

Application and Design

The ICD-45 is a low leakage thermally insulated damper with extruded airfoil blades. ICD-45 features thermally broken frame and blade will minimize the transfer of thermal energy and reduces condensation. It's also IECC (International Energy Conservation Code) compliant with a leakage rating of 3 cfm/ft² @ 1 in. wg (55 cmh/m² @ .25 kPa) or less.

The new quick connect frame allows easy connection to ductwork.

Ratings

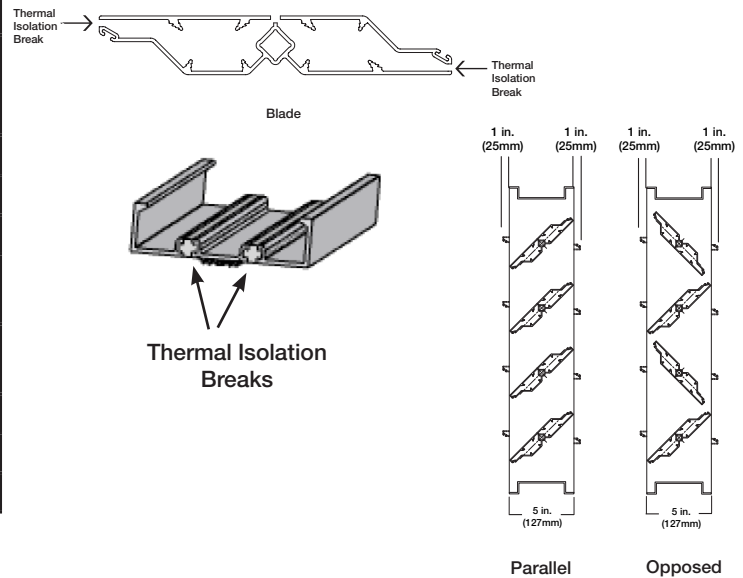
Pressure:	Up to 8 in. wg (2kPa) pressure differential
Velocity:	2,500 to 4,000 fpm (12.7 m/s - 20.3 m/s)
Leakage:	Class 1A @ 1 in. wg at -40°F (Class 1A @ .25 kPa at -40°C) Class 1 @ 4 in. wg at -40°F (Class 1 @ 4 in. wg at -40°C)
Temperature:	-70°F to 200°F (-56°C to 93°C)



	Standard Construction	Optional Construction
Frame Material	Aluminum, thermally broken	
Frame Material Thickness	.125 in. (3.2mm)	
Frame Type	5 in. x 1 in. (127mm x 25mm) Quick Connect	Single Flange, Reverse Flange, Channel
Blade Action	Opposed	Parallel
Blade Material	Extruded Aluminum	
Blade Type	Insulated Thermally Broken Airfoil	
Linkage	Plated Steel Out of Airstream	316SS
Axle Bearings	Dual Bearing With Acetal Inner Sleeve, Flanged Outer Bearing	
Axle Material	½ Inch Plated Steel	316SS
Blade Seals	Silicone	
Jamb Seals	Silicone	

Note Regarding UV Lights:

The dampers should not be mounted or stored in direct line of sight to UV lights.



