)	0.33 (83)
2000 (10.16)	0.55 (139)

24 x 24

Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.03 (7)
1500 (7.62)	0.06 (15)
2000 (10.16)	0.11 (27)

48 x 12

Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.06 (15)
1500 (7.62)	0.15 (38)
2000 (10.16)	0.23 (58)

12 x 48

Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.03 (7)
1500 (7.62)	0.06 (15)
2000 (10.16)	0.11 (27)

36 x 36

Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.009 (2)
1500 (7.62)	0.02 (5)
2000 (10.16)	0.03 (7)

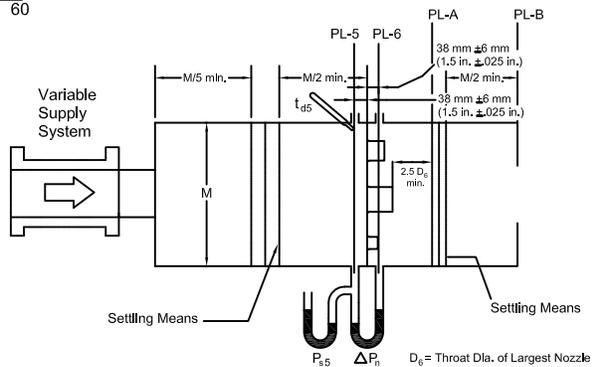


Figure 6.5- Airflow Rate Measurement Setup- Multiple Nozzle Chamber on Fan Outlet



**Industrial Airfoil Blade Control Damper
Model NAH-720-3**

Design / Application

Model **NAH-720-3** (Opposed Blade Operation) and **NAH-721-3** (Parallel Blade Operation) are Industrial Air Control Damper with Airfoil Shaped Blades. These models consist of a heavy duty flanged frames designed for direct attachment to the ductwork or equipment. **NAH Series** models are ideal for balancing and/or shut off HVAC applications in the industrial systems with many options to meet your needs.

STANDARD CONSTRUCTION:

FRAME:

8" x 2" x 1/4" H.R.S. steel channel

BLADES:

Airfoil-shaped 14 ga H.R.S. double skin construction
5" to 8" wide.

AXLES:

Plated steel 3/4"Ø

LINKAGE:

9 ga galvanized jamb linkage

BEARINGS:

Bronze Oilite

FINISH:

Powder Coated (super durable polyester gray)

SIZE LIMITATIONS:

Maximum size: 60"w x 96"h
Minimum size: single blade 6"w x 8"h

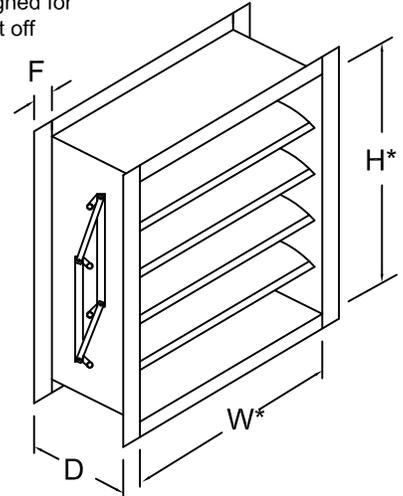
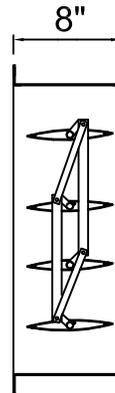
RATINGS:

Pressure: 10-35" w.g.- differential pressure

Velocity: 3000-6000 fpm

Temperature: 180° -400°

Note: Special blade clearances are required when temperatures exceed 250°F (121°C).



NOTE: Damper blades **always** run horizontal and are always the first dimension (W) when ordering (example: always order W" x H").

*Inside Dimensions are Actual Size(not undersized)



OPTIONS

- Stainless steel jamb seals
- Flange bolt holes
- EPDM blade seals 250° F
- Silicone blade seals 450° F
- 304 stainless steel construction
- 316 stainless steel construction
- Ball bearings: (2) hole flange style
 - Standard
 - Stainless steel
- Stuffing box seal
- Outboard bearing with shaft seal
- Linkage cover
- Central manifold grease system
- Hand Quadrant
- Actuator
- Powder Coated
- 1000° F (powder coated) resistance
- Insulated (Foam Filled Blades)

Quantity:	Max. Temp. (if higher than 250°F)	"W" Width	"H" Height	Frame Depth "D" 8" std.	Flange Width "F" 2" std.	Bolt Hole Information							REMARKS	
						J	N1	L Spacing	M Dia.	K	N2	C		

Job Name:	<input type="checkbox"/> Model NAH-720-3 (opposed blades) <input type="checkbox"/> Model NAH-721-3 (parallel blades)
Location:	
Architect:	
Engineer:	
Contractor:	

MODEL NAH-720-3 PERFORMANCE DATA

Imperial Units (Forward Flow)

Damper Width X Height	1 in. w.g. Class	4 in. w.g. Class	8 in. wg Class	*Torque (per sq. ft.)
12" x 12"	Class I	Class II	Class II	15 lbs/in
24" X 24"	Class I	Class I	Class I	12.59 lbs/in
36" X 36"	Class I	Class I	Class I	15 lbs/in
12" X 48"	Class III	Class III	Class II	12.59 lbs/in
48" X 12"	Class I	Class I	Class I	12.59 lbs/in
60" X 36"	Class II	Class II	Class II	15 lbs/in

Air leakage is based on operation between 50°F to 104°F. All data corrected to represent air density of 0.075 lbs/ft.³

*Torque applied to hold damper in closed position

Imperial Units (Back Flow)

Damper Width X Height	1 in. w.g. Class	4 in. w.g. Class	8 in. wg Class	*Torque (per sq. ft.)
12" x 12"	Class II	Class III	Class III	15 lbs/in
24" X 24"	Class I	Class I	Class II	12.59 lbs/in
36" X 36"	Class II	Class III	Class III	15 lbs/in
12" X 48"	Class III	Class III	Class III	12.59 lbs/in
48" X 12"	Class II	Class II	Class II	12.59 lbs/in
60" X 36"	Class III	Class III	Class II	15 lbs/in

*Torque applied to hold damper in closed position

		Leakage, ft ³ /min ² /ft			
		Required Rating		Extended Ranges (optional)	
Class	Pressure	1"	4"	8"	12"
	I		4	8	11
II		10	20	28	35
III		40	80	112	140

All data corrected to represent standard air at a density of 0.075 lbs/ft.

NAH-720 SOUND RATINGS								
Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12	2000	16	1500	11	1000	11	500	*
	3000	28	2250	21	1500	18	750	*
	4000	36	3000	29	2000	24	1000	*
18 x 18	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	31	1125	*
	6750	43	5063	37	3375	40	1688	15
24 x 24	4000	11	3000	10	2000	26	1000	*
	8000	33	6000	29	4000	37	2000	21
	12000	43	9000	42	6000	46	3000	31

NC = Noise criteria In Decibels Is based on room effect and 10db of room attenuation.
* = Less than 10 NC

AMCA Test Figures

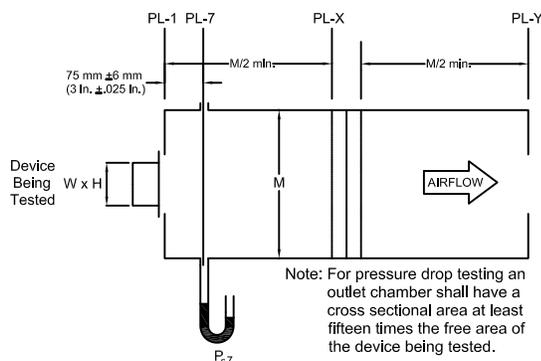


Figure 5.4- Test Device Setup with Outlet Chamber

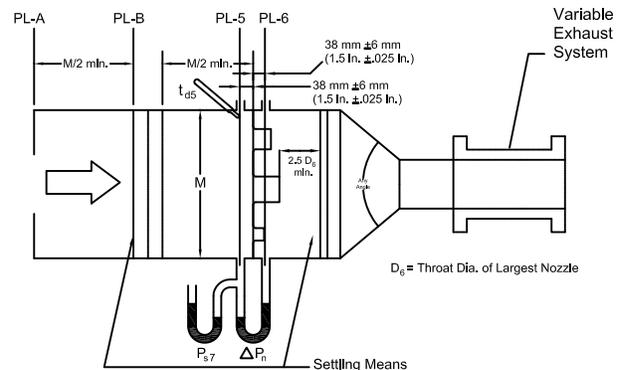


Figure 6.3- Airflow Rate Measurement Setup- Multiple Nozzle Chamber on Fan Inlet

MODEL NAH-720-3 PERFORMANCE DATA

Standard International Units (Forward Flow)

Damper Width X Height (mm)	250 Pa Class	1 KPa Class	2 KPa Class	*Torque
305 x 305	Class I	Class II	Class II	2,679 grams/cm
610 X 610	Class I	Class I	Class I	2,248 grams/cm
915 X 915	Class I	Class I	Class I	2,679 grams/cm
305 X 1220	Class III	Class III	Class II	2,248 grams/cm
1220 X 305	Class I	Class I	Class I	2,248 grams/cm
1525 X 915	Class II	Class II	Class II	2,679 grams/cm

Air leakage is based on operation between 10°C to 40°C. All data corrected to represent air density of 1.201 kg/m³.

*Torque applied to hold damper in closed position

Standard International Units (Back Flow)

Damper Width X Height (mm)	250 Pa Class	1 KPa Class	2 KPa Class	*Torque
305 x 305	Class II	Class III	Class III	2,679 grams/cm
610 X 610	Class I	Class I	Class II	2,248 grams/cm
915 X 915	Class II	Class III	Class III	2,679 grams/cm
305 X 1220	Class III	Class III	Class III	2,248 grams/cm
1220 X 305	Class II	Class II	Class II	2,248 grams/cm
1525 X 915	Class III	Class III	Class II	2,679 grams/cm

*Torque applied to hold damper in closed position

		Leakage, L/s / m ²			
		Required Rating		Extended Ranges (optional)	
Class	Pressure	0.25 kPa	1.0 kPa	2.0 kPa	3.0 kPa
I		20.3	40.6	55.9	71.1
II		50.8	102	142	178
III		203	406	569	711

FRAME CONSTRUCTION OPTIONS

Flange (F Dim): Standard- 2" Bolt holes: (Standard construction is **no** bolt holes)

Optional - 1-1/2" to 4"

Dim. "M": 7/16" dia. hole

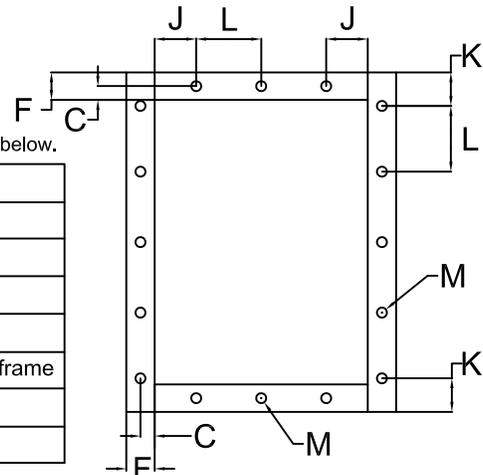
Web (D Dim): Standard - 8"

Dim. "L": 6" Center to Center

Optional - 8" to 12"

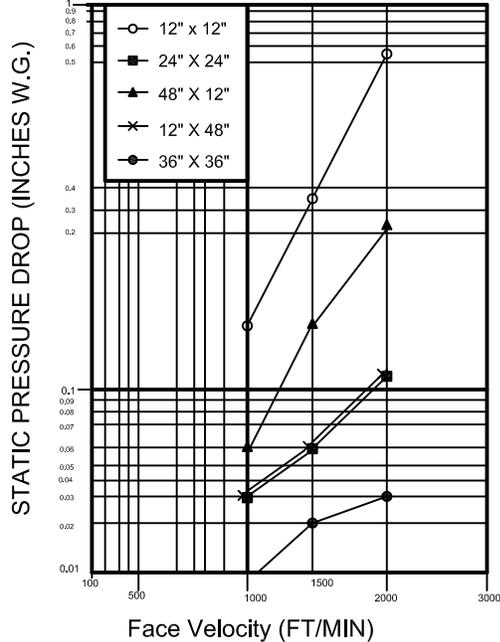
Note: Customer must be within Min. or Max limits on table below.

Dim.	Min or Max	Standard	Description
J	min. 3/4"		First/Last Space in Head/Sill
N1	min. 1.0"		No. of holes in Head/Sill
K	min. F/2"		First/Last Space in Jamb
N2	min. 1.0"		No. of holes in Jamb
C	.75*D" to 3/4"	F/(2*M)"	Centerline of bolt hole from inside edge of frame
L	2" to 12"	6.0"	Hole Spacing
M	1/4" to 11/16"	7/16"	Mounting hole Diameter



MODEL NAH-720-3 PERFORMANCE DATA

PRESSURE DROP



Face Velocity (FT/MIN)

Based on STANDARD AIR- .075 lb. per cubic foot.

