

Life Safety Dampers – International

- Fire
- Smoke
- Combination Fire Smoke
- Ceiling Radiation



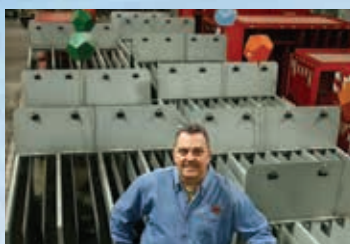
 **GREENHECK**
Building Value in Air.



Greenheck's employees are deeply committed to being easy to do business with anywhere in the world. As an industry-leading manufacturer, our focus is to **build value in air**... by offering the widest range of reliable air movement and control products and to exceed your expectations for on-time delivery, easy installation, performance and operating efficiency.

Our commitment to our customers is what drives our long-standing sustainability practices. We continuously strive to reduce energy usage and other production costs to ensure competitive prices for you and ongoing business success. We support the health, safety and training of our employees to achieve the high quality product performance you expect from Greenheck — and deserve. And we take on the industry's most complex challenges by introducing innovative new product solutions to meet your future needs.

Our Mission: To be the market leader in the development, manufacture and worldwide sale of quality air moving and control equipment with total commitment to the customer.



Our Vision: Greenheck will be a company that exceeds customer expectations and that others strive to emulate. We will be the worldwide leader in providing timely, flexible and cost-effective solutions focused on the movement, cleaning, tempering, and control of air.

Building value in air — from the beginning.

Today, we're the world's largest manufacturer of commercial, institutional and industrial air movement and control equipment.

Greenheck's worldwide leadership in providing cost-effective, value-added solutions for air movement and control challenges evolved from rather humble beginnings. Bernie and Bob Greenheck weren't sure what lay ahead when they opened their small sheet metal shop in Schofield, Wisconsin USA in 1947. But they were determined that no product would ever leave their shop, unless it met the most stringent quality standards—their own. At first, the company manufactured a variety of sheet metal products. In 1956, Greenheck engineers developed a highly efficient power roof ventilator. This product and the innovative ventilation solutions that followed ultimately enabled us to expand our distribution throughout the world. Today, quality Greenheck products are efficiently moving air in commercial buildings, institutions and factories throughout North America, Latin America, the Middle East, and Asia.



The first factory.
1947



Bernie and Bob Greenheck
1956

Customer driven employees.

Greenheck employees continue to share an extraordinary commitment to meeting and exceeding customers' expectations. We know our future success depends on the value we bring to the market: reliable, top-quality products and exceptional service.



The Greenheck Difference

What makes Greenheck different from other damper manufacturers? Perhaps it's having the most UL Certified dampers or industry-leading testing capabilities. Most Greenheck dampers meet California State Fire Marshal and NY MEA requirements. Aggressive research and development also keeps Greenheck at the front of the damper industry.



Unparalleled In-House Testing Capabilities

Internal testing capabilities are directly related to product quality and the ability to meet stringent code requirements. With industry-leading testing abilities, Greenheck can introduce new products faster, and can quickly develop qualified products for your unique applications. Our dampers qualify to UL 555, UL 555C, UL 555S and AMCA 500-D test standards.



Quick Build and Quick Delivery

Greenheck's Quick Build (QB) program, along with strategic manufacturing locations, ensures rapid response time. Products are manufactured on a 1-, 3-, 5-, 10- or 25-day program, then efficiently shipped to your jobsite.

Leading Edge Technical Support

All Greenheck products are supported by the industry's best product literature, electronic media, and Computer Aided Product Selection program (CAPS). You'll also find extensive information on our website, www.greenheck.com.



You can always count on the personal service and expertise of our national and international representative organizations. To locate your nearest Greenheck representative, call 715-359-6171, or visit our website at www.greenheck.com

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Life safety dampers are intended to protect openings in walls, ceilings, floors and/or partitions to prevent the spread of fire and/or smoke. The four types are:

Ceiling Radiation Dampers

Fire Dampers

Smoke Dampers

Combination Fire Smoke Dampers



Ceiling Radiation Dampers are designed to protect penetrations through the ceiling membrane of fire resistive floor ceiling and/or roof ceiling assemblies. These products are tested and listed in accordance with UL Standard 555C and 263.

Fire Dampers are required by all building codes to maintain the required fire resistance ratings of walls, partitions and floors when they are penetrated by air ducts and transfer openings. These products are tested and classified in accordance with UL Standard 555.

Smoke Dampers have two applications:

1. They may be applied in a passive smoke control system where they simply close and prevent the circulation of air and smoke through a duct or a ventilation opening in a smoke barrier.
2. They may be applied as part of an engineered smoke control system designed to control the spread of smoke using walls and floors as barriers and using the building's HVAC system and/or dedicated fans to create pressure differences.

These products are tested and classified in accordance with UL Standard 555S.

Combination Fire Smoke Dampers perform the function of both a fire damper and a smoke damper. Building layouts and designs often combine fire and smoke rated partitions and barriers requiring the installation of both a fire damper and smoke damper at the same location. These products are tested and classified in accordance with both UL 555 and UL 555S.

Fire Damper Quick Reference Guide

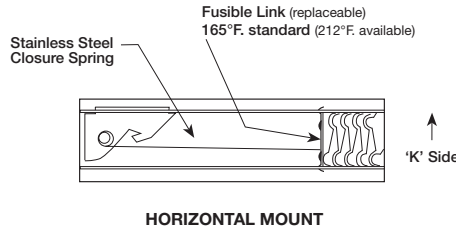
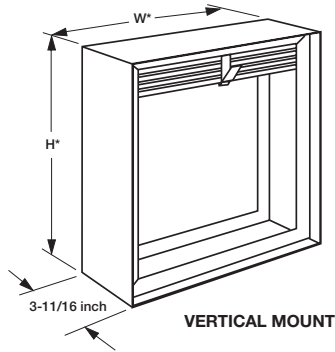
	Construction				Material			Blade Profile			Fire Rating		Closure Temperature			Accessories		
	Ultrathin Frame 1 1/2 in. (38 mm)	Narrowline Frame 2 3/16 in. (66 mm)	Integral 20 ga. (1 mm) Sleeve 10, 12, 14, 16 in. length (254, 305, 356, 406 mm)	Standard Frame 3 1/16 in. (94 mm)	5 in. x 1 in. 16 ga. (127 x 25 x 1.5 mm) Hat Channel Frame	Galvanized Steel	304 Stainless Steel	316 Stainless Steel	Curtain	Airfoil	3V	1 1/2 Hour	3 Hour	165°F (74°C)	212°F (100°C)	286°F (141°C)	350°F (177°C)	Retaining Angles
DFD-110		X				X			X			X		X	O	O		O
DFD-150				X		X			X			X		X	O	O		O
SSDFD-150				X			X		X			X		X	O			O
DFD-150X series			X			X			X			X		X	O	O		O
ODFD-150				X		X			X			X		X	O	O		O
DFD-210					X	X				X	X		X	O	O	O		O
DFDAF-310					X	X			X		X		X	O	O	O		O
DFDAF-330					X	X			X		X		X	O	O	O		O
SEDFD-210					X		X			X	X		X	O	O	O		O
SSDFD-210					X		X			X	X		X	O	O	O		O
DFD-310		X				X			X			X	X	O	O			O
DFD-350				X		X			X			X	X	O	O			O
SSDFD-350				X			X		X			X	X	O				O
FD-100	X					X			X		X		X	O	O			O
FD-110		X				X			X		X		X	O	O			O
FD-150				X		X			X		X		X	O	O			O
SSFD-150				X			X		X		X		X	O	O			O
FD-150X series			X			X			X		X		X	O	O			O
OFD-150				X		X			X		X		X	O	O			O
FD-300	X					X			X			X	X	O	O			O
FD-310		X				X			X			X	X	O	O			O
FD-350				X		X			X			X	X	O	O			O
SSFD-350				X			X		X			X	X	O	O			O



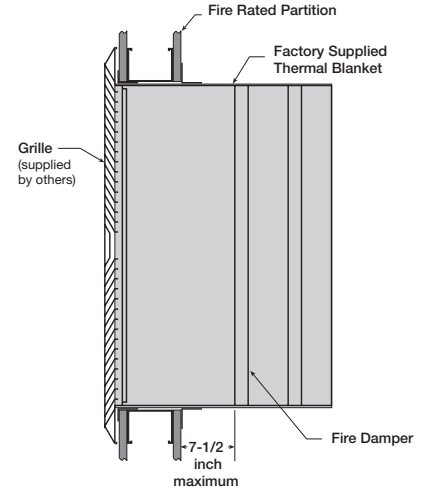
Design and Construction Features

Mounting

Fire dampers are available for mounting either vertically or horizontally (below left and center). Greenheck also offers fire dampers for out-of-the-wall installation (right).



*These dimensions are furnished approximately 1/4 in. (6 mm) undersize. (Add sleeve thickness for overall sleeved damper dimension)



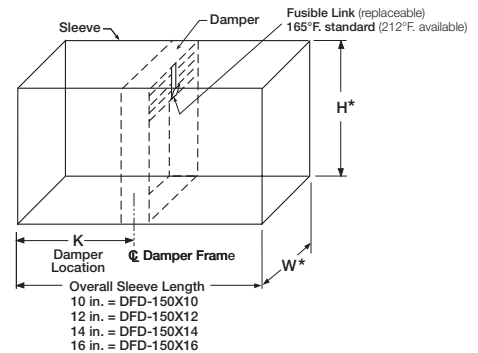
Close Indicator Switch

The close indicator switch sends a signal when the damper blades are closed.

Factory Sleeve Option

Fire dampers are available in factory-furnished sleeves. Sleeves are galvanized steel or stainless steel, depending on the model, and are available in 10 through 20 ga. (3 through 1 mm) thicknesses and lengths up to 48 in. (1219 mm).

The "K" dimension specifies the location of the damper within the sleeve. Horizontal dampers must be installed with the "K" dimension on the top (K-side facing up).

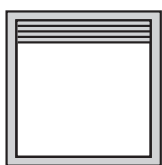


Integral Sleeve (X series)

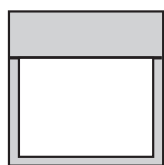
X series dampers in the FD and DFD model lines have the sleeve formed with the fire damper frame as one piece providing the most economical solution for sleeved fire dampers. The frame with integral sleeve is constructed of galvanized steel.

Transitions

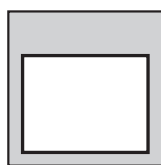
When a rectangular fire damper is being used in conjunction with round, square or oval ductwork, they can be supplied in a factory sleeve with round, square or oval transitions on one or both ends of the sleeve. Dampers should be ordered to the duct dimensions. For medium pressure ductwork, Greenheck can seal the transition and sleeve seams to prevent air leakage.



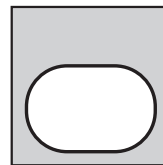
Type A



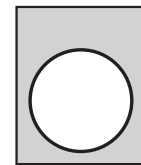
Type B/B2



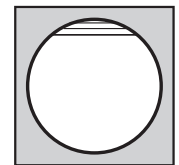
Type C



Type CO



Type CR



Type R

Multiblade Design and Construction Features

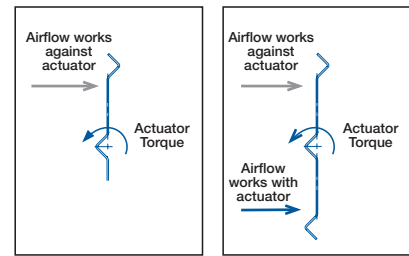
Reinforced Corner Design

Tog-L-Loc®, Greenheck's reinforced corner design, is incorporated into every Greenheck multiblade fire damper frame. It provides higher structural rigidity than many competitors' welded frames. It also prevents white rust that may result from improper welds. This design ensures that every frame has square corners, helping prevent blades from binding on the frame and making damper operation much smoother due to less friction.



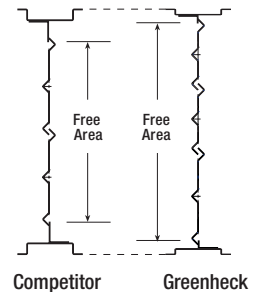
Maximize Free Area and Minimize Pressure Drop

Greenheck's Variable Symmetrical Blade (VSB) design uses a combination of four symmetrical blade sizes – 4, 5, 6 and 7-inch (102, 127, 152 and 178 mm) – to maximize the free area at any given height and minimize pressure drop. The VSB design also allows for consistent operating characteristics regardless of airflow direction. Traditional damper designs utilize only one blade width (usually 6 in. [152 mm]), which reduces manufacturing costs, but compromises the damper's performance capabilities by having cutoff or extended blades and oversized closure strips.



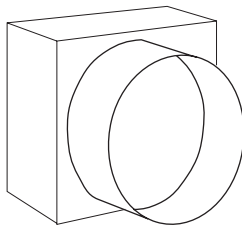
Low Profile Frame

Low profile top and bottom frames, standard on all dampers 17 in. (432 mm) high or less, optimize free area on smaller dampers and reduce pressure loss.

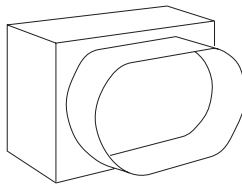


Transitions

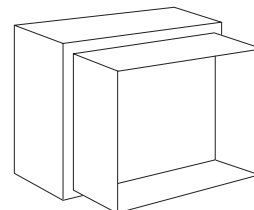
When a rectangular multiblade fire damper is being used in conjunction with round, square or oval ductwork, they can be supplied in a factory sleeve with round, square or oval transitions on one or both ends of the sleeve. Dampers should be ordered to the duct dimensions. For medium pressure ductwork, Greenheck can seal the transition and sleeve seams to prevent air leakage.



