Nailor®

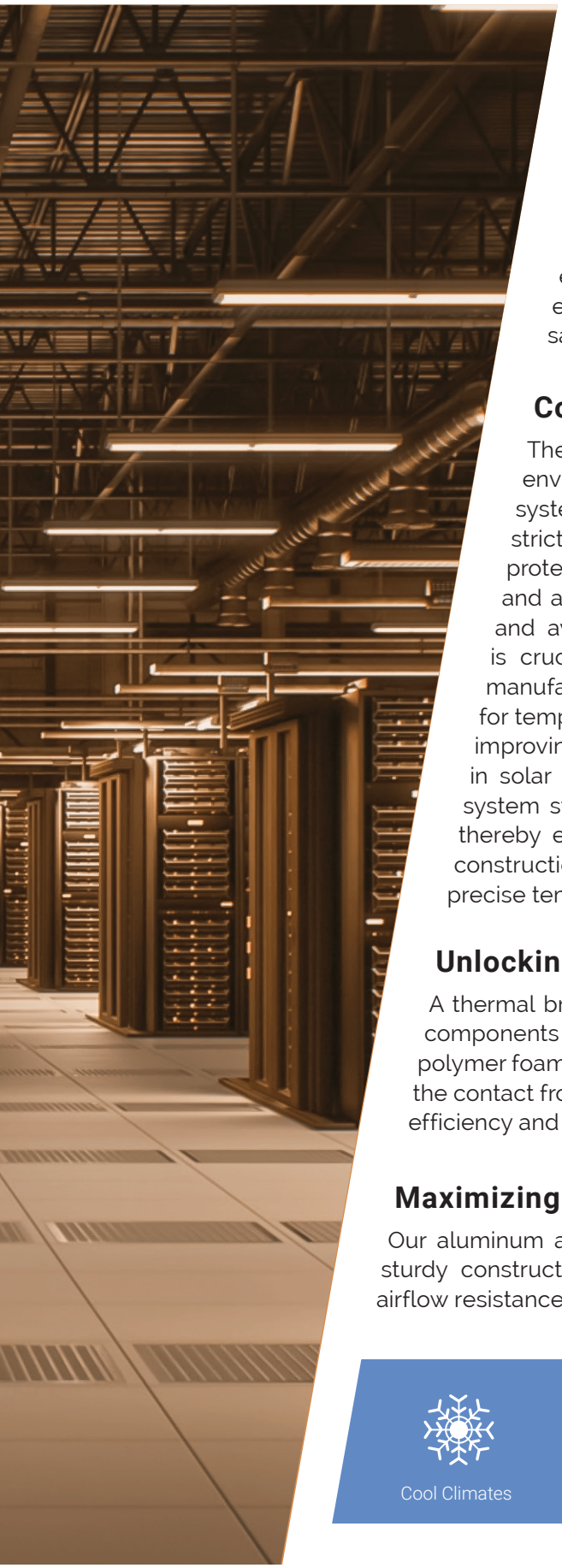
THERMALLY BROKEN

CONTROL DAMPERS

2200 SERIES

2200 Series

Thermally Broken Control Damper.
Extruded Aluminum Construction
Thermally Broken Blades
Optional Thermally Broken Frames



Unleashing the future with the 2200 Series

The 2200 Series is the pinnacle of control damper technology designed for utmost performance and efficiency. These models excel in maintaining controlled environments by preventing unwanted air transfer from passing through the damper. What sets it apart is its exceptional thermal efficiency, effectively minimizing condensation and thermal energy transfer. One can expect maximized energy-efficient operation, saving on heating and cooling costs all while enhancing indoor comfort. Trust the 2200 Series for superior energy savings and environmental control in your HVAC system.

Common Applications

Thermal break control dampers are the best choice for high-performance environments where temperature regulation, energy efficiency, and system longevity are critical. In data centers, these dampers help maintain strict climate control by preventing thermal bridging in ventilation systems, protecting sensitive servers and reducing HVAC energy loads. In aerospace and aviation, they are vital for managing airflows within pressurized cabins and avionics bays, where insulation from external temperature extremes is crucial for both safety and performance. In industrial equipment and manufacturing, thermal break dampers ensure stable environmental conditions for temperature-sensitive processes and equipment, minimizing heat loss and improving operational efficiency within renewable energy systems. Particularly in solar thermal and battery storage facilities, these dampers contribute to system stability by regulating airflow and minimizing unwanted heat transfer, thereby enhancing overall energy efficiency. Their robust, thermally isolated construction makes them a strategic investment for any application requiring precise temperature and airflow control.