NAH-720-3 sizes: 12x12, 24x24, 48x12, 12x48, 36x36
(305x305, 610x610, 1219x305, 305x1219, 914x914)

NAH-720-3

PRESSURE LIMITATIONS

The chart at the right shows conservative pressure limitations based on a maximum blade deflection of w/360.

TEMPERATURE LIMITATIONS

Blade Seals: EPDM -40° to +250°F
Silicone Rubber -40° to +450°F
Jamb Seals: Flexible stainless steel -40° to +400°F

VELOCITY LIMITATIONS

The chart at the right shows conservative velocity limitations based on damper size.

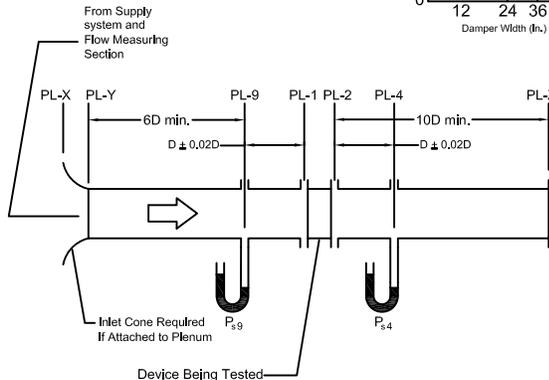
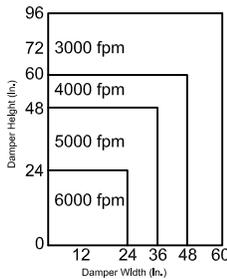
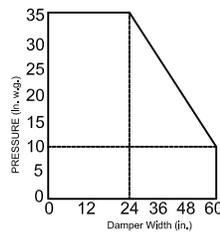


Figure 5.3- Test Device Setup with Inlet and Outlet Ducts

AMCA Test Figure 5.3

Figure 5.3 illustrates a fully ducted damper. This configuration has low pressure drop because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

Pressure Drop Data

This pressure drop data was conducted in accordance with AMCA Standard 500 using Test Figure 5.3. All data has been corrected to represent standard air at a density of .075 lb/cu.ft.

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

12 x 12	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.15 (38)
1500 (7.62)	0.33 (83)
2000 (10.16)	0.55 (139)

24 x 24	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.03 (7)
1500 (7.62)	0.06 (15)
2000 (10.16)	0.11 (27)

48 x 12	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.06 (15)
1500 (7.62)	0.15 (38)
2000 (10.16)	0.23 (58)

12 x 48	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.03 (7)
1500 (7.62)	0.06 (15)
2000 (10.16)	0.11 (27)

36 x 36	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.009 (2)
1500 (7.62)	0.02 (5)
2000 (10.16)	0.03 (7)

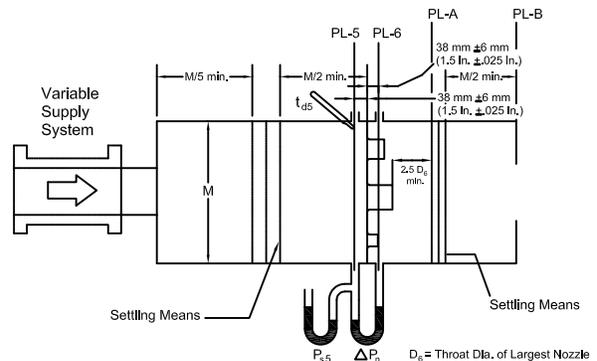


Figure 6.5- Airflow Rate Measurement Setup- Multiple Nozzle Chamber on Fan Outlet



**Industrial Airfoil Blade Control Damper
Model NAH-720-4**

Design / Application

Model **NAH-720-4** (Opposed Blade Operation) and **NAH-721-4** (Parallel Blade Operation) are Industrial Air Control Damper with Airfoil Shaped Blades. These models consist of a heavy duty flanged frames designed for direct attachment to the ductwork or equipment. **NAH Series** models are ideal for balancing and/or shut off HVAC applications in the industrial systems with many options to meet your needs.

STANDARD CONSTRUCTION:

FRAME:

8" x 2-1/2" x 3/8" H.R.S. channel

BLADES:

Airfoil-shaped 12 ga H.R.S. double skin construction 5" to 8" wide.

AXLES:

Plated steel 1-7/16"Ø T.G.&P

LINKAGE:

9 ga galvanized jamb linkage

BEARINGS:

Cast iron housing 2 hole ball bearings

FINISH:

Powder Coated (super durable polyester gray)

SIZE LIMITATIONS:

Maximum size: 60"w x 96"h
Minimum size: single blade 6"w x 8"h

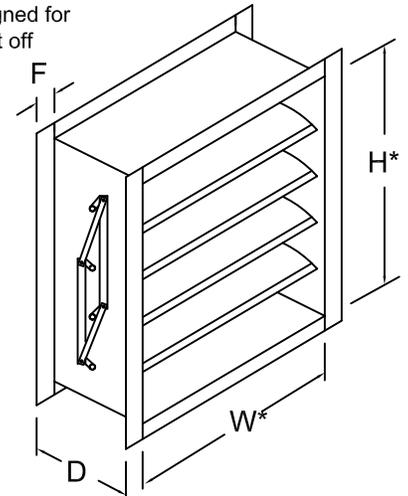
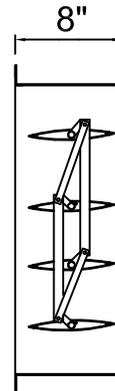
RATINGS:

Pressure: 10-40" w.g.- differential pressure

Velocity: 3000-8000 fpm

Temperature: -20°F - 1,000°F (without blade gasket)

Note: Special blade clearances are required when temperatures exceed 250°F (121°C).



NOTE: Damper blades always run horizontal and are always the first dimension (W) when ordering (example: always order W" x H").

***Inside Dimensions are Actual Size(not undersized)**



OPTIONS

- Stainless steel jamb seals
- Flange bolt holes
- EPDM blade seals 250° F
- Silicone blade seals 450° F
- 304 stainless steel construction
- 316 stainless steel construction
- Bearing Options: (consult factory)
 - Wheel driven worm gear heavy duty
 - Chain driven worm gear heavy duty
- Stuffing box seal
- Outboard bearing with shaft seal
- Linkage cover
- Central manifold grease system
- Actuator
- Powder Coated
- 1000° F (powder coated) resistance
- Insulated (Foam Filled Blades)

Quantity:	Max. Temp. (if higher than 250°F)	"W" Width	"H" Height	Frame Depth "D" 8" std.	Flange Width "F" 2" std.	Bolt Hole Information							REMARKS	
						J	N1	L Spacing	M Dia.	K	N2	C		

Job Name:	<input type="checkbox"/> Model NAH-720-4 (opposed blades) <input type="checkbox"/> Model NAH-721-4 (parallel blades)
Location:	
Architect:	
Engineer:	
Contractor:	

MODEL NAH-720-4 PERFORMANCE DATA

Imperial Units (Forward Flow)

Damper Width X Height	1 in. w.g. Class	4 in. w.g. Class	8 in. wg Class	*Torque (per sq. ft.)
12" x 12"	Class I	Class I	Class I	18 lbs-in
24" X 24"	Class I	Class I	Class I	15 lbs-in
36" X 36"	Class I	Class I	Class I	18 lbs-in
12" X 48"	Class I	Class I	Class I	15 lbs-in
48" X 12"	Class I	Class I	Class I	15 lbs-in
60" X 36"	Class I	Class I	Class I	18 lbs-in

Air leakage is based on operation between 50°F to 104°F. All data corrected to represent air density of 0.075 lbs/ft.³

*Torque applied to hold damper in closed position

Imperial Units (Back Flow)

Damper Width X Height	1 in. w.g. Class	4 in. w.g. Class	8 in. wg Class	*Torque (per sq. ft.)
12" x 12"	Class I	Class I	Class I	18 lbs-in
24" X 24"	Class I	Class I	Class I	15 lbs-in
36" X 36"	Class I	Class I	Class I	18 lbs-in
12" X 48"	Class II	Class II	Class II	15 lbs-in
48" X 12"	Class I	Class I	Class I	15 lbs-in
60" X 36"	Class I	Class II	Class I	18 lbs-in

*Torque applied to hold damper in closed position

		Leakage, ft ³ /min ² /ft			
		Required Rating		Extended Ranges (optional)	
Class	Pressure	1"	4"	8"	12"
	I		4	8	11
II		10	20	28	35
III		40	80	112	140

All data corrected to represent standard air at a density of 0.075 lbs/ft.

NAH-720 SOUND RATINGS								
Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12	2000	16	1500	11	1000	11	500	*
	3000	28	2250	21	1500	18	750	*
	4000	36	3000	29	2000	24	1000	*
18 x 18	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	31	1125	*
	6750	43	5063	37	3375	40	1688	15
24 x 24	4000	11	3000	10	2000	26	1000	*
	8000	33	6000	29	4000	37	2000	21
	12000	43	9000	42	6000	46	3000	31

NC = Noise criteria in Decibels is based on room effect and 10db of room attenuation.
* = Less than 10 NC

AMCA Test Figures

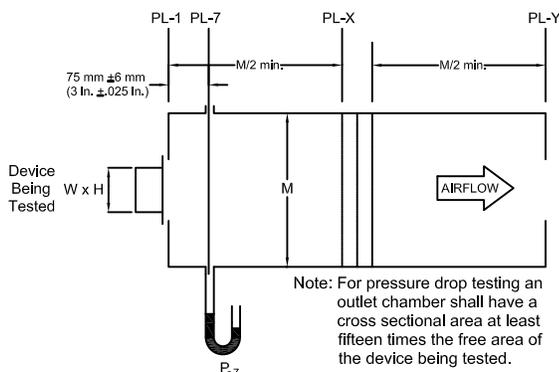


Figure 5.4- Test Device Setup with Outlet Chamber

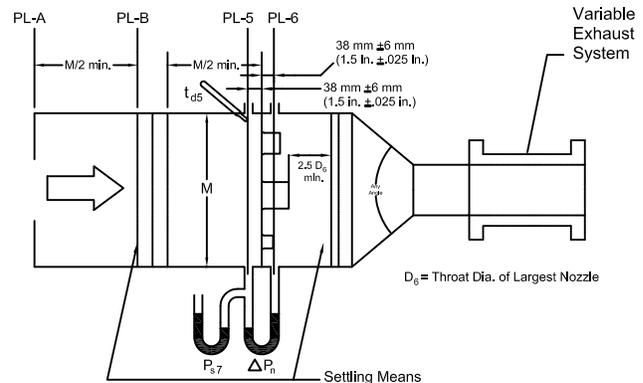


Figure 6.3- Airflow Rate Measurement Setup- Multiple Nozzle Chamber on Fan Inlet

MODEL NAH-720-4 PERFORMANCE DATA

Standard International Units (Forward Flow)

Damper Width X Height (mm)	250 Pa Class	1 KPa Class	2 KPa Class	*Torque
305 x 305	Class I	Class I	Class I	3,214 grams-cm
610 X 610	Class I	Class I	Class I	2,679 grams-cm
915 X 915	Class I	Class I	Class I	3,214 grams-cm
305 X 1220	Class I	Class I	Class I	2,679 grams-cm
1220 X 305	Class I	Class I	Class I	2,679 grams-cm
1525 X 915	Class I	Class I	Class I	3,214 grams-cm

Air leakage is based on operation between 10°C to 40°C. All data corrected to represent air density of 1.201 kg/m³.