Type R



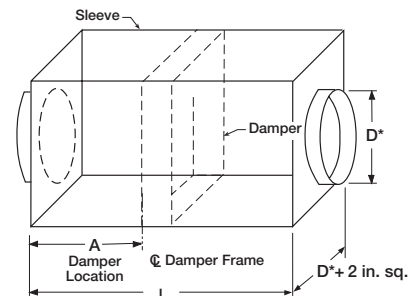
Type O



Type C

Factory Sleeves

Fire dampers are available in factory-furnished sleeves. Sleeves are galvanized steel and are available in 10 through 20 ga. (3 through 1 mm) thicknesses and lengths up to 48 in. (1219 mm).



Static Fire Dampers – Models and Sizes

Model	Mounting Horizontal or Vertical (H or V)	Maximum Single Section Size W x H, in inches (mm)							Maximum Multisection W x H, in inches (mm)*			
		No Transitions or A style	B/B2	C & CO	CR	R			A	B/B2	C & CO	CR
						0 in. offset	1 in. offset	2 in. offset				
FD-100	V	48 x 48 (1219 x 1219)	48 x 40 (1219 x 1016)	---	---	---			---			
FD-110	H or V	48 x 48 (1219 x 1219)	48 x 42 (1219 x 1067)	---	---	---			96 x 48 (2438 x 1219)	96 x 42 (2438 x 1067)	----	----
FD-150	H or V	48 x 48 (1219 x 1219)	48 x 42 (1219 x 1067)	46 x 41 (1168 x 1041)	41 (1041)	30 (762)	47 (1194)	46 (1168)	96 x 48 or 120 x 40 (2438 x 1219 or 3048 x 1016)	96 x 42 or 120 x 35 (2438 x 1067 or 3048 x 889)	94 x 41 or 118 x 34 (2438 x 1041 or 2997 x 864)	41 (1041)
	V	37 x 37 (940 x 940)	37 x 32 (940 x 813)	37 x 31 (940 x 787)	31 (787)	30 (762)	36 (914)	35 (889)	74 x 74 (1880 x 1880)	74 x 69 (1880 x 1753)	72 x 68 (1829 x 1727)	68 (1727)
FD-150X10 FD-150X12 FD-150X14 FD-150X16	H or V	48 x 48 (1219 x 1219)	48 x 42 (1219 x 1067)	46 x 41 (1168 x 1041)	41 (1041)	30 (762)	47 (1194)	46 (1168)	---			
SSFD-150	V	48 x 48 (1219 x 1219)	48 x 42 (1219 x 1067)	46 x 41 (1168 x 1041)	41 (1041)	30 (762)	47 (1194)	46 (1168)	96 x 48 or 120 x 40 (2438 x 1219 or 3048 x 1016)	96 x 42 or 120 x 35 (2438 x 1067 or 3048 x 889)	94 x 41 or 118 x 34 (2438 x 1041 or 2997 x 864)	---
	H	36 x 36 (914 x 914)	36 x 31 (914 x 787)	34 x 30 (864 x 762)	30 (762)	30 (762)	35 (889)	34 (864)	---			
OFD-150	H or V	36 x 36 (914 x 914)	36 x 31 (914 x 787)	---	---	---			---			
FD-300	V	48 x 48 (1219 x 1219)	48 x 40 (1219 x 1016)	---	---	---	---	---	---			
FD-310	V	48 x 48 (1219 x 1219)	48 x 42 (1219 x 1067)	---	---	---	---	---	---			
FD-350	V	48 x 48 (1219 x 1219)	48 x 42 (1219 x 1067)	46 x 41 (1168 x 1041)	41 (1041)	30 (762)	47 (1194)	46 (1168)	---			
	H	40 x 40 (1016 x 1016)	40 x 35 (1016 x 889)	38 x 34 (965 x 864)	34 (864)	30 (762)	39 (991)	38 (965)	80 x 40 (2032 x 1016)	80 x 35 (2032 x 889)	78 x 34 (1981 x 964)	---
SSFD-350	V	48 x 48 (1219 x 1219)	48 x 42 (1219 x 1067)	46 x 41 (1168 x 1041)	41 (1041)	30 (762)	47 (1194)	46 (1168)	---			

*Multisection size

Note: For round fire dampers, see pages 19 and 20.



DFD/FD



DFD/FD X Series

Dynamic Fire Dampers (1½ Hour) – Models and Sizes

Model	Mounting Horizontal or Vertical (H or V)	Maximum			Maximum Size W x H, in inches (mm)														
		Temperature °F/°C	Velocity ft./min. (m/s)	Pressure in. wg (kPa)	No Transitions or A style		B/B2	C & C0	CR	R									
					Single Section	Multisection				0 in. offset	1 in. offset	2 in. offset							
DFD-110	V	165°/74°	2000 (10)	4 (1)	36 x 36 (914 x 914)	72 x 48 (1829 x 1219)	72 x 45 (1829 x 1143)	---	---	---	---	---	---						
			3000 (15.2)		30 x 30 (762 x 762)	---	30 x 26 (762 x 660)												
			4000 (20)		24 x 24 or 18 x 30 (610 x 610 or 457 x 762)	---	24 x 21 or 18 x 26 (610 x 533 or 457 x 660)												
	H	2000 (10)	30 x 30 (762 x 762)	48 x 36 (1219 x 914)	48 x 33 (1219 x 838)														
	V	212°/100°	2000 (10)	24 x 24 (610 x 610)	48 x 36 or 18 x 48 (1219 x 914 or 457 x 1219)	48 x 31 or 18 x 45 (1219 x 787 or 457 x 1143)													
			3000 or 4000 (15.2 or 20)	18 x 30 (457 x 762)	---	18 x 26 (457 x 660)													
			2000 (10)	24 x 24 (610 x 610)	48 x 36 (1219 x 914)	48 x 33 (1219 x 838)													
	V	286°/141°	2000 (10)	24 x 24 (610 x 610)	18 x 48 (457 x 1219)	18 x 45 (457 x 1143)													
			3000 or 4000 (15.2 or 20)	18 x 30 (457 x 762)	---	18 x 26 (457 x 660)													
			2000 (10)	24 x 24 (610 x 610)	---	24 x 21 (610 x 533)													
	DFD-150	V	165°/74°	2000 (10)	4 (1)	36 x 36 (914 x 914)	72 x 48, 60 x 60 or 120 x 30 (1829 x 1219, 1524 x 1524 or 3048 x 762)							72 x 45, 60 x 58 or 120 x 26 (1829 x 1143, 1524 x 1422 or 3048 x 660)	70 x 44, 58 x 55 or 118 x 25 (1778 x 1118, 1473 x 1397 or 2997 x 635)	55 (1397)	30 (762)	59 (1499)	58 (1473)
				3000 (15.2)		30 x 30 (762 x 762)	---							30 x 26 (762 x 660)	28 x 25 (711 x 635)	25 (635)	30 (762)	29 (737)	28 (711)
4000 (20)				24 x 24 or 18 x 30 (610 x 610 or 457 x 762)		---	24 x 21 or 18 x 26 (610 x 533 or 457 x 660)	22 x 20 or 16 x 25 (559 x 508 or 406 x 635)	20 (508)	24 (610)	23 (584)	22 (559)							
H		2000 (10)	30 x 30 (762 x 762)	48 x 36 (1219 x 914)		48 x 33 (1219 x 838)	46 x 32 (1168 x 813)	32 (813)	30 (762)	35 (889)	34 (864)								
V		212°/100°	2000 (10)	24 x 24 or 18 x 30 (610 x 610 or 457 x 762)		48 x 36 or 18 x 60 (1219 x 914 or 457 x 1524)	48 x 31 or 18 x 56 (1219 x 787 or 457 x 1422)	46 x 30 or 16 x 55 (1168 x 762 or 406 x 1397)	30 (762)	30 (762)	35 (889)	34 (864)							
			3000 or 4000 (15.2 or 20)	18 x 30 (457 x 762)		---	18 x 26 (457 x 660)	16 x 25 (406 x 635)	16 (406)	18 (457)	17 (432)	16 (406)							
			2000 (10)	24 x 24 (610 x 610)		48 x 36 (1219 x 914)	48 x 33 (1219 x 838)	46 x 32 (1168 x 813)	32 (813)	30 (762)	35 (889)	34 (864)							
V		286°/141°	2000 (10)	24 x 24 or 18 x 30 (610 x 610 or 457 x 762)		18 x 60 (457 x 1524)	24 x 21 or 18 x 56 (610 x 533 or 457 x 1422)	22 x 20 or 16 x 55 (559 x 508 or 406 x 1397)	20 (508)	24 (610)	23 (584)	22 (559)							
			3000 or 4000 (15.2 or 20)	18 x 30 (457 x 762)		---	18 x 26 (457 x 660)	16 x 25 (406 x 635)	16 (406)	18 (457)	17 (432)	16 (406)							
			2000 (10)	24 x 24 (610 x 610)		---	24 x 21 (610 x 533)	22 x 20 (559 x 508)	20 (508)	24 (610)	23 (584)	22 (559)							

Note: For round fire dampers, see pages 19 and 20.

Dynamic Fire Dampers (1½ Hour) – Models and Sizes

Model	Mounting Horizontal or Vertical (H or V)	Maximum			Maximum Size W x H, in inches (mm)							
		Temperature °F/°C	Velocity ft./min. (m/s)	Pressure in. wg (kPa)	No Transitions or A style		B/B2	C & C0	CR	R		
					Single Section	Multisection				0 in. offset	1 in. offset	2 in. offset
DFD-150X10 DFD-150X12 DFD-150X14 DFD-150X16	V	165°/74°	2000 (10)	4 (1)	36 x 36 (914 x 914)	---	36 x 31 (914 x 787)	34 x 30 (864 x 762)	30 (762)	30 (762)	35 (889)	34 (864)
			3000 (15.2)		30 x 30 (762 x 762)	---	30 x 26 (762 x 660)	28 x 25 (762 x 635)	25 (635)	30 (762)	29 (737)	28 (711)
			4000 (20)		24 x 24 (610 x 610)	---	24 x 21 or 18 x 26 (610 x 533 or 457 x 660)	22 x 20 or 16 x 25 (559 x 508 or 406 x 635)	22 (559)	24 (610)	23 (584)	22 (559)
	H	2000 (10)	2000 (10)	4 (1)	30 x 30 (762 x 762)	---	30 x 26 (762 x 660)	28 x 25 (711 x 635)	25 (635)	30 (762)	29 (737)	28 (711)
	V	212°/100°	2000 (10)	4 (1)	24 x 24 (610 x 610)	---	24 x 21 or 18 x 26 (610 x 533 or 457 x 660)	22 x 20 or 16 x 25 (559 x 508 or 406 x 635)	22 (559)	24 (610)	23 (584)	22 (559)
			3000 or 4000 (15.2 or 20)	18 x 30 (457 x 762)	---	18 x 26 (457 x 660)	16 x 25 (406 x 635)	16 (406)	18 (457)	17 (432)	16 (406)	
	H	2000 (10)	2000 (10)	4 (1)	24 x 24 (610 x 610)	---	24 x 21 (610 x 533)	22 x 20 (559 x 508)	22 (559)	24 (610)	23 (584)	22 (559)
	V	286°/141°	2000 (10)	4 (1)	24 x 24 (610 x 610)	---	24 x 21 or 18 x 26 (610 x 533 or 457 x 660)	22 x 20 or 16 x 25 (559 x 508 or 406 x 635)	22 (559)	24 (610)	23 (584)	22 (559)
			3000 or 4000 (15.2 or 20)	18 x 30 (457 x 762)	---	18 x 26 (457 x 660)	16 x 25 (406 x 635)	16 (406)	18 (457)	17 (432)	16 (406)	
			2000 (10)	24 x 24 (610 x 610)	---	24 x 21 (610 x 533)	22 x 20 (559 x 508)	22 (559)	24 (610)	23 (584)	22 (559)	
	H	2000 (10)	2000 (10)	4 (1)	24 x 24 (610 x 610)	---	24 x 21 (610 x 533)	22 x 20 (559 x 508)	22 (559)	24 (610)	23 (584)	22 (559)
	ODFD-150	V	165°/74°	2000 (10)	4 (1)	36 x 36 (914 x 914)	---	36 x 31 (914 x 787)	---	---	---	---
3000 (15.2)				30 x 30 (762 x 762)		---	30 x 26 (762 x 660)	---	---	---	---	
4000 (20)				24 x 24 or 18 x 30 (610 x 610 or 457 x 762)		---	24 x 21 or 18 x 26 (610 x 533 or 457 x 660)	---	---	---	---	
H		2000 (10)	2000 (10)	4 (1)	30 x 30 (762 x 762)	36 x 36 (914 x 914)	36 x 31 (914 x 787)	---	---	---	---	
V		212°/100°	2000 (10)	4 (1)	24 x 24 or 18 x 30 (610 x 610 or 457 x 762)	36 x 36 (914 x 914)	36 x 31 (914 x 787)	---	---	---	---	
			3000 or 4000 (15.2 or 20)	18 x 30 (457 x 762)	---	18 x 26 (457 x 660)	---	---	---			
H		2000 (10)	2000 (10)	4 (1)	24 x 24 (610 x 610)	36 x 36 (914 x 914)	36 x 31 (914 x 787)	---	---	---	---	
V		286°/141°	2000 (10)	4 (1)	24 x 24 or 18 x 30 (610 x 610 or 457 x 762)	36 x 36 (914 x 914)	36 x 31 (914 x 787)	---	---	---	---	
			3000 or 4000 (15.2 or 20)	18 x 30 (457 x 762)	---	18 x 26 (457 x 660)	---	---	---			
			2000 (10)	24 x 24 (610 x 610)	---	24 x 21 (610 x 533)	---	---	---			
H		2000 (10)	2000 (10)	4 (1)	24 x 24 (610 x 610)	---	24 x 21 (610 x 533)	---	---	---	---	
SSDFD-150		V	Up to 212°/100°	4 (1)	30 x 30 (762 x 762)	---	30 x 26 (762 x 660)	28 x 25 (711 x 635)	25 (635)	30 (762)	29 (737)	28 (711)
	286°/141°		24 x 24 (610 x 610)		---	24 x 21 (610 x 533)	22 x 20 (559 x 508)	20 (508)	24 (610)	23 (584)	22 (559)	

Note: For round fire dampers, see pages 19 and 20.

