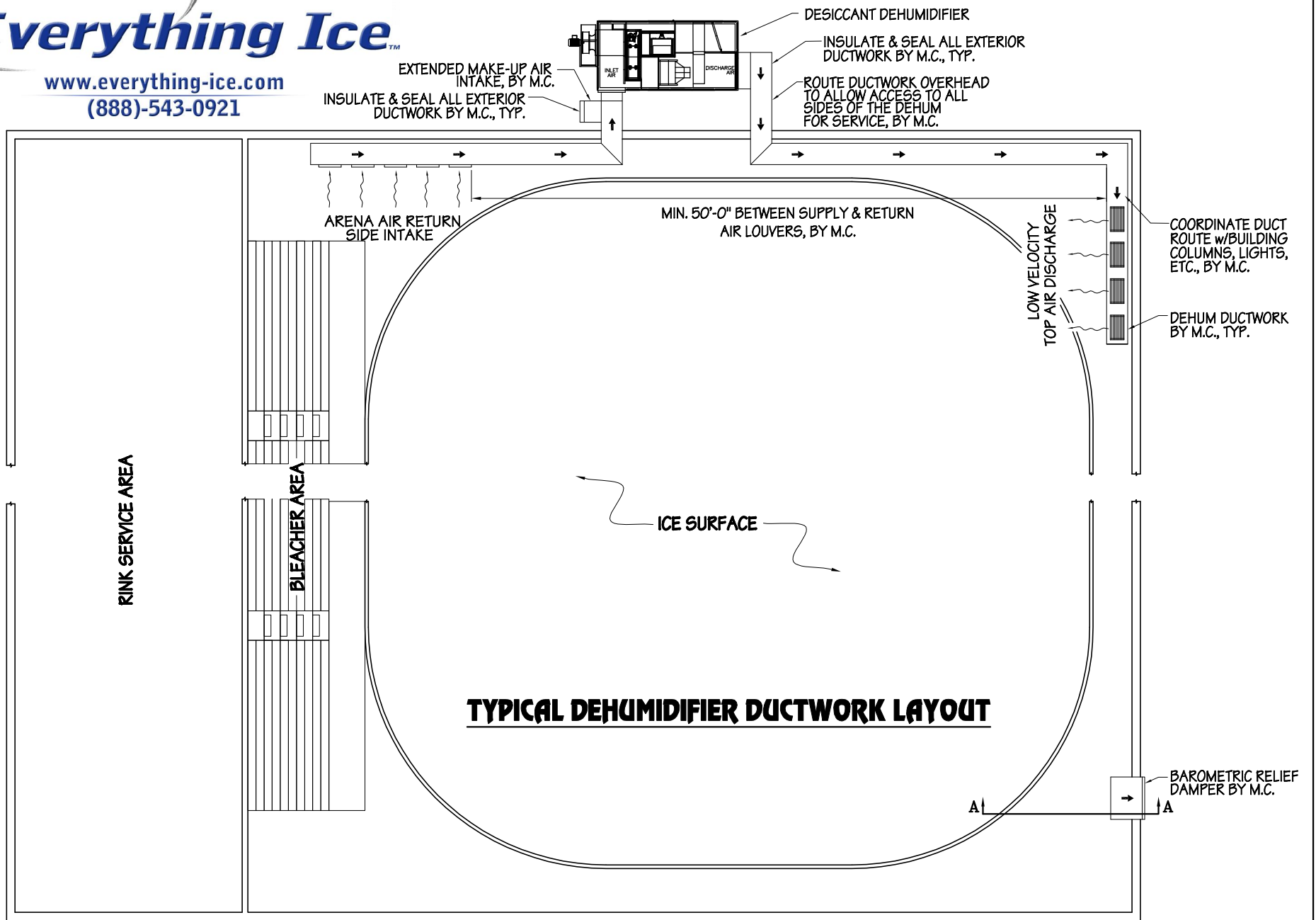
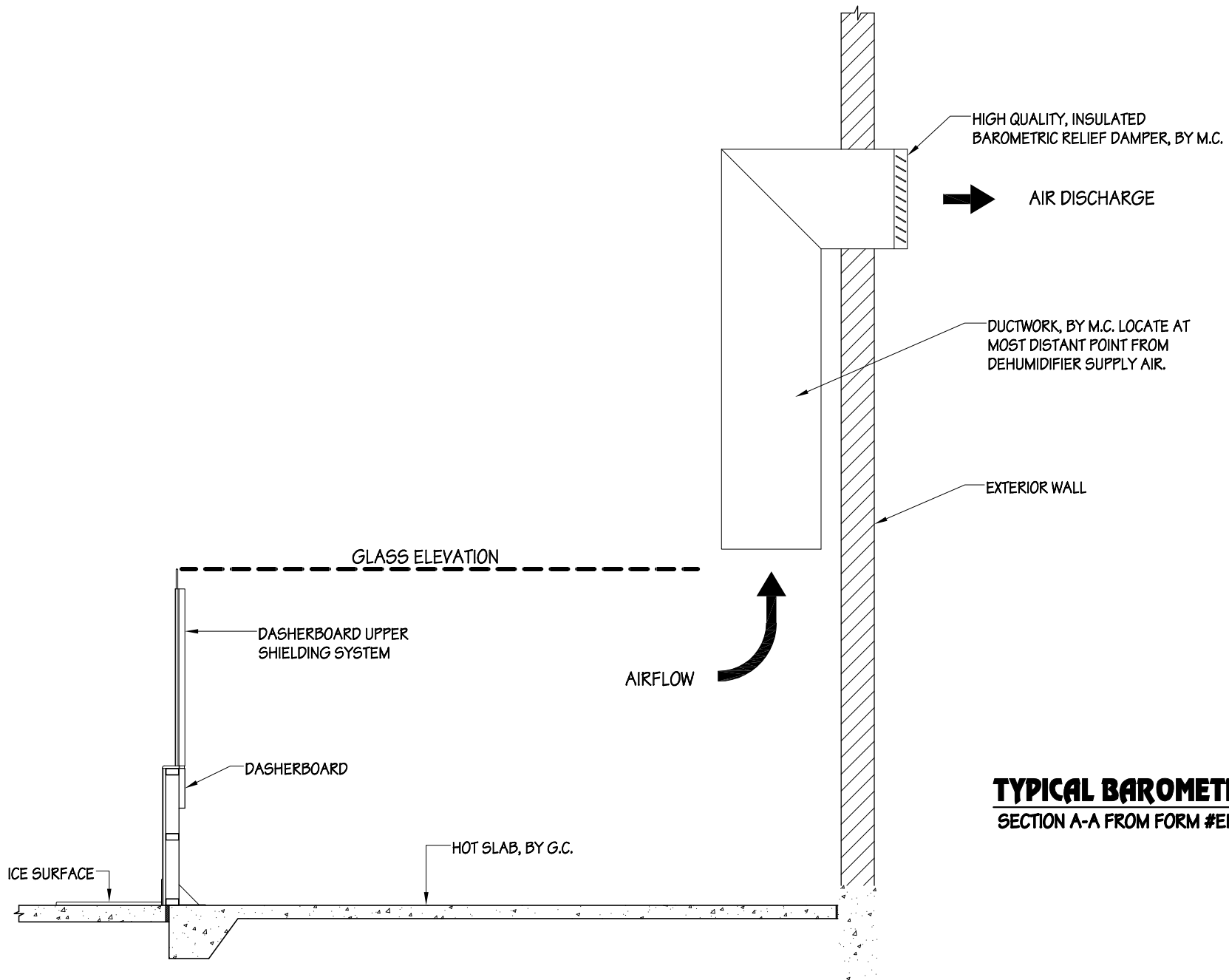




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**TYPICAL BAROMETRIC DAMPER**  
 SECTION A-A FROM FORM #ENDH-128

## Barometric Relief Damper – Model BRL

**Design Features** — Traditional medium to light duty galvanized & aluminum backdraft damper with adjustable blade mounted counter weight.