*Torque applied to hold damper in closed position

Standard International Units (Back Flow)

Damper Width X Height (mm)	250 Pa Class	1 KPa Class	2 KPa Class	*Torque
305 x 305	Class I	Class I	Class I	3,214 grams-cm
610 X 610	Class I	Class I	Class I	2,679 grams-cm
915 X 915	Class I	Class I	Class I	3,214 grams-cm
305 X 1220	Class II	Class II	Class II	2,679 grams-cm
1220 X 305	Class I	Class I	Class I	2,679 grams-cm
1525 X 915	Class I	Class II	Class I	3,214 grams-cm

*Torque applied to hold damper in closed position

		Leakage, L/s /m ²			
		Required Rating		Extended Ranges (optional)	
Class	Pressure	0.25 kPa	1.0 kPa	2.0 kPa	3.0 kPa
I		20.3	40.6	55.9	71.1
II		50.8	102	142	178
III		203	406	569	711

FRAME CONSTRUCTION OPTIONS

Flange (F Dim): Standard- 2"
Optional - 1-1/2" to 4"

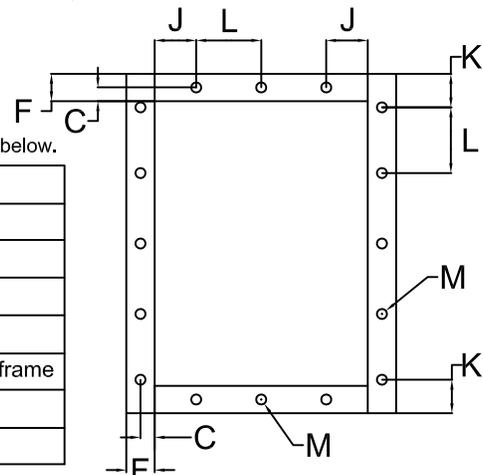
Bolt holes: (Standard construction is **no** bolt holes)

Dim. "M": 7/16" dia. hole
Dim. "L": 6" Center to Center

Web (D Dim): Standard - 8"
Optional - 8" to 12"

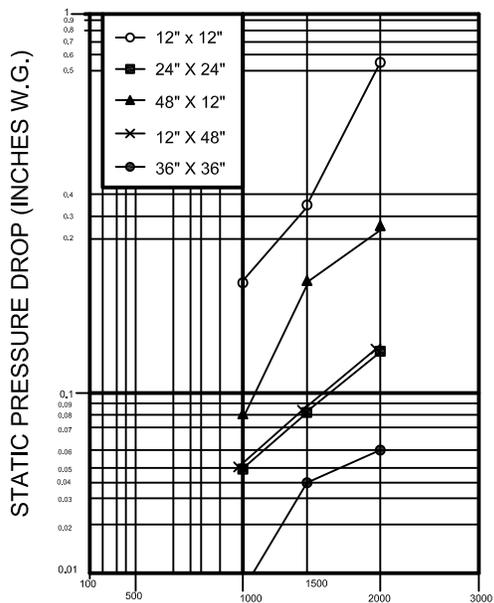
Note: Customer must be within Min. or Max limits on table below.

Dim.	Min or Max	Standard	Description
J	min. 3/4"		First/Last Space in <u>Head/Sill</u>
N1	min. 1.0"		No. of holes in <u>Head/Sill</u>
K	min. F/2"		First/Last Space in <u>Jamb</u>
N2	min. 1.0"		No. of holes in <u>Jamb</u>
C	.75*D" to 3/4"	F/(2*M)"	Centerline of bolt hole from inside edge of frame
L	2" to 12"	6.0"	Hole Spacing
M	1/4" to 11/16"	7/16"	Mounting hole Diameter



MODEL NAH-720-4 PERFORMANCE DATA

PRESSURE DROP



Face Velocity (FT/MIN)

Based on STANDARD AIR- .075 lb. per cubic foot.

NAH-720-4 sizes: 12x12, 24x24, 48x12, 12x48, 36x36
(305x305, 610x610, 1219x305, 305x1219, 914x914)

NAH-720-4

PRESSURE LIMITATIONS

The chart at the right shows conservative pressure limitations based on a maximum blade deflection of $w/360$.

TEMPERATURE LIMITATIONS

Blade Seals: EPDM -40° to $+250^{\circ}$ F
Silicone Rubber -40° to $+450^{\circ}$ F
Jamb Seals: Flexible stainless steel -40° to $+400^{\circ}$ F

VELOCITY LIMITATIONS

The chart at the right shows conservative velocity limitations based on damper size.

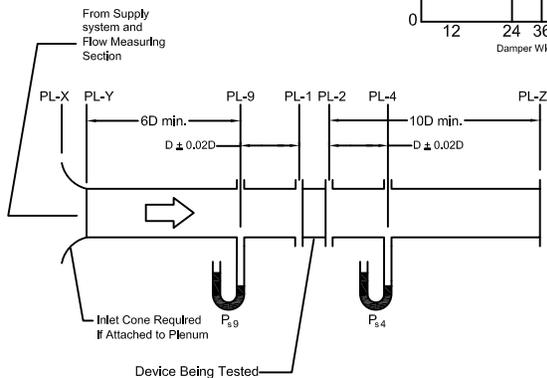
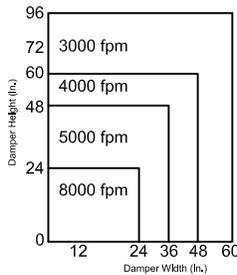
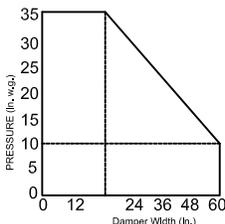


Figure 5.3- Test Device Setup with Inlet and Outlet Ducts

AMCA Test Figure 5.3

Figure 5.3 illustrates a fully ducted damper. This configuration has low pressure drop because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

Pressure Drop Data

This pressure drop data was conducted in accordance with AMCA Standard 500 using Test Figure 5.3. All data has been corrected to represent standard air at a density of .075 lb/cu.ft.

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

12 x 12	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.18 (45)
1500 (7.62)	0.35 (88)
2000 (10.16)	0.57 (144)

24 x 24	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.05 (12)
1500 (7.62)	0.08 (20)
2000 (10.16)	0.13 (33)

48 x 12	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.08 (20)
1500 (7.62)	0.18 (45)
2000 (10.16)	0.26 (66)

12 x 48	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.05 (12)
1500 (7.62)	0.08 (20)
2000 (10.16)	0.13 (33)

36 x 36	
Face Velocity ft/min (m/s)	Pressure Drop in. w.g. (Pa)
1000 (5.08)	0.011 (3)
1500 (7.62)	0.04 (10)
2000 (10.16)	0.06 (15)

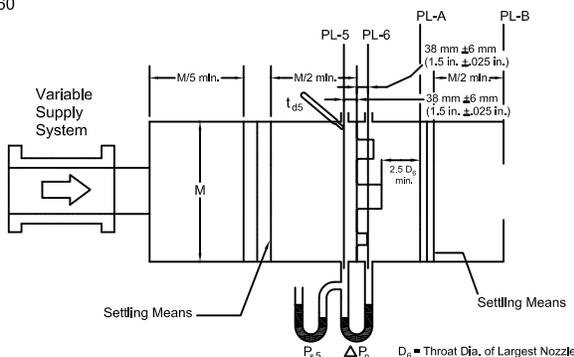


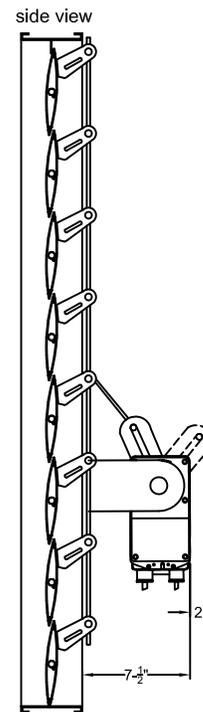
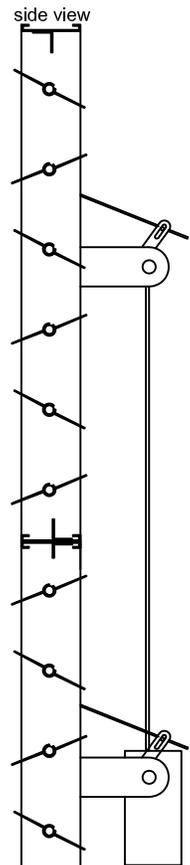
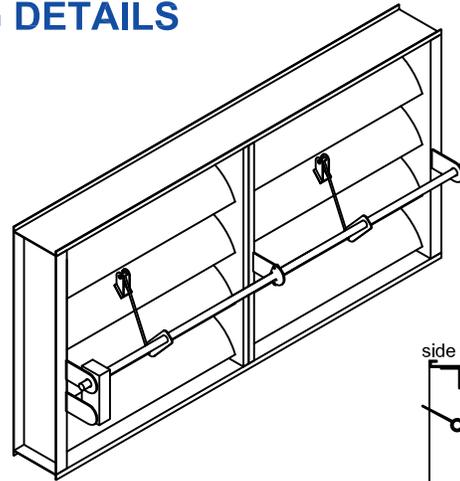
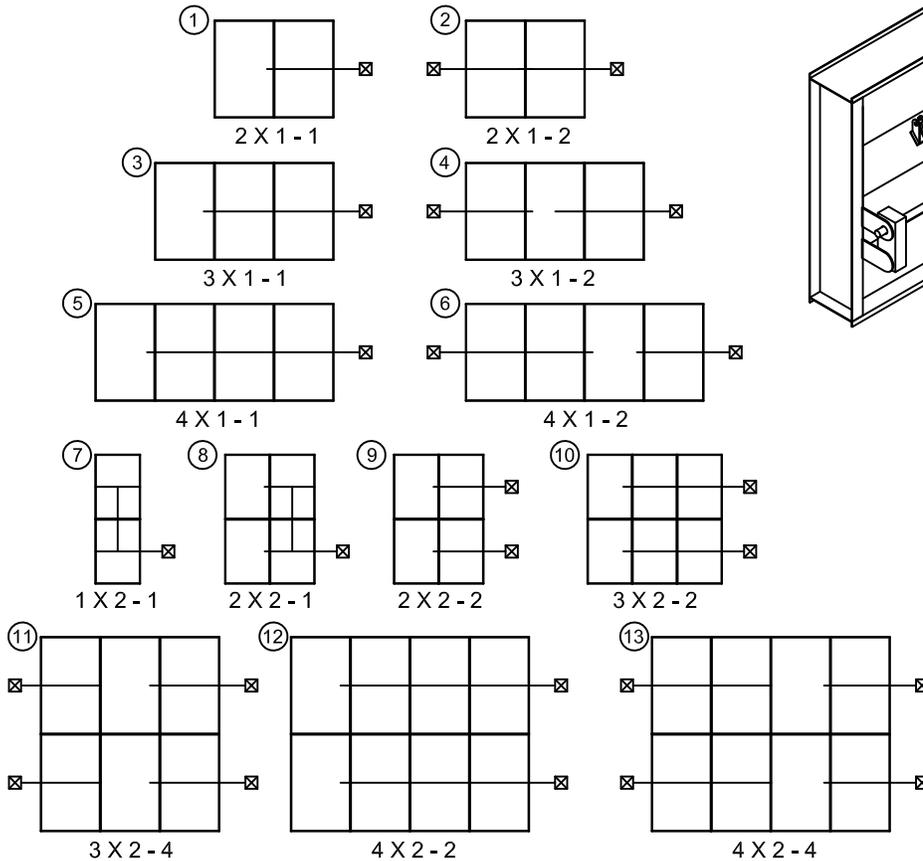
Figure 6.5- Airflow Rate Measurement Setup- Multiple Nozzle Chamber on Fan Outlet



JACKSHAFTING DETAILS

Select: 1 thru 13

Jackshaft Configurations



Airfoil blade w/face linkage (single section)

Standard blade w/jamb linkage (1 X 2 - 2)

CONFIGURATION LEGEND:



- OPTIONAL:**
- Actuator in Airstream
 - Actuator out of Airstream

1. The primary function of a Jackshaft is to distribute power equally to each section of a multiple section damper. This is best achieved by linking the operator directly to the Jackshaft which in turn will control all of the individual sections as one.
2. Dampers are undersized approximately 1/4" for both width and height on entire multi-section assembly.
3. Dampers are self-supporting only in the largest recommended single section. Additional bracing at every 8 feet of damper width and height is recommended on multiple section assemblies.
4. During field installation of damper sections, it is important that final linkage positions are set so that all sections open and close simultaneously for their given operator.
5. Jackshafting will be located near the bottom of damper section height.
6. If actuators are field mounted, actuator must be powered up and then locked down on shaft.

Job Name:
Location:
Architect:
Engineer:
Contractor:

JACKSHAFTING DETAILS



INSTALLATION AND MAINTENANCE INSTRUCTIONS

All Adjustable Louvers and Operating Dampers

BEFORE INSTALLING IN DUCT:

1. If the assembly is provided with un-joined jackshaftering that operates more than one section, connect blade jumpers as required or bolt the two jackshafts together, depending on which is provided. Jackshaftering may have been repositioned to prevent damage during shipment. If damper operator is to be mounted out of airstream, the jackshaft should extend through the bearing bracket and approximately 6" beyond frame. Secure jackshaftering in place with provided clamps.
2. If applicable, link lower and upper jackshafts with the crossover bar through the ball joint on crank arm at each jackshaft. Locate crank arm close to bearing support bracket of jackshaft.
3. Improperly installed dampers and damper sections prevent blades from sealing properly (Fig. 1). Gaps between the blades and frame indicate a damper installed out of flat. Misalignment of the damper or damper sections can cause twist in the frame resulting in blade-to-linkage bind. This overloads the damper actuator or renders it inoperative.
4. We recommend lubricating moving parts with dry graphite.
5. Manual dampers should be run through a full-open to full-close cycle by hand to insure proper operation of the damper.
6. Motorized dampers should be checked by a preliminary attempt to operate with the motor. If binding occurs, disconnect one end of the driving linkage (and note its exact position beforehand) to operate damper manually and check per above. Reconnect linkage and check again.
7. Lift panels into duct (or opening) by its frame, not by any blade or hardware. Final position must be square, straight, plumb, and without twist.
8. Due to shipping and handling, dampers may arrive at the site slightly racked or twisted. Dampers are to be squared and not twisted prior to installation into square duct or sleeves.
9. Damper should be shimmed in the opening to prevent distortion of the frame by the fasteners holding it in place. Dampers with seals should be caulked to prevent leakage between the frame and duct.
10. CHECK DAMPER FOR FREE OPERATION BEFORE INSTALLATION.

