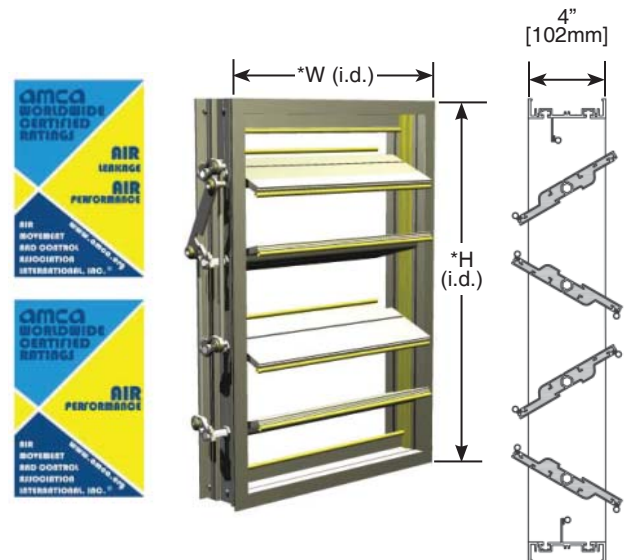


CARNES COMPANY 448 S. Main St., P. O. Box 930040, Verona, WI 53593-0040 Phone: (608)845-6411 Fax: (608)845-6504 www.carnes.com

This damper is designed to eliminate transfer of high heat or low cold penetration and reduces condensation. Carnes Thermal Broken Damper is compliant with IECC with a leakage rating of 3 cfm/ft² [25mm] w.g. of static pressure at a temperature of -40°F [-4.4°C]. (55 cmh/m² at 0.25 kpa or less) and 6 cfm/ft² at 4" [102mm] w.g. of static pressure at a temperature of -40°F [-4.4°C] (110 cmh/m² at 1 kpa)

Standard Construction		Optional
Frame	Thermally broken, 0.125" [3.188mm] extruded aluminum	—
Blade	Heavy duty double construction extruded aluminum	—
**Blade Type	Airfoil, thermally broken and insulated	—
Linkage	Aluminum and corrosion resistant zinc plated steel	Stainless Steel (in lieu of zinc plated steel)
Axle Bearing	Celcon inner bearing fixed to an aluminum hexagon blade pin	—
Axle Material	7/16" [11mm] aluminum hexagon (zinc plated steel - drive blade only)	Stainless Steel
Blade & Jamb Seals	Silicone	—