Unlocking the Advantages of Blades and Frames

A thermal break is made when insulating material is placed between conductive components to prevent or minimize heat transfer. The blades contain polyurethane polymer foam insulation, and the frame contains polyurethane resin which separates the contact from aluminum to aluminum. This design provides top of the line thermal efficiency and prevents condensation from entering the system.

Maximizing Performance with Nailor's Aluminum Airfoil Blade

Our aluminum airfoil blades are preferred for dampers due to their lightweight yet sturdy construction and corrosion resistance. Their aerodynamic design minimizes airflow resistance, making them ideal for precise airflow control in HVAC systems.

Cool Climates

Energy Saving

Aerodynamic Blades

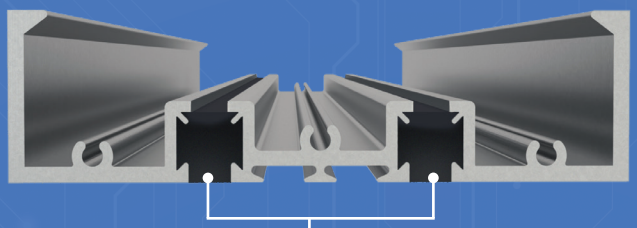
Thermal Efficiency Ratio

Frame Construction

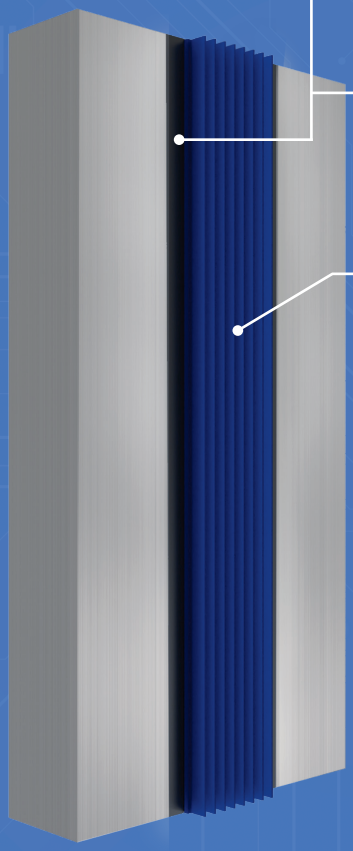
A durable aluminum channel featuring polyurethane resin pockets and strategically placed thermal breaks serves as an effective barrier against heat transfer.

* Model 2200TB does not include Thermally Broken Frame

Frame Top View (Quick Connect)



Frame Inside View



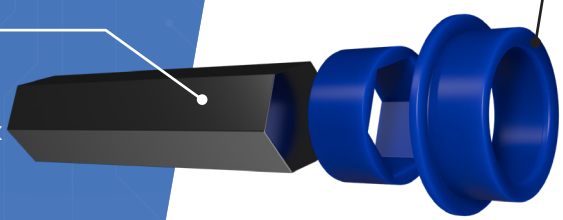
Thermal Breaks (frame)

Seals

Securing silicone blade and jamb seals through mechanical fastening is imperative to maintain their stability and size, playing a crucial role in achieving exceptional leakage performance.

Axles

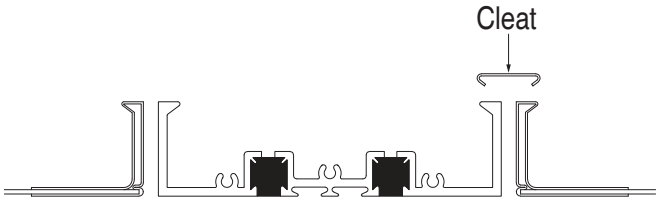
The blade is securely attached by mechanically fastening a plated steel hex with a 1/2-inch diameter.



Frame Types

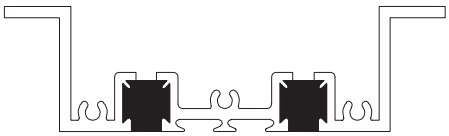
Quick Connect Flanged Frame

Engineered to align seamlessly with TDC, TDF, or Duct mate.