**PLEASE SPECIFY HORIZONTAL OR VERTICAL FLOW**

### STANDARD CONSTRUCTION

**FRAME**

4' Deep, 16 gauge galvanized steel

**BLADES**

.063" Aluminum, 6" to 12" wide ( varies with height dimension )

**BLADE AXLES & BEARINGS**

AXLE – 1/2" Plated shaft

BEARING – 1/2" Bore ball bearing

**LINKAGE**

Mounted at the center point of the width dimension on face of blades

**COUNTER WEIGHT**

Adjustable, on .063" aluminum bracket

**MAXIMUM VELOCITY & STATIC PRESSURE**

1500 FPM @ 2" Static pressure

**MAXIMUM TEMPERATURE**

250°F

**MAXIMUM SIZE**

Unlimited, with mullions, structural bracing supplied by others

**MAXIMUM SINGLE SECTION SIZE**

48" w x 96" h

**MINIMUM SIZE**

6" w x 14" h

**UNDERSIZED**

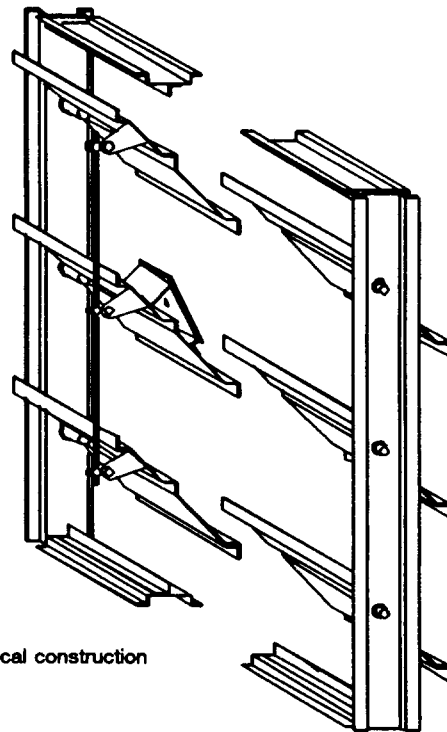
1/4" under ordered size unless specified Exact or Actual

**FINISH**

Mill

**OPERATOR**

None



Typical construction

### OPTIONAL CONSTRUCTION

**FRAME** – Available in galvanized steel or aluminum up to 10 gauge

**BLADES** – Available in galvanized steel or aluminum up to 14 gauge

**SPECIFIED MATERIAL** – Available in Stainless, Aluminum or as requested

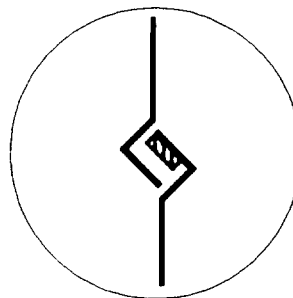
**BLADE & JAMB SEALS** – Neoprene blade edge and/or foam rubber side seals

**SLEEVE AND DUCTWORK CONNECTION** – 10 ga. to 20 ga. Galvanized

steel to 30" in length, — Transitions available in; round, oval, rectangular or

custom. Factory can install access door, retaining angles, or flange

connections.



BLADE  
EDGE SEAL

### SPECIAL PURPOSE CONSTRUCTION

Fully welded assembly

Security bars ( mounted in sleeve )

Horizontal mount up flow or down flow configurations

For higher velocities please consult factory

\* Dampers 11" high and under will be single blade, and extend from the frame proportionately

DATE	ARCHITECT			ENGINEER
PROJECT				
ITEM	QTY	W	H	



DEPENDABLE PRODUCTS SINCE 1955

**SAFE-AIR OF ILLINOIS INC.**

*Engineering and General Offices*

1855 South 54th Avenue, Cicero, Illinois 60804

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**Application and Design**

Model HPR-230 is a heavy duty pressure relief damper with double flanged channel frame and streamlined airfoil blades. It is designed to protect HVAC systems and industrial processes by relieving air pressure. External heavy duty linkage, ball bearings, blade counterbalance and adjustable pressure setting weights are standard.

**Ratings** (See page 2 for specific limitations)

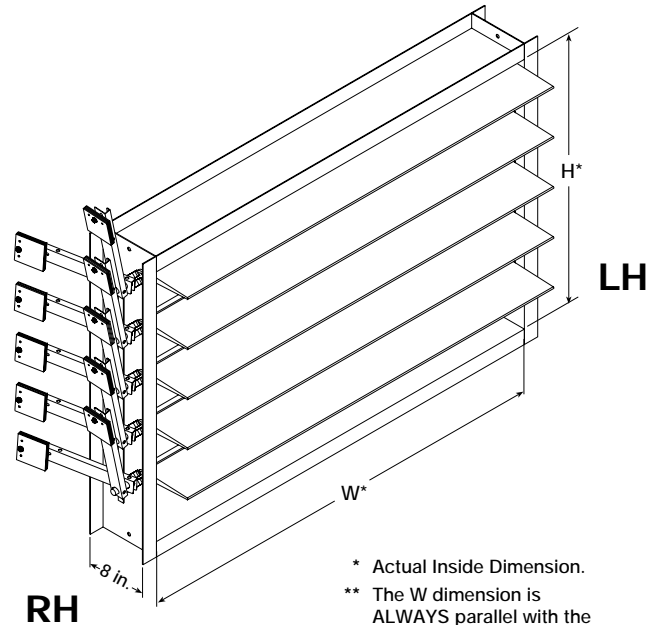
- Pressure Relief:** 0.25 in. wg minimum  
4.0 in. wg maximum
- Back Pressure:** 6.0 - 13.5 in. wg
- Velocity:** 3900 - 5150 fpm
- Temperature:** Minimum: -40°F  
Maximum: 250°F  
Consult factory for temp. above 250°F.

**Standard Construction** (See page 3 for options)

- Frame:** 8 in. x 2 in. x 12 ga. galvanized steel channel.
- Blades:** Airfoil shaped, 18 ga. galvanized steel double skin construction, edge pivoted, 7 in. max. spacing.
- Blade Seals:** Silicone rubber.
- Axles:** Plated steel 3/4 in. dia.
- Linkage:** External heavy duty type with galvanized steel clevis arms and plated steel tie bars & pivot pins with nylon pivot bearings.
- Bearings:** Galvanized steel ball press fit into frame.
- Pressure Set:** Adjustable arms and weights.
- Finish:** Mill galvanized.