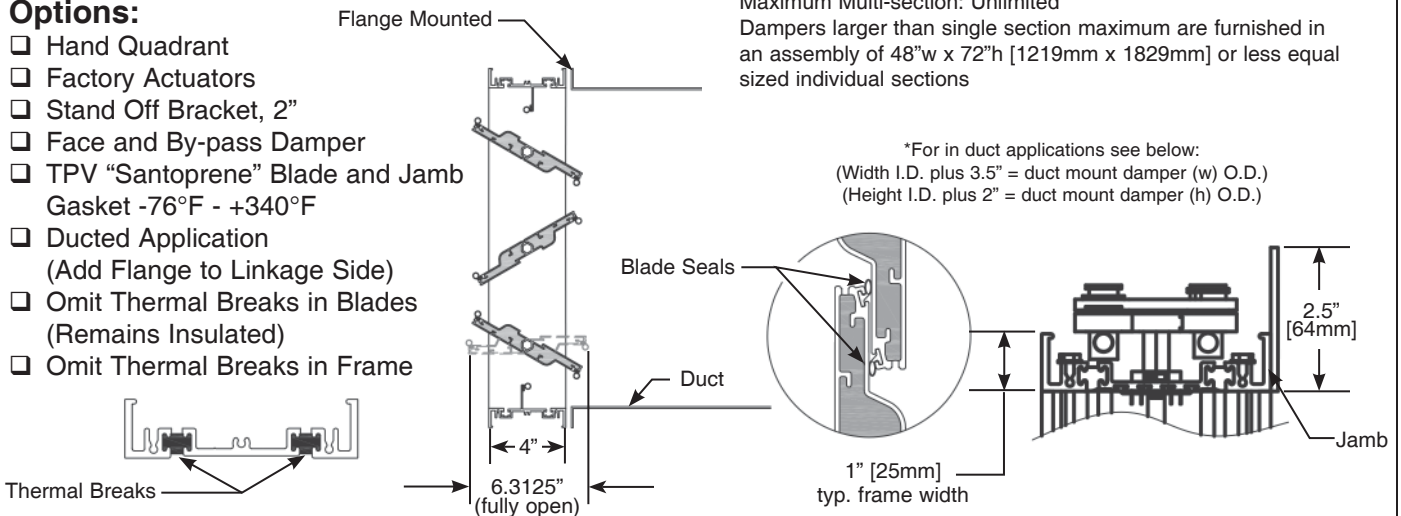


**Blade has an insulated factor of R3.95 and a temperature index of 57
Temperature range: -40°F to 200°F [-4.4°C to 93.3°C]

*Sizes are exact inside dimensions (I.D.)
Minimum Size: 6"w x 7"h [152mm x 179mm] (single blade)
Maximum Size: 60"w x 72"h [1524mm x 1828mm] (single blade)
Maximum Multi-section: Unlimited
Dampers larger than single section maximum are furnished in an assembly of 48"w x 72"h [1219mm x 1829mm] or less equal sized individual sections

Options:

- Hand Quadrant
- Factory Actuators
- Stand Off Bracket, 2"
- Face and By-pass Damper
- TPV "Santoprene" Blade and Jamb Gasket -76°F - +340°F
- Ducted Application (Add Flange to Linkage Side)
- Omit Thermal Breaks in Blades (Remains Insulated)
- Omit Thermal Breaks in Frame



*For in duct applications see below:
(Width I.D. plus 3.5" = duct mount damper (w) O.D.)
(Height I.D. plus 2" = duct mount damper (h) O.D.)

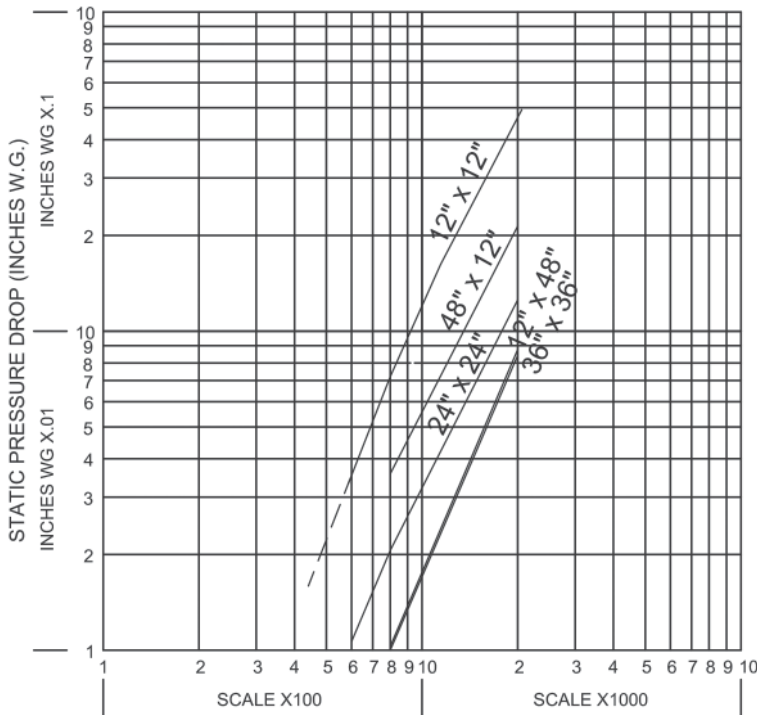
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		Width	Height	

Project
Arch./Engr.
Representative

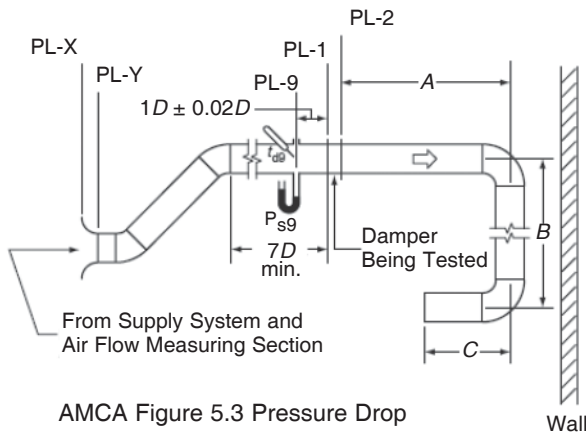
Location
Contractor
Date

Carnes Specialty Products — Thermal Broken Damper PERFORMANCE DATA

AIR FLOW RESISTANCE



TB-155, 156 sizes: 12" x 12", 24" x 24", 42" x 12", 12" x 48", 36" x 36"
(305 x 305mm, 610 x 610mm, 1219 x 305mm, 305 x 1219, 914 x 914mm)
Pressure drop test per AMCA Standard 500-D, Figure 5.3.