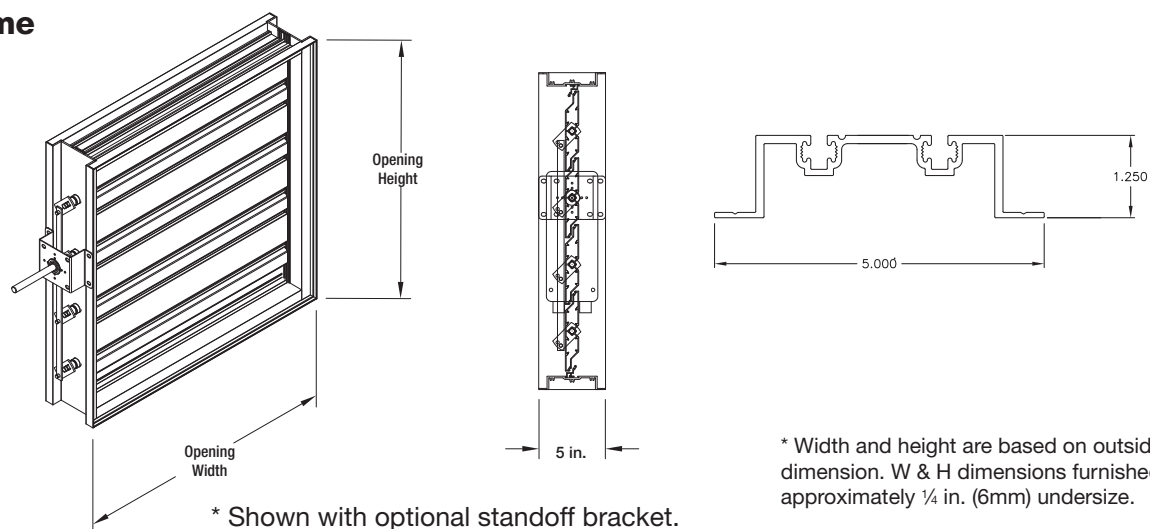
Size Limitations

in. (mm) W x H		Frame Type			
		Quick Connect		Channel, Single or Reverse Flange	
Blade Action		Parallel	Opposed	Parallel	Opposed
Minimum Sizes	Internal Mount	-		8 x 8 (203 x 203)	8 x 8 (203 x 203)
	External Mount	8 x 6 (203 x 152)	8 x 6 (203 x 152)	8 x 7 (203 x 178)	8 x 7 (203 x 178)
Maximum Sizes	Single Section	60 in. W x 74 in. H (1524mm x 1880mm)			
	Multi-Section	96 in. W x 120 in. H (2438mm x 3048mm)		180 in. W x 120 in. H (4572mm x 3048mm)	