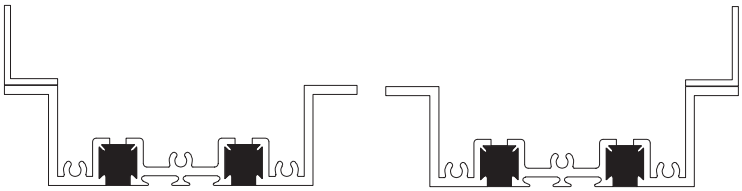
Hat Channel Frame

This type permits the damper to be securely placed within an opening or duct.



Single and Reversed Frame

These options can either be inserted into a mounting location, or attached directly to a wall/compatible surfaces like a plenum wall.



Dual Bearings

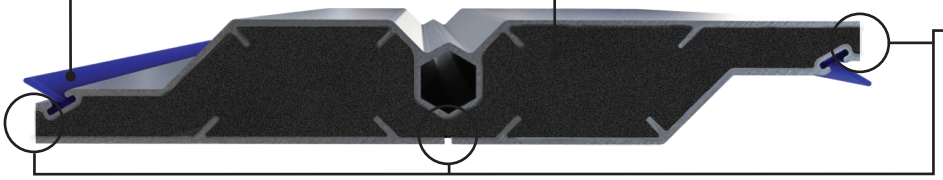
The blade axle features a synthetic inner bearing that rotates within a synthetic outer bearing securely placed within the frame. This design ensures there are no contact surfaces between metal to metal, or metal and plastic, resulting in a thermally efficient connection between the blade and the frame.

Blade Construction

The heavy-duty airfoil, constructed with high-density polyurethane polymer injection and a thermally isolated design, effectively eliminates any potential for heat transfer by preventing the formation of thermal pathways.

Blade Top View

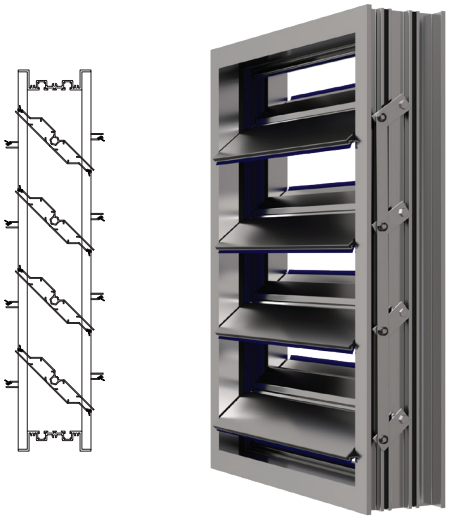
Blade Cut Through View



Thermal Breaks

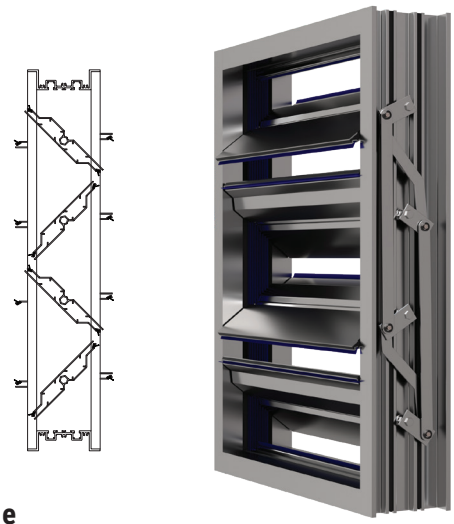
The extruded aluminum airfoil blade has strategically placed thermal cuts serve as a barrier.

Blade Types



Parallel Blade

The parallel blade configuration involves the synchronized rotation of damper blades, maintaining a parallel alignment to each other. This setup is commonly employed when the damper has only two operating states: fully open or completely closed.



Opposed Blade

The opposed blade configuration, adjacent damper blades rotate in opposite directions. This arrangement is commonly found in dampers designed for the purpose of regulating airflow.