AMCA Figure 5.3 Pressure Drop

12 x 12 Pressure Drop			
Free Velocity		Pressure Drop	
fpm	(m/s)	inches w.g.	(Pa)
591	3.01	0.034	8.47
800	4.08	0.073	18.18
1207	6.16	0.168	41.85
1611	8.22	0.302	75.22
2024	10.32	0.487	121.30

Pressure drop test per AMCA Standard 500-D, Figure 5.3.

48 x 12 Pressure Drop			
Free Velocity		Pressure Drop	
fpm	(m/s)	inches w.g.	(Pa)
398	2.03	0.008	1.99
801	4.09	0.036	8.97
1193	6.08	0.077	19.18
1596	8.14	0.135	33.63
1998	10.19	0.216	53.80

Pressure drop test per AMCA Standard 500-D, Figure 5.3.

24 x 24 Pressure Drop			
Free Velocity		Pressure Drop	
fpm	(m/s)	inches w.g.	(Pa)
599	3.05	0.012	2.99
800	4.08	0.021	5.23
1203	6.14	0.047	11.71
1601	8.17	0.84	20.92
2004	10.22	0.129	32.13

Pressure drop test per AMCA Standard 500-D, Figure 5.3.

36 x 36 Pressure Drop			
Free Velocity		Pressure Drop	
fpm	(m/s)	inches w.g.	(Pa)
595	3.03	0.005	1.25
792	4.04	0.011	2.74
1193	6.08	0.030	7.47
1590	8.11	0.050	12.45
1994	10.17	0.084	20.92

Pressure drop test per AMCA Standard 500-D, Figure 5.3.

12 x 48 Pressure Drop			
Free Velocity		Pressure Drop	
fpm	(m/s)	inches w.g.	(Pa)
397	2.02	0.001	0.25
801	4.09	0.012	2.99
1193	6.08	0.030	7.47
1596	8.14	0.052	12.95
2000	10.20	0.087	21.67

Pressure drop test per AMCA Standard 500-D, Figure 5.3.



Carnes Company certifies that the Thermal Broken Damper (Opposed Blade) 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 Rating Program. The AMCA Certified Rating Seal applies to Air Performance and Air Leakage ratings.



Carnes Company certifies that the Thermal Broken Damper (Parallel Blade) 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 Rating Program. The AMCA Certified Rating Seal applies to Air Performance ratings only.

Carnes Specialty Products — Thermal Broken Damper

PERFORMANCE DATA (continued)

Imperial Units (Forward Flow)

Damper Width x Height	1 in. w.g.	4 in. w.g.	8 in. w.g.	*Torque (per sq. ft.)
12" x 48"	Class 1A	Class 1	Class 1	16.5 lbs-in
36" x 36"	Class 1A	Class 1	Class 1	13.3 lbs-in
60" x 36"	Class 1A	Class 1	Class 1	9.6 lbs-in

*Torque applied to close and seat damper in during the test

Imperial Units (Reverse Flow)

Damper Width x Height	1 in. w.g.	4 in. w.g.	8 in. w.g.	*Torque (per sq. ft.)
12" x 48"	Class 1A	Class 1	Class 1	16.5 lbs-in
36" x 36"	Class 1A	Class 1	Class 1	13.3 lbs-in
60" x 36"	Class 1A	Class 1	Class 1	9.6 lbs-in

*Torque applied to close and seat damper in during the test

Metric Units (Forward Flow)

Damper Width x Height	1 in. w.g.	4 in. w.g.	8 in. w.g.	*Torque (per sq. ft.)
305 x 1220	Class 1A	Class 1	Class 1	20.2 N-m
915 x 915	Class 1A	Class 1	Class 1	16.1 N-m
1524 x 915	Class 1A	Class 1	Class 1	11.7 N-m