Dynamic Fire Dampers (3 Hour) – Models and Sizes

Model	Mounting Horizontal or Vertical (H or V)	Maximum			Maximum Size W x H, in inches (mm)														
		Temperature °F/°C	Velocity ft./min. (m/s)	Pressure in. wg (kPa)	No Transitions or A style		B/B2	C & C0	CR	R									
					Single Section	Multisection				0 in. offset	1 in. offset	2 in. offset							
DFD-310	V	165°/74°	2000 (10)	4 (1)	36 x 36 (914 x 914)	48 x 48 (1219 x 1219)	48 x 45 (1219 x 1143)	---	---	---	---	---	---						
			3000 (15.2)	4 (1)	30 x 30 (762 x 762)	---	30 x 26 (762 x 660)												
			4000 (20)	4 (1)	24 x 24 or 18 x 30 (610 x 610 or 457 x 762)	---	24 x 21 or 18 x 26 (610 x 533 or 457 x 660)												
	H	2000 (10)	4 (1)	30 x 30 (762 x 762)	40 x 36 (1016 x 914)	40 x 33 (1016 x 838)													
	V	212°/100°	2000 (10)	4 (1)	24 x 24 (610 x 610)	48 x 36 or 18 x 48 (1219 x 914 or 457 x 1219)	48 x 31 or 18 x 45 (1219 x 787 or 457 x 1143)												
			3000 or 4000 (15.2 or 20)	4 (1)	18 x 30 (457 x 762)	---	18 x 26 (457 x 660)												
	H	2000 (10)	4 (1)	24 x 24 or 18 x 30 (610 x 610 or 457 x 762)	40 x 36 (1016 x 914)	40 x 33 (1016 x 838)													
	V	286°/141°	2000 (10)	4 (1)	24 x 24 (610 x 610)	18 x 48 (457 x 1219)	18 x 45 (457 x 1143)												
			3000 or 4000 (15.2 or 20)	4 (1)	18 x 30 (457 x 762)	---	18 x 26 (457 x 660)												
	H	2000 (10)	4 (1)	24 x 24 (610 x 610)	---	24 x 21 or 18 x 26 (610 x 533 or 457 x 660)													
	DFD-350	V	165°/74°	2000 (10)	4 (1)	36 x 36 (914 x 914)	48 x 48 (1219 x 1219)							48 x 45 (1219 x 1143)	46 x 44 (1168 x 1118)	44 (1118)	30 (762)	47 (1194)	46 (1168)
				3000 (15.2)	4 (1)	30 x 30 (762 x 762)	---							30 x 26 (762 x 660)	28 x 25 (711 x 635)	25 (635)	30 (762)	29 (737)	28 (711)
4000 (20)				4 (1)	24 x 24 or 18 x 30 (610 x 610 or 457 x 762)	---	24 x 21 or 18 x 26 (610 x 533 or 457 x 660)	22 x 20 or 16 x 25 (559 x 508 or 406 x 635)	20 (508)	24 (610)	23 (584)	22 (559)							
H		2000 (10)	4 (1)	30 x 30 (762 x 762)	40 x 36 (1016 x 914)	40 x 33 (1016 x 914)	38 x 32 (965 x 813)	32 (813)	30 (762)	35 (889)	34 (864)								
V		212°/100°	2000 (10)	4 (1)	24 x 24 (610 x 610)	48 x 36 or 18 x 48 (1219 x 914 or 457 x 1219)	48 x 31 or 18 x 45 (1219 x 787 or 457 x 1143)	46 x 30 or 16 x 44 (1168 x 762 or 406 x 1118)	30 (762)	30 (762)	35 (889)	34 (864)							
			3000 or 4000 (15.2 or 20)	4 (1)	18 x 30 (457 x 762)	---	18 x 26 (457 x 660)	16 x 25 (406 x 635)	16 (406)	18 (457)	17 (432)	16 (406)							
H		2000 (10)	4 (1)	30 x 30 (762 x 762)	40 x 36 (1016 x 914)	40 x 33 (1016 x 914)	38 x 32 (965 x 813)	32 (813)	30 (762)	35 (889)	34 (864)								
V		286°/141°	2000 (10)	4 (1)	24 x 24 (610 x 610)	18 x 48 (457 x 1219)	24 x 21 or 18 x 45 (610 x 533 or 457 x 1143)	22 x 20 or 16 x 44 (559 x 508 or 406 x 1118)	20 (508)	24 (610)	23 (584)	22 (559)							
			3000 or 4000 (15.2 or 20)	4 (1)	18 x 30 (457 x 762)	---	18 x 26 (457 x 660)	16 x 25 (406 x 635)	16 (406)	18 (457)	17 (432)	16 (406)							
H		2000 (10)	4 (1)	24 x 24 (610 x 610)	---	24 x 21 (610 x 533)	22 x 20 (559 x 508)	20 (508)	24 (610)	23 (584)	22 (559)								
SSDFD-350		V	up to 212°/100°	2000 (10)	4 (1)	30 x 30 (762 x 762)	---	30 x 26 (762 x 660)	28 x 25 (711 x 635)	25 (635)	30 (762)	29 (737)	28 (711)						
			286°/141°			24 x 24 (610 x 610)	---	24 x 21 (610 x 533)	22 x 20 (559 x 508)	20 (508)	24 (610)	23 (584)	22 (559)						

Note: For round fire dampers, see pages 19 and 20.

Multiblade Dynamic Fire Dampers – Models and Sizes

Model	Mounting Horizontal or Vertical (H or V)	Maximum			Maximum Sizes H or V Installation, in inches (mm)								
		Temperature °F/°C	Velocity ft./min. (m/s)	Pressure in. wg (kPa)	No Transitions		C & O	R					
					Single Section Size	Multisection		0 in. offset	1 in. offset	2 in. offset			
1 ½ Hour	DFD-210	H	2000 (10)	4 (1)	32 x 50 (813 x 1270)	128 x 96 (3251 x 2438)	C: 92 x 82 (2337 x 2083) O: 92 x 80 (2337 x 2032)	30 (762)	83 (2108)	82 (2083)			
											36 x 36 (914 x 914)	---	34 x 34 (864 x 864)
		V			286°/141°	32 x 50 (813 x 1270)	128 x 100 (3251 x 2540)	C: 92 x 82 (2337 x 2083) O: 92 x 80 (2337 x 2032)	30 (762)	83 (2108)	82 (2083)		
												36 x 36 (914 x 914)	---
		H or V			Up to 212°/100°	32 x 50 (813 x 1270)	64 x 50 (1626 x 1270)	62 x 48 (1575 x 1219)	30 (762)	49 (1245)	48 (1219)		
												36 x 36 (914 x 914)	---
	H or V	Up to 350°/177°	4000 (20)	10 (2.5)	32 x 50 (813 x 1270)	---	30 x 48 (762 x 1219)	30 (762)	31 (787)	30 (762)			
											36 x 36 (914 x 914)	---	34 x 34 (864 x 864)
	SEDFD-210	H or V	Up to 350°/177°	2000 (10)	4 (1)	24 x 30 (610 x 762)	48 x 30 (1219 x 762)	46 x 28 (1168 x 711)	30 (762)	29 (737)	28 (711)		
	DFDAF-310	H	Up to 350°/177°	2000 (10)	4 (1)	32 x 50 (813 x 1219)	144 x 96 (3658 x 2438)	C: 92 x 82 (2337 x 2083) O: 92 x 80 (2337 x 2032)	30 (762)	83 (2108)	82 (2083)		
V												286°/141°	32 x 50 (813 x 1219)
		H or V	Up to 350°/177°			4000 (20)	8 (2)	32 x 50 (813 x 1219)	---	30 x 48 (762 x 1219)	30 (762)		
32 x 50 (813 x 1219)												96 x 50 (2438 x 1219)	92 x 48 (2337 x 1219)
3 Hour	DFDAF-330	V	2000 (10)	4 (1)	32 x 36 or 30 x 48 (813 x 914 or 762 x 1219)	120 x 96 (3048 x 2438)	C: 92 x 82 (2337 x 2083) O: 92 x 80 (2337 x 2032)	30 (762)	83 (2108)	82 (2083)			
											H	286°/141°	30 x 48 (762 x 1219)
		H or V			Up to 350°/177°	4000 (20)	8 (2)	30 x 48 (762 x 1219)	---	28 x 46 (711 x 1168)			
											32 x 36 or 30 x 48 (813 x 914 or 762 x 1219)	32 x 48 (813 x 1219)	30 x 46 (762 x 1219)
	H	Up to 350°/177°			4000 (20)	8 (2)	30 x 48 (762 x 1219)	32 x 48 (813 x 1219)	30 x 46 (762 x 1168)	30 (762)	31 (787)	30 (762)	
													30 x 48 (762 x 1219)
H or V	Up to 350°/177°	4000 (20)	8 (2)	30 x 48 (762 x 1219)	---	28 x 46 (711 x 1168)	30 (762)	29 (737)	28 (711)				

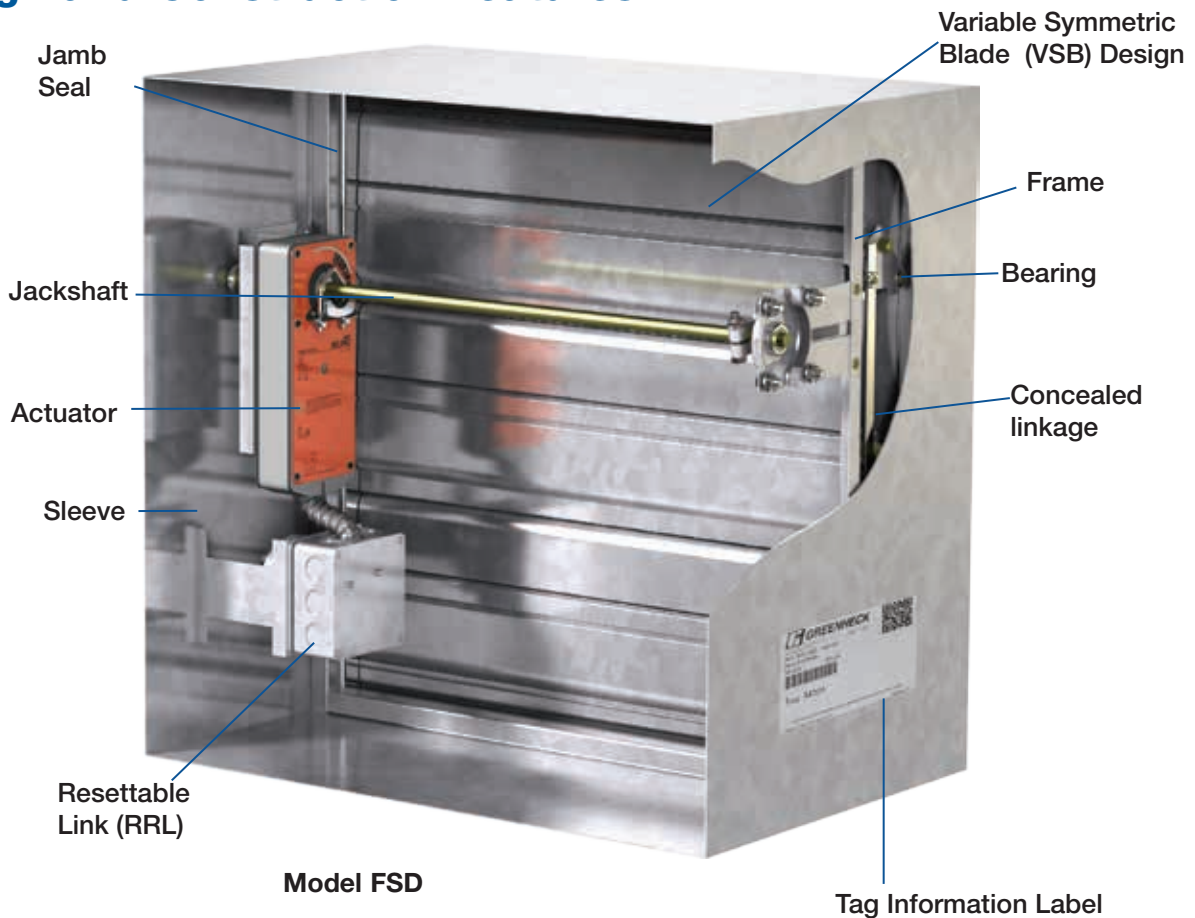
Note: For round fire dampers, see pages 19 and 20.