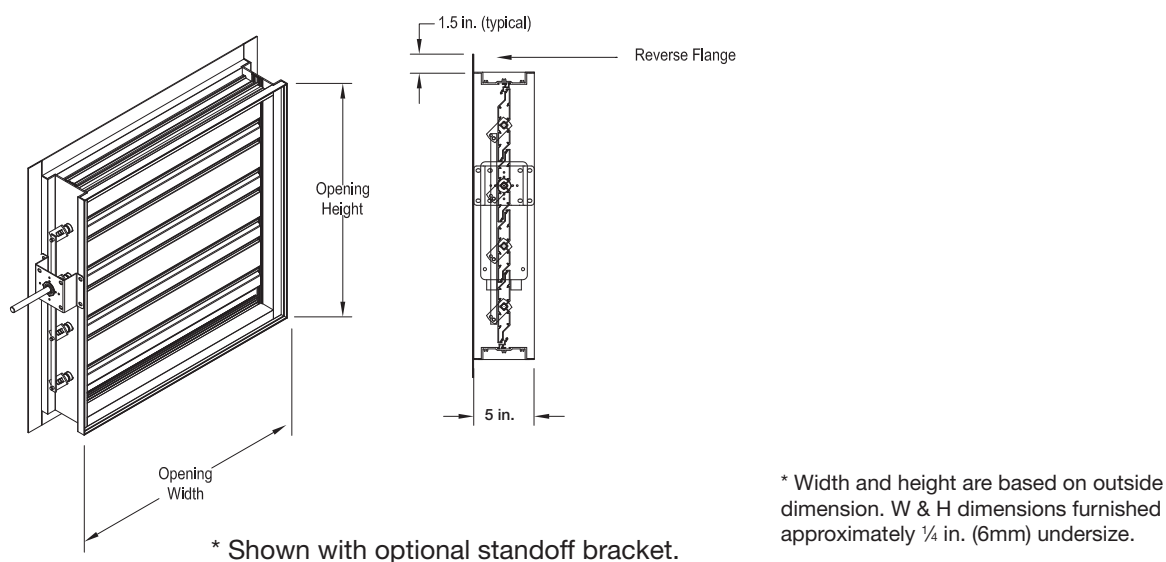
Frame Type Options

ICD-45

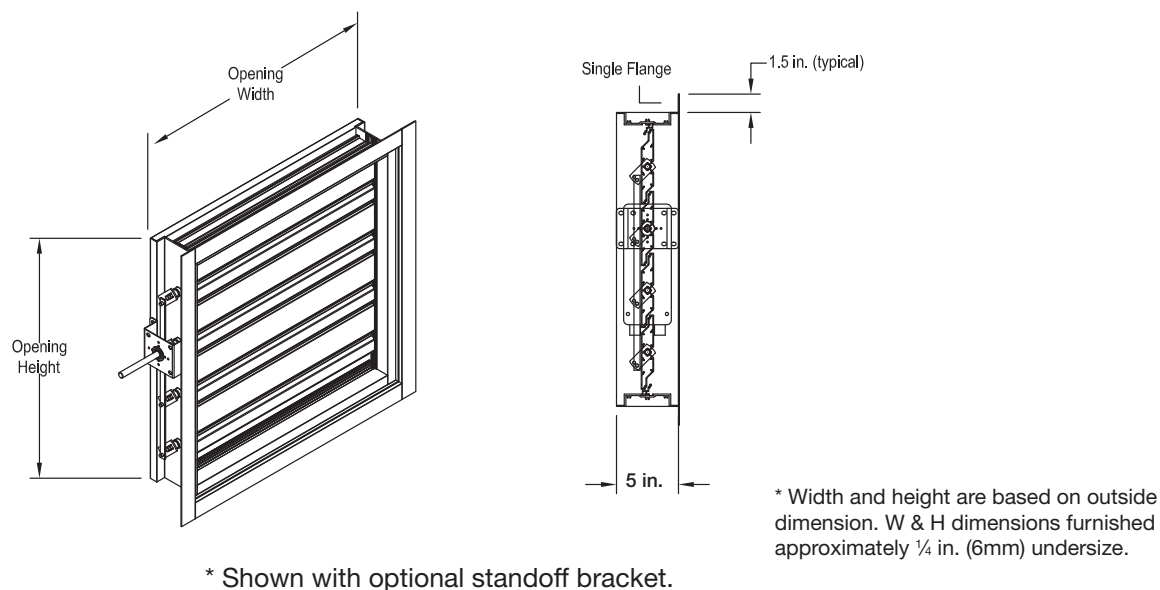
Channel Frame



Reverse Flange

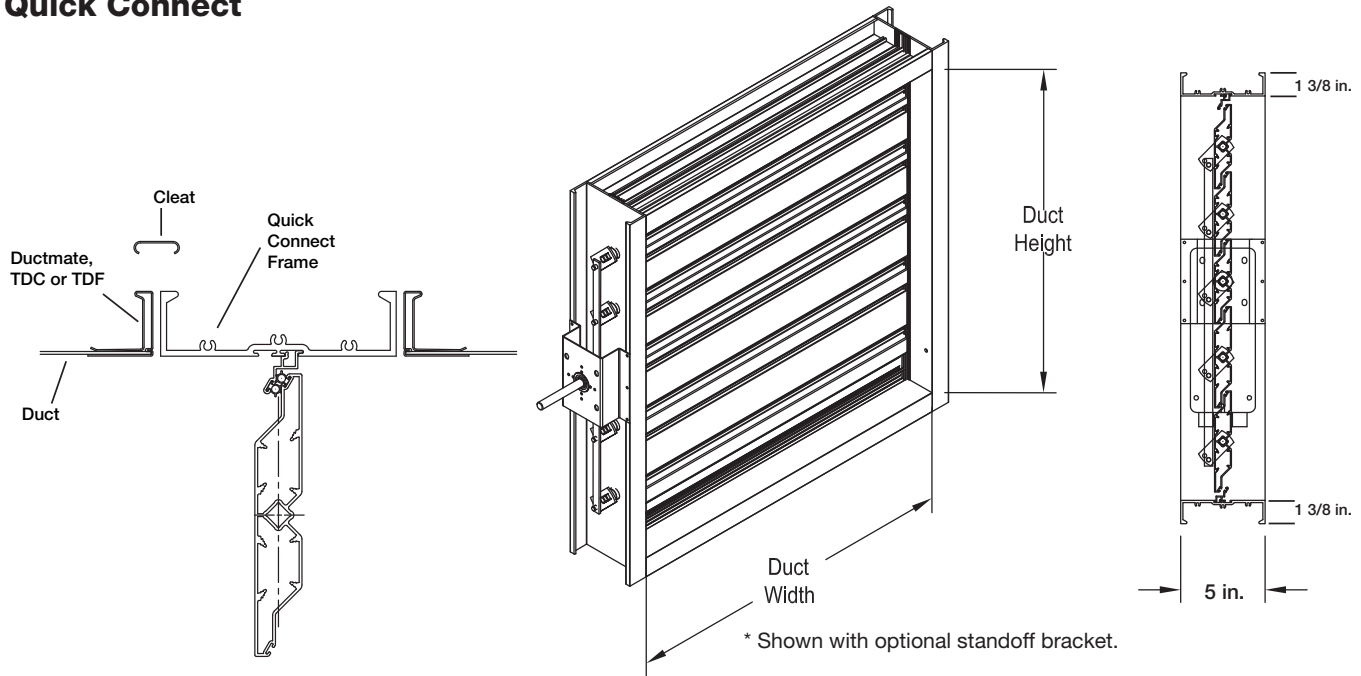


Single Flange



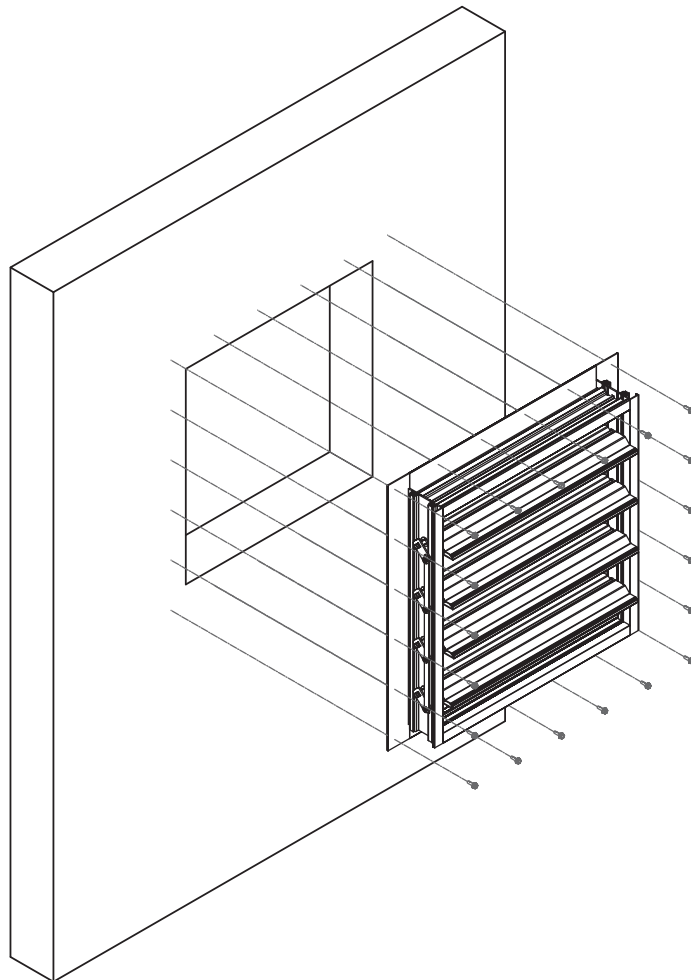
Frame Type Options & Thermal Performance ICD-45

Quick Connect



Note: When ordering the Quick Connect Frame, size is based on duct size (or inside dimension of the damper frame). Quick Connect frame is actual size.

There are applications that require mounting an ICD-45 into a plenum wall. This illustration depicts how to mount an ICD-45 into a plenum wall.



Pressure drop testing 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 0.075 lb/ft³ (1.2 kg/m³).