**Size Limitations:**

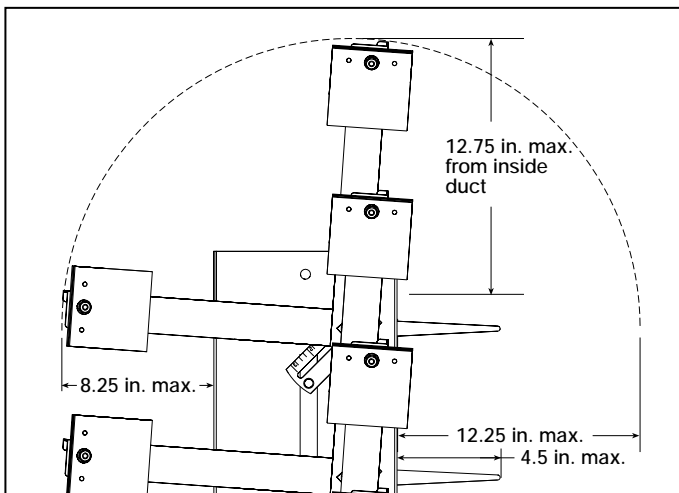
- Maximum Single Section Size: 48 in. W x 96 in. H
- Maximum Double Section Size: 96 in. W x 96 in. H
- Minimum Size: Single blade 6 in. W x 6 in. H



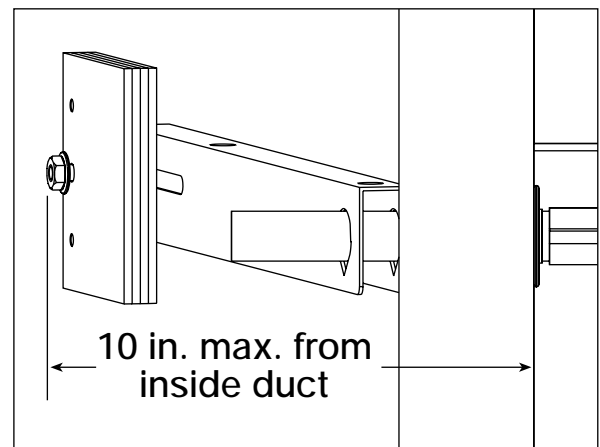
- \* Actual Inside Dimension.
- \*\* The W dimension is ALWAYS parallel with the damper blade length.
- \*\*\* RH counterbalance and pressure setting are standard.
- \*\*\*\* Counterbalance and pressure setting weights extend beyond flanges in the open/closed positions.

**Advise flow direction, relief pressure, & counterbalance weight location when ordering**

**Counterbalance & Pressure Setting Weight Dimensions**



Side View



Front View

## Back Pressure Limitations

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

## Temperature Limitations

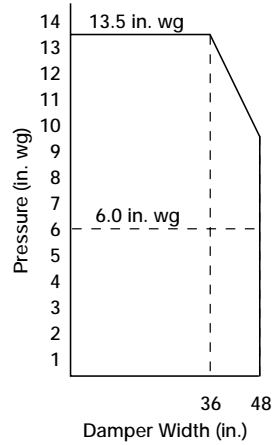
-40°F to +250°F

For higher temperatures consult Greenheck

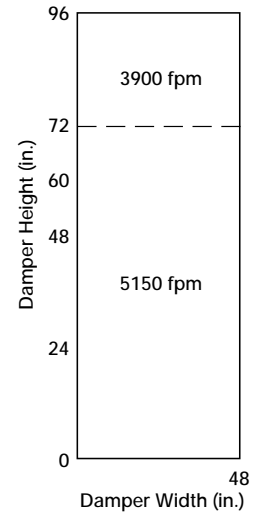
## Velocity Limitations

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

**Pressure Limitations**



**Velocity Limitations**



## Pressure Relief/Leakage Data

This pressure drop data was conducted in accordance with AMCA Standard 500 using the configuration shown. All data has been corrected to represent standard air at a density of 0.075 lb/cu.ft.

## AMCA Test Figure

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

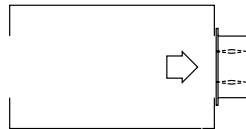
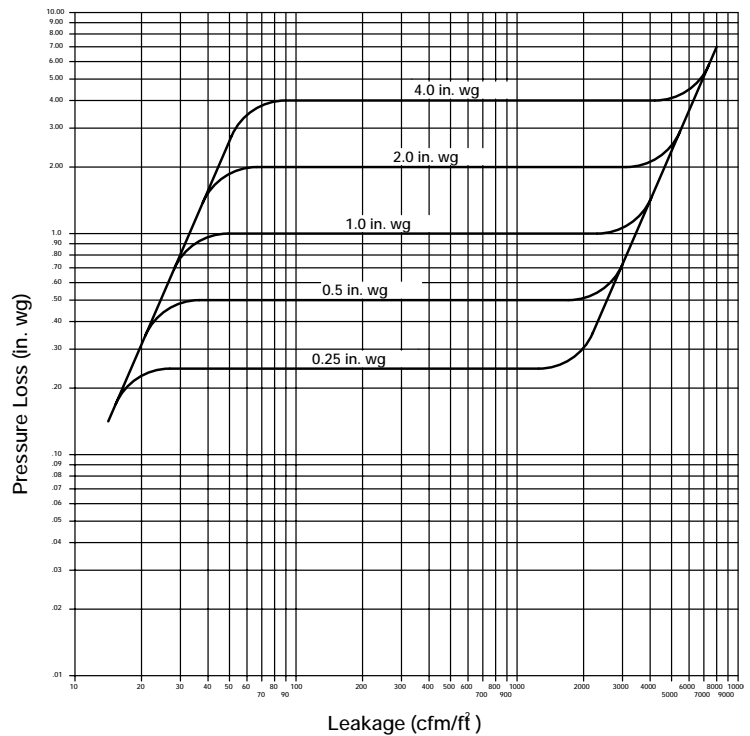


Fig. 5.5

AMCA Test Figures

**Pressure Relief/Leakage**  
36 in. x 36 in. Damper



## Material Options

**Frame:** Standard - 12 ga. galvanized steel  
 Optional - 10 ga. galvanized steel  
 12 & 10 ga. 304 stainless steel

**Axles:** Standard - 3/4 in. dia. plated steel  
 Optional - 3/4 in. dia. type 304 stainless steel

**Blades:** Standard - 18 ga. galvanized steel  
 Optional - 18 ga. 304 stainless steel

**Bearings:** Standard - Galvanized ball press fit into frame  
 Optional - Externally mounted relubricable sealed ball

## Frame Construction Options

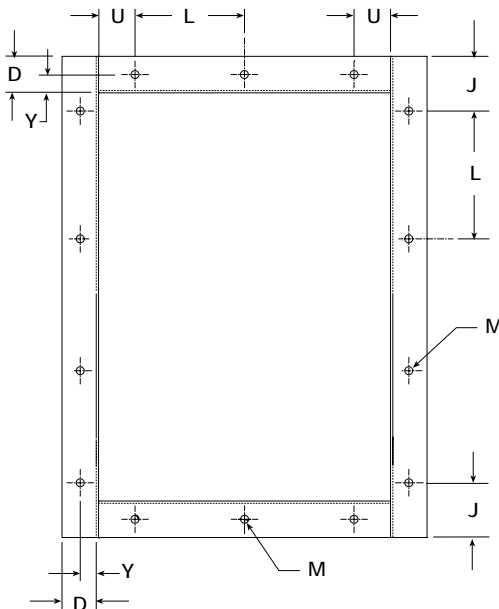
**Flange (D Dim.):** Standard - 2 in.  
 Optional - 1 1/2 in. - 4 in.

**Bolt Holes:** Standard - Does not include bolt holes  
 Optional - Greenheck recommended standard pattern.  
 7/16 in. Dia. holes (M dim.) Spaced 6 in. C-C (L dim.)