*Torque applied to close and seat damper in during the test

Metric Units (Reverse Flow)

Damper Width x Height	1 in. w.g.	4 in. w.g.	8 in. w.g.	*Torque (per sq. ft.)
305 x 1220	Class 1A	Class 1	Class 1	20.2 N-m
915 x 915	Class 1A	Class 1	Class 1	16.1 N-m
1524 x 915	Class 1A	Class 1	Class 1	11.7 N-m

*Torque applied to close and seat damper in during the test

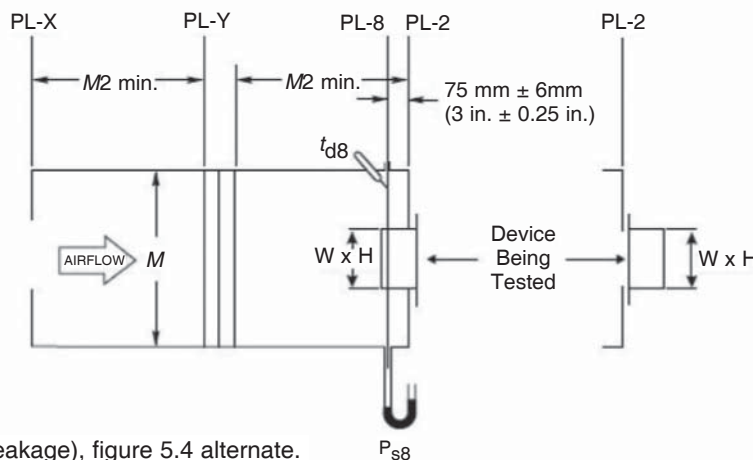
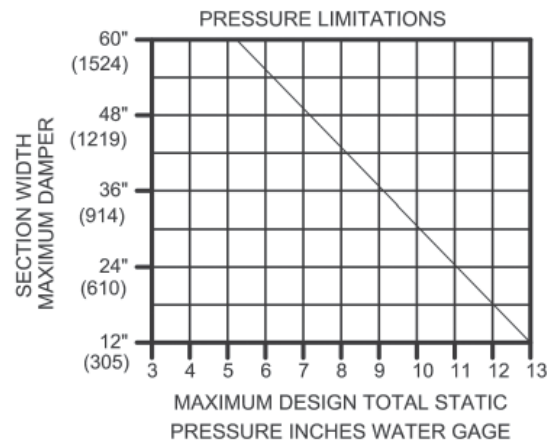
Air leakage is based on operation between 50°F to 104°F. All data corrected to represent air density of 0.075 lbs/ft³. Tested per AMCA Standard 500-D (leakage), figure 5.4 Alternate.

Carnes Company certifies that the Thermal Broken Damper (Opposed Blade) 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 Rating Program. The AMCA Certified Rating Seal applies to Air Performance and Air Leakage ratings.



Class	Leakage, ft ³ /min/ft ²			
	Required Rating		Extended Ranges (optional)	
	1"	4"	8"	12"
1A	3	n/a	n/a	n/a
1	4	8	11	14
2	10	20	28	35
3	40	80	112	140

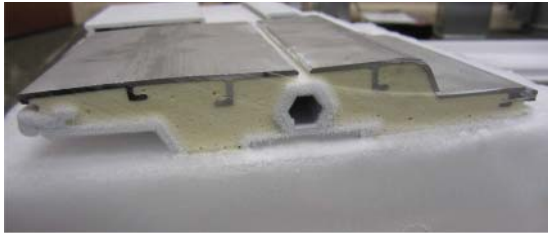
All data corrected to represent standard air at a density of 0.075 lbs/ft³



AMCA Standard 500-D (leakage), figure 5.4 alternate.