MULTIPLE-PANEL DAMPERS:

Multiple-panel dampers will be tagged for ease of assembly.

OPERATORS:

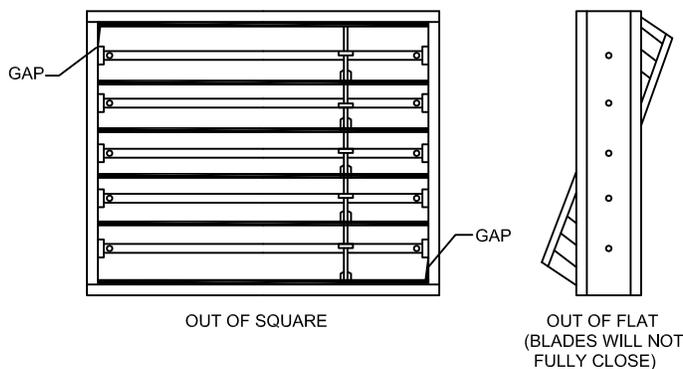
1. An extended shaft kit is supplied if no operator is specified.
2. Reference specific installation instructions supplied with damper operator for motorized dampers.

MAINTENANCE:

In general this unit must be kept clean and free from foreign matter that may impede normal movement and seating of blades and seals (if applicable). A cleaning schedule should be established and is entirely dependent upon the environment into which the damper is placed. The damper is basically maintenance free with the above exception and regular lubrication and seal inspection as indicated below:

BEARINGS AND LINKAGE PIVOTS: Lubricate with dry graphite as required to provide free movement.

Fig. (1) Dampers Out of Square and Flat



IMPORTANT: Check Often. Use a square.

CAUTION:

Check damper linkage to ensure that blades move freely. Make sure that linkage rods are not bent or damaged. Also check blade brackets for damage. **DO NOT INSTALL IF DAMAGED!**

NEVER DISCONNECT LINKAGE! If for some reason it is necessary, precision mark the linkage arm where it connects to the actuator and re-connect. If linkage has been disconnected without being marked, power motor to full stroke and push linkage rod to extend louver blades to the full open position and connect and tighten to actuator.

Job Name:

Location:

Architect:

Engineer:

Contractor:



ROUND INDUSTRIAL CONTROL DAMPER

Model HD-292 Level IV Rating

Design / Application

Model **HD-292** is a Round Industrial Air Control Damper with a single skin 14 ga to 3/16" thick steel blade. This model consist of a heavy duty flanged frame (14 ga to 10 ga steel) designed for direct attachment to the ductwork or equipment. **HD-292** model is ideal for balancing and/or shut off HVAC applications in the industrial systems with many options to meet your needs.

STANDARD CONSTRUCTION

(see table below for specifics)

- Frame: Carbon steel (above 12" diameter)
Galvanized steel (up to 12" diameter)
- Blades: Steel, welded to shaft, reinforced as required
- Axles: Plated steel
- Bearings: Bronze sleeve 200° F max
- Finish: 14 ga...Galv. steel 12 ga...Baked Powder Polyester
- Blade Stop: Single Point (not req'd with 1000°F blade gasket)
- Seals: None

SIZE LIMITATIONS:

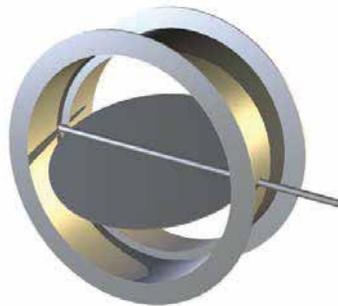
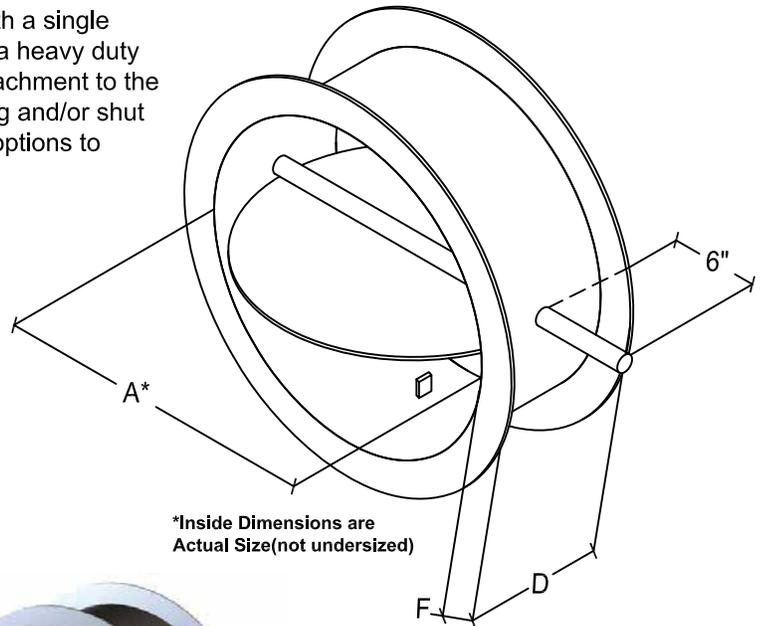
- Minimum Size: 4" Diameter
- Maximum Size: 60" Diameter

RATINGS: (see page 2 for additional information)

- Velocity: up to 4000 fpm
- Pressure: up to 5 in w.g.- differential pressure
- Temperature: Bronze Brg. -20°F ~ 200°F (Standard)
Stainless Brg. 200°F ~ 1,000°F (Optional)

OPTIONS

- Rolled bar stop (1/2" x 1/4" bar thru 17", 1/2" x 1/2" bar over 17")
- Crosslinked closed cell blade seal with rolled bar (Max 190°F)
- Silica/Woven hi-temp, low leak, 1000° F seal
- Bolt Holes
 one side both sides
- Bearings (see page 3)
Type _____ Upgrade _____
- Hand Quadrant # _____
- Actuator Mounting Plate
- Stainless Steel Construction
 304 316 Other _____
- Powder Coated Epoxy



BLADE/FRAME SECTIONS



Diameter/I.D. (A")		Frame		Flange Web "F"	Axle Diameter	Blade Thickness
Above	Through	Depth "D"	Gauge			
3.99"	12"	6"	14	1.25"	0.5"	14 ga
12"	20"	8"	12	1.5"	0.5"	12 ga
20"	24"	8"	12	1.5"	0.75"	12 ga
24"	32"	8"	10	2.0"	0.75"	12 ga
32"	40"	8"	10	2.0"	0.75"	10 ga
40"	48"	8"	10	2.0"	1.0"	10 ga
48"	54"	8"	10	2.0"	1.0"	10 ga
54"	60"	8"	10	2.0"	1.0"	3/16" (thk)

Job Name: _____

Location: _____

Architect: _____

Engineer: _____

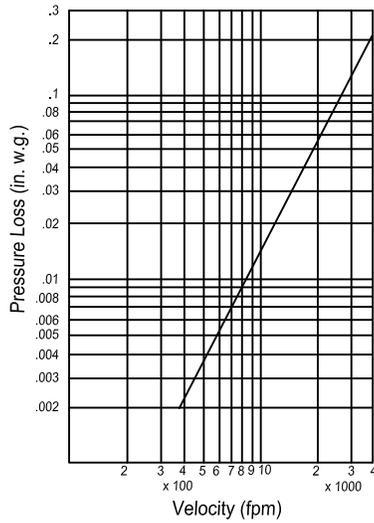
Contractor: _____

MODEL HD-292

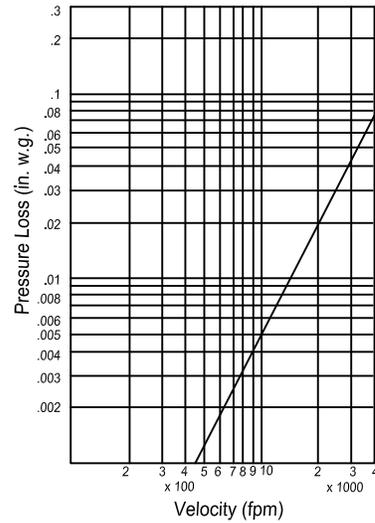
Pressure Drop Data

The HVAC system has many factors that effect its internal pressure losses. Dampers in the system is one contributing factor. These dampers have been tested per AMCA Standard 500-D, Fig. 5.3 (ductwork upstream and downstream). There are many influences the ductwork configuration that could effect the performance below such as other objects close to the dampers, elbows or turns near the dampers, internally mounted actuators, etc. This data will assist the designer in the analysis of the system.

Pressure Drop
12" dia. Damper



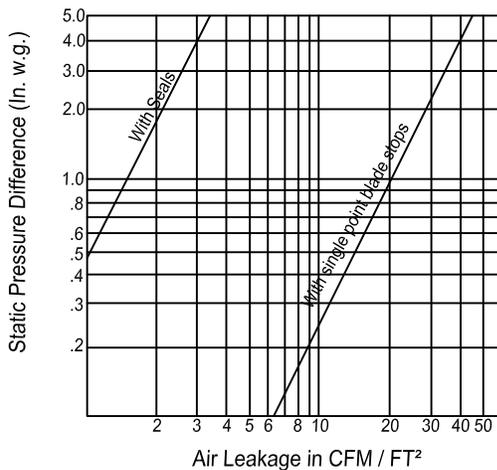
Pressure Drop
36" dia. Damper



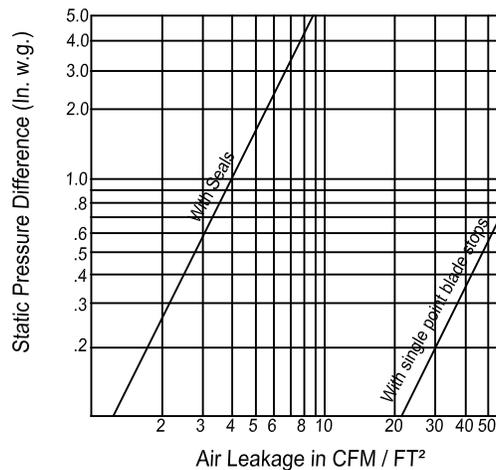
Leakage Data

The damper leakage shown below is per AMCA Standard 500-D . The leakage shown is without seals (standard construction) and with seals, crosslink closed cell or silica/woven. The damper is in the fully closed position.

Leakage
12" Diameter Damper



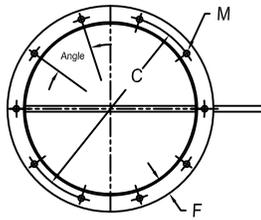
Leakage
36" Diameter Damper



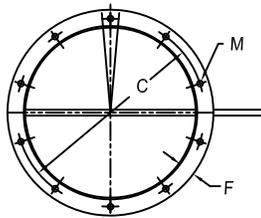
Bolt Holes: Standard construction is **no** bolt holes. Optional: Bolt holes in one flange or both flanges

If bolt holes are required, CVS recommends either pattern shown on the drawings below. The patterns shown below "Parallel to Axle" or "Straddle Axle" drawings should be specified when ordering. The table below also gives further details and recommendations on our standard hole patterns. Should a custom hole pattern be required, then it must be approved and sent in at time of order.

Bolt Holes
Parallel to Axle Centerline (P)



Bolt Holes
Straddle Axle Centerline (S)



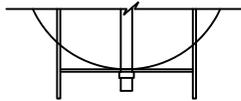
CVS Recommended Bolt Hole Pattern
(Bolt Holes Parallel to Axle Centerline)

Diameter (I.D.)		Number of Holes	Mounting Hole Diameter "M"	Bolt Circle Diameter "C"	Degrees Between Holes
Above	Through				
4"	5"	4	3/8"	*	90
5"	8"	6	3/8"	*	60
8"	11"	6	7/16"	*	60
11"	18"	8	7/16"	*	45
18"	24"	12	7/16"	*	30
24"	36"	16	7/16"	*	22.5
36"	58"	24	7/16"	*	15
58"	60"	32	9/16"	*	11.25

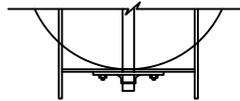
* Bolt Circle Diameter = Damper Diameter + Flange Height + 1/4"

Quantity	Max. Temp. (if higher than 250°F)	A Diameter	Bolt Hole Information			Placement (P or S)
			# of Holes	M Dia.	C Dia.	