Quick Reference Guide

	Frame					Blade Profile		Leakage Class			Fire Rating			Closure Temperature					Closure Device			Accessories								
	5 x 1 in. x 16 ga. Galvanized Steel Hat Channel	304 Stainless Steel	316 Stainless Steel	Aluminum	8 x 2 in. x 12 ga. Galvanized Steel Hat Channel	3V	Steel Airfoil	Aluminum Airfoil	Class I	Class II	Class III	1 Hour	1½ Hour	3 Hour	165°F (74°C)	212°F (100°C)	250°F (121°C)	286°F (141°C)	350°F (177°C)	Fusible Link	1 Reusable Resettable Link (RRL)	2 Temperature Limited Override (TOR)	3 Pneumatic Relief Valve (PRV)	Retaining Angles	Smoke Detector	Momentary Switches	Open or Close Indicator (OCI)	Transformer	Greenheck Test Switch (GTS)	
CFSD-211	X					X		X			X			X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
CFSD-212	X					X			X		X			X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
FSD-211	X					X		X				X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
FSD-212	X					X			X			X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
FSD-213	X					X				X		X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
SEFSD-211			X			X		X				X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
SSFSD-211		X				X		X				X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
FSD-311	X						X	X				X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
FSD-312	X						X		X			X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
FSD-311M	X						X	X				X		X	O	O				X	O		O	O	O	O	O	O	O	O
FSD-312M	X						X		X			X		X	O	O				X	O		O	O	O	O	O	O	O	O
FSD-311V	X						X	X				X		X	O	O		O		X	O	O	O	O	O	O	O	O	O	O
FSD-331	X						X	X					X	X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
GFSD-211	X					X		X				X		X	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O	O
GFSD-212	X					X			X			X		X	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O	O
OFSD-211	X					X		X				X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
OFSD-212	X					X			X			X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
OFSD-311	X						X	X				X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
OFSD-312	X						X		X			X		X	O	O	O	O	O	O	X	O	O	O	O	O	O	O	O	O
SMD-201	X					X		X																O	O	O	O	O	O	O
SMD-201M	X					X		X																O	O	O	O	O	O	O
SMD-202	X					X			X															O	O	O	O	O	O	O
SMD-203	X					X				X														O	O	O	O	O	O	O
SSSMD-201		X				X		X																O	O	O	O	O	O	O
SESMD-201			X			X		X																O	O	O	O	O	O	O
SMD-301	X						X	X																O	O	O	O	O	O	O
SMD-301M	X						X	X																O	O	O	O	O	O	O
SMD-301V	X						X	X																O	O	O	O	O	O	O
SMD-302	X						X		X															O	O	O	O	O	O	O
SMD-302M	X						X		X															O	O	O	O	O	O	O
SMD-401	X							X	X															O	O	O	O	O	O	O
SMD-401EF				X				X	X															O	O	O	O	O	O	O
SMD-401M	X							X	X															O	O	O	O	O	O	O
HSD-401					X		X	X																O	O	O	O	O	O	O

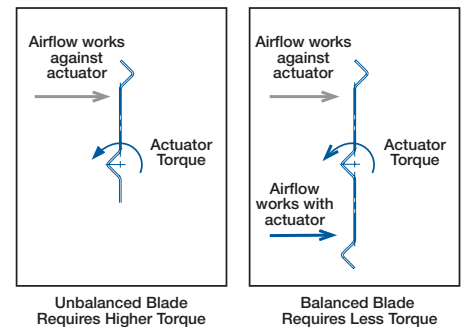
¹ Available with or without Open or Closed Indicator; EP switch required if pneumatic actuator is used.
² Includes Open or Closed Indicator; EP switch required if pneumatic actuator used.
³ For use with pneumatic actuators.

Design and Construction Features



Maximize Free Area and Minimize Pressure Drop

Greenheck's Variable Symmetrical Blade (VSB) design uses a combination of four symmetrical blade sizes – 4, 5, 6 and 7 inch (102, 127, 152 and 178 mm) – to maximize the free area at any given height and minimize pressure drop. The VSB design also allows for consistent operating characteristics regardless of airflow direction. Traditional damper designs utilize only one blade width (usually 6 in. [152 mm]), which compromises the damper's performance capabilities by having cutoff or extended blades and oversized closure strips.

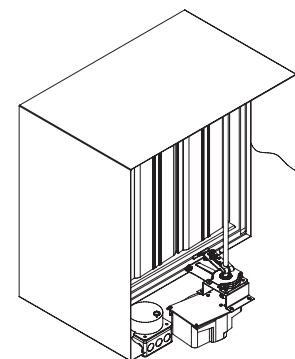


No Top or Bottom

Jobsites are full of restricted space envelopes that are difficult to account for when planning for damper installations. However, Greenheck's combination fire smoke and smoke dampers are qualified for installation in any position with the blades horizontal. The damper can be turned over so the actuator is on the other side. In essence, the damper does not have a top or bottom.

Vertical Blade

Vertical blade dampers (shown) allow the installer to mount the actuator externally on the top or bottom of the damper when obstructions prevent installation with the actuator mounted on the sides. The FSD-311V has a Class I leakage rating and 350°F (177°C) temperature rating.

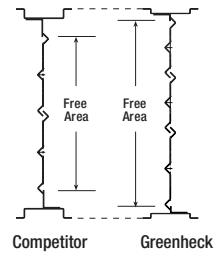


Model FSD-311V

Design and Construction Features

Low Profile Frame

Low profile top and bottom frames, standard on all dampers 17 inches (432 mm) high or less, optimize free area on smaller dampers and reduce pressure loss.



Reinforced Corner Design

The Tog-L-Loc® design, Greenheck's reinforced corner, is incorporated into every Greenheck combination fire smoke damper frame. It provides higher structural rigidity than many competitors' welded frames. It also prevents rust that may result from improper welds. The design ensures that every frame has square corners, helping prevent blades from binding on the jamb seals and making damper operation much smoother with less friction.



Actuator Mounting Options

Factory-Mounted External

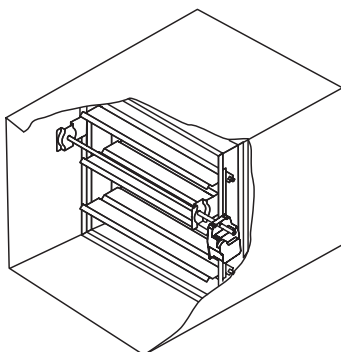
As all combination fire smoke dampers require a sleeve for proper installation, the most practical choice is for the damper to be furnished by the factory complete with a sleeve and the actuator installed on the outside of the sleeve. This is standard and the recommended actuator mounting option for combination fire smoke dampers.

Factory-Mounted Internal

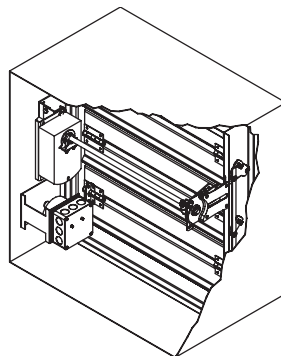
Most actuators can be mounted internally (in the airstream) to accommodate those installations where space constraints prevent the more desirable external installation. There are limitations on small sizes due to available internal space.

Sideplate

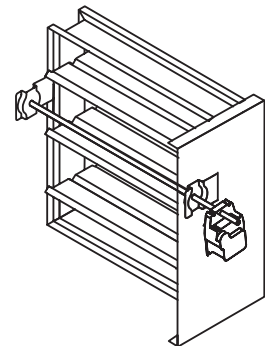
Smoke dampers may be installed with sleeves or sideplates. In lieu of sleeves, external factory installation of the actuator can still be accomplished with a sideplate (usually the full height of the damper as illustrated). These dampers are installed in a slotted duct section with the sideplate covering the slot in the side of the duct. Full height sideplates may not be practical on larger smoke dampers (particularly multisection assemblies).



Damper mounted in sleeve with actuator externally mounted



Damper mounted in sleeve with actuator internally mounted

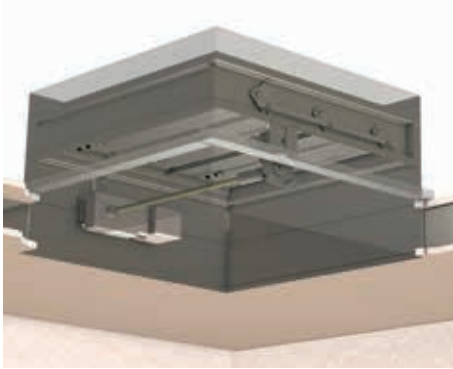


Damper with sideplate actuator externally mounted

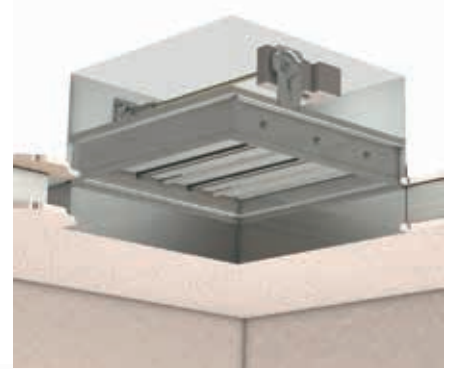
Design and Construction Features

Corridor Ceiling Qualified

Greenheck offers corridor ceiling rated combination fire smoke dampers that are available in three different installation configurations. Configurations #1 and #2 apply when the fire rated ceiling is also the finished ceiling and the damper is installed behind a grille, register, or diffuser. Configuration #3 applies when the fire rated ceiling is above the finished ceiling.



Configuration #1



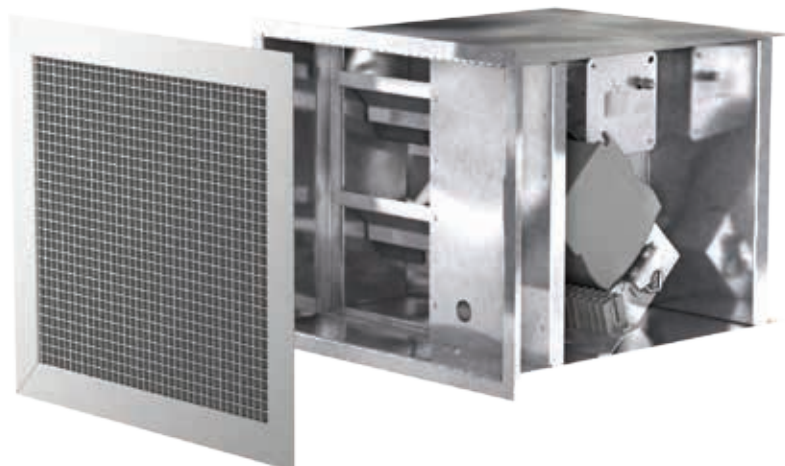
Configuration #2



Configuration #3

Grille Access Dampers

Greenheck offers an out-of-wall combination fire smoke damper, GFSD series, designed for easy access through the grille to the damper, closure device and the actuator. A separate compartment houses the actuator allowing for installations with limited depth.



Actuator Checklist

A variety of electric and pneumatic actuators are available for all damper models. Each actuator-damper combination is UL Classified to operate up to specific maximum velocities and pressures, with ratings as high as 4000 ft/min. (20 m/s) and 8 in. wg (2 kPa). Actuators can be mounted internally or externally.

Under UL 555 and UL 555S testing, the damper and its installed actuator must be tested as an assembly. Actuators must be furnished factory-installed by the damper manufacturer. Modulating actuators are available for variable volume applications.

Electric Actuator Checklist

(See Figures 1 and 2)

Power Supply

- 24, 120, or 240 VAC
- Frequency in Hz

Operation

- Two position (damper position is open or close)
- Modulating (damper position determined by modulating control signal)

Fail Direction

- Open or close

Location

- Internal or external

Control Signal (for modulating only)

- 0/2-10 VDC, 4-20 mA

NEMA Enclosure

- 1 or 7 (specify one for specific application)

Accessories

- Auxiliary switches (end switches built into actuator)
- Transformer

Pneumatic Actuator Checklist

(See Figure 3)

Air Pressure

- 20 or 25 psi

Operation

- Two position (damper position is open or close)
- Modulating (damper position determined by modulating pressure signal)

Fail Direction

- Open or close

Location

- Internal or external

Control Signal (for modulating only)

- Control pressure start point and operating span are field adjustable

Accessories

- Solenoid valve
- Positioners



Figure 1



Figure 2



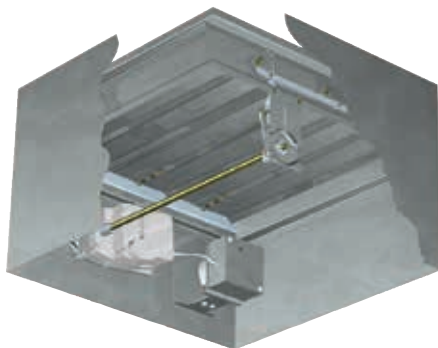
Figure 3

Greenheck offers a wide variety of electric actuators for installation as an external or internal mount.

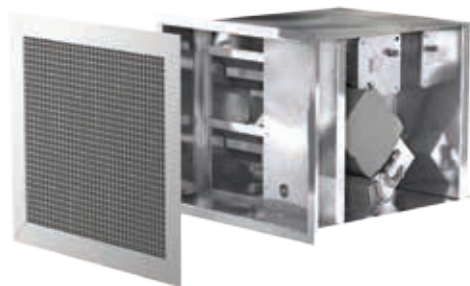
Greenheck also offers several pneumatic actuator options.