**Web (C Dim.):** Standard - 8 in.  
 Optional - 8 in. - 12 in.

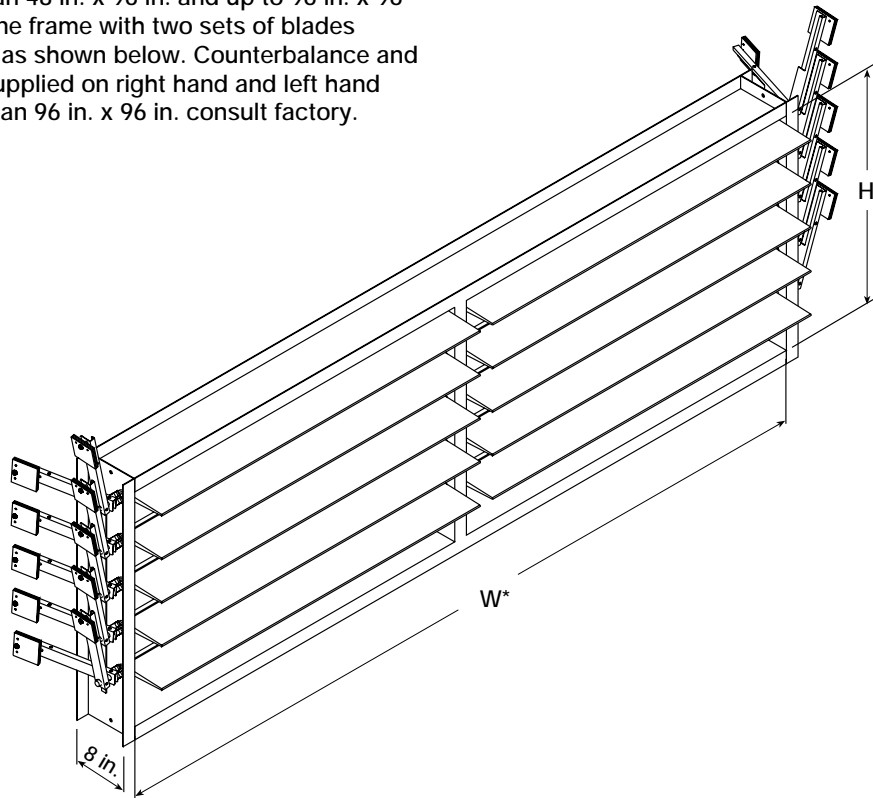
Optional - Customer may specify within limits shown in table below.

Dim.	Standard	(Min./Max.)	Description
J		(D/2 min.)	First/Last Space in Jamb
F		(1 min.)	No. of Holes in Jamb
L	6 in.	(2 in. / 12 in.)	Hole Spacing
M	7/16 in.	(1/4 in. / 1 1/16 in.)	Mounting Hole Diameter
U		(3/4 in. min.)	First/Last Space in Head/Sill
V		(1 min.)	No. of Holes in Head/Sill
Y	D/2 in.	(3/4 in. / D - 3/4 in.)	Centerline of bolt hole from inside edge of frame



## Multiple Section Assembly

Damper sizes larger than 48 in. x 96 in. and up to 96 in. x 96 in. will be supplied in one frame with two sets of blades separated by a mullion as shown below. Counterbalance and pressure set weights supplied on right hand and left hand side. For sizes larger than 96 in. x 96 in. consult factory.



## Specifications

Industrial grade pressure relief dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules. Dampers shall consist of: a 12 ga. galvanized steel channel frame with 8 in. minimum depth and 2 in. flanges; airfoil shaped, 18 ga. galvanized steel double skin construction blades; silicone blade seals; 3/4 in. dia. plated steel axles turning in galvanized steel ball bearings press fit into frame; and external (out of the airstream) heavy

duty linkage with counterbalance and pressure set weights. Damper manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for back pressures to 13.5 in. wg, relief pressures to 4 in. wg, velocities to 5150 fpm, and temperatures to 250°F. Testing and ratings to be in accordance with AMCA Standard 500. Basis of design is Greenheck model HPR-230.



### Application and Design

Model HPR-120 is a heavy duty pressure relief damper with double flanged channel frame and single thickness blades. It is designed to protect HVAC systems and industrial processes by relieving air pressure. External heavy duty linkage, ball bearings, blade counterbalance and adjustable pressure setting weights are standard.

### Ratings (See page 2 for specific limitations)

- Pressure Relief:** 0.1 in. wg minimum  
2.0 in. wg maximum
- Back Pressure:** 5.0 - 8.5 in. wg
- Velocity:** 3900 - 5150 fpm
- Temperature:** Minimum: -20°F  
Maximum with seals: 180°F  
Maximum without seals: 250°F  
Consult factory for temp. above 250°F.

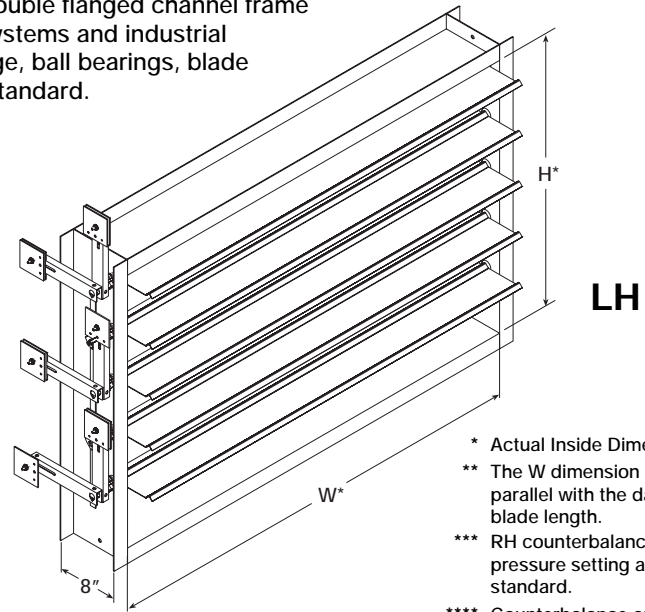
### Standard Construction (See page 3 for options)

- Frame:** 8" x 2" x 14 ga. galvanized steel channel.
- Blades:** 2V type - 16 ga. galvanized steel, eccentrically pivoted, 7" max. spacing.
- Blade Seals:** Vinyl.
- Axles:** Plated steel 1/2" dia.
- Linkage:** External heavy duty type with galvanized steel clevis arms and plated steel tie bars & pivot pins with nylon pivot bearings.
- Bearings:** Galvanized steel ball press fit into frame.
- Pressure Set:** Adjustable arms and weights.
- Finish:** Mill galvanized.

### Size Limitations:

- Maximum Single Section Size: 48" W x 96" H
- Maximum Double Section Size: 96" W x 96" H
- Minimum Size: Single blade 6" W x 6" H

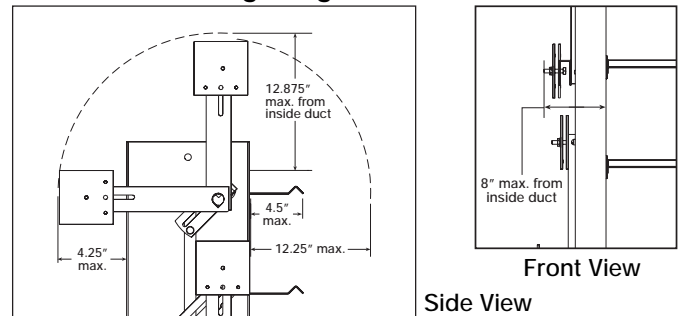
**Advise flow direction, relief pressure, & counterbalance weight location when ordering**



**RH**

- \* Actual Inside Dimension.
- \*\* The W dimension is ALWAYS parallel with the damper blade length.
- \*\*\* RH counterbalance and pressure setting are standard.
- \*\*\*\* Counterbalance and pressure setting weights extend beyond flanges in the open/closed positions.