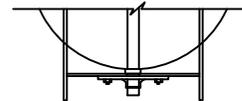
BEARING AND SHAFT OPTIONS



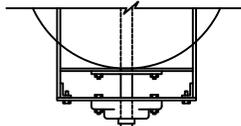
Standard: Bronze sleeve or Type I Stainless Steel sleeve



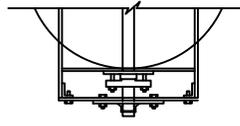
Type II Two Hole Flange Ball Bearing



Type II(i) Two Hole Flange Ball Bearing with O-ring



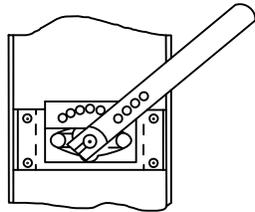
Type V Two Hole Flange Ball Bearing with O-ring



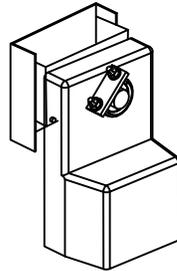
Type VI Two Hole Flange Ball Bearing with Packing Gland

Bearing Options:			Bearing Up-grade Options:			
Type I	Stainless Steel Pressed Bushing	Type V (Outboard) Two Hole Flange pressed steel housing Ball- Permanently Lubricated (-30° to 200°F) with O-ring	a...	Upgrade Type II, V, & VI to cast iron housing	f...	Upgrade Type II, V, & VI to All Stainless Steel (-30° to 200°F)
Type II	Two Hole Flange Pressed Steel Housing Ball- Permanently Lubricated (-30F to 200°F)	Type VI (Outboard) Two Hole Flange pressed steel housing Ball- Permanently Lubricated (-30° to 200°F) with Packing Gland Over 200°F (500°F packing gland material will be supplied)	b...	Grease fitting in lieu of Permanently Lubricated	g...	Upgrade Type II, V, & VI Add Bearing Cover for Harsh environments
Type III	(Outboard) pressed bronze bushing with O-ring seal		c...	Upgrade Type II, V, & VI to High Temp. (-30° to 400°F)	h...	Upgrade Type II, V, & VI to Thermo-plastic (-30° to 200°F) Harsh environments
Type IV	(Outboard) pressed Stainless steel bushing with O-ring seal		d...	Upgrade Type II, V, & VI to High Temp.graphite (-30° to 750°F)	i...	Upgrade Type II to include O-ring
			e...	Upgrade Type II, V, & VI to High Temp. graphite (-450° to 1000°F)		

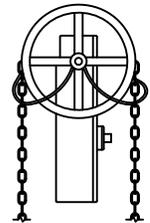
Model **HD-292** has available many operators shown below that can be factory mounted by CVS. Consult factory for other operators not shown.



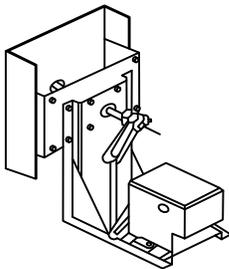
Hand Quadrant #2



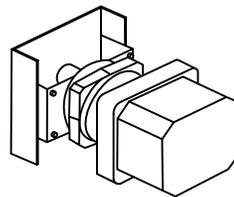
Direct Drive Mounted
Electric Actuators



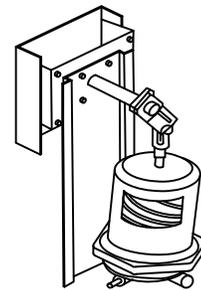
Pull Chain and
Worm Gear



Foot Mounted Actuators
Such as Honeywell,
Siebe/Barber Coleman



RCS Surepower TM



Pneumatic Diaphragm

SPECIFICATIONS:

Industrial Round Dampers meeting the following specifications shall be furnished and installed where shown on drawings and described in the schedule. The damper frame shall consist of heavy gauge steel (14 -10 ga) rolled with a 1-1/4" minimum depth flange/web. The damper blade shall be of a single thickness, heavy gauge steel (14 ga < 12"D, 12"-32"D=12 ga, 33"-54"D=10 ga, 3/16" thick plate > 54"). The axle shall be continuous length of 1/2" dia. up to 20", 3/4" dia. up to 40" and 1" dia over 40". Bearings shall be of the bronze sleeve type to minimize wear. Also submitted with submittal package is the dampers performance data such as pressure drop, leakage, and temperature ratings. The damper shall be suitable for velocities up to 4000 fpm at a pressure differential of 5" wg.

ADDITIONAL INFORMATION THAT MAY BE ADDED TO SPECIFICATIONS:

Damper shall be factory supplied with Blade Seals for low leakage. Blade Seals shall be Crosslinked Closed Cell (190°F maximum temperature) or Silica/woven Hi-temp (Up to 1000°F) {Specifier to choose one}. Damper leakage for a 36" diameter damper to be less than 4 cfm/ft² at 1" w.g. and less than 8 cfm/ft² at 4" w.g. shall be submitted for approval on manufacturer's submittal data. Bearing type upgrades may be specified.



INDUSTRIAL CONTROL DAMPERS
Model HD-392 Level V Rating

DESIGN / APPLICATION

Model **HD-392** is a Round Industrial Air Control Damper with a single skin 10 ga to 1/4" thick steel blade. This model consist of a heavy duty flanged frame (12 ga to 3/16" plate steel) designed for direct attachment to the ductwork or equipment. **HD-392** model is ideal for balancing and/or shut off HVAC applications in the industrial systems with many options to meet your needs.

STANDARD CONSTRUCTION

(see table below for specifics)

- Frame: Carbon steel
- Blades: Steel, welded to shaft, reinforced as required
- Axles: Plated steel
- Bearings: Bronze sleeve 200° F max
- Finish: Baked Powder Polyester
- Blade Stop: Single Point (not req'd with 1000°F blade gasket)
- Seals: None

SIZE LIMITATIONS

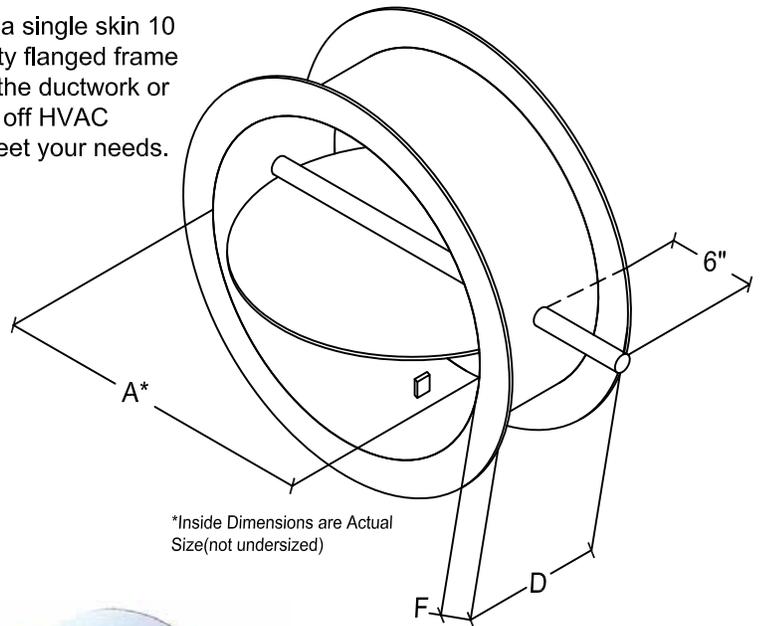
Minimum Size: 4" Diameter
 Maximum Size: 60" Diameter

RATINGS (see page 2)

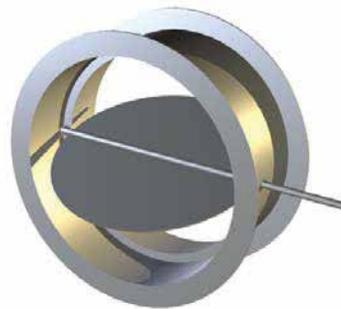
- Velocity: 6000 fpm
- Pressure: 10 in w.g.- differential pressure
- Temperature: Bronze Brg. -20°F ~ 200°F (Standard)
- Stainless Brg. 200°F ~ 1,000°F (Optional)

OPTIONS

- Rolled bar stop (1/2" x 1/4" bar thru 17", 1/2" x 1/2" bar over 17")
- Crosslinked closed cell seal with rolled bar (Max 190°F)
- Silica/Woven hi-temp, low leak, 1000° F seal
- Bolt Holes
 - one side both sides
- Bearings (see page 3)
 - Type _____ Upgrade _____
- Hand Quadrant # _____
- Actuator Mounting Plate
- Stainless Steel Construction
 - 304 316 Other _____
- Powder Coated Epoxy



*Inside Dimensions are Actual Size(not undersized)



BLADE/FRAME SECTIONS



Diameter/ID(A)		Frame		Flange Width F	Axle Diameter	Blade Thickness
Above	Through	Depth D	Gauge			
3.99"	12"	6"	12	1.25"	0.5"	10 ga
12"	20"	8"	10	1.5"	0.5"	10 ga
20"	24"	8"	10	1.5"	0.75"	3/16" (thk)
24"	32"	8"	10	2.0"	0.75"	3/16" (thk)
32"	40"	8"	10	2.0"	0.75"	3/16" (thk)
40"	48"	8"	10	2.0"	1.0"	3/16" (thk)
48"	54"	8"	3/16" (thk)	2.0"	1.5"	3/16" (thk)
54"	60"	8"	3/16" (thk)	2.0"	1.5"	1/4" (thk)

Job Name: _____

Location: _____

Architect: _____

Engineer: _____

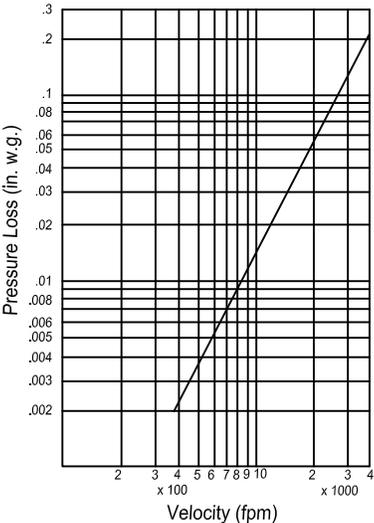
Contractor: _____

MODEL HD-392

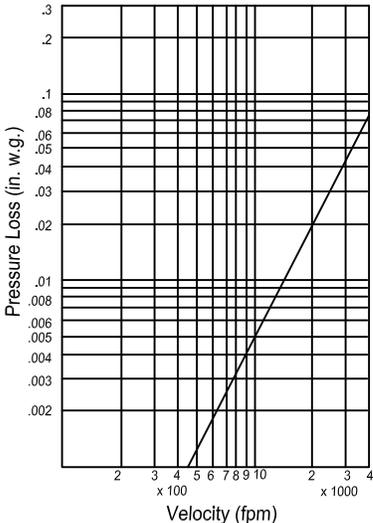
Pressure Drop Data

The HVAC system has many factors that effect its internal pressure losses. Dampers in the system is one contributing factor. These dampers have been tested per AMCA Standard 500-D, Fig. 5.3 (ductwork upstream and downstream). There are many influences the ductwork configuration that could effect the performance below such as other objects close to the dampers, elbows or turns near the dampers, internally mounted actuators, etc. This data will assist the designer in the analysis of the system.

Pressure Drop
12" dia. Damper



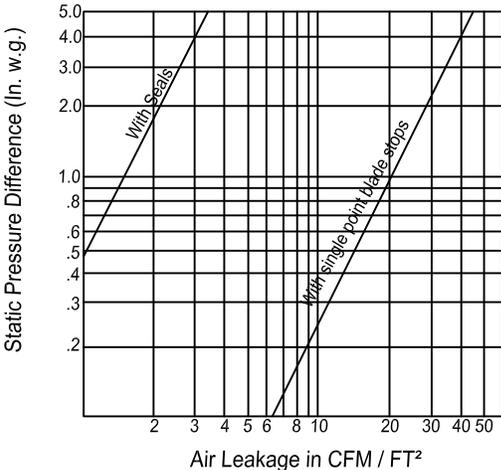
Pressure Drop
36" dia. Damper



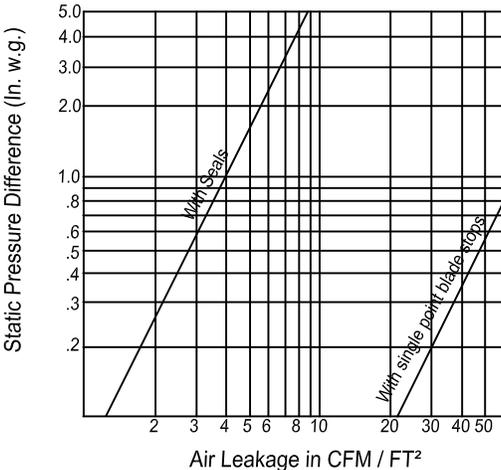
Leakage Data

The damper leakage shown below is per AMCA Standard 500-D . The leakge shown is without seals (standard contruction) and with seals, crosslink closed cell or silica/woven. The damper is in the fully closed position.