Combination Fire Smoke & Smoke Dampers - Models and Sizes

Model	Leakage Class	Size Limitations - W x H, in inches (mm)						Maximum			
		Single Section				Multisection		Temperature Ratings °F/°C	Velocity ft/min. (m/s)	Pressure in. wg (kPa)	
		Horizontal		Vertical		Horizontal	Vertical				
		Minimum	Maximum	Minimum	Maximum	Maximum					
FIRE SMOKE DAMPERS											
1 1/2 Hour	FSD-211 FSD-212 FSD-213	I II III	8 x 6 (203 x 152)	32 x 50 or 36 x 48 (813 x 1270 or 914 x 1219)	8 x 6 (203 x 152)	32 x 50 or 36 x 48 (813 x 1270 or 914 x 1219)	144 x 96 (3658 x 2438)	128 x 100 (3251 x 2540)	350°/177°	2000 (10.2)	4 (1)
		36 x 48 (914 x 1219)		36 x 48 (914 x 1219)		144 x 48 (3658 x 1219)	128 x 48 (3251 x 1219)	6 (1.5)			
	FSD-211M	I	8 x 6 (203 x 152)	36 x 36 (914 x 914)	8 x 6 (203 x 152)	36 x 36 (914 x 914)	36 x 72 (914 x 1829)	36 x 72 (914 x 1829)	250°/121°	2000 (10.2)	4 (1)
	SSFSD-211 SEFSD-211	I	8 x 6 (203 x 152)	24 x 30 (610 x 762)	8 x 6 (203 x 152)	24 x 30 or 22 x 36 (610 x 762 or 559 x 914)	48 x 30 (1219 x 762)	88 x 72 (2235 x 1829)	350°/177°	2000 (10.2)	4 (1)
		24 x 30 (610 x 762)				48 x 30 (1219 x 762)	88 x 48 (2235 x 1219)	6 (1.5)			
	GFSD-211 GFSD-212	I II	14 x 12 (356 x 305)	42 x 48 (1067 x 1219)	14 x 12 (356 x 305)	42 x 48 (1067 x 1219)	48 x 48 (1219 x 1219)	48 x 48 (1219 x 1219)	350°/177°	2000 (10.2)	4 (1)
	FSD-311 FSD-312	I II	8 x 6 (203 x 152)	32 x 50 (813 x 1270)	8 x 6 (203 x 152)	32 x 50 (813 x 1270)	144 x 96 (3658 x 2438)	128 x 100 (3251 x 2540)	350°/177°	2000 (10.2)	8 (2)
							128 x 96 (3251 x 2438)	128 x 100 (3251 x 2540)	350°/177°	3000 (15.2)	8 (2)
							128 x 96 (3251 x 2438)	128 x 50 (3251 x 1270)	350°/177°	4000 (20.3)	4 (1)
	FSD-311M FSD-312M	I II	8 x 6 (203 x 152)	32 x 50 (813 x 1270)	8 x 6 (203 x 152)	32 x 50 (813 x 1270)	128 x 96 (3251 x 2438)	128 x 100 (3251 x 2540)	250°/121°	2000 (10.2)	4 (1)
	FSD-311V	I	--	--	6 x 8 (152 x 203)	50 x 32 (1270 x 813)	--	100 x 32 (2540 x 813)	350°/177°	2000 (10.2)	4 (1)
			--	--	6 x 8 (152 x 203)	50 x 32 (1270 x 813)	--	--	350°/177°	4000 (20.3)	4 (1)
	CFSD-211 CFSD-212	I II	8 x 6 (203 x 152)	24 x 24 (610 x 610)	8 x 6 (203 x 152)	24 x 24 (610 x 610)	--		350°/177°	2000 (10.2)	6 (1.5)
	OFSD-211 OFSD-212	I II	12 x 12 (305 x 305)	36 x 36 (914 x 914)	12 x 12 (305 x 305)	36 x 36 (914 x 914)	--		350°/177°	2000 (10.2)	6 (1.5)
OFSD-311 OFSD-312	I II	12 x 12 (305 x 305)	32 x 30 (813 x 762)	12 x 12 (305 x 305)	32 x 30 (813 x 762)	36 x 36 (914 x 914)	36 x 36 (914 x 914)	350°/177°	4000 (20.3)	4 (1)	
FSD-331	I	--	--	8 x 6 (203 x 152)	32 x 36 or 30 x 48 (813 x 914 or 762 x 1219)	144 x 96 (3658 x 2438)	120 x 96 (3048 x 2438)	350°/177°	3000 (15.2)	8 (2)	
						120 x 96 (3048 x 2438)	120 x 96 (3048 x 2438)	350°/177°	4000 (20.3)	4 (1)	



CFSD Series



GFSD Series



OFSD Series

Smoke Dampers - Models and Sizes

Model	Leakage Class	Size Limitations - W x H, in inches (mm)						Maximum		
		Single Section				Multisection		Temperature Ratings °F / °C	Velocity ft./min. (m/s)	Pressure in. wg (kPa)
		Horizontal		Vertical		Horizontal	Vertical			
		Minimum	Maximum	Minimum	Maximum	Maximum				
SMOKE DAMPERS										
SMD-201 SMD-202 SMD-203	I II III	8 x 6 (203 x 152)	32 x 50 or 36 x 48 (813 x 1270 or 914 x 1219)	8 x 6 (203 x 152)	32 x 50 or 36 x 48 (813 x 1270 or 914 x 1219)	144 x 100 or 288 x 50 (3658 x 2540 or 7315 x 1270)	144 x 100 or 288 x 50 (3658 x 2540 or 7315 x 1270)	350°/177°	2000 (10.2)	4 (1)
	36 x 48 (914 x 1219)		36 x 48 (914 x 1219)		144 x 48 (3658 x 1219)	144 x 48 (3658 x 1219)	6 (1.5)			
SMD-201M	I	8 x 6 (203 x 152)	36 x 36 (914 x 914)	8 x 6 (203 x 152)	36 x 36 (914 x 914)	36 x 72 (914 x 1829)	36 x 72 (914 x 1829)	250°/121°	2000 (10.2)	4 (1)
SESMD-201 SSSMD-201	I	8 x 6 (203 x 152)	24 X 30 (610 x 762)	8 x 6 (203 x 152)	24 x 30 (610 x 762)	88 x 72 (2235 x 1829)	88 x 72 (2235 x 1829)	350°/177°	2000 (10.2)	4 (1)
	88 x 48 (2235 x 1219)					88 x 48 (2235 x 1219)	6 (1.5)			
SMD-301 SMD-302	I II	8 x 6 (203 X 152)	32 x 50 (813 x 1270)	8 x 6 (203 x 152)	32 x 50 (813 x 1270)	192 x 100 (4877 x 2540)	192 x 100 (3251 x 2540)	350°/177°	2000 (10.2)	4 (1)
	192 x 72 or 128 x 100 (4877 x 1270 or 3251 x 2540)					192 x 72 or 128 x 100 (4877 x 1270 or 3251 x 2540)	8 (2)			
	192 x 72 or 128 x 100 (4877 x 1270 or 3251 x 2540)					192 x 72 or 128 x 100 (4877 x 1270 or 3251 x 2540)	8 (2)			
	192 x 50 (4877 x 1270)					192 x 50 (4877 x 1270)	4 (1)			
SMD-301M SMD-302M	I II	8 x 6 (203 x 152)	32 x 50 (813 x 1270)	8 x 6 (203 x 152)	32 x 50 (813 x 1270)	128 x 100 (3251 x 2540)	128 x 100 (3251 x 2540)	250°/121°	2000 (10.2)	4 (1)
SMD-301V	I	--	--	6 x 8 (152 x 203)	50 x 32 (1270 x 813)	--	100 x 32 (2540 x 813)	350°/177°	2000 (10.2)	4 (1)
						--	--			4000 (20.3)
SMD-401	I	8 x 8 (203 x 203)	48 x 60 (1219 x 1524)	8 x 8 (203 x 203)	48 x 60 (1219 x 1524)	192 x 120 (4877 x 3048)	192 x 120 (4877 x 3048)	250°/121°	2000 (10.2)	4 (1)
	48 x 36 (1219 x 914)		48 x 36 (1219 x 914)		192 x 72 (4877 x 1829)	192 x 72 (4877 x 1829)	6 (1.5)			
SMD-401EF	I	8 x 6 (203 x 152)	48 x 48 (1219 x 1219)	8 x 6 (203 x 152)	48 x 48 (1219 x 1219)	192 x 120 (4877 x 3048)	192 x 120 (4877 x 3048)	250°/121°	2000 (10.2)	4 (1)
	36 x 48 (914 x 1219)		36 x 48 (914 x 1219)		144 x 96 (3658 x 2438)	144 x 96 (3658 x 2438)	6 (1.5)			
SMD-401M	I	8 x 8 (203 x 203)	36 x 36 (914 x 914)	8 x 8 (203 x 203)	36 x 36 (914 x 914)	36 x 72 (914 x 1829)	36 x 72 (914 x 1829)	250°/121°	2000 (10.2)	4 (1)
HSD-401	I	6 x 6¼ (152 x 159)	60 x 60 (1524 x 1524)	6 x 6¼ (152 x 159)	60 x 60 (1524 x 1524)	240 x 120 (6096 x 3048)	240 x 120 (6096 x 3048)	250°/121°	3000 (15.2)	6 (1.5)



SMD-201



SMD-301V



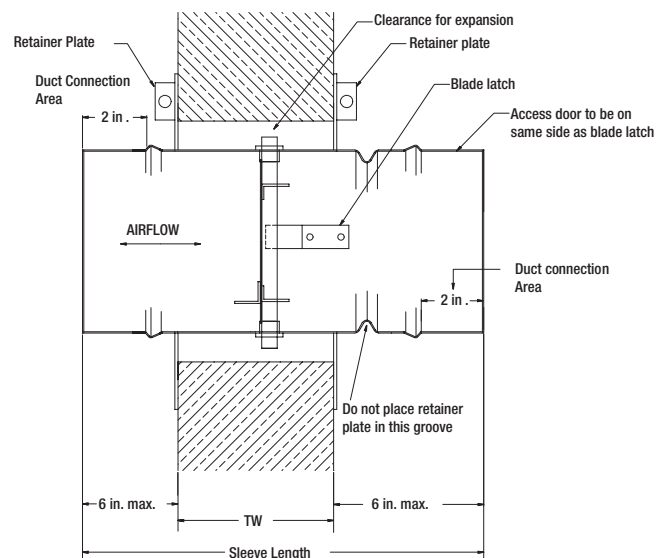
HSD-401

Quick Reference Guide

	Type			Material			UL 555 Fire Rating	UL 555S Leakage Class		Closure Device				Closure Temperature				Accessories						
	Fire	Smoke	Combination Fire Smoke	Galvanized Steel	304 Stainless Steel	316 Stainless Steel	1½ Hour	Class I	Class II	Fusible Link	RRL	RRL/OCI	TOR	PRV	165°F (74°C)	212°F (100°C)	286°F (141°C)	350°F (177°C)	Retaining Plates	Momentary Test Switch	Transformer	Greenheck Test Switch (GTS)	Smoke Detector	Open Close Indicator (OCI)
DFDR-510	X			X			X			X					X	O	O		O				O	
FDR-510	X			X			X			X					X	O	O		O				O	
FSDR-511			X	X			X	X		X	O	O	O	O	X	O		O	O	O	O	O	O	O
FSDR-512			X	X			X		X	X	O	O	O	O	X	O		O	O	O	O	O	O	O
SEFSDR-511			X			X	X	X		X	O	O	O	O	X	O		O	O	O	O	O	O	O
SESMDR-501		X				X		X													O	O	O	O
SMDR-501		X		X				X													O	O	O	O
SMDR-502		X		X					X												O	O	O	O
SSDFDR-510	X				X		X			X					X	O	O		O				O	
SSFDR-510	X				X		X			X					X	O	O		O				O	
SSFSDR-511			X		X		X	X		X	O	O	O	O	X	O		O	O	O	O	O	O	O
SSFSDR-512			X		X		X		X	X	O	O	O	O	X	O		O	O	O	O	O	O	O
SSSMDR-501		X			X			X													O	O	O	O

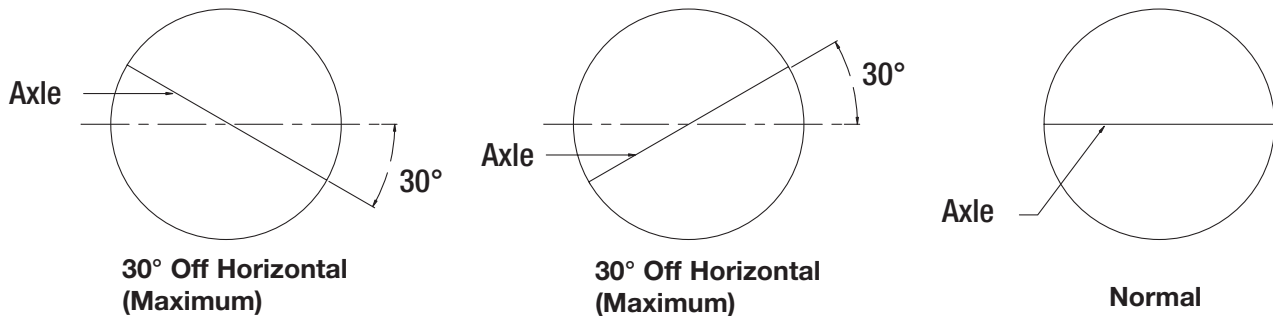
Mounting

Round fire, smoke and combination fire smoke dampers are available for mounting either vertically or horizontally. Only one retainer plate is required for mounting of damper. Dampers are supplied with sleeves from the factory and can be installed without the need for additional field installed sleeves.



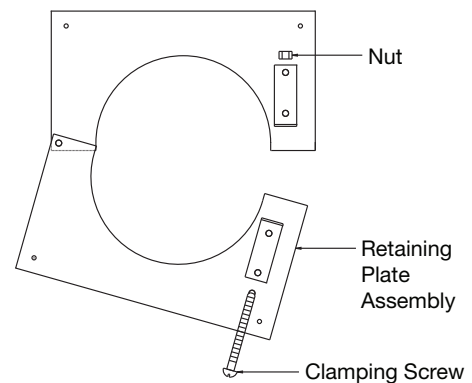
Design and Construction Features

Blade Orientation



Retaining Plates

Square one-piece retaining plates easily wrap around the sleeve of the damper and tighten with the clamping screw for simplified installation. They are designed to mount flush to the wall/floor and hold the damper in the opening. One retaining plate is provided standard with the damper. A second optional plate is available for two-sided plate installations.



Round UL Dampers - Models and Sizes

Model	Type	Mounting Horizontal or Vertical (H or V)	Maximum			
			Temperature °F/°C	Diameter in. (mm)	Velocity ft./min. (m/s)	Pressure in. wg (kPa)
FDR-510	Static Fire	H or V	-	24 (610)	-	-
SSFDR-510	Static Fire	H or V	-	24 (610)	-	-
DFDR-510	Dynamic Fire	H or V	286°/141°	24 (610)	2000 (10.2)	4 (1)
SSDFDR-510	Dynamic Fire	H or V	286°/141°	24 (610)	2000 (10.2)	4 (1)
FSDR-511, 512	Fire Smoke	H or V	350°/177°	24 (610)	3000 (15.2)	4 (1)
SSFSDR-511, 512	Fire Smoke	H or V	350°/177°	24 (610)	3000 (15.2)	4 (1)
SEFSDR-511	Fire Smoke	H or V	350°/177°	24 (610)	3000 (15.2)	4 (1)
SMDR-501, 502	Smoke	H or V	350°/177°	24 (610)	3000 (15.2)	4 (1)
SESMDR-501	Smoke	H or V	350°/177°	24 (610)	3000 (15.2)	4 (1)
SSSMDR-501	Smoke	H or V	350°/177°	24 (610)	3000 (15.2)	4 (1)

Design and Construction Features

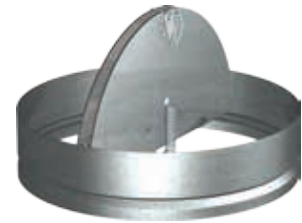
Greenheck's CRD models have been tested and labeled for protection of ceiling openings in fire rated floor/ceiling assemblies with fire resistance ratings of three hours or less. They can also be applied to steel lay-in style ceiling diffusers up to 24 x 24 in. (610 x 610 mm) maximum size when installed with an approved thermal blanket.