### Counterbalance & Pressure Setting Weight Dimensions



Frame		Blades		Seals		Axles		Bearings		Options	
Standard	14 ga. galv. steel	Standard	16 ga. galv. steel	Standard	Vinyl	Standard	Plated Steel	Standard	Galvanized Ball	Bolt Holes in Flanges	
				Blade Seals	180°F max.	1/2" dia.				SS Linkage	
12 ga. galv. steel		16 ga. 304 SS		No Seals	250°F max.	Type 304	Stainless Steel				
14 ga. 304 SS						1/2" dia.					
12 ga. 304 SS											

Quantity	Flow Direction (i.e.) Vertical Up Vertical Down Horizontal Exhaust	Relief Pressure (in. wg)	W Width	H Height	Frame Depth C 8" Std.	Flange Width D 2" Std.	Bolt Hole information (See pg. 3)						Counterbalance Weight Location (i.e.) Right Hand, Left Hand, or Both	
							J	F	L Spacing	M Dia.	U	V		Y

Project	Location
Contractor	Design Specifier



## Back Pressure Limitations

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

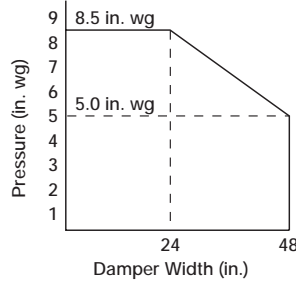
## Temperature Limitations

- Vinyl blade seals: -20°F to +180°F
- No seals: -20°F to +250°F

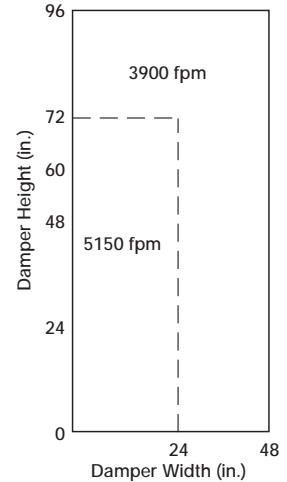
For higher temperatures consult Greenheck

## Velocity Limitations

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



**Pressure Limitations**



**Velocity Limitations**

## Pressure Relief/Leakage Data

This pressure drop data was conducted in accordance with AMCA Standard 500 using the configuration shown. All data has been corrected to represent standard air at a density of 0.075 lb/cu.ft.

## AMCA Test Figure

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

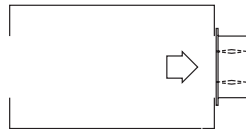
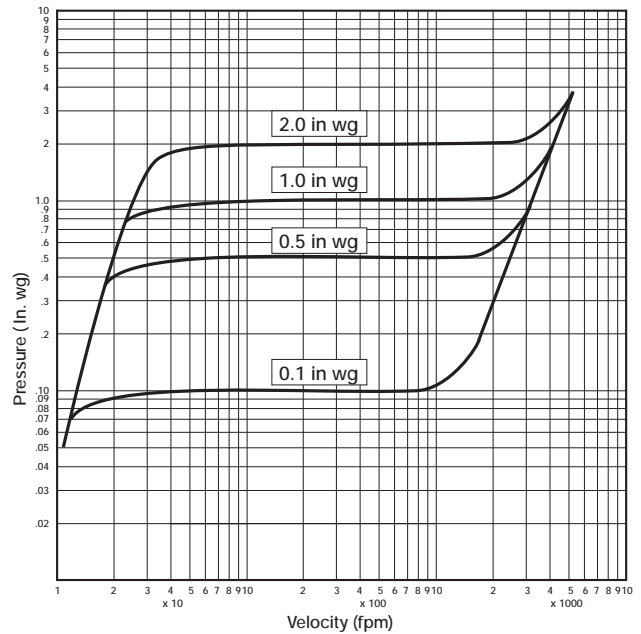


Fig. 5.5

**AMCA Test Figures**

**Pressure Relief/Leakage  
36"x 36" Damper**



## Material Options

**Frame:** Standard - 14 ga. galvanized steel  
 Optional - 12 ga. galvanized steel  
 12 & 14 ga. 304 stainless steel

**Axles:** Standard - 1/2" dia. plated steel  
 Optional - 1/2" dia. type 304 stainless steel

**Blades:** Standard - 16 ga. galvanized steel  
 Optional - 16 ga. 304 stainless steel

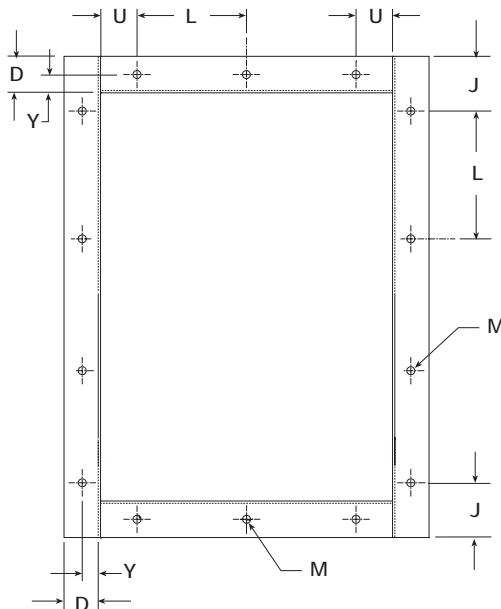
## Frame Construction Options

**Flange (D Dim.):** Standard - 2"  
 Optional - 1 1/2" - 4"

**Bolt Holes:** Standard - Does not include bolt holes  
 Optional - Greenheck recommended standard pattern.  
 7/16" Dia. holes (M dimension) Spaced 6" C-C (L dimension)  
 Optional - Customer may specify within limits shown in table below.

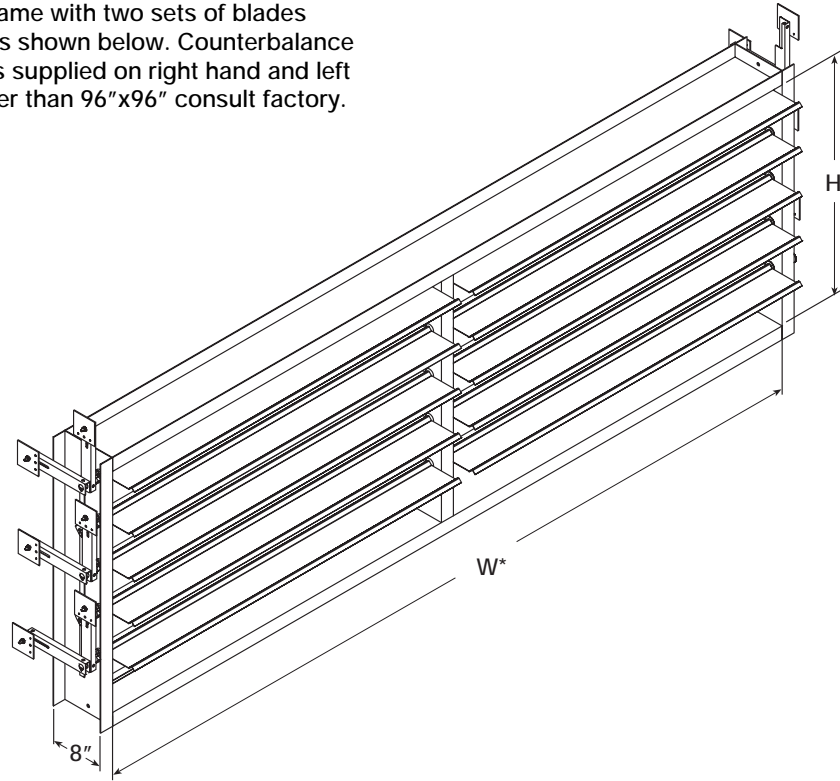
**Web (C Dim.):** Standard - 8"  
 Optional - 8" - 12"