Leakage
12" Diameter Damper



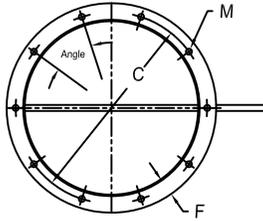
Leakage
36" Diameter Damper



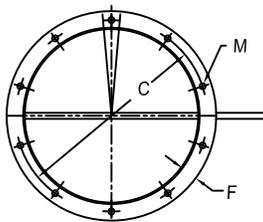
Bolt Holes: Standard construction is **no** bolt holes. Optional: Bolt holes in one flange or both flanges

If bolt holes are required, CVS recommends either pattern shown on the drawings below. The patterns shown below "Parallel to Axle" or "Straddle Axle" drawings should be specified when ordering. The table below also gives further details and recommendations on our standard hole patterns. Should a custom hole pattern be required, then it must be approved and sent in at time of order.

**Bolt Holes
Parallel to Axle Centerline (P)**



**Bolt Holes
Straddle Axle Centerline (S)**



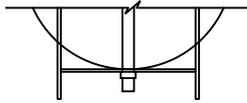
**CVS Recommended Bolt Hole Pattern
(Bolt Holes Parallel to Axle Centerline)**

Diameter/ID (A)		Number of Holes	Mounting Hole Diameter "M"	Bolt Circle Diameter "C"	Degrees Between Holes
Above	Through				
4"	5"	4	3/8"	*	90
5"	8"	6	3/8"	*	60
8"	11"	6	7/16"	*	60
11"	18"	8	7/16"	*	45
18"	24"	12	7/16"	*	30
24"	36"	16	7/16"	*	22.5
36"	58"	24	7/16"	*	15
58"	60"	32	9/16"	*	11.25

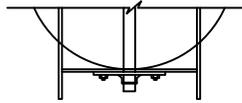
* Bolt Circle Diameter = Damper Diameter + Flange Height + 1/4"

Quantity	Max. Temp. (if higher than 250°F)	A Diameter	Bolt Hole Information		
			# of Holes	M Dia.	C Dia.

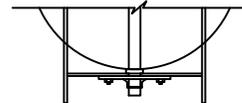
BEARING AND SHAFT OPTIONS



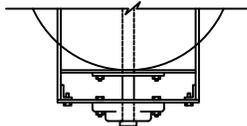
Standard: Bronze sleeve or Type I Stainless Steel sleeve



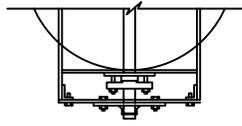
Type II Two Hole Flange Ball Bearing



Type II(i) Two Hole Flange Ball Bearing with O-ring



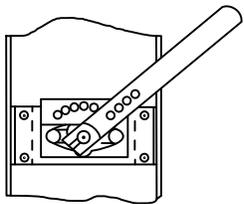
Type V Two Hole Flange Ball Bearing with O-ring



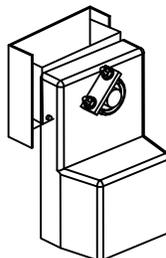
Type VI Two Hole Flange Ball Bearing with Packing Gland

Bearing Options:		Bearing Up-grade Options:	
Type I	Stainless Steel Pressed Bushing	Type V	(Outboard) Two Hole Flange pressed steel housing Ball- Permanently Lubricated (-30° to 200°F) with O-ring
Type II	Two Hole Flange Pressed Steel Housing Ball- Permanently Lubricated (-30F to 200°F)	Type VI	(Outboard) Two Hole Flange pressed steel housing Ball- Permanently Lubricated (-30° to 200°F) with Packing Gland Over 200° F (500° F packing gland material will be supplied)
Type III	(Outboard) pressed bronze bushing with O-ring seal		
Type IV	(Outboard) pressed Stainless steel bushing with O-ring seal		
a...	Upgrade Type II, V, & VI to cast iron housing	f...	Upgrade Type II, V, & VI to All Stainless Steel (-30° to 200°F)
b...	Grease fitting in lieu of Permanently Lubricated	g...	Upgrade Type II, V, & VI Add Bearing Cover for Harsh environments
c...	Upgrade Type II, V, & VI to High Temp. (-30° to 400°F)	h...	Upgrade Type II, V, & VI to Thermo-plastic (-30° to 200°F) Harsh environments
d...	Upgrade Type II, V, & VI to High Temp. graphite (-30° to 750°F)	i...	Upgrade Type II to include O-ring
e...	Upgrade Type II, V, & VI to High Temp. graphite (-450° to 1000°F)		

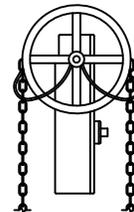
Model **HD-392** has available many operators shown below that can be factory mounted by CVS. Consult factory for other operators not shown.



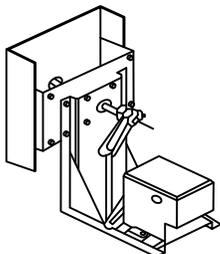
Hand Quadrant #2



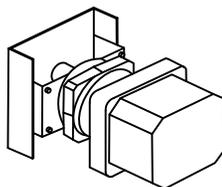
Direct Drive Mounted Electric Actuators



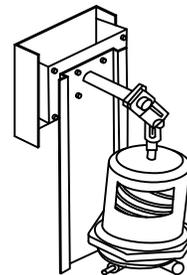
Pull Chain and Worm Gear



Foot Mounted Actuators
Such as Honeywell,
Siebe/Barber Coleman



RCS Surepower TM



Pneumatic Diaphragm

SPECIFICATIONS:

Industrial Round Dampers meeting the following specifications shall be furnished and installed where shown on drawings and described in the schedule. The damper frame shall consist of heavy gauge steel (12 ga - 3/16" plate) rolled with a 1-1/4" minimum depth flange/web. The damper blade shall be of a single thickness, heavy gauge steel (10 ga < 20"D, 21"-54"D=3/16" plate, 1/4" thick plate > 54"). The axle shall be continuous length of 1/2" dia. up to 20", 3/4" dia. up to 40", 1" dia. up to 48", and 1.5" dia over 48". Bearings shall be of the bronze sleeve type to minimize wear. Also submitted with submittal package is the dampers performance data such as pressure drop, leakage, and temperature ratings. The damper shall be suitable for velocities up to 6000 fpm at a pressure differential of 10" wg.

ADDITIONAL INFORMATION THAT MAY BE ADDED TO SPECIFICATIONS:

Damper shall be factory supplied with Blade Seals for low leakage. Blade Seals shall be Crosslinked Closed Cell (190°F maximum temperature) or Silica/woven Hi-temp (Up to 1000°F) {Specifier to choose one}. Damper leakage for a 36" diameter damper to be less than 4 cfm/ft² at 1" w.g. and less than 8 cfm/ft² at 4" w.g. shall be submitted for approval on manufacturer's submittal data. Bearing type upgrades may be specified.



INDUSTRIAL CONTROL DAMPERS

Model HD-492 Level VI Rating

APPLICATION AND DESIGN

Model **HD-492** is a Round Industrial Air Control Damper with a single skin 3/16" to 3/8" thick steel blade. This model consist of a heavy duty flanged frame (10 ga to 3/16" plate steel) designed for direct attachment to the ductwork or equipment. **HD-492** model is ideal for balancing and/or shut off HVAC applications in the industrial systems with many options to meet your needs.

STANDARD CONSTRUCTION

(see table below for specifics)

- Frame: Carbon steel
- Blades: Steel, reinforced as required
- Axles: Plated steel
- Bearings: Bronze sleeve 200°F max
- Finish: Baked Powder Polyester
- Blade Stop: Single Point (not req'd with 1000°F blade gasket)
- Seals: None

SIZE LIMITATIONS

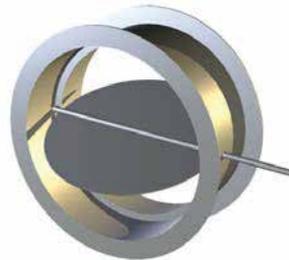
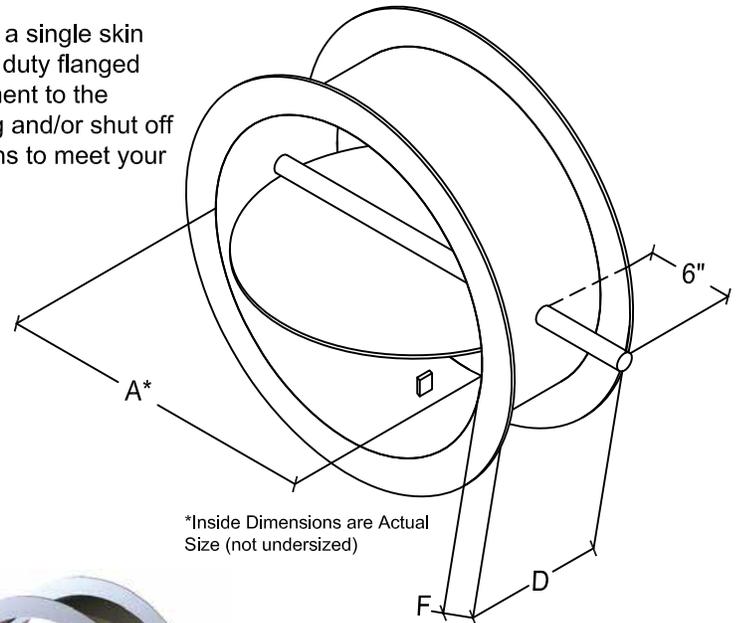
- Minimum Size: 4" Diameter
- Maximum Size: 72" Diameter

RATINGS (see page 2)

- Velocity: 6400 fpm
- Pressure: 20 in w.g.- differential pressure
- Temperature: Bronze Brg. -20°F ~ 200°F (Standard)
- Stainless Brg. 200°F ~ 1,000°F (Optional)

OPTIONS

- Rolled bar stop (1/2" x 1/4" bar thru 17", 1/2" x 1/2" bar over 17")
- Crosslinked closed cell seal with rolled bar (190°F)
- Silica/Woven hi-temp, low leak, 1000° F seal
- Bolt Holes
 - one side both sides
- Bearings (see page 3)
Type _____ Upgrade _____
- Hand Quadrant # _____
- Actuator Mounting Plate
- Stainless Steel Construction
 - 304 316 Other _____
- Powder Coated Epoxy



BLADE/FRAME SECTIONS



Diameter/ID (A)		Frame		Flange Width F	Axle Diameter	*Blade Thickness
Above	Through	Depth D	Gauge			
3.99"	12"	6"	10	1.25"	0.5"	3/16" (thk)
12"	20"	8"	10	1.5"	0.5"	3/16" (thk)
20"	24"	8"	10	1.5"	0.75"	3/16" (thk)
24"	32"	8"	10	2.0"	0.75"	1/4" (thk)
32"	40"	8"	3/16" (thk)	2.0"	0.75"	1/4" (thk)
40"	48"	8"	3/16" (thk)	2.0"	1.0"	1/4" (thk)
48"	54"	8"	3/16" (thk)	2.0"	1.5"	3/8" (thk)
54"	60"	8"	3/16" (thk)	2.0"	1.5"	3/8" (thk)
60"	72"	8"	3/16" (thk)	2.0"	2"	3/8" (thk)

*blades reinforced as required.