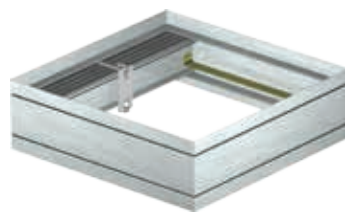
CRD-1 butterfly



CRD-1LP low profile butterfly



CRD-2 round butterfly



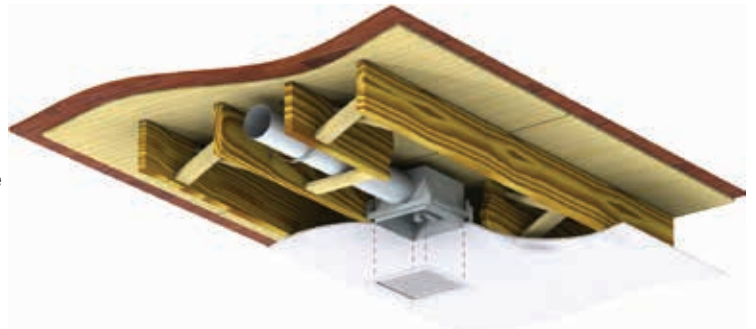
CRD-60 curtain blade style



CRD-60 curtain blade style
with skirt

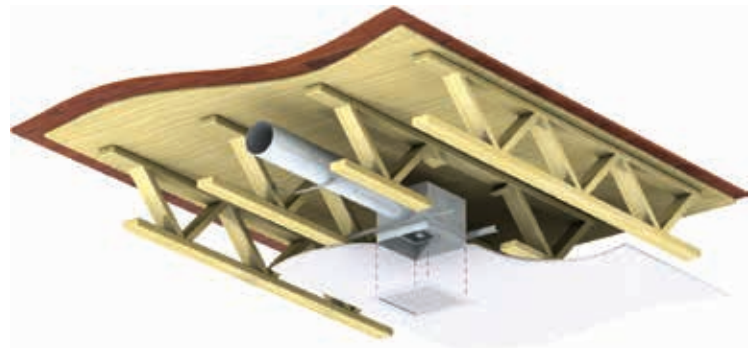
Wood Joist Application

The CRD-1WJ is a UL 555C Classified ceiling radiation damper for installation in wood joist floor/ceiling and roof/ceiling assemblies and approved for use in 17 ceiling designs as detailed in the UL Fire Resistance Directory. The CRD-1WJ provides the ceiling radiation damper installed in an insulated steel enclosure with C, O or R inlet shapes for duct connections. The damper is positioned in the enclosure to accommodate 1½ in. (38 mm) grille depth.



Wood Truss Application

The CRD-1WT is a UL 555C Classified ceiling radiation damper for installation in wood truss floor/ceiling and roof/ceiling assemblies and approved for two ceiling designs. The standard design includes a flange attached around the perimeter of the damper. The CRD-1WT is positioned either flush with the ceiling or above the ceiling to accommodate a 2 in. (51 mm) grille depth.



Design & Construction Features

Low Leakage Ceiling Radiation Damper

The CRD-501 is a round ceiling radiation damper with a Class I Smoke Leakage Rating. It is UL Classified as a ceiling radiation (UL 555C) and as a smoke damper (UL 555S). As a UL 555C ceiling radiation, it is used in floor/ceiling and roof/ceiling assemblies to maintain the fire resistance integrity of the assembly during fire exposure. As a UL 555S smoke damper, Model CRD-501 is a Class I smoke leakage rated damper designed to control the spread of smoke.



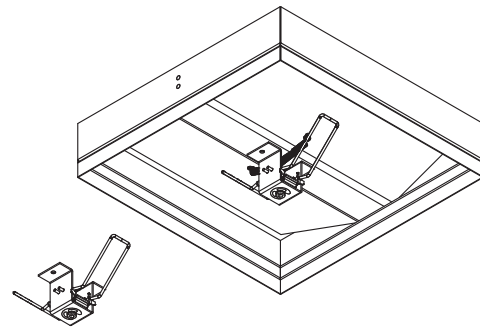
CRD-501

Options

Volume Controller - A volume controller gives you the ability to regulate airflow thru the damper by manually setting the blades to a given angle. Adjusting the screw will open or close the blades.

Frame Extensions - Top, bottom or top/bottom frame extensions are available on CRD-1, CRD-1LP and CRD-2.

Thermal Blankets - Greenheck offers two different types of thermal blankets with ceiling radiation dampers to be used as batt and blanket material. QB-24 is a refractory thermal blanket consisting of a non-asbestos high temperature ceramic fiber blanket quilted between two layers of fiberglass cloth. TB-24 is a non-asbestos mineral wool thermal blanket.



Volume Controller



Ceiling Radiation Dampers - Models and Sizes

Type	Butterfly Style				Curtain Style		Round	
Model	CRD-1	CRD-1LP Low Profile	CRD-1WJ	CRD-1WT	CRD-60	CRD-60X	CRD-2	CRD-501
Minimum Size in. (mm)	4 x 6 (102 x 152)	4 x 12 (102 x 305)	4 x 6 (102 x 152)	4 x 6 (102 x 152)	6 x 4 (152 x 102)	6 x 4 (152 x 102)	5 (127)	6 (152)
Maximum Size in. (mm)	24 x 24 (610 x 610)	24 x 24 (610 x 610)	16 x 12 (406 x 305)	21 x 18 (533 x 457)	24 x 24 (610 x 610)	24 x 24 (610 x 610)	24 (610)	12 (305)

Installation & Convenience Features

Helpful Installation Decals

Greenheck dampers feature decals highlighting damper areas that are important to an accurate installation. Our decals point out critical damper areas and include messages to make installation hassle-free. We are the only damper manufacturer to offer these simple, yet very helpful tips, right on the damper.



Installation Booklets

Greenheck includes installation booklets in every shipment of dampers. These booklets include installation guidelines such as field-supplied sleeves, single side retaining angles, and much more to help with your installation needs.



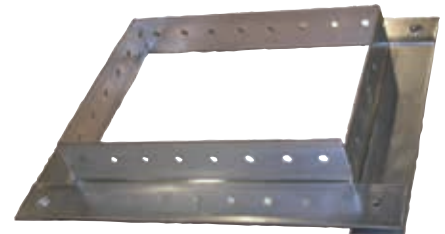
Tag Label

Greenheck labels—on all dampers—include the tag information for your order. This label provides the damper model, size, actuator model, and purchase order number. This label will help save time in the field when you have multiple locations for dampers on the jobsite. On combination fire smoke, smoke and fire dampers, you will see a QR code on the label too. When you scan the QR code with your smartphone, you will be directed to www.greenheck.com for model specific information.

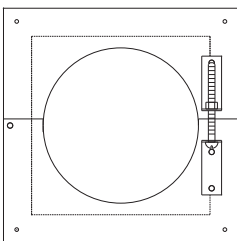


One Piece Retaining Angles

Greenheck’s one piece retaining angle, the POC (literally named for being a “Piece of Cake”) makes combination fire smoke damper installation a breeze. The POC simply wraps around the sleeve of the damper, connections are made as described in our installation instructions, and that’s it! Simple! Like their rectangular counterparts, round one-piece retaining plates easily wrap around the sleeve of the damper and tighten with the clamping screw for simplified installation.



Single Side Retaining Angles and Plates



Retaining Plate

Rectangular dampers and sleeve assemblies are qualified for installations with retaining angles on **one side** of the partition only. Round dampers and sleeve assemblies may be installed with retaining plates on **one side** only. Damper assemblies exceeding these maximum sizes must be secured with retaining angles or plates on **both sides** of the partition.

A 3-side retaining angle is qualified in applications where the damper rests directly on the base of the wall opening (example: underfloor application). A retaining angle is not required on the bottom side of the damper.

Maximum Qualified Damper Size for Single Side and 3-side* Retaining Angle (Width x Height)		
Mounting	Inches	Millimeters
Vertical*	80 x 50	2032 x 1270
	50 x 80	1270 x 2032
	40 x 100	1016 x 2540
Horizontal	144 x 96	3658 x 2438
Round Fire and Fire Smoke	24 diameter	610 diameter

Installation and Convenience Features

Tight Space Constraints – Use Firestop

Where standard retaining angle installations will not work, Greenheck has a UL approved firestop and retaining clip installation, which allows contractors to meet UL requirements where space limits capabilities.

Firestop and Retaining Clip Installation Maximum Damper Size (Width x Height)	
Inches	Millimeters
72 x 96	1829 x 2438



Options and Accessories

Testing Devices

Greenheck Test Switch (GTS) - Greenheck test switches are used in dynamic smoke management systems containing combination fire smoke dampers and smoke dampers. These switches provide an easy way to perform testing and maintenance of motorized life safety dampers. All Greenheck test switches come with a 5 x 5 in. (127 x 127 mm) stainless steel plate and replaceable LED lights.

GTS-1 and **GTS-2** are single control panels to be used on combination fire smoke dampers equipped with TOR (Temperature Override Control). GTS-1 control panel has a toggle switch with red indicator light for closed damper, green for open damper. The GTS-1 is available factory-mounted or shipped loose. GTS-2 has a key switch with red indicator light for closed damper, green for open damper. The GTS-2 is available shipped loose.



GTS-1

GTS-3 is a control panel that can be used on combination fire smoke dampers with RRL/OCI, TOR or a smoke damper with an OCI. This test switch has open and close indicator lights with a momentary test switch. The GTS-3 is available factory-mounted or shipped loose.

GTS-4 is a control panel that can be used with combination fire smoke dampers with RRL/OCI, TOR or smoke damper with an OCI. This test switch has open and close indicator lights only. The GTS-4 is available factory-mounted or shipped loose.

Momentary Test Switch - The momentary test switch is used with smoke and combination fire smoke dampers to test and cycle the damper on location for both start-up testing and maintenance. This UL Qualified assembly ships factory-mounted and wired.



Momentary Test Switch

Toggle Switch - The two position toggle switch is used with smoke and combination fire smoke dampers to test and cycle the damper on location for both start-up testing and maintenance.

Blade Indication

Open Close Indicator (OCI) - The OCI option provides two switches providing positive blade indication. One indicates when the damper is open, and the other indicates the damper closes. The switches are physically linked to a damper blade and therefore give a true representation of the damper's position.



OCI

Options and Accessories

Closure Devices

Resettable Link (RRL) - The RRL replaces the fusible link with a bimetal heat responsive device that is easily reset from outside the duct. This allows routine testing of a damper without the need to replace a fusible link. It also ensures controlled closure of the damper, eliminating the possibility of duct damage resulting from sudden instantaneous type closures. RRL options are available with temperature ratings of 165°F (74°C), 212°F (100°C), 250°F (121°C) and 350°F (177°C).



RRL

Resettable Link with Open Closed Indicator (RRL/OCI) - The RRL/OCI combines the resettable link (RRL) and the open close indicator (OCI) into one device. RRL/OCI option is available with temperature ratings of 165°F (74°C), 212°F (100°C), 250°F (121°C) and 350°F (177°C).



RRL/OCI

Pneumatic Relief Valve (PRV) - The PRV is a heat responsive device that activates when temperatures in excess of 165°F (74°C) or 212°F (100°C) are detected. When the fusible link melts, air from the actuator is exhausted to close the damper. No electrical connection is required. The PRV must be installed at the factory and cannot be added in the field. An alternative to the PRV is a RRL with EP switch, which requires an electrical connection.



PRV

Temperature Override Control (TOR) - The TOR option provides damper closure, usually at 165°F (74°C), with the ability to override this closure (reopen damper) so the duct system can accomplish its intended smoke control system functions as long as the temperature at the damper does not exceed the secondary heat responsive device setting, usually 350°F (177°C).



TOR

Electro-Pneumatic Switch (EP) - This is also known as a three-way solenoid valve, and is used to electronically open and close a pneumatic actuated damper. It is wired in series with a normally closed thermostat when used with a fire smoke damper to initiate closure at elevated temperatures. It can also be used on a smoke damper to initiate closure when required in a smoke control system.



EP Switch

Security Bars

When a specification requires security bars to be installed with the damper, they can be shipped assembled. Installation of security bars into dampers reduces security risks and reinforces the equipment. Security bars maintain the UL Classification for all products and are welded into the sleeve. Two types of security bars are available:

- Cross bar - round steel bars placed horizontal and vertical on center, based on customer selection or
- Punched mid bar - round steel bars placed vertical on center, based on customer selection, with flat mid bars placed horizontal on dampers higher than 24 inches (610 mm).



Options and Accessories

Smoke Detectors

A smoke detector's purpose is to sample air currents passing through a duct and upon alarm, provide management of fans, blowers, combination fire smoke dampers and smoke dampers.

Smoke Detector - These photoelectric smoke detectors sample air currents passing through a duct and give dependable performance for management of smoke and combination fire smoke dampers. There are two smoke detectors available:

1. The DH-98-P is rated for air velocities from 300 - 4000 ft/min. (1.5 - 20.3 m/s).
2. The D4120 is rated for air velocities from 100 - 4000 ft/min. (0.5 - 20.3 m/s)

These smoke detectors can either be factory-mounted and wired or shipped loose.

No Flow Smoke Detector - The no flow smoke detector is rated for systems without a minimum operating velocity. This smoke detector is rated for air velocities from 0 to 3000 ft/min. (0 to 15.2 m/s) and is mounted internally to the damper sleeve. It can be used on dampers with a maximum of two actuators. The no flow smoke detector has a built-in test switch.