Dim.	Standard (Min./Max.)	Description
J	(D/2 min.)	First/Last Space in Jamb
F	(1 min.)	No. of Holes in Jamb
L	6" (2"/12")	Hole Spacing
M	7/16" (1/4" / 11/16")	Mounting Hole Diameter
U	(3/4" min.)	First/Last Space in Head/Sill
V	(1 min.)	No. of Holes in Head/Sill
Y	D/2" (3/4" / D - 3/4")	Centerline of bolt hole from inside edge of frame



## Multiple Section Assembly

Damper sizes larger than 48"x96" and less than 96"x96" will be supplied in one frame with two sets of blades separated by a mullion as shown below. Counterbalance and pressure set weights supplied on right hand and left hand side. For sizes larger than 96"x96" consult factory.



## Specifications

Industrial grade pressure relief dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules. Dampers shall consist of: a 14 ga. galvanized steel channel frame with 8" minimum depth and 2" flanges; double V type blades fabricated from 16 ga. galvanized steel; 1/2" dia. plated steel axles turning in galvanized steel ball bearings press fit into frame; and external (out of the airstream) heavy duty linkage with counterbalance and

pressure set weights. Damper manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for back pressures to 8.5 in. wg, relief pressures to 2 in. wg, velocities to 5150 fpm, and temperatures to 250°F. Testing and ratings to be in accordance with AMCA Standard 500. Basis of design is Greenheck model HPR-120.



**Application and Design**

Model HPR-330 is a heavy duty pressure relief damper with double flanged channel frame and streamlined airfoil blades. It is designed to protect HVAC systems and industrial processes by relieving air pressure. External spherical rod end linkage, externally mounted relubricable ball bearings, blade counterbalance and adjustable pressure setting weights are standard so as to withstand elevated relief pressures and flows.

**Ratings** (See page 2 for specific limitations)

- Pressure Relief:** 0.5 in. wg minimum  
6.0 in. wg maximum
- Back Pressure:** 8.5 - 20 in. wg
- Velocity:** 5150 - 6400 fpm
- Temperature:** Minimum: -40°F  
Maximum: 250°F  
Consult factory for temp. above 250°F.

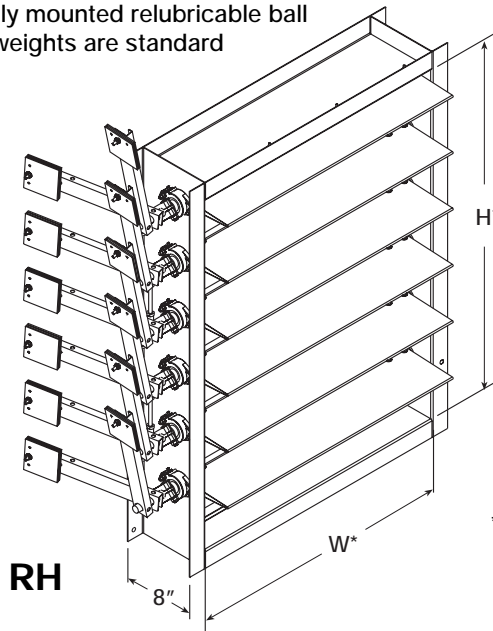
**Standard Construction** (See page 3 for options)

- Frame:** 8" x 2" x 10 ga. galvanized steel channel.
- Blades:** Airfoil shaped, 16 ga. galvanized steel double skin construction, edge pivoted, 7" max. spacing.
- Blade Seals:** Silicone rubber.
- Axles:** Plated steel 3/4" dia.
- Linkage:** External heavy duty type with galvanized steel crankarms and 3/8" spherical rod ends with 3/8" threaded rod interconnect.
- Bearings:** Relubricable ball.
- Pressure Set:** Adjustable arms and weights.
- Finish:** Mill galvanized.

**Size Limitations:**

- Maximum Single Section Size: 48" W x 96" H
- Maximum Double Section Size: 96" W x 96" H
- Minimum Size: Single blade 6" W x 6" H

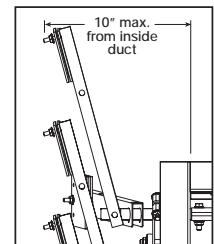
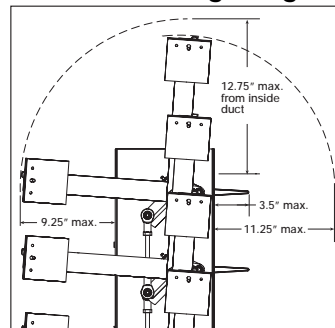
**Advise flow direction, relief pressure, & counterbalance weight location when ordering**



**LH**

- \* Actual Inside Dimension.
- \*\* The W dimension is ALWAYS parallel with the damper blade length.
- \*\*\* RH counterbalance and pressure setting are standard.
- \*\*\*\* Counterbalance and pressure setting weights extend beyond flanges in the open/closed positions.

**Counterbalance & Pressure Setting Weight Dimensions**



Front View

Side View

Frame		Blades		Seals		Axles		Bearings		Options	
Standard	10 ga. galv. steel	Standard	Galv. steel	Standard	Silicone Rubber Blade Seals	Standard	Plated Steel 3/4" dia.	Standard	Relubricable Ball	Bolt Holes in Flanges	
	10 ga. 304 SS		304 SS		None		Type 304 Stainless Steel 3/4" dia.				

Quantity	Flow Direction (i.e.) Vertical Up Vertical Down Horizontal	Relief Pressure (in. wg)	W Width	H Height	Frame Depth C 8" Std.	Flange Width D 2" Std.	Bolt Hole information (See pg. 3)						Counterbalance Weight Location (i.e.) Right Hand, Left Hand, or Both	
							J	F	L Spacing	M Dia.	U	V		Y

Project	Location
Contractor	Design Specifier

## Back Pressure Limitations

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

## Temperature Limitations

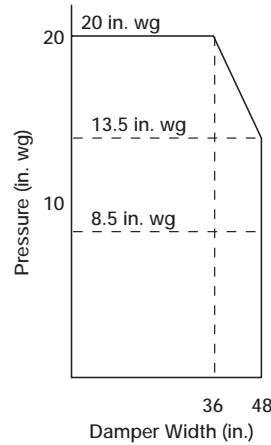
-40°F to +250°F

For higher temperatures consult Greenheck

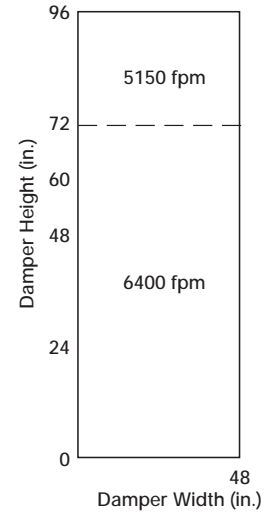
## Velocity Limitations

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

**Pressure Limitations**



**Velocity Limitations**



## Pressure Relief/Leakage Data

This pressure drop data was conducted in accordance with AMCA Standard 500 using the configuration shown. All data has been corrected to represent standard air at a density of 0.075 lb/cu.ft.