Job Name: _____

Location: _____

Architect: _____

Engineer: _____

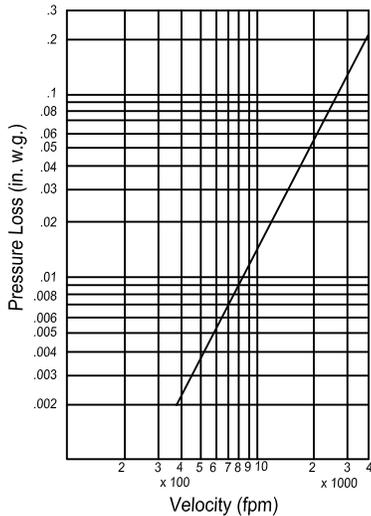
Contractor: _____

MODEL HD-492

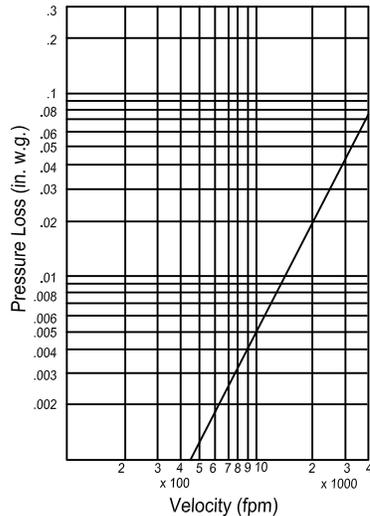
Pressure Drop Data

The HVAC system has many factors that effect its internal pressure losses. Dampers in the system is one contributing factor. These dampers have been tested per AMCA Standard 500-D, Fig. 5.3 (ductwork upstream and downstream). There are many influences the ductwork configuration that could effect the performance below such as other objects close to the dampers, elbows or turns near the dampers, internally mounted actuators, etc. This data will assist the designer in the analysis of the system.

Pressure Drop
12" dia. Damper



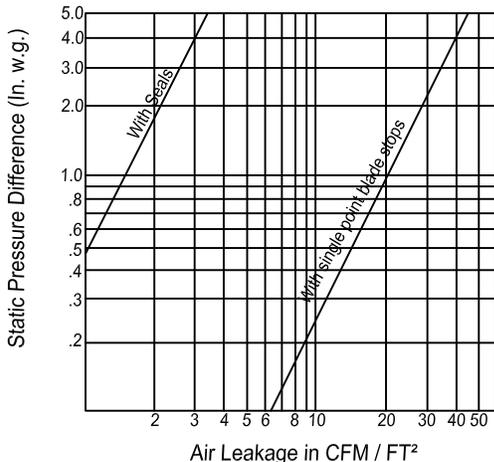
Pressure Drop
36" dia. Damper



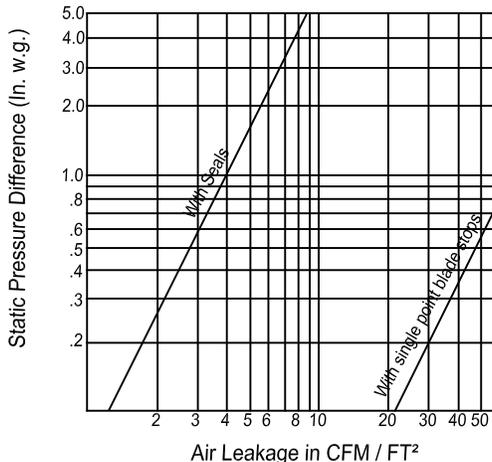
Leakage Data

The damper leakage shown below is per AMCA Standard 500-D . The leakage shown is without seals (standard contruction) and with seals, crosslink closed cell or silica/woven. The damper is in the fully closed position.

Leakage
12" Diameter Damper

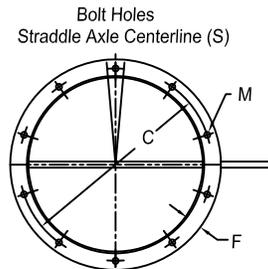
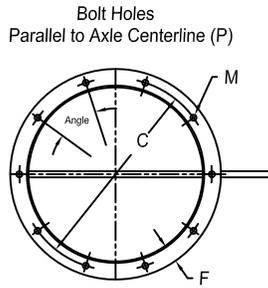


Leakage
36" Diameter Damper



Bolt Holes: Standard construction is **no** bolt holes. Optional: Bolt holes in one flange or both flanges

If bolt holes are required, CVS recommends either pattern shown on the drawings below. The patterns shown below "Parallel to Axle" or "Straddle Axle" drawings should be specified when ordering. The table below also gives further details and recommendations on our standard hole patterns. Should a custom hole pattern be required, then it must be approved and sent in at time of order.



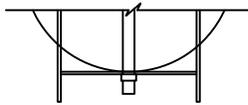
CVS Recommended Bolt Hole Pattern
(Bolt Holes Parallel to Axle Centerline)

Diameter/ID (A)		Number of Holes	Mounting Hole Diameter "M"	Bolt Circle Diameter "C"	Degrees Between Holes
Above	Through				
4"	5"	4	3/8"	*	90
5"	8"	6	3/8"	*	60
8"	11"	6	7/16"	*	60
11"	18"	8	7/16"	*	45
18"	24"	12	7/16"	*	30
24"	36"	16	7/16"	*	22.5
36"	58"	24	7/16"	*	15
58"	60"	32	9/16"	*	11.25
60"	72"	36	9/16"	*	10

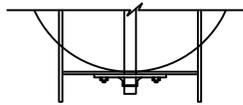
* Bolt Circle Diameter = Damper Diameter + Flange Height + 1/4"

Quantity	Max. Temp. (if higher than 250°F)	A Diameter	Bolt Hole Information			
			# of Holes	M Dia.	C Dia.	Placement (P or S)

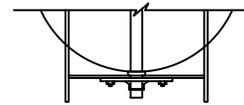
BEARING AND SHAFT OPTIONS



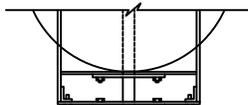
Standard: Bronze sleeve or Type I Stainless Steel sleeve



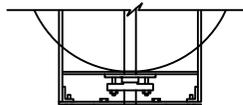
Type II Two Hole Flange Ball Bearing



Type II(i) Two Hole Flange Ball Bearing with O-ring



Type V Two Hole Flange Ball Bearing with O-ring



Type VI Two Hole Flange Ball Bearing with Packing Gland

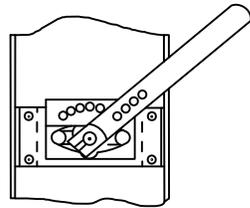
Bearing Options:

Type I	Stainless Steel Pressed Bushing	Type V	(Outboard) Two Hole Flange pressed steel housing Ball- Permanently Lubricated (-30° to 200°F) with O-ring
Type II	Two Hole Flange Pressed Steel Housing Ball- Permanently Lubricated (-30F to 200°F)	Type VI	(Outboard) Two Hole Flange pressed steel housing Ball- Permanently Lubricated (-30° to 200°F) with Packing Gland Over 200° F (500° F packing gland material will be supplied)
Type III	(Outboard) pressed bronze bushing with O-ring seal		
Type IV	(Outboard) pressed Stainless steel bushing with O-ring seal		

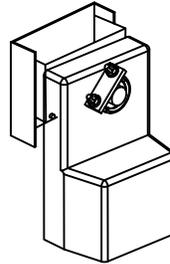
Bearing Up-grade Options:

a...	Upgrade Type II, V, & VI to cast iron housing	f...	Upgrade Type II, V, & VI to All Stainless Steel (-30° to 200°F)
b...	Grease fitting in lieu of Permanently Lubricated	g...	Upgrade Type II, V, & VI Add Bearing Cover for Harsh environments
c...	Upgrade Type II, V, & VI to High Temp. (-30° to 400°F)	h...	Upgrade Type II, V, & VI to Thermo-plastic (-30° to 200°F) Harsh environments
d...	Upgrade Type II, V, & VI to High Temp. graphite (-30° to 750°F)	i...	Upgrade Type II to include O-ring
e...	Upgrade Type II, V, & VI to High Temp. graphite (-450° to 1000°F)		

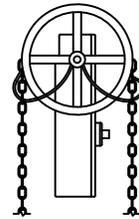
Model **HD-492** has available many operators shown below Consult factory for other operators not shown.



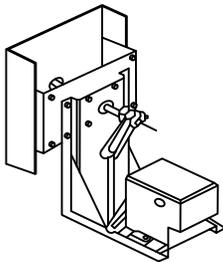
Hand Quadrant #2



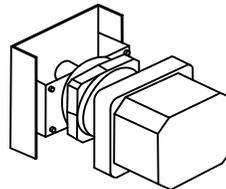
Direct Drive Mounted
Electric Actuators



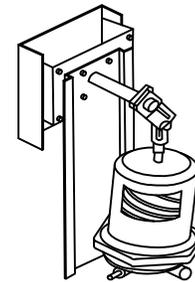
Pull Chain and
Worm Gear



Foot Mounted Actuators
Such as Honeywell,
Siebe/Barber Coleman



RCS Surepowr TM



Pneumatic Diaphragm

SPECIFICATIONS:

Industrial Round Dampers meeting the following specifications shall be furnished and installed where shown on drawings and described in the schedule. The damper frame shall consist of heavy gauge steel (10 ga - 3/16" plate) rolled with a 1-1/4" minimum depth flange/web. The damper blade shall be of a single thickness, heavy gauge steel (3/16" plate < 24"D, 24"-48"D = 1/4" plate, 3/8" thick plate > 54"). The axle shall be a continuous length of 1/2" dia. up to 20", 3/4" dia. up to 40", 1" dia. up to 48", 1.5" dia up to 60", and 2" dia over 60". Bearings shall be of the bronze sleeve type to minimize wear. Also submitted with submittal package is the dampers performance data such as pressure drop, leakage, and temperature ratings. The damper shall be suitable for velocities up to 6400 fpm at a pressure differential of 20" wg. Damper shall be Model HD-492 or equivalent.

ADDITIONAL INFORMATION THAT MAY BE ADDED TO SPECIFICATIONS:

Damper shall be factory supplied with Blade Seals for low leakage. Blade Seals shall be Crosslinked Closed Cell (190°F maximum temperature) or Silica/woven Hi-temp (Up to 1000°F) {Specifier to choose one}. Damper leakage for a 36" diameter damper to be less than 4 cfm/ft² at 1" w.g. and less than 8 cfm/ft² at 4" w.g. shall be submitted for approval on manufacturer's submittal data. Bearing type upgrades may be specified.



INDUSTRIAL ISOLATION DAMPERS

Model HD-492-ISO

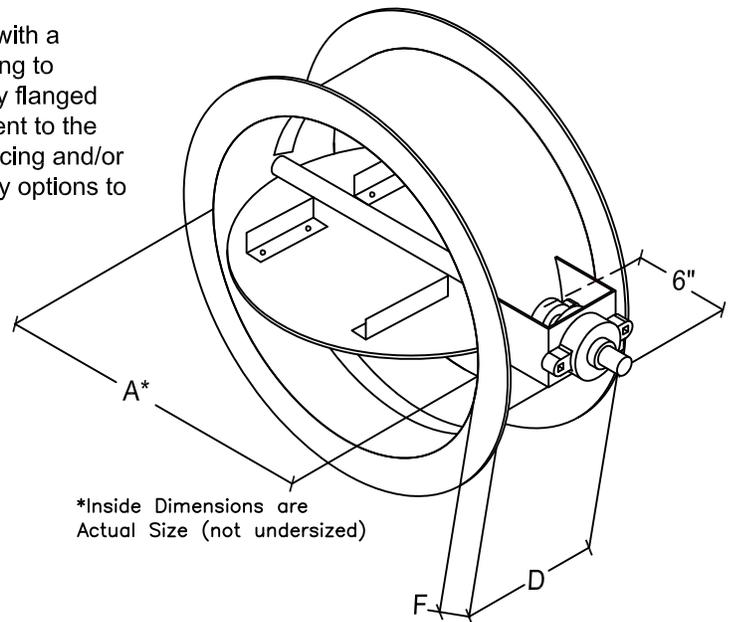
DESIGN / APPLICATION

Model **HD-492-ISO** is a Round Industrial Air Control Damper with a single skin 3/16" - 1/4" thick steel blade with a steel retainer ring to secure a 450°F blade seal. This model consist of a heavy duty flanged frame (10 ga to 3/16" plate steel) designed for direct attachment to the ductwork or equipment. **HD-492-ISO** model is ideal for balancing and/or shut off HVAC applications in the industrial systems with many options to meet your needs.