AMCA Pressure Drop

AMCA FIGURE 5.2 HALF DUCTED (MEDIUM PRESSURE DROP)

12 x 12 (305 mm x 305 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.05
1000	.13
1500	.30
2000	.53
2500	.83
3000	1.21
3500	1.65
4000	2.17

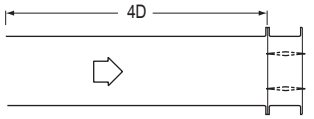
24 x 24 (610 mm x 610 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.02
1000	.06
1500	.14
2000	.24
2500	.38
3000	.54
3500	.74
4000	.97

36 x 36 (914 mm x 914 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.01
1000	.05
1500	.11
2000	.19
2500	.29
3000	.42
3500	.57
4000	.74

12 x 48 (305 mm x 1219 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.01
1000	.05
1500	.12
2000	.21
2500	.33
3000	.47
3500	.65
4000	.85

48 x 12 (1219 mm x 305 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.03
1000	.12
1500	.24
2000	.41
2500	.64
3000	.91
3500	1.23
4000	1.57

4D



AMCA FIGURE 5.3 FULLY DUCTED (LOWEST PRESSURE DROP)

12 x 12 (305 mm x 305 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.006
1000	.05
1500	.12
2000	.21
2500	.34
3000	.50
3500	.69
4000	.91

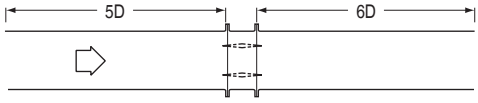
24 x 24 (610 mm x 610 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.007
1000	.03
1500	.05
2000	.09
2500	.14
3000	.20
3500	.28
4000	.37

36 x 36 (914 mm x 914 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.005
1000	.02
1500	.04
2000	.08
2500	.12
3000	.18
3500	.24
4000	.31

12 x 48 (305 mm x 1219 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.007
1000	.009
1500	.05
2000	.1
2500	.15
3000	.21
3500	.28
4000	.39

48 x 12 (1219 mm x 305 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.01
1000	.05
1500	.10
2000	.17
2500	.26
3000	.37
3500	.51
4000	.67

5D & 6D



AMCA FIGURE 5.5 PLENUM MOUNTED (HIGHEST PRESSURE DROP)

12 x 12 (305 mm x 305 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.06
1000	.19
1500	.45
2000	.81
2500	1.27
3000	1.83
3500	2.51
4000	3.29

24 x 24 (610 mm x 610 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.04
1000	.19
1500	.43
2000	.77
2500	1.20
3000	1.72
3500	2.35
4000	3.11

36 x 36 (914 mm x 914 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.04
1000	.16
1500	.36
2000	.65
2500	1.02
3000	1.48
3500	2.02
4000	2.65

12 x 48 (305 mm x 1219 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.04
1000	.18
1500	.42
2000	.75
2500	1.16
3000	1.67
3500	2.28
4000	3.0

48 x 12 (1219 mm x 305 mm)	
Velocity (fpm)	Pressure Drop (in. wg)
500	.05
1000	.19
1500	.43
2000	.76
2500	1.18
3000	1.68
3500	2.25
4000	2.91

None

AMCA Certified Energy Efficiency Performance

Nailor Model 2200-TBF has a Thermal Efficiency Ratio of **910%**

Test Information- An evaluation was carried out using a 36" x 36" sample, following the AMCA 500-D Figure 5.10 guidelines, in accordance with the AMCA Standard 500-D's Thermal Efficiency test. data is established with a torque of 9.0 in.lb./ft² (0.56 N·m) applied to close and seat the damper during the test.

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

2200	AMCA Certified Leakage Data			
Damper Width inches (mm)	1 in. wg. (0.25 kPa)	4 in. wg. (1 kPa)	6 in. wg. (1.5 kPa)	8 in. wg. (2.0 kPa)
12" (305)	1 A	1	1	1
36" (914)	1 A	1	1	1
60" (1524)	1 A	1	N/A	N/A

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

Leakage Class Definitions:

Leakage Class 1A: 3 cfm/ft2 @ 1 in. w.g. (0.015 L/s/ m2 @ 0.25 kPa)

Leakage Class 1: 4 cfm/ft2 @ 1 in. w.g. (0.20 L/s/ m2 @1.0 kPa)

8 cfm/ft2 @ 4 in. w.g. (0.41 L/s/ m2 @1.0 kPa)

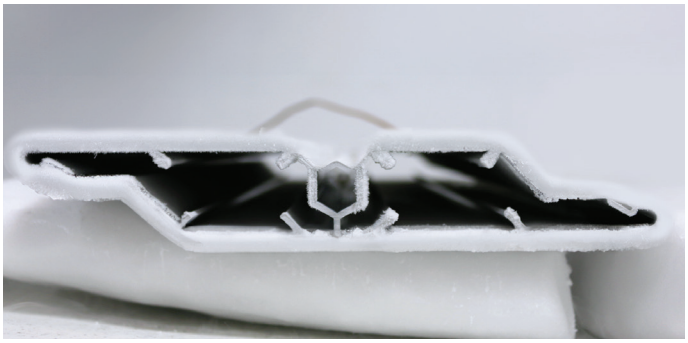
11 cfm/ft2 @ 8 in. w.g. (0.61 L/s/ m2 @2.0 kPa)