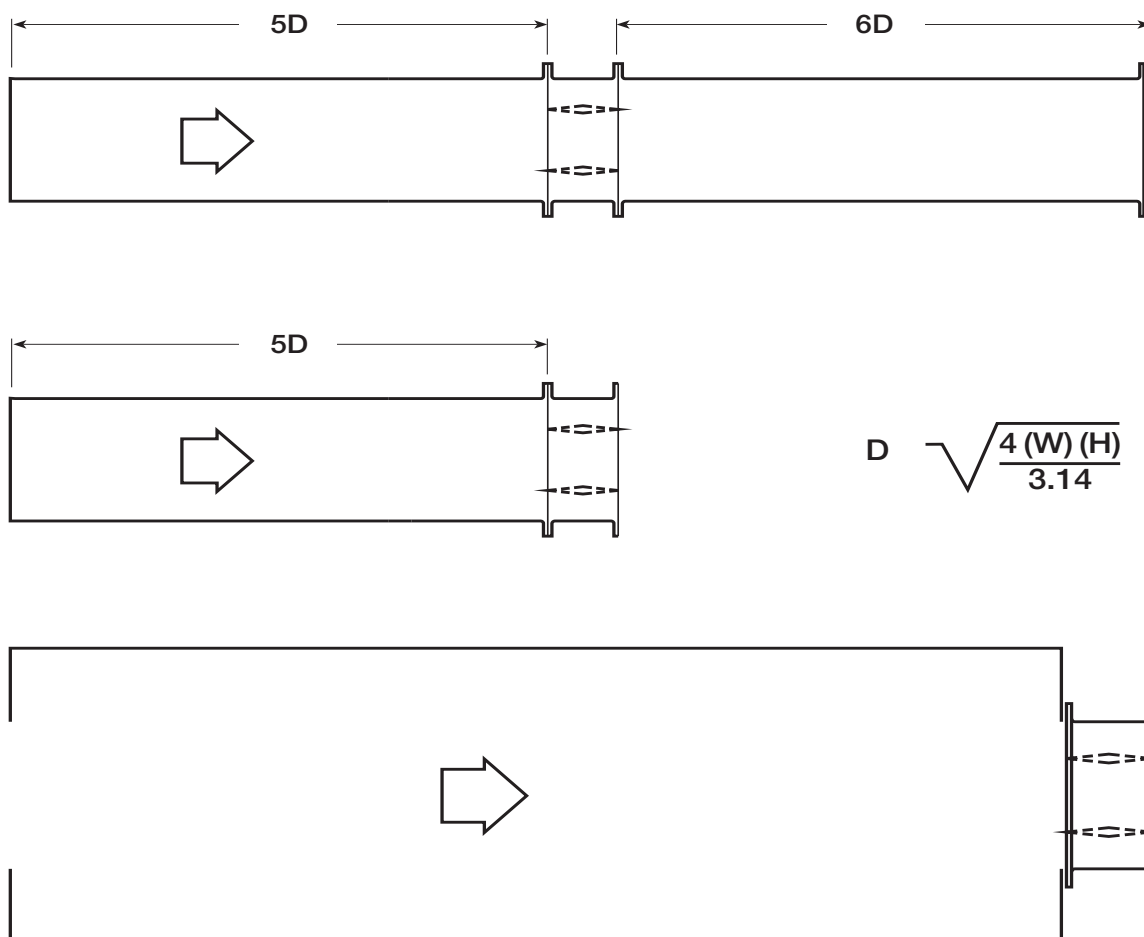
Actual pressure drop found in any HVAC system is a combination of many factors. This pressure drop information along with an analysis of other system influences should be used to estimate actual pressure losses for a damper installed in a given HVAC system.

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 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 extremely high entrance and exit losses due to the sudden changes of area in the system.



Greenheck Fan Corporation certifies that the model ICD-45 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Programs. The AMCA Certified Ratings Seal applies to Air Leakage, Air Performance and Energy Efficiency ratings.

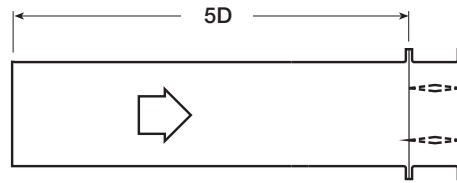


Figure 5.2

12 x 12 (305mm x 305mm)		24 x 24 (610mm x 610mm)		36 x 36 (914mm x 914mm)		12 x 48 (305mm x 1219mm)		48 x 12 (1219mm x 305mm)	
Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)
500	.03	500	.02	500	.01	500	.01	500	.03
1000	.11	1000	.08	1000	.05	1000	.06	1000	.14
1500	.25	1500	.19	1500	.11	1500	.14	1500	.32
2000	.45	2000	.34	2000	.21	2000	.25	2000	.57
2500	.71	2500	.53	2500	.33	2500	.40	2500	.89
3000	1.03	3000	.77	3000	.47	3000	.57	3000	1.29
3500	1.40	3500	1.05	3500	.64	3500	.78	3500	1.76
4000	1.83	4000	1.37	4000	.84	4000	1.02	4000	2.30

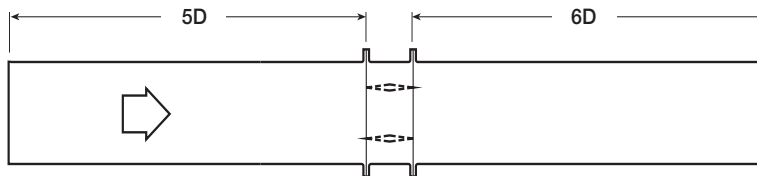


Figure 5.3

12 x 12 (305mm x 305mm)		24 x 24 (610mm x 610mm)		36 x 36 (914mm x 914mm)		12 x 48 (305mm x 1219mm)		48 x 12 (1219mm x 305mm)	
Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)
500	.01	500	.01	500	.01	500	.01	500	.01
1000	.04	1000	.03	1000	.02	1000	.02	1000	.06
1500	.09	1500	.08	1500	.04	1500	.06	1500	.14
2000	.17	2000	.14	2000	.08	2000	.10	2000	.25
2500	.26	2500	.22	2500	.12	2500	.17	2500	.40
3000	.38	3000	.32	3000	.18	3000	.24	3000	.58
3500	.52	3500	.43	3500	.24	3500	.33	3500	.79
4000	.67	4000	.57	4000	.32	4000	.43	4000	1.03