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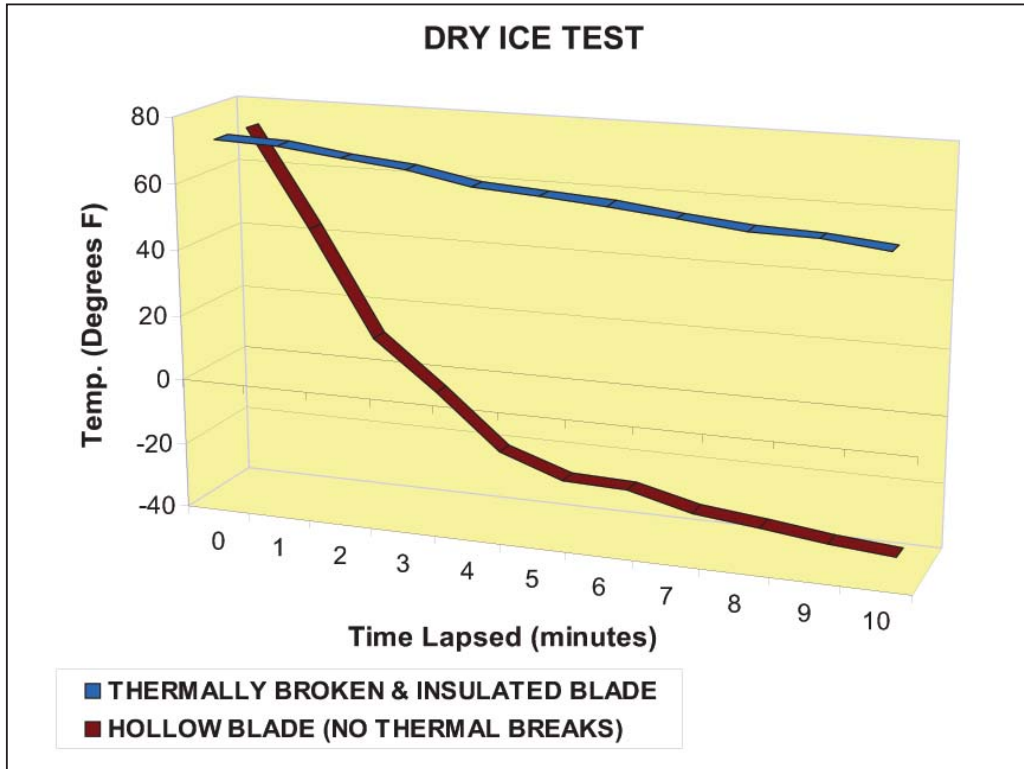
Carnes Specialty Products — Thermal Broken Damper PERFORMANCE DATA (continued)



Thermal Broken & Insulated Blade



Hollow Blade (No Thermal Breaks)



TEST NOTES:

- (1) Both specimens began testing at the ambient temperature of 73°F.
- (2) Temperature measurements were taken from the side opposite the ice.
- (3) For best thermal performance, the broken side of the damper blades should always face the cold.

*AAMA 1503-09 TEST RESULTS <small>(*Test method for Thermal Transmittance and Condensation Resistance of Glazed Wall Systems)</small>	
Test conducted at Architectural Laboratories (ATI)	Condensation Resistance Factor (CRF)
Frame (thermally broken)	60
Blade (insulated and thermally broken)	48

SUGGESTED SPECIFICATIONS

Furnish and install per plans and specifications dampers meeting the following specifications. Thermally broken blade and frame, with leakage not to exceed 4 cfm/sq.ft. at 4" w.g. and holding torque not to exceed 16.5 in-lbs/sq.ft. Frame shall be .125" extruded aluminum thermally broken on all four sides with dual polyurethane resin gaps. External sides of frame shall be insulated with polystyrene. Airfoil blade shall consist of 6063T5 extruded aluminum and silicone blade gasket mechanically locked within an internal slot within the extrusion. Blades to be insulated with polyurethane foam. Jamb seals consist of a special silicone gasket inserted in the mechanically locked frame. Bearings are composed of a celcon inner bearing fixed within 7/16" (11.11mm) aluminum hexagon blade pin, rotating within a polycarbonate outer bearing inserted in the frame, resulting in no metal-to-metal or metal-to-plastic contact. Linkage is installed in the outer frame jamb and constructed of aluminum and corrosion resistant zinc plated steel with cup paint Trunnions screws for a slip proof grip. Damper is designed for operation in temperatures ranging between -40°F (-4.4°C) and 200°F (93°C). Dampers are to be constructed to size without blanking off. Damper shall have condensation resistance factors (CRF) of 60 for the frame and 40 for the blade. Damper manufacturer to provide catalog data, including pressure, velocity leakage and temperature limitations. Performance data shall be developed in accordance with the latest edition of AMCA Standard 500-D.