Sizing

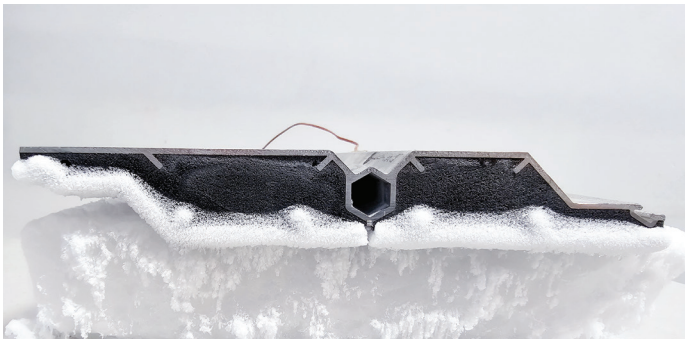
Frame Type		Quick Connect		Channel, Flange	
Blade Action		Parallel	Opposed	Parallel	Opposed
Min. Size		6" x 6" (152 x 152)	6" x 9 1/2" (152 x 241)	8" x 8" (203 x 203)	8" x 12 1/2" (203 x 318)
Max. Size	Single Section	60" x 76" (1524 x 1930)		60" x 78" (1524 x 1981)	
	Multi-Section	96" x 152" (2438 x 3861)		240" x 234" (6096 x 5944)	

Dry Ice Test

The introduction of thermal breaks within the damper blades and frame acts as a barrier, minimizing the transmission of heat from the "lower temperature zone" to the "higher temperature zone." In comparison to a standard airfoil blade design, the incorporation of thermal breaks and insulation in the airfoil blades prevents the ice from forming on the opposing side.