Low flow



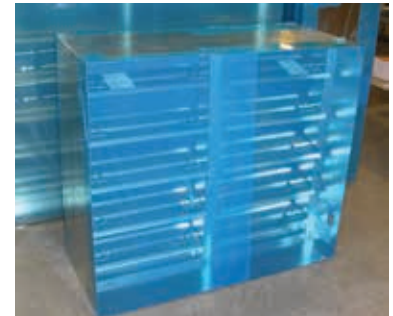
Low flow



No flow

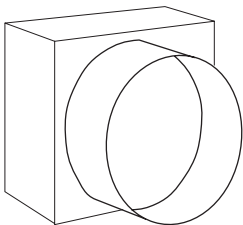
Clean Wrap

In the Indoor Air Quality section of the Green Building and LEED Core Concepts Guide, you need to protect air quality during construction and prevent dust and particulate buildup. Greenheck offers Clean Wrap to help meet this requirement. Clean Wrap is a thin film that adheres to the ends of the damper sleeve to prevent dust, dirt and debris from entering the damper at the construction site.

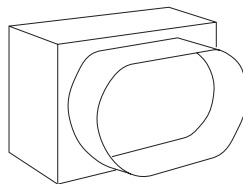


Transitions

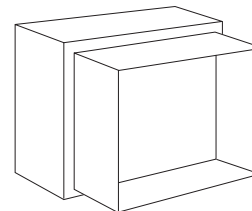
When a rectangular combination fire smoke or smoke damper is being used in conjunction with round or oval ductwork, it must be supplied with round or oval transitions on one or both ends of the sleeve. A Type C transition may be used to increase free area and minimize pressure drop. Dampers should be ordered to the duct dimensions.



Type R



Type O



Type C

Factory-Mounted Accessories

Access Doors

According to NFPA 80 and NFPA 90A, an access door needs to be provided in air ducts adjacent to each fire damper, smoke damper, or combination fire smoke damper for maintenance and inspection.

Save time and money by letting Greenheck install the access door in the sleeve to save on labor costs in the field.



Retaining Angle

Save time by letting Greenheck install retaining angles for you. You can order your retaining angles four different ways:

- **Single Fastened** - one retaining angle mounted in the location you want
- **Single Wrapped** - one retaining angle wrapped around the damper sleeve and wire tied
- **Double Wrapped** - the same feature as single wrapped, but with 2 sets of retaining angles
- **Fastened and Wrapped** - one retaining angle fastened and one angle wrapped around the damper



Quick Connect Breakaway Connections

Greenheck was the first manufacturer to successfully UL Qualify a universal breakaway duct connection that is compatible with TDC, TDF, Ductmate, Nexus or Ward flange systems. You now have the option to choose the universal breakaway connection on fire dampers, smoke, and combination fire smoke dampers. You can order your dampers with breakaway connection three different ways:

- Universal flange attached to one end of the sleeve
- Universal flange attached to both ends of the sleeve
- One end attached and one shipped loose

S and Drive connection uses drive slip connection on the side of the hemmed sleeve and S-slip joints are used on top and bottom.

To see the UL 555 Duct Impact Test (Quick Connect Breakaway Test) video, go to www.greenheck.com/library/videos.



Damper Performance Testing Criteria

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 .075 lb/ft³ (1.201 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.

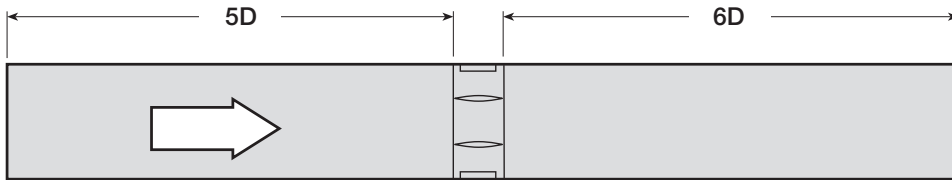


Figure 5.3

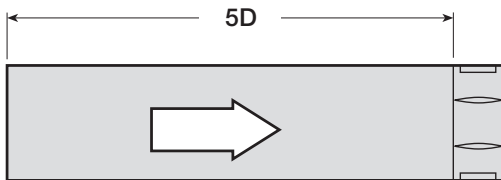


Figure 5.2

D = Duct length
W = Damper width
H = Damper height

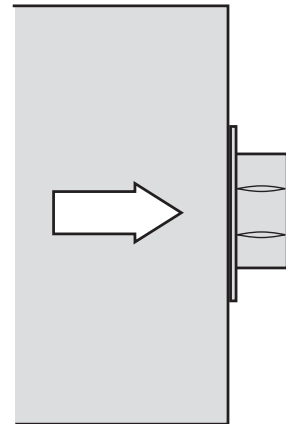



Figure 5.5

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


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 models CFSD-211, 212; DFD-210; DFDAF-310, 330; SEDFD-210; FSD-211, 211M, 212, 213, 311, 311M, 312, 312M, 331; SSFSD-211; SEFSD-211; OFSD-211, 212, 311, 312; SMD-201, 201M, 202, 203, 301, 302, 301M, 302M; SESMD-201 and SSSMD-201 shown herein are 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 performance only.



Greenheck India Pvt Ltd. certifies that the models DFD-210; FSD-211, 212, 311; SMD-201, 202, 301, 302 shown herein are 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 performance only.

Pressure Drop Data for 3V Blade Models

These pressure drop charts apply to the following models: CFSD-211, 212; DFD-210; SEDFD-210; FSD-211, 211M, 212, 213; OFSD-211, 212; SEFSD-211; SSFSD-211; SMD-201, 201M, 202, 203; SESMD-201; and SSSMD-201.

AMCA Figure 5.2 Pressure Drop

Dimension in. (mm)	12 x 12 (305 x 305)	24 x 24 (610 x 610)	36 x 36 (914 x 914)	12 x 48 (305 x 1219)	48 x 12 (1219 x 305)
Velocity (ft/min.)	Pressure Drop - in. wg				
500	.04	.02	.01	.01	.03
1000	.14	.07	.04	.06	.10
1500	.32	.15	.09	.13	.23
2000	.56	.27	.16	.23	.41
2500	.88	.42	.25	.36	.63
3000	1.26	.61	.36	.52	.91
3500	1.72	.83	.49	.70	1.24
4000	2.24	1.08	.64	.92	1.62

AMCA Figure 5.3 Pressure Drop

Dimension in. (mm)	12 x 12 (305 x 305)	24 x 24 (610 x 610)	36 x 36 (914 x 914)	12 x 48 (305 x 1219)	48 x 12 (1219 x 305)
Velocity (ft/min.)	Pressure Drop - in. wg				
500	.02	.01	.01	.01	.02
1000	.09	.04	.03	.04	.07
1500	.20	.09	.06	.10	.16
2000	.36	.16	.11	.17	.29
2500	.56	.25	.17	.27	.45
3000	.81	.35	.24	.39	.64
3500	1.10	.48	.33	.53	.88
4000	1.44	.63	.42	.70	1.14

AMCA Figure 5.5 Pressure Drop

Dimension in. (mm)	12 x 12 (305 x 305)	24 x 24 (610 x 610)	36 x 36 (914 x 914)	12 x 48 (305 x 1219)	48 x 12 (1219 x 305)
Velocity (ft/min.)	Pressure Drop - in. wg				
500	.06	.03	.03	.03	.04
1000	.22	.14	.12	.13	.17
1500	.50	.31	.26	.30	.38
2000	.89	.55	.47	.53	.67
2500	1.39	.86	.73	.83	1.04
3000	2.00	1.24	1.05	1.19	1.50
3500	2.73	1.69	1.42	1.62	2.05
4000	3.56	2.20	1.86	2.11	2.67

Pressure Drop Data for Airfoil Blade Models

These pressure drop charts apply to the following models: DFDAF-310, 330; FSD-311, 311M; FSD-312, 312M; FSD-331; OFSD-311, 312; SMD-301, 302; SMD-301M and 302M.

AMCA Figure 5.2 Pressure Drop

Dimension in. (mm)	12 x 12 (305 x 305)	24 x 24 (610 x 610)	36 x 36 (914 x 914)	12 x 48 (305 x 1219)	48 x 12 (1219 x 305)
Velocity (ft/min.)	Pressure Drop - in. wg				
500	.03	.01	.01	.01	.02
1000	.12	.06	.06	.05	.08
1500	.26	.12	.12	.12	.18
2000	.46	.22	.22	.21	.32
2500	.72	.34	.34	.33	.51
3000	1.04	.49	.49	.48	.74
3500	1.41	.67	.67	.65	1.00
4000	1.84	.87	.88	.85	1.31

AMCA Figure 5.3 Pressure Drop

Dimension in. (mm)	12 x 12 (305 x 305)	24 x 24 (610 x 610)	36 x 36 (914 x 914)	12 x 48 (305 x 1219)	48 x 12 (1219 x 305)
Velocity (ft/min.)	Pressure Drop - in. wg				
500	.01	.01	.01	.01	.01
1000	.06	.03	.02	.03	.05
1500	.13	.06	.05	.07	.10
2000	.23	.11	.10	.12	.18
2500	.36	.17	.15	.18	.29
3000	.52	.24	.22	.26	.41
3500	.71	.33	.29	.36	.56
4000	.92	.43	.38	.47	.74

AMCA Figure 5.5 Pressure Drop

Dimension in. (mm)	12 x 12 (305 x 305)	24 x 24 (610 x 610)	36 x 36 (914 x 914)	12 x 48 (305 x 1219)	48 x 12 (1219 x 305)
Velocity (ft/min.)	Pressure Drop - in. wg				
500	.05	.03	.03	.03	.04
1000	.18	.13	.12	.13	.15
1500	.41	.30	.27	.29	.33
2000	.73	.53	.47	.51	.58
2500	1.14	.83	.74	.80	.91
3000	1.65	1.20	1.06	1.15	1.31
3500	2.24	1.64	1.44	1.57	1.79
4000	2.93	2.14	1.88	2.05	2.33

Pressure Drop Data for Dynamic Curtain Fire Dampers

These pressure drop charts apply to the following models: DFD-110, 150, 310, 350; DFD-150X series; ODFD-150; SSDFD-150 and 350.

AMCA Figure 5.2 Pressure Drop

Dimension in. (mm)	12 x 12 (305 x 305)	24 x 24 (610 x 610)	36 x 36 (914 x 914)	12 x 48 (305 x 1219)	48 x 12 (1219 x 305)
Velocity (ft/min.)	Pressure Drop - in. wg				
500	.03	.02	.016	.025	.025
1000	.11	.08	.06	.10	.09
1500	.26	.17	.15	.21	.20
2000	.48	.31	.26	.38	.37
2500	.72	.49	.41	.58	.58
3000	1.02	.70	.59	.83	.85
3500	1.40	.94	.80	1.18	1.17
4000	1.84	1.27	1.04	1.55	1.58

AMCA Figure 5.3 Pressure Drop

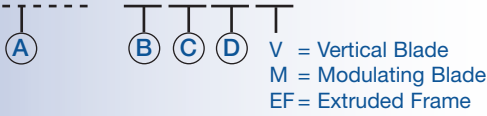
Dimension in. (mm)	12 x 12 (305 x 305)	24 x 24 (610 x 610)	36 x 36 (914 x 914)	12 x 48 (305 x 1219)	48 x 12 (1219 x 305)
Velocity (ft/min.)	Pressure Drop - in. wg				
500	.01	.006	.004	.001	.001
1000	.04	.03	.02	.04	.04
1500	.09	.05	.04	.09	.09
2000	.17	.10	.07	.16	.15
2500	.27	.15	.11	.24	.23
3000	.38	.23	.16	.36	.33
3500	.52	.29	.21	.49	.45
4000	.69	.40	.28	.63	.60

AMCA Figure 5.5 Pressure Drop

Dimension in. (mm)	12 x 12 (305 x 305)	24 x 24 (610 x 610)	36 x 36 (914 x 914)	12 x 48 (305 x 1219)	48 x 12 (1219 x 305)
Velocity (ft/min.)	Pressure Drop - in. wg				
500	.047	.04	.036	.046	.038
1000	.19	.16	.14	.18	.15
1500	.43	.36	.34	.41	.35
2000	.72	.65	.60	.72	.63
2500	1.18	.98	.92	1.14	.97
3000	1.66	1.45	1.31	1.61	1.40
3500	2.3	1.97	1.85	2.25	1.92
4000	3.3	2.64	2.37	2.95	2.54

Model Definition - Damper Model Number Code

FSD-311V



EXAMPLE: Combination Fire-Smoke Damper with Vertical Steel Airfoil Blades
1½ Hour Fire Rating
Class I Leakage

DFD-150X12



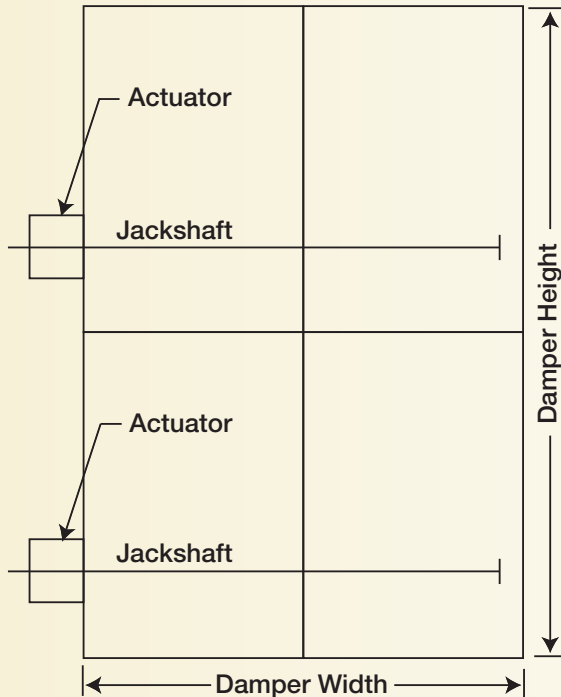
EXAMPLE: Dynamic Fire Damper with 1½ Hour Fire Rating
3-¹¹/₁₆ inch Frame
Low to Medium Pressure
12 inch Integral Sleeve

