

## Bubble Tight Isolation Damper

### Application and Design

Model HBTR-451 is a heavy duty round bubble tight damper. The flange frame is designed for easy flange mounting. The blade is removable making maintenance easy. Every HBTR-451 is factory leakage tested in accordance with AMCA 500-D figure 5.8 to ensure a bubble tight seal at 30 in. wg (7.5 kPa). HBTR-451 is recommended for two position shut off applications.

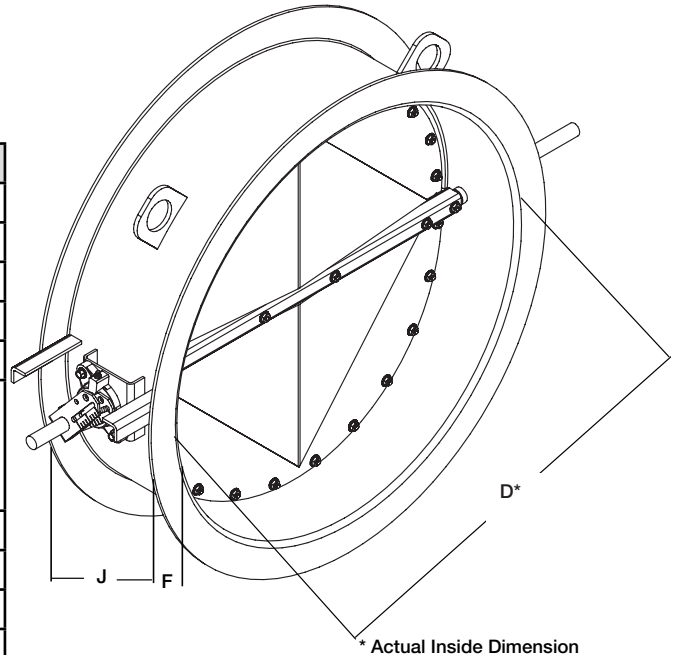
### Ratings (See pages 2 for specific limitations)

**Pressure:** Bubble tight up to 30 in. wg (7.5 kPa) - differential pressure

**Velocity:** 6500 fpm (33 m/s)

**Temperature:** 250°F (121°C) maximum  
-40° F (C) minimum

Construction	Standard	Optional
Frame Material	Painted Steel	304SS or 316SS
Frame Type	Flanged Channel	-
Blade Material	Painted Steel	304SS or 316SS
Blade Type	Reinforced butterfly, field removable	
Blade Seals	Silicone rubber, field replaceable	
Axle	Full length round - diameters up to 12 in. (305mm); reinforced round stubs (diameters over 12 in. (305mm))	
Axle Material	Zinc plated steel	304SS or 316SS
Axle Seal	Double gland	-
Bearings	Relubricable ball	-
Paint Finish	Permatector™ (max. temperature 250°F [121°C])	Hi Pro Polyester, Industrial Epoxy, Epoxy



Note: Standard drive axle length is 6 in. (152mm).

### Size Limitations:

**Minimum Size:** 6 in. (152mm) diameter

**Maximum Size:** 48 in. (1219mm) diameter

### Options Available:

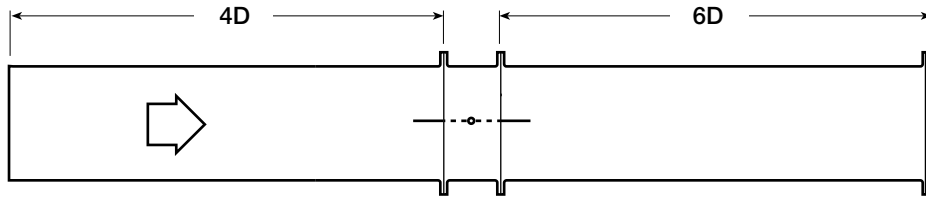
- Bolt holes in flanges
- Actuators
- Limit switches
- Temperatures greater than 250°F (121°C), consult factory.
- Special construction available

Standard Construction						
Diameter (D) inches (mm)		Frame Depth J Inches (mm)	Frame & Flange gauge (mm)	Flange Width F Inches (mm)	Axle Diameter Inches (mm)	Blade Thickness gauge (mm)
Above	Through					
5.99 (152)	12 (305)	6 (152)	12 (2.7)	1.5 (38)	0.75 (19)	12 (2.7)
12 (305)	24 (610)	8 (203)	10 (3.5)	1.5 (38)	0.75 (19)	10 (3.5)
24 (610)	35 (889)	8 (203)	0.188 (4.8)	2 (51)	1 (25)	10 (3.5)
35 (889)	42 (1067)	8 (203)	0.188 (4.8)	2 (51)	1.25 (32)	10 (3.5)
42 (1067)	48 (1219)	8 (203)	0.25 (6)	2 (51)	1.5 (38)	0.188 (4.8)