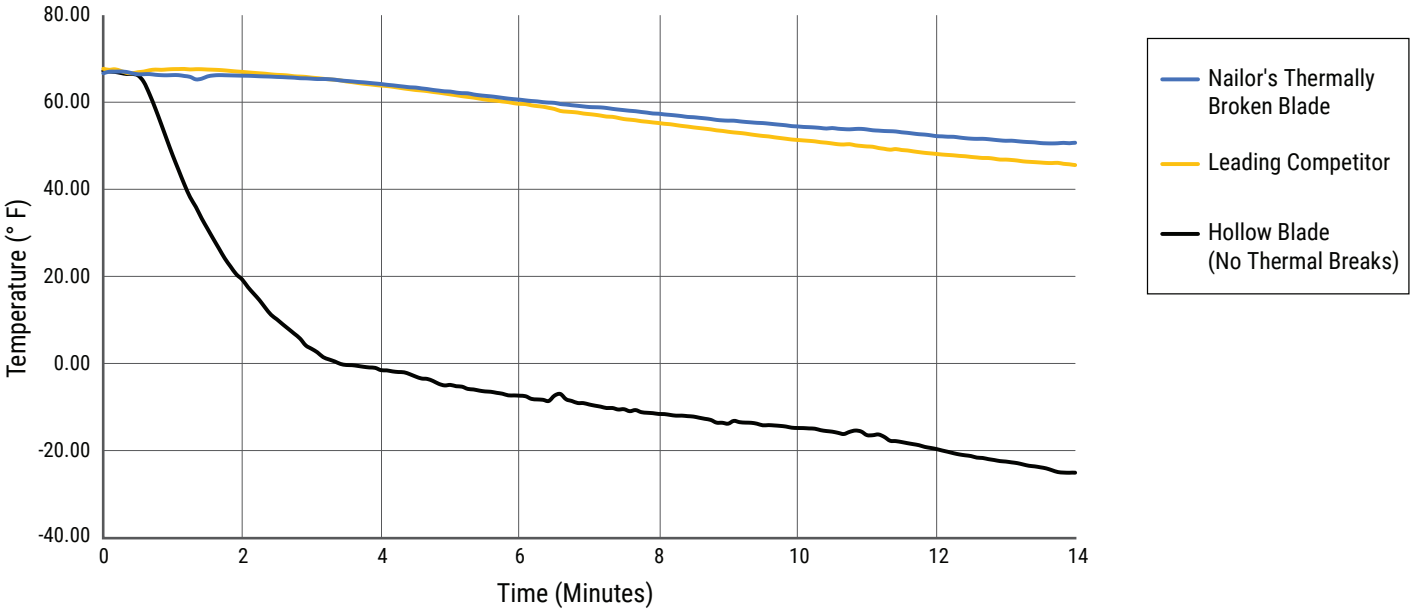


Without Thermal Breaks or Insulation



With Thermal Breaks and Insulation

Test Results



Condensation Control in Dampers

In cold climates, condensation can form on damper frames and blades when humidity and thermal conduction combine. This accumulated moisture may freeze, causing the blades to stick, reducing damper effectiveness. Over time, persistent moisture can also promote mold growth, leading to potential air quality issues. Thermal breaks help prevent condensation by limiting heat transfer, reducing the risk of freezing, moisture buildup, and mold formation.

What is the Thermal Efficiency Ratio?

The Thermal Efficiency Ratio (E) test aims to assess the energy loss in the damper under evaluation by comparing it to a predetermined reference damper. This test measures how effectively a system converts input energy into useful heat or cooling.

2200 Series AMCA 500-D Testing

Air Performance

Air performance testing determines the relationship of airflow rate and pressure drop. The damper is tested in 3 different configurations (fully ducted, half ducted and plenum mounted) representing a real-world installation. In each setup, the damper is placed in the fully open position, and air is moved through the damper at a given rate. Precision instruments measure the pressure on either side of the damper. The difference of this pressure is known as the pressure drop. The pressure drop reflects the damper's resistance to airflow. The lower the pressure drop, the more efficient the damper.

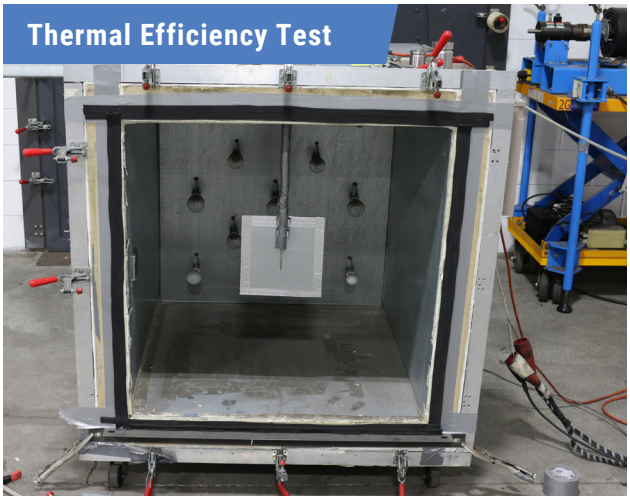
Thermal Efficiency

Thermal efficiency testing measures a damper's ability to limit heat transfer. A controlled setup compares the energy needed to maintain a specific temperature difference across the damper. By testing against a reference damper, we can determine a damper's efficiency by comparison. The lower the energy used during the test, the better the damper is at reducing heat transfer - leading to improved energy savings.

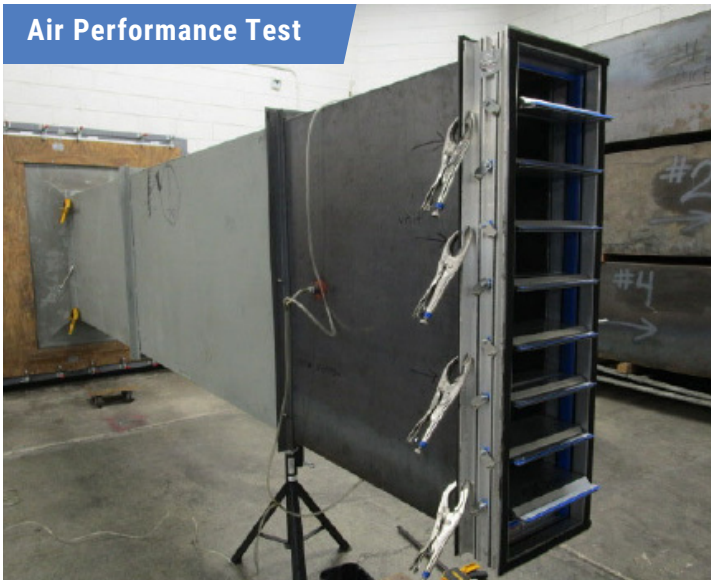
Air Leakage

Leakage testing determines a damper's ability to prevent airflow when closed. The amount of air that escapes the damper under certain air pressures is measured. The rate at which the air escapes is known as the leakage rate. High leakage rates hurt system performance, waste energy, and put added strain on equipment. Air leakage testing helps you choose products that keep your system running efficiently.