1	Product Type - Curtain
DFD	Dynamic Fire Damper
FD	Static Fire Damper
SSFD	304 Stainless Steel Static Fire Damper
ODFD	Out-of-Wall Dynamic Fire Damper
OFD	Out-of-Wall Static Fire Damper
SSDFD	304 Stainless Steel Dynamic Fire Damper
SSFD	304 Stainless Steel Fire Damper
2	Fire Resistance Rating
1	1½ Hour
3	3 Hour
3	Frame Style
0	Ultrathin - 1½ in. (38 mm)
1	Narrowline - 2 ³ / ₁₆ in. (56 mm)
5	Standard - 3 ¹¹ / ₁₆ in. (94 mm)
4	Pressure Rating
0	Pressure (up to 4 in. wg)
5	Damper with Integral Sleeve
X10	10 in. long
X12	12 in. long
X14	14 in. long
X16	16 in. long

A	Product Type - Multiblade & Round
CFSD	Corridor Ceiling Combination Fire Smoke Damper
DFD	Dynamic Fire Damper
DFDAF	Dynamic Fire Damper - Airfoil Blade Damper
DFDR	Round Dynamic Fire Damper
FDR	Round Static Fire Damper
FSD	Combination Fire Smoke Damper
FSDR	Round Combination Fire Smoke Damper
GFSD	Grille Access Combination Fire Smoke Damper
HSD	Heavy Duty Smoke Damper
OFSD	Out-of-Wall Combination Fire Smoke Damper
SEDFD	316 Stainless Steel Dynamic Fire Damper
SEDFDR	Round 316 Stainless Steel Dynamic Fire Damper
SEFSD	316 Stainless Steel Combination Fire Smoke Damper
SEFSDR	Round 316 Stainless Steel Combination Fire Smoke Damper
SESMD	316 Stainless Steel Smoke Damper
SESMDR	Round 316 Stainless Steel Smoke Damper
SMD	Smoke Damper
SMDR	Round Smoke Damper
SSDFD	304 Stainless Dynamic Fire Damper
SSDFDR	Round 304 Stainless Steel Dynamic Fire Damper
SSFDR	Round 304 Stainless Steel Static Fire Damper
SSFSD	304 Stainless Steel Combination Fire Smoke Damper
SSFSDR	Round 304 Stainless Steel Combination Fire Smoke Damper
SSSMD	304 Stainless Steel Smoke Damper
SSSMDR	Round 304 Stainless Steel Smoke Damper
B	Blade Style
2	Fabricated Steel with Triple Vee Reinforcements (3V)
3	Fabricated Steel Airfoil
4	Extruded Aluminum Airfoil
5	Round
C	Fire Rating
0	Smoke Damper-No Fire Rating
1	1½ Hour
3	3 Hour
D	Leakage
0	No Leakage Rating
1	Leakage Class I
2	Leakage Class II
3	Leakage Class III

Drive Arrangement Definition

The following breakdown of a drive arrangement code is a good reference in understanding what each number and letter signifies.



22-2FEL-2

① ② ③ ④ ⑤ ⑥ ⑦

1	Number of sections wide
2	Number of sections high
3	Number of actuators
4	Who supplies the actuators F = Factory (<i>always</i>) on UL dampers
5	Actuator mounting E = External I = Internal B = Both internal and external
6	Actuator location (viewed from jackshaft side) L = Left hand drive R = Right hand drive B = Both right and left
7	Number of jackshafts

Listings/Approvals

UL Category EMME (all models)	California State Fire Marshal		New York City MEA (all models)
EMME R13317	DFD-2xx; DFDAF-310; SSDFD-2xx	3225-0981:0103	260-91-M
	All DFD/FD curtain style	3225-0981:0102	
	GFSD/FSD/OFSD/SSFSD (fire)	3225-0981:0103	
	GFSD/FSD/OFSD/SSFSD/SMD/SSSMD (leakage)	3230-0981:0104	
	CFSD (leakage)	3230-0981:0105	
	CFSD (fire)	3225-0981:0106	
	DFDR/FDR/FSDR/SSFSDR (fire)	3225-0981:0112	
	FSDR/SSFSDR/SMDR/SSSMDR (leakage)	3230-0981:0113	
EMME R13317 CABS R13446	CRD-501	3230-0981:0113	
CABS R13446	CRD-1/CRD-1xx/CRD-2	3225-0981:0101	
	CRD-60, -60X	3226-0981:0111	

Test Standards & Certifications

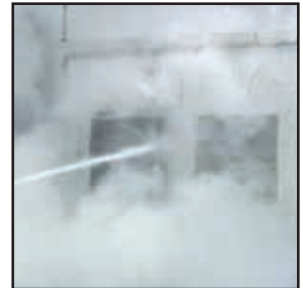
Underwriters Laboratories®

UL 555 - This standard governs fire and combination fire smoke dampers which are intended for use where air ducts penetrate or terminate at openings in walls or partitions, in air transfer openings in partitions, and where air ducts extend through floors as specified in the Standard for Installation of Air-Conditioning and Ventilating Systems, NFPA 90A. In a fire emergency the fire damper is designed to close and prevent the spread of fire from one side of the wall or partition to the other. Testing includes cycling, salt spray, dust loading, dynamic closure, fire endurance, and hose stream.



UL 555C - This standard governs ceiling dampers which are intended for use in air handling duct outlets which penetrate membrane ceilings of hourly fire rated resistive assemblies, or for installation in the ceiling membrane of such assemblies which utilize the plenum space for return air.

UL 555S - This standard governs smoke and combination fire smoke dampers which are intended to prevent the spread of smoke when HVAC systems shut down during a fire emergency and those which control the movement of smoke within a building when the HVAC system functions in a smoke control mode. Leakage rated dampers are intended for installation in accordance with NFPA 90A. Testing includes salt spray, dust loading, cycling, temperature degradation, operation while under heated airflow, and elevated temperature leakage.



AMCA

The AMCA Certified Rating Program seal assures you that a product line has been tested to the appropriate AMCA standards in accordance with a legal license agreement and that the manufacturer's catalogued certified ratings have been submitted to AMCA for approval.

Warnock Hersey®

The Warnock Hersey mark is among the most well-recognized and respected North American marks of compliance for building codes, association criteria, and product safety and performance standards. Warnock Hersey, like UL, is an independent agency that evaluates and tests products to recognized standards including those dictated by UL, NFPA, and ASTM.



Codes

Greenheck smoke and combination fire smoke dampers meet the requirements established by:

- ICC (International Building Code)
- ICBO (International Conference of Building Officials)
- IMC (International Mechanical Code)
- NFPA (National Fire Protection Association) 80, 90A, 92A, 92B, 101 and 105



Specification Checklist

	Ceiling Radiation Dampers	Combination Fire Smoke Dampers	Fire Dampers	Smoke Dampers
UL Standard				
UL 555		✓	✓	
UL 555C	✓			
UL 555S		✓		✓
NFPA				
80		✓	✓	
90A	✓	✓	✓	
92A		✓		✓
92B		✓		✓
101	✓	✓	✓	✓
105		✓		✓
Fire Resistance				
1½ Hour	✓	✓	✓	
3 Hour		✓	✓	
Fire Closure Temperature				
165°F (74°C)	✓	✓	✓	
212°F (100°C)	✓	✓	✓	
250°F (121°C)		✓	✓	
286°F (141°C)			✓	
350°F (177°C)		✓	✓	
Elevated Operational Temperature				
250°F (121°C)		✓		✓
350°F (177°C)		✓		✓
Differential Pressure <i>(applies to dynamic rated fire dampers, combination fire smoke dampers, smoke dampers)</i>				
4 in. wg (1 kPa)		✓	✓	✓
6 in. wg (1.5 kPa)		✓	✓	✓
8 in. wg (2 kPa)		✓	✓	✓
10 in. wg (2.5 kPa)			✓	
Velocity				
2000 ft/min. (10 m/s)		✓	✓	✓
3000 ft/min. (15 m/s)		✓	✓	✓
4000 ft/min. (20 m/s)		✓	✓	✓
Leakage				
Class I		✓		✓
Class II		✓		✓
Class III		✓		✓
Mounting				
Horizontal	✓	✓	✓	✓
Vertical		✓	✓	✓
Factory-Mounted Actuators		✓		✓

Please visit our website at www.greenheck.com/products/dampers for complete specifications.

Models by Manufacturing Location

Fire Dampers		
	Manufacturing Location	
	Greenheck Fan Corporation	Greenheck India Pvt., Ltd.
DFD-110	✓	
DFD-150	✓	✓
SSDFD-150	✓	
DFD-150X series	✓	✓
ODFD-150	✓	
DFD-210	✓	✓
DFDAF-300	✓	✓
DFDAF-310	✓	✓
DFDAF-330	✓	
SEDFD-210	✓	
SSDFD-210	✓	
DFD-310	✓	
DFD-350	✓	✓
SSDFD-350	✓	
FD-100	✓	
FD-110	✓	
FD-150	✓	✓
SSFD-150	✓	
FD-150X series	✓	✓
OFD-150	✓	
FD-300	✓	
FD-310	✓	
FD-350	✓	
SSFD-350	✓	

Round UL Dampers		
	Manufacturing Location	
	Greenheck Fan Corporation	Greenheck India Pvt., Ltd.
DFDR-510	✓	
FDR-510	✓	
FSDR-511	✓	
FSDR-512	✓	
SEFSDR-511	✓	
SESMDR-501	✓	
SMDR-501	✓	
SMDR-502	✓	
SSDFDR-510	✓	
SSFDR-510	✓	
SSFSDR-511	✓	
SSFSDR-512	✓	
SSSMDR-501	✓	

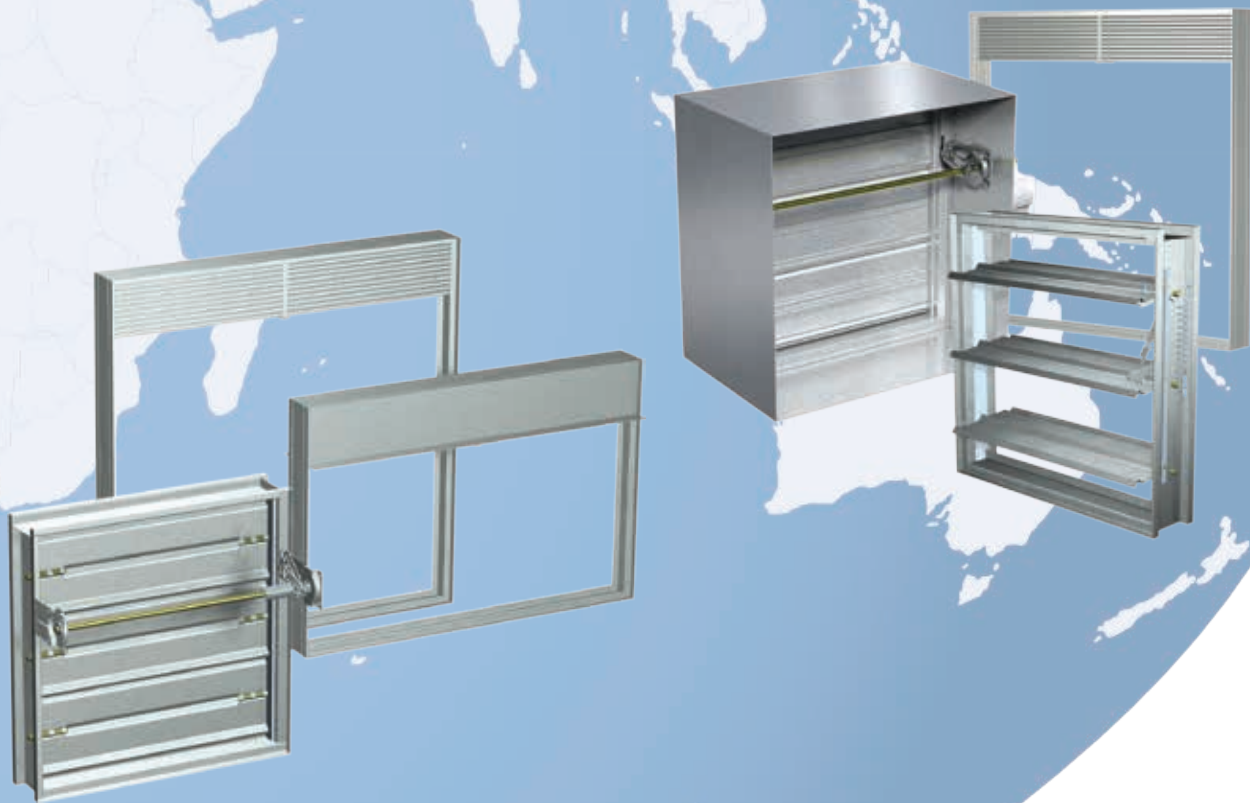
Combination Fire Smoke & Smoke Dampers		
	Manufacturing Location	
	Greenheck Fan Corporation	Greenheck India Pvt., Ltd.
CFSD-211	✓	
CFSD-212	✓	
FSD-211	✓	✓
FSD-211M	✓	
FSD-212	✓	✓
FSD-213	✓	
SEFSD-211	✓	
SSFSD-211	✓	
FSD-311	✓	✓
FSD-312	✓	
FSD-311M	✓	
FSD-312M	✓	
FSD-311V	✓	
FSD-331	✓	
GFSD-211	✓	
GFSD-212	✓	
OFSD-211	✓	
OFSD-212	✓	
OFSD-311	✓	
OFSD-312	✓	
SMD-201	✓	✓
SMD-201M	✓	
SMD-202	✓	✓
SMD-203	✓	
SSSMD-201	✓	
SESMD-201	✓	
SMD-301	✓	✓
SMD-301M	✓	
SMD-301V	✓	
SMD-302	✓	✓
SMD-302M	✓	
SMD-401	✓	
SMD-401M	✓	
SMD-401EF	✓	
HSD-401	✓	

NOTE: Accessories and options vary by manufacturing location. Refer to CAPS to determine what is available.

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we engineer value.**



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Greenheck offers added value to our wide selection of top performing, energy-efficient products by providing several unique Greenheck service programs.



- Greenheck's free Computer Aided Product Selection program (CAPS), rated by many as the best in the industry. CAPS helps you