STANDARD CONSTRUCTION

(see table below for specifics)

- Frame: Steel channel
- Blades: Steel, w/ retainer rings for seals
- Axles: Steel
- Bearings: Lubricated ball bearings w/ packing gland, **Type VI
- Finish: Baked Powder Polyester
- Seals: Double Lapped Silicone 450° F
- **over 200° F (450° F packing gland material included)



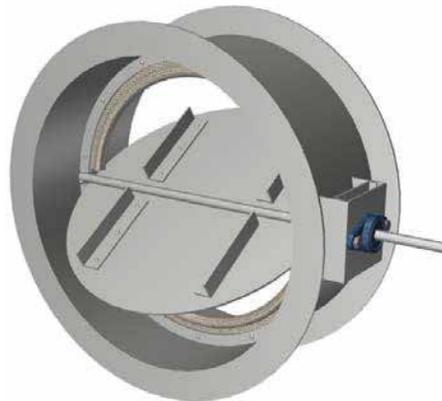
*Inside Dimensions are Actual Size (not undersized)

SIZE LIMITATIONS

Minimum Size: 4" Diameter
 Maximum Size: 60" Diameter

RATINGS

- Velocity: 6400 fpm
- Pressure: 20 in w.g.- differential pressure (up to 30" dia)
 15 in w.g.- differential pressure (up to 60" dia)
- Temperature: -20°F ~ *450° F
- Leakage: Shall not exceed .350 scfm per inch of blade circumference at 10" w.g.
- 20°F to *200° F
- 205°F to *450° F



OPTIONS:

- Bolt Holes
 - one side both sides
- Stainless Steel Bearings
- Bearings (see page 3)
 Type _____ Upgrade _____
- Hand Quadrant # _____
- Actuator Mounting Plate

Finish Options:

- Stainless Steel Construction
 - 304 S.S.
 - 304L S.S.
 - 316 S.S.
 - 316L S.S.
- Powder Coated Epoxy
- Heresite coated

Diameter(A)		Frame		Flange Width F	Axle Diameter	*Blade Thickness
Above	Through	Depth D	Gauge			
3.99"	20"	6"	10	1.25"	0.75"	3/16" (thk)
20"	28"	8"	10	1.5"	1.0"	3/16" (thk)
28"	40"	8"	10	1.5"	1.50"	1/4" (thk)
40"	48"	8"	3/16" (thk)	2.0"	1.50"	1/4" (thk)
48"	60"	8"	3/16" (thk)	2.0"	1.75"	1/4" (thk)

*blades reinforced as required.

Job Name: _____

Location: _____

Architect: _____

Engineer: _____

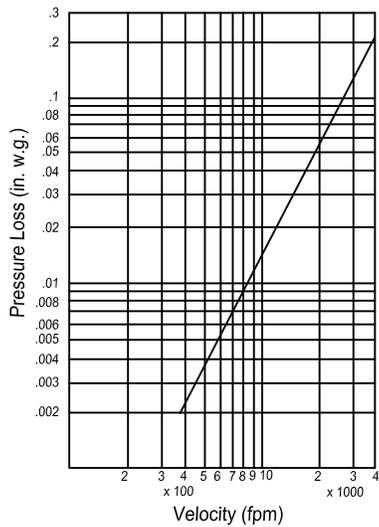
Contractor: _____

MODEL HD-492-ISO

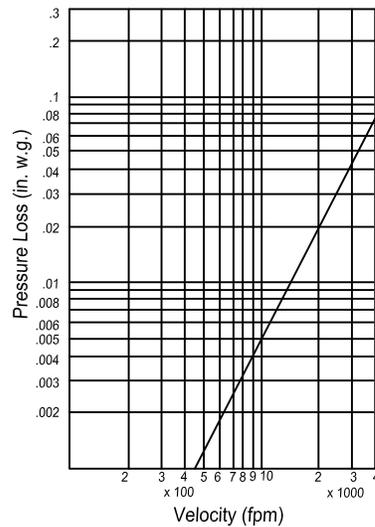
Pressure Drop Data

The HVAC system has many factors that effect its internal pressure losses. Dampers in the system is one contributing factor. These dampers have been tested per AMCA Standard 500-D, Fig. 5.3 (ductwork upstream and downstream). There are many influences the ductwork configuration that could effect the performance below such as other objects close to the dampers, elbows or turns near the dampers, internally mounted actuators, etc. This data will assist the designer in the analysis of the system.

Pressure Drop
12" dia. Damper



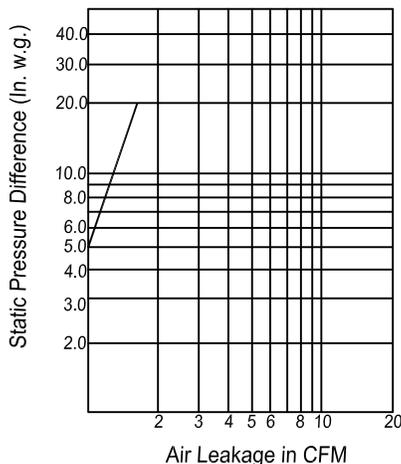
Pressure Drop
36" dia. Damper



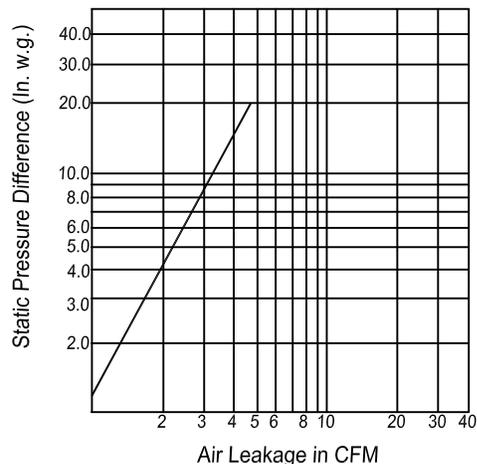
Leakage Data

The damper leakage shown below is per AMCA Standard 500-D . The leakage shown is with silicone seals (standard construction). The damper is in the fully closed position.

Leakage
12" Diameter Damper

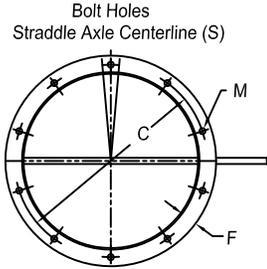
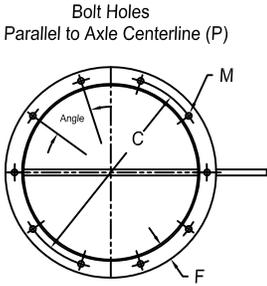


Leakage
36" Diameter Damper



Bolt Holes: Standard construction is no bolt holes. Optional: Bolt holes in one flange or both flanges

If bolt holes are required, CVS recommends either pattern shown on the drawings below. The patterns shown below "Parallel to Axle" or "Straddle Axle" drawings should be specified when ordering. The table below also gives further details and recommendations on our standard hole patterns. Should a custom hole pattern be required, then it must be approved and sent in at time of order.



CVS Recommended Bolt Hole Pattern
(Bolt Holes Parallel to Axle Centerline)

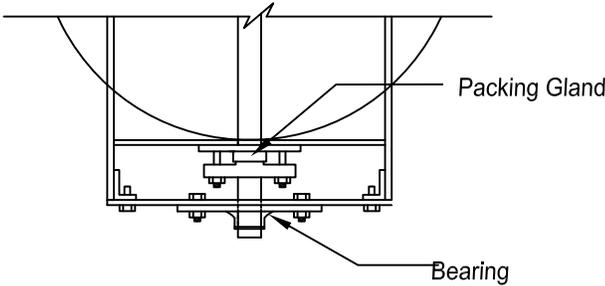
Diameter/ID (A)		Number of Holes	Mounting Hole Diameter "M"	Bolt Circle Diameter "C"	Degrees Between Holes
Above	Through				
4"	5"	4	3/8"	*	90
5"	8"	6	3/8"	*	60
8"	11"	6	7/16"	*	60
11"	18"	8	7/16"	*	45
18"	24"	12	7/16"	*	30
24"	36"	16	7/16"	*	22.5
36"	58"	24	7/16"	*	15
58"	60"	32	9/16"	*	11.25
60"	72"	36	9/16"	*	10

* Bolt Circle Diameter = Damper Diameter + Flange Height + 1/4"

Quantity	Max. Temp. (if higher than 250°F)	"A" Diameter	Bolt Hole Information		
			# of Holes	M Dia.	C Dia.

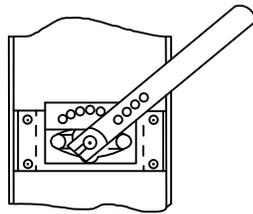
BEARING OPTIONS

Type VI Two Hole Flange Ball Bearing with Packing Gland

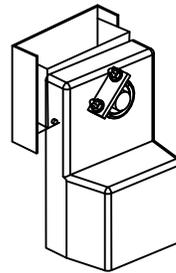


Bearing Options:	Bearing Up-grade Options:
<p>Type VI (Outboard) Two Hole Flange pressed steel housing Ball- Permanently Lubricated (-30° to 200°F) with Packing Gland Over 200° F (450° F packing gland material will be supplied)</p>	<p>a... Upgrade Type VI to cast iron housing</p> <p>b... Grease fitting in lieu of Permanently Lubricated</p> <p>c... Upgrade Type VI to High Temp. (-30° to 400°F)</p> <p>d... Upgrade Type VI to High Temp. graphite (-30° to 750°F)</p> <p>e... Upgrade Type VI to High Temp. graphite (-450° to 1000°F)</p> <p>f... Upgrade Type VI to All Stainless Steel (-30° to 200°F)</p> <p>g... Upgrade Type VI Add Bearing Cover for Harsh environments</p> <p>h... Upgrade Type VI to Thermo-plastic (-30° to 200°F) Harsh environments</p>

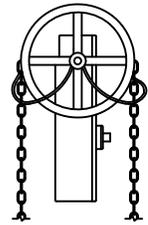
Model **HD-492-ISO** has available many operators shown below Consult factor for other operators not shown.



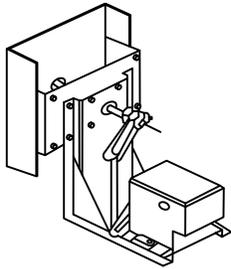
Hand Quadrant #2



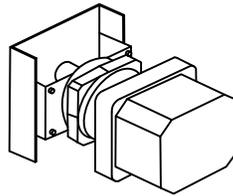
Direct Drive Mounted
Electric Actuators



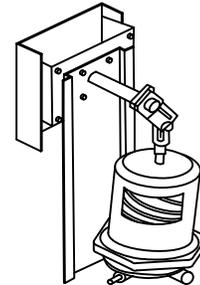
Pull Chain and
Worm Gear



Foot Mounted Actuators
Such as Honeywell,
Siebe/Barber Coleman



RCS Surepower TM



Pneumatic Diaphragm

SPECIFICATIONS:

Industrial Round Dampers meeting the following specifications shall be furnished and installed where shown on drawings and described in the schedule. The damper frame shall consist of heavy gauge steel (10 ga - 3/16" plate) rolled with a 1-1/4" minimum depth flange/web. The damper blade shall be of a single thickness heavy gauge steel (3/16" plate < 28"D, 1/4" thick plate > 54"). The axle shall be a continuous length of 3/4" dia. up to 20", 1" dia. up to 28", 1.5" dia up to 48", and 2" dia over 48". Bearings shall be lubricated ball bearings with packing gland, type VI to minimize wear. Also submitted with submittal package is the dampers performance data such as pressure drop, leakage, and temperature ratings. The damper shall be suitable for velocities up to 6400 fpm at a pressure differential of 20" wg. up to 36" diameter and 15" w.g. up to 60" diameter.

ADDITIONAL INFORMATION THAT MAY BE ADDED TO SPECIFICATIONS:

3XX grade Stainless Steel construction for corrosion resistance. Powder Coated Epoxy or Heresite Coating to be applied for additional corrosion resistance.

Product Range

- ▶ Fire-Resisting Ductwork (BS & EN)
- ▶ Fire-rated Insulation (ASTM & UL)
- ▶ Sound Attenuators (ASTM & BS)
- ▶ VAV Boxes (AHRI)
- ▶ Life Safety Dampers (UL)
- ▶ Control Dampers (AMCA & BS)
- ▶ Access Doors (BS & EN)
- ▶ Louvers (AMCA)
- ▶ Smoke Exhaust, Building, Car Park & Tunnel Ventilation Fans (AMCA & EN)
- ▶ Domestic and Industrial Ventilation Fans
- ▶ AHU, FAHU, FCU, RTU, ERV & Ecology Units (Eurovent, TUV & AHRI)
- ▶ Electrostatic Precipitators (ESPs) & UL Listed Air Filters (UL)

Our Brands



Control Dampers, Louvers,
Sound Attenuators & VAV Boxes



Non-Coated Fire-Resisting Ductwork
& Life Safety Dampers



Fire-rated Insulation

Building & Industry



Smoke Exhaust, Car Park &
Tunnel Ventilation



General Ventilation



Global Clean Air
Solutions Provider

**Central Ventilation System
Co. L.L.C**

Al Wasit Street,
Industrial Area 2,
Sharjah, U.A.E

CVS Arabia L.L.C

2nd Industrial City,
Dammam 31952,
K.S.A

**Badr and Asfour
Company For Engineering
and Metal Industries**

Al Minya Industrial Zone,
Al Minya Governorate
2427606, Egypt

**Central Ventilation Systems
Co. W.L.L.**

Street 9,
Industrial Area
Doha, Qatar



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