**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.

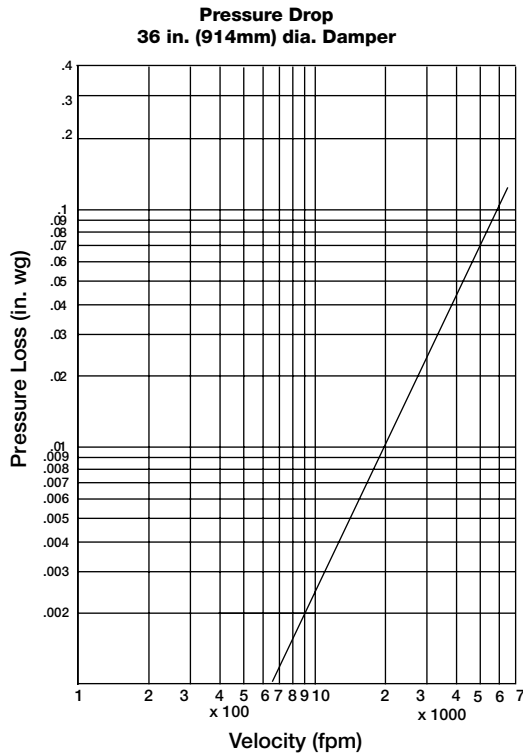
AMCA Test Figure 5.3



**Pressure Drop Data**

This pressure drop data was conducted in accordance with AMCA Standard 500-D using Test Figure 5.3. All data has been corrected to represent standard air at a density of 0.075 lb/ft<sup>3</sup> (1.2 kg/m<sup>3</sup>).

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.



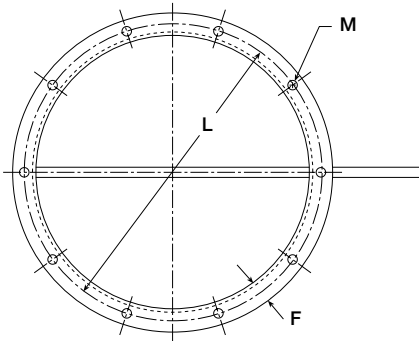
## Frame Construction Options

### Bolt Holes:

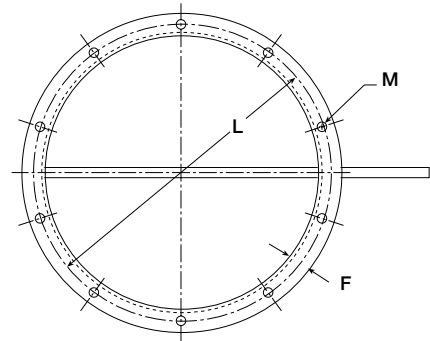
- Standard - Does not include bolt holes
- Optional - Bolt holes in both flanges.

Greenheck recommended bolt hole pattern is shown in the table below. Customer must specify bolt holes that are parallel to the axle centerline (P) or that straddle the axle centerline (S) as shown in the diagrams below. Greenheck can also provide bolt hole sizes and patterns other than those shown below.

Bolt Holes  
Parallel to Axle Centerline (P)



Bolt Holes  
Straddle Axle Centerline (S)



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

Diameter Inches (mm)		Number of Holes	Mounting Hole Diameter in. (mm) (M)	Bolt Circle Diameter (L)	Degrees Between Holes
Above	Through				
5.99 (152)	11 (279)	6	7/16 (11)	*	60
11 (279)	18 (457)	8	7/16 (11)	*	45
18 (457)	24 (610)	12	7/16 (11)	*	30
24 (610)	36 (914)	16	7/16 (11)	*	22 1/2
36 (914)	48 (1219)	24	7/16 (11)	*	15

\* Bolt Circle Diameter = Damper Diameter + Flange Height + 1/4 in.

All dimensions shown are in inches.

## Specifications

Industrial grade isolation 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 round channel frame, single reinforced axle, and single, removable circular blade fabricated from steel with Permator™ finish. Damper axle shall be pivoting in relubricable ball bearings bolted outboard of damper frame. Axle seal shall be double gland. Dampers shall be equipped with silicone rubber blade seals for bubble tight leakage performance up to 250°F (121°C) maximum.

Each damper shall be tested in accordance to AMCA Standard 500-D Bubble Tight Test prior to shipping.

Damper manufacturer's printed application and performance data including pressure, and velocity limitations shall be submitted for approval showing damper suitable for pressures to 30 in. wg (7.5 kPa), velocities to 6500 fpm, (33 m/s) and temperatures to 250°F (121°C) maximum.

Frame gauges, blade gauges, and axle diameters shall be equal to or exceed those of the model which is the basis of design.

Basis of design is Greenheck model HBTR-451.