## AMCA Test Figure

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

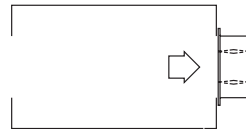
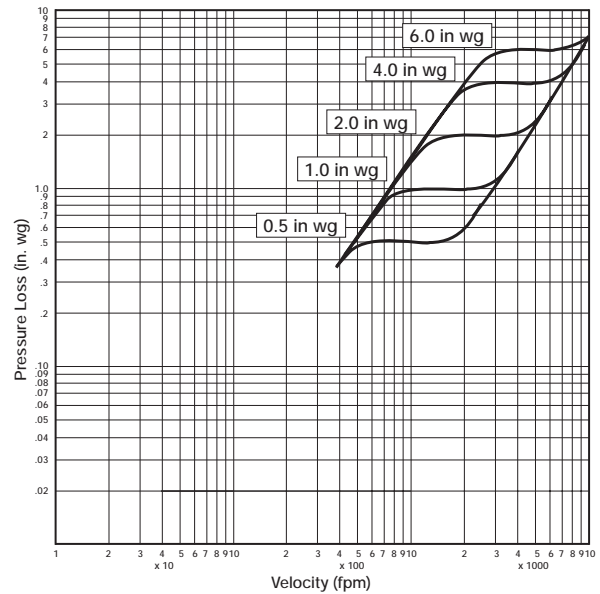


Fig. 5.5

**AMCA Test Figures**

**Pressure Relief/Leakage  
36"x 36" Damper**



## Material Options

**Frame:** Standard - 10 ga. galvanized steel  
 Optional - 10 ga. 304 stainless steel

**Axles:** Standard - 3/4" dia. plated steel  
 Optional - 3/4" dia. type 304 stainless steel

**Blades:** Standard - 16 ga. galvanized steel  
 Optional - 16 ga. 304 stainless steel

**Bearings:** Standard - Externally mounted relubricable sealed ball

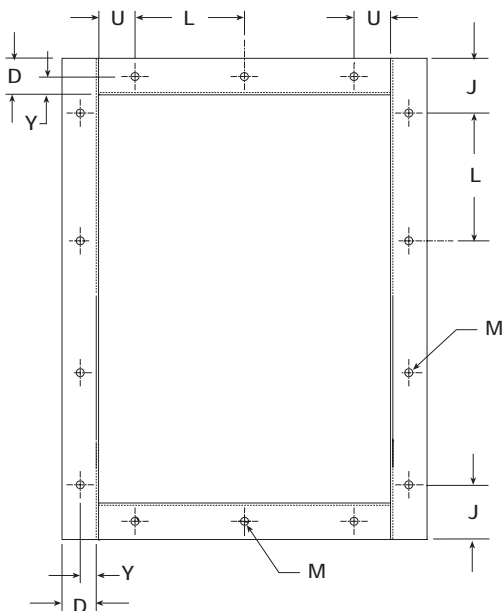
## Frame Construction Options

**Flange (D Dim.):** Standard - 2"  
 Optional - 1 1/2" - 4"

**Bolt Holes:** Standard - Does not include bolt holes  
 Optional - Greenheck recommended standard pattern.  
 7/16" Dia. holes (M dimension) Spaced 6" C-C (L dimension)  
 Optional - Customer may specify within limits shown in table below.

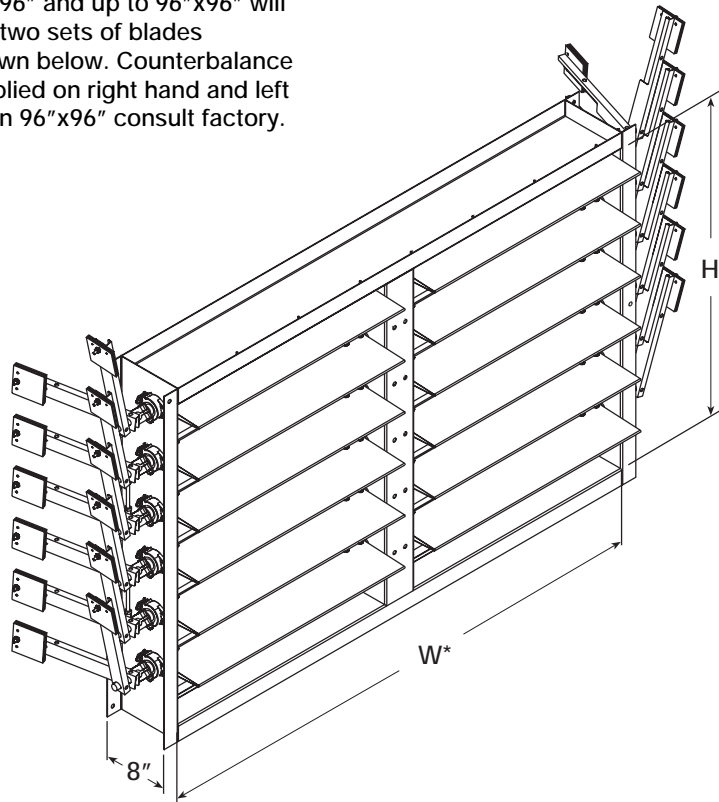
**Web (C Dim.):** Standard - 8"  
 Optional - 8" - 12"

Dim.	Standard (Min./Max.)	Description
J	(D/2 min.)	First/Last Space in Jamb
F	(1 min.)	No. of Holes in Jamb
L	6" (2"/12")	Hole Spacing
M	7/16" (1/4" / 11/16")	Mounting Hole Diameter
U	(3/4" min.)	First/Last Space in Head/Sill
V	(1 min.)	No. of Holes in Head/Sill
Y	D/2" (3/4" / D - 3/4")	Centerline of bolt hole from inside edge of frame



## Multiple Section Assembly

Damper sizes larger than 48"x96" and up to 96"x96" will be supplied in one frame with two sets of blades separated by a mullion as shown below. Counterbalance and pressure set weights supplied on right hand and left hand side. For sizes larger than 96"x96" consult factory.



## Specifications

Industrial grade pressure relief dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules. Dampers shall consist of: a 10 ga. galvanized steel channel frame with 8" minimum depth and 2" flanges; airfoil shaped, 16 ga. galvanized steel double skin construction blades; silicone rubber blade seals; 3/4" dia. plated steel axles turning in externally mounted relubricable sealed ball bearings; and external (out of the airstream) precision 3/8" spherical rod end linkage with

counterbalance and pressure set weights. Damper manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for back pressures to 20 in. wg, relief pressures to 6 in. wg, velocities to 6400 fpm, and temperatures to 250°F. Testing and ratings to be in accordance with AMCA Standard 500. Basis of design is Greenheck model HPR-330.