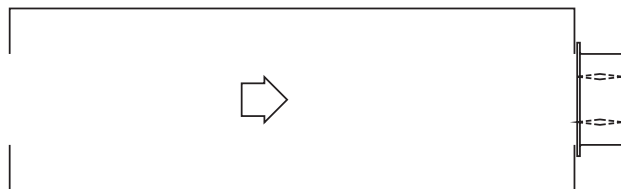


Figure 5.5

12 x 12 (305mm x 305mm)		24 x 24 (610mm x 610mm)		36 x 36 (914mm x 914mm)		12 x 48 (305mm x 1219mm)		48 x 12 (1219mm x 305mm)	
Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)	Velocity (fpm)	Pressure Drop (in. wg)
500	.05	500	.05	500	.04	500	.04	500	.05
1000	.23	1000	.21	1000	.14	1000	.18	1000	.22
1500	.52	1500	.47	1500	.33	1500	.42	1500	.51
2000	.93	2000	.84	2000	.58	2000	.74	2000	.90
2500	1.44	2500	1.32	2500	.91	2500	1.16	2500	1.41
3000	2.08	3000	1.90	3000	1.31	3000	1.68	3000	2.04
3500	2.83	3500	2.59	3500	1.79	3500	2.28	3500	2.78
4000	3.70	4000	3.39	4000	2.34	4000	2.98	4000	3.70

AMCA Certified Leakage Data

Air leakage is based on operation between 32°F (0°C) and 120°F (49°C).

Tested for leakage in accordance with ANSI/AMCA Standard 500-D, Figure 5.5.

Tested for air performance in accordance with ANSI/AMCA Standard 500-D, Figures 5.2, 5.3 and 5.5.

Torque

Data are based on a torque of 9.0 in.lb./ft² (1.02 N·m) applied to close and seat the damper during the test.

ICD-45	Leakage Class*			
Maximum Damper Width	1 in. wg (0.25 kPa)	4 in. wg (1 kPa)	8 in. wg (2 kPa)	10 in. wg (2.5 kPa)
60 in. (1524mm)	1A	1	1	1



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*Leakage Class Definitions

The *maximum* allowable leakage is defined by AMCA as the following:

- Leakage Class 1A - 3 cfm/ft² @ 1 in. wg (class 1A is only defined at 1 in. wg).
- Leakage Class 1
 - 4 cfm/ft² @ 1 in. wg
 - 8 cfm/ft² @ 4 in. wg
 - 11 cfm/ft² @ 8 in. wg
 - 12.6 cfm/ft² @ 10 in. wg

Energy Efficiency Performance



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Greenheck Model ICD-45 has a Thermal Efficiency Ratio of 941%.

A damper's Thermal Efficiency Ratio (E) is a comparison of the thermal performance of the tested damper with that of a standard reference damper, which is a 3V blade damper with blade and jamb seals. A damper with the same thermal efficiency as the reference damper would have an E of 0%. A damper that is twice as efficient as the reference damper would have an E of 100%.

Test Information

Testing was conducted on a 36"x36" sample in AMCA 500-D figure 5.10 per AMCA standard 500-D's Thermal Efficiency test.

Torque

Data are based on a torque of 9.0 in.lb./ft² (0.56 N·m) applied to close and seat the damper during the test.

Specifications

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: 0.125 (3.2mm) aluminum quick connect frame thermally broken with dual polyurethane resin gaps; aluminum airfoil blade internally insulated polyurethane foam and thermally broken. Blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow in either direction or pressure on either side of the damper. Axle will be ½ in. (13mm) diameter plated steel; bearings are dual bearing with acetal inner sleeve, flanged outer bearing resulting in no metal-to-metal or metal-to-plastic contact. Blade and jamb seals to be silicone rubber and external (out of the airstream) blade-to-blade linkage.

Dampers manufacturer's printed application and performance data including pressure, velocity, leakage, and temperature limitations shall be submitted for approval showing damper suitable for pressures to 8 in. wg (2 kPa), velocities to 4000 fpm (20.3 m/s), standard air leakage less than 8 cfm/sq. ft. @ 4 in. wg (146 cmh/m² @ 1kPa) and temperatures to 200 °F (93°C). Damper air performance data shall be developed in accordance with the latest edition of AMCA Standard 500-D.

Basis of design is ICD-45.