Air Leakage


Thermal Efficiency Test


Thermal Efficiency Test


Air Performance Test

Standard Construction:

Frame: 5" x 1 3/8" x 0.125" (127 x 35 x 3.2) extruded aluminum, thermally broken. Quick Connect.

Blades: 6063-T6 extruded aluminum thermally broken insulated airfoil blades.

Blade Action: Opposed or Parallel.

Linkage: Concealed side type totally enclosed within the frame and out of the air stream. Plated Steel.

Bearings: 1/2" (13) dia. dual action, synthetic.

Axles: 7/16" (11) dia. plated steel, hexagonal.

Drive Shaft: 6" (152) long x 1/2" (13) rigid drive shaft.

Blade Seals: Silicone. Mechanically fastened.

Jamb Seals: Silicone. Mechanically fastened.

Temperature Range: -70˚F to 200˚F (-57˚C to 93˚C)

Leakage: Class 1A @ 1" w.g. (0.25 kPa)
Class 1 @ 4" w.g. (1.0 kPa)

Pressure: Up to 8 in. wg (2kPa) pressure differential.

Velocity: Up to 4,000 fpm (20.3 m/s).

Ordering Options:

1. **Models**
   - 2200TB Thermally Broken Blade
   - 2200TBF Thermally Broken Blade & Frame
2. **Duct Size**
   - Width x Height (inches [mm's])
3. **Blade Action**
   - Opposed (default)
   - Parallel
4. **Frame Type**
   - Hat Channel (2200TB default)
   - Quick Connect Flange Frame (2200TBF default)
   - Flanged Front
   - Flanged Rear
5. **Frame Material**
   - Aluminum (2200TB default)
   - Insulated, Thermally Broken Aluminum (2200TBF default)
6. **Bearings**
   - Dual Action Synthetic (default)
7. **Blade Seals**
   - Silicone (default)
8. **Jamb Seals**
   - JSSI Silicone (default)
9. **Actuator Mounting**
   - None (default)
   - External Supplied by Nailor
   - External Supplied by Others
   - Internal Supplied by Nailor
   - Internal Supplied by Others
10. **Drive Shaft**
    - Rigid (default)
    - Jackshaft
    - Jackshaft - 1" dia.
    - Jackshaft - 1/2" dia.
11. **Drive Location**
    - Right Hand (default)
    - Left Hand
    - Internal Left
    - Internal Right (default when actuator internal mounting selected)

OPTIONS & ACCESSORIES:

12. **Linkage/Axle Material**
    - Plated Steel (default)
    - Type 304 Stainless Steel
13. **Actuator Selected By**
    - Not Applicable (default)
    - Least Cost (Auto-select)
    - Belimo
    - Honeywell
    - Manually Select
    - Siemens
14. **Power Requirement**
    - 120 VAC
    - 230 VAC
    - 24 VAC
15. **Spring Return**
    - Non-Spring Return
    - Spring Return
16. **Control Type**
    - Two Position
    - Floating
    - Modulating
    - Modulating and Floating
17. **Fail Position (SPR only)**
    - None
    - Close
    - Open
18. **Auxiliary Switch Package**
    - None
    - On Electric Actuator

About Nailor

Nailor Industries, Inc. is known for our industry leading customer focused approach to providing innovative commercial and industrial HVAC products. Nailor manufactures a unique and comprehensive line of products essential for a well designed HVAC system. Product offerings include Air Control & Distribution products, VAV Terminal Units, Green Building products, Fan Coil Units, Electric Duct Heaters, Sound Attenuators, Air Handling Units, and Filter Housings. Coupled with a wide range of product offerings and industry leading design, testing and manufacturing capabilities, Nailor offers a single source solution for all of your HVAC needs.

nailor.com

2200 SERIES

ENGINEERED TO PREVENT
CONDENSATION, CONVECTION,
AND AIR INFILTRATION!

PERFORMANCE YOU CAN DEPEND ON!

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