**GREENHECK**

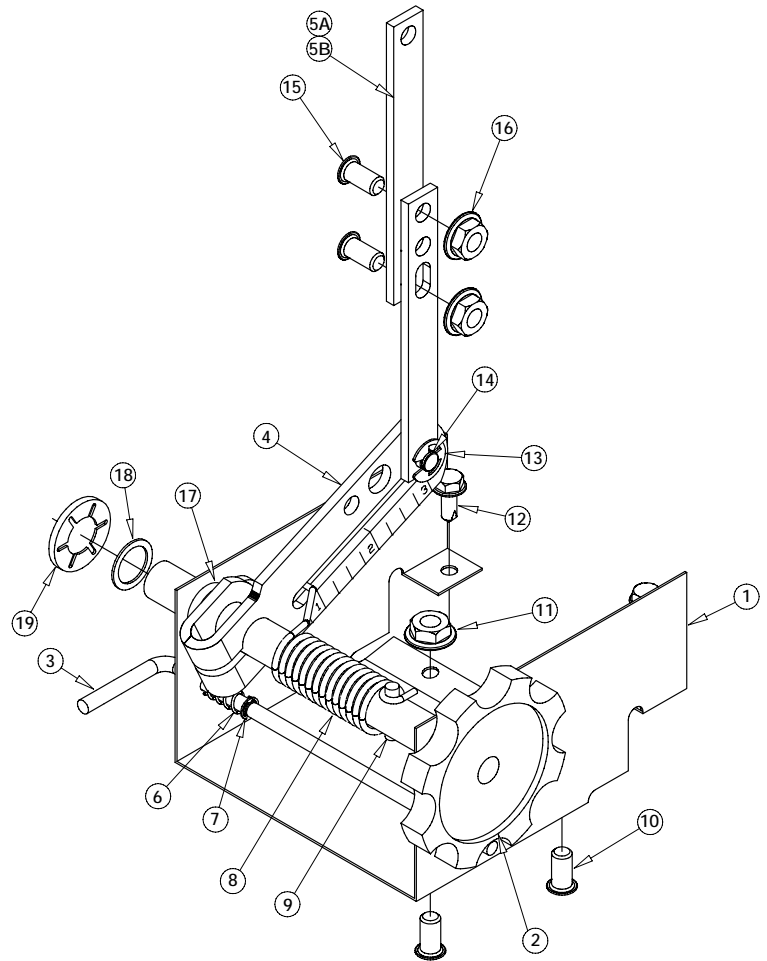
DAMPERS AND LOUVERS

Extruded **BACKDRAFT DAMPER**  
ADJUSTABLE COUNTERBALANCE

**EM SERIES**

EM-10, Horizontal Mount - Vertical Airflow Up  
EM-30, Vertical Mount - Horizontal Airflow  
EM-40, Horizontal Mount - Vertical Airflow Down

Item #	Part #	Description	QTY
1	705238	Mounting Bracket	1
2	823936	Control Knob Sub-Assembly	1
3	705241	Release Rod	1
4	653631	1/2 in. Non-Knurled Crankarm	1
5A	705239	Connecting Bar (4.125 in. Long)	See Chart
5B	705240	Connecting Bar (3.000 in. Long)	Chart
6	457803	Spring	1
7	457806	3/16 E-Clip	1
8	453728	Link Separator Spring-SS	1
9	454092	5/32 x 1.5 Roll Pin-SS	2
10	416052	#10-32 x 5/8 SS Threadstud	2
11	415991	#10-32 Keps Nut-SS	2
12	415555	#10 x 1/2 Tek Screw-ZP	2
13	451588	1/4 in. E-Clip-ZP	1
14	451819	1/4 x 1/2 Knurl Pin-ZP	1
15	415609	1/4-20 x 1/2 Threadstud	2
16	415455	1/4-20 Spinlock Nut-ZP	2
17	415482	3/16 x 1/2 Nylon Washer	2
18	415483	1/2 x .030 Nylon Washer	1
19	415484	1/2 in. Push-On Retainer-ZP	1



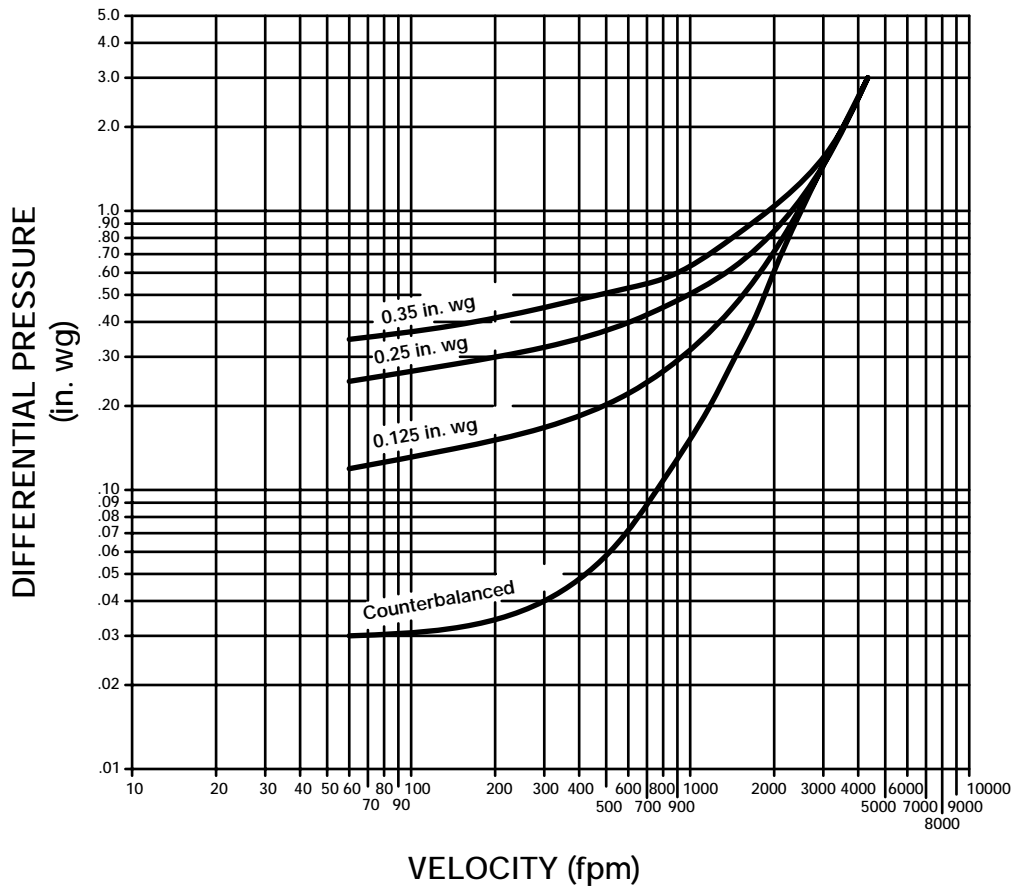
**EM Option**

- APC (Adjustable Pressure Controller).  
Allows field setting of relief pressure on all EM dampers. Use one per panel.  
Maximum recommended pressure set limitations are as follows:

(EM-30 Damper must be equipped with counterbalance)

Area (ft <sup>2</sup> )	Max. Set Pressure (in. wg)
4	.75
6	.50
8	.40
10	.30
15	.20
20	.15
24	.125





Tested to AMCA Figure 5-3