

Application and Design

Model HCD-240 is a heavy duty flanged frame style industrial control damper with extruded airfoil blades. It is designed to control airflow and provide shut off in HVAC or industrial process control systems. A variety of optional features makes model HCD-240 extremely versatile, allowing its capabilities to be tailored to the application. Available with parallel or opposed blade action. Blade edge and jamb seals are standard.

Ratings (See pages 2 and 3 for specific limitations)

Pressure: 8.5 - 15 in. wg (2.1 - 3.7 kPa) - differential pressure

Velocity: 4000 - 5000 fpm (20.3 - 25.4 m/s)

Temperature: -60°F to 250°F (-51°C to 121°C). Consult factory for other temperatures.

Standard Construction

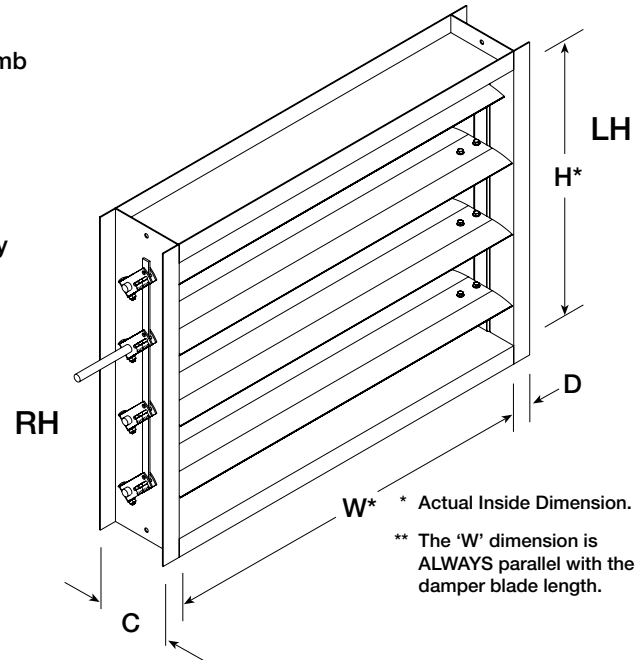
	Standard	Optional
Frame Depth (C)	8 in. (203mm)	10 in. (254mm)
Frame Material	Galvanized Steel	304SS, 316SS, Painted
Frame Type	Flanged Channel	
Frame Thickness	14 ga. (2mm)	12 ga. (2.7mm) 10 ga. (3.5mm)
Flange Width (D)	2 in. (51mm)	1 1/2 in. (38mm) 2 1/2 in. (64mm)
Blade Action	Parallel	Opposed
Blade Material	Aluminum	
Blade Seals	Silicone	EPDM
Blade Thickness	.080 in. (2mm)	-
Blade Type	Extruded Airfoil	
Linkage	Plated Steel	304SS, 316SS
Jamb Seals	304SS	316SS
Axle Diameter	3/4 in. (19mm)	-
Axle Bearing	Stainless Steel Sleeve	External Bronze Sleeve, External Relubricable Ball, Outboard Bronze Sleeve, Outboard Relubricable Ball
Axle Material	Plated Steel	304SS, 316SS
Axle Seals	None	O-ring, Double Gland Stuffing Box
Paint Finishes	None	Epoxy, Hi Pro Polyester, HI Temperature Silver, Industrial Epoxy, Permatector™

Size Limitations

W x H	Minimum Size	Maximum Size	
		Single Section	Multi - Section
Inches	6 x 6 1/4	60 x 96	120 x 96
mm	152 x 158	1524 x 2438	3048 x 2438

Industrial Control Damper

Extruded Aluminum Airfoil Blades
Standard Spark 'B' & 'C' Resistant
Optional Spark 'A' Resistant



Features:

- Linkage is external heavy duty type with galvanized steel clevis arms and tie bars and plated steel pivot pins.
- Blades are extruded aluminum airfoil symmetrical shaped.
- Blades run vertically**, consult factory.
- Wide mounting flanges can be ordered with bolt holes, customized to match your requirements.

Options:

- Position Indicator
 - Open Close Indicator (OCI)
 - External Switch

Spark Resistant

AMCA Standard 99-0401 defines fan material performance requirements for operation in hazardous environments. Greenheck dampers meet the spirit of this standard as follows:

- Class A - All materials in the airstream must be non-ferrous
- Class B or C - Damper blades must be non-ferrous

Construction for Spark 'A' Resistant

Frame: 8 in. x 2 in. x 1/8 in. (203mm x 51mm x 3.2mm) formed aluminum channel

Blades: Extruded aluminum airfoil shaped, symmetrical 8 in. (203mm) maximum width.

Seals: Silicone rubber blade seals. No jamb seal.

Axles: 3/4 in. (19mm) dia. aluminum

Linkage: External heavy duty type with galvanized steel clevis arms, plated steel tie bars & pivot pins

Bearings: External mounted relubricatable ball bearings

Finish: Mill finish

Options for Spark 'A' Resistant

- No stainless steel linkage or jamb seal
- 5 in. (127mm) wide mullion required on two panel wide due to bearings

Pressure Limitations

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

Temperature Limitations

- Blade seals: Silicone Rubber -40° to +400°F (-40° to +204°C)
- EPDM -20° to +250°F (-29° to +121°C)
- Jamb seals: Flexible stainless steel -40° to +400°F (-40° to +204°C)

For higher temperatures, consult Greenheck

Velocity Limitations

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

Pressure Drop Data

This pressure drop data was conducted in accordance with AMCA Standard 500-D using the three configurations shown. All data has been corrected to represent standard air at a density of $.075 \text{ lb/ft}^3$ (1.2 kg/m^3).

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.

AMCA Test Figures

Figure 5.3 Illustrates a fully ducted damper. This configuration has the lowest pressure drop of the three test configurations because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

Figure 5.2 Illustrates a ducted damper exhausting air into an open area. This configuration has a lower pressure drop than Figure 5.5 because the entrance losses are minimized by a straight duct run upstream of the damper.

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

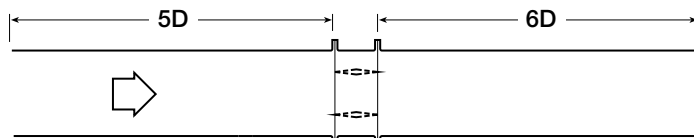
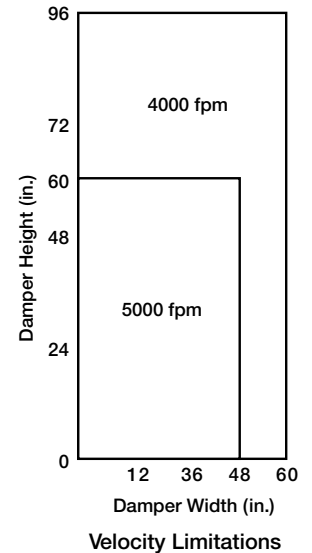
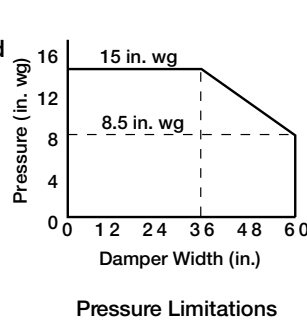


Fig. 5.3

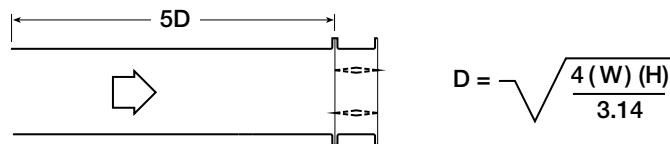


Fig. 5.2

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

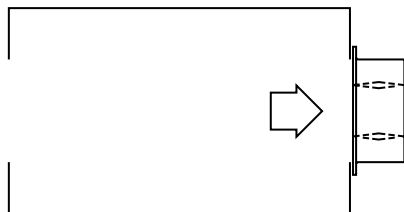
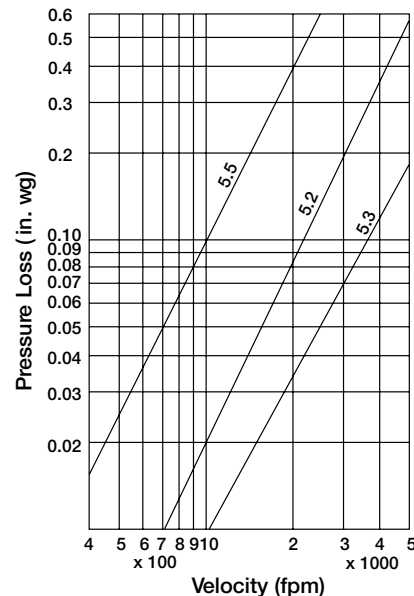


Fig. 5.5

Pressure Drop
36 in. x 36 in. (914mm x 914mm) Damper

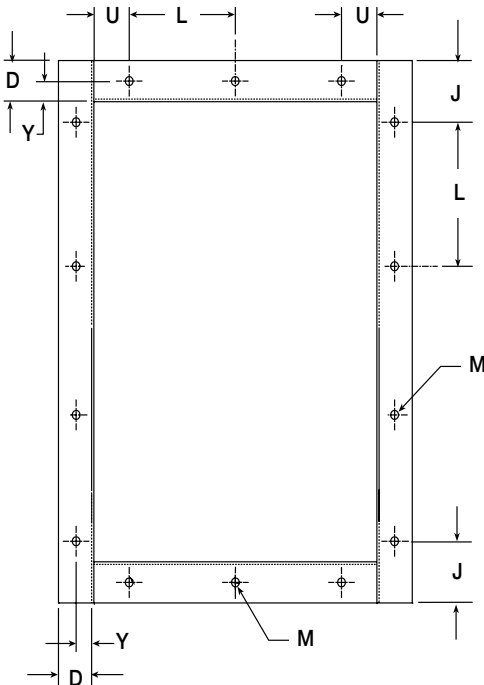
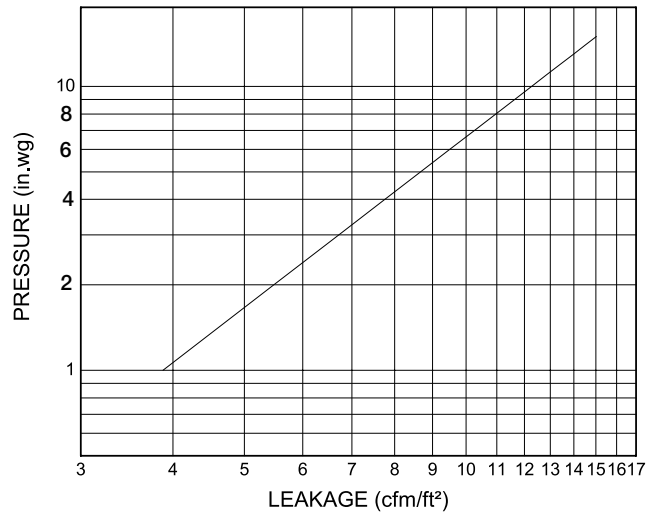


Leakage

This chart shows worst case scenario based on these sizes:
 6 in. x 60 in. (152mm x 1524mm), 60 in. x 6 1/4 in. (1524mm x 159mm),
 48 in. x 36 in. (1219mm x 914mm), 60 in. x 60 in. (1524mm x 1524mm).
 (Based on 5 in. lb/ft² of torque)

Leakage Data

Damper leakage (with blades fully closed) varies based on the type of low leakage seals applied. Model HCD-240 is available with stainless steel jamb seals and EPDM or silicone rubber blade seals. Leakage testing was conducted in accordance with AMCA Standard 500-D and is expressed as CFM per sq.ft. of damper face area. All data has been corrected to represent standard air at a density of .075 lb/ft³ (1.2 kg/m³).

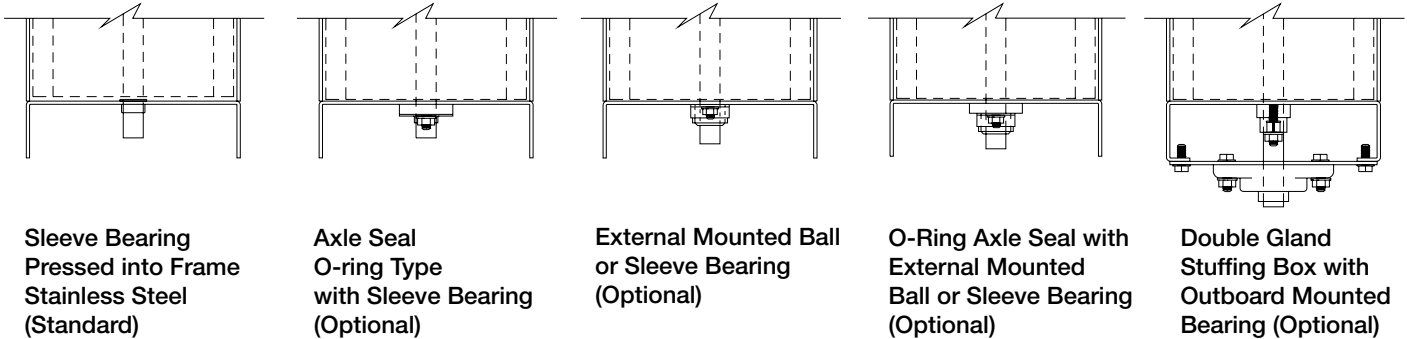


Bolt holes are available as an option. Greenheck's standard pattern is 7/16 in. (11mm) diameter holes (M dimension) spaced 6 in. (152mm) on center (L dimension). Also, available is custom bolt hole pattern within the limitations of the chart below.

Bolt Hole Limitations

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. (152mm)	2 in. /12 in. (51mm/305mm)	Hole Spacing
M	7/16 in. (11mm)	1/4 in. / 11/16 in. (6mm/17mm)	Mounting Hole Diameter
U		3/4 in. min. (19mm)	First/Last Space in Head/Sill
V		1 min. (25mm)	No. of Holes in Head/Sill
Y	D/2 in. (D/51mm)	3/4 in./D-3/4 in. (19mm/D -19mm)	Centerline of bolt hole from inside edge of frame

Bearing and Shaft Options



Specifications

Industrial grade control 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. (2.7mm) galvanized steel channel frame with 8 in. (203mm) minimum width and 2 in. (51mm) flanges; airfoil shaped, 6063-T5 extruded aluminum blades (0.080 in. [2mm] thick) with metal blade to blade overlap (seal to seal only contact is not acceptable); blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow and operation in either direction through the damper (blades that are non-symmetrical relative to their axle pivot point are unacceptable); 3/4 in. (19mm) dia. plated steel axles turning in stainless steel sleeve bearings; and external (out of the airstream) blade-to-blade linkage.

Spark 'A' resistant requires the damper to be non-ferrous in the airstream. Damper shall consist of 1/8 in. (3mm)

aluminum channel frame with 8 in. (203mm) minimum depth and 2 in. (51mm) flanges; maximum 8 in. (203mm) wide airfoil shaped, extruded aluminum (.080 in. [2mm] thick) blades with integral structural reinforcing tube and torsional stiffener running full length of each blade; silicone rubber blade seals; 3/4 in. (19mm) dia. aluminum axles turning in external mounted relubricatable ball bearings; and external (out of airstream) heavy duty plated steel linkage.

Damper manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for pressures to 15 in. wg (3.7 kPa), velocities to 5000 fpm (25.4 m/s) and temperatures to 250°F (121°C).

Damper air performance data shall be developed in accordance with the latest edition of AMCA Standard 500-D. Basis of design is Greenheck model HCD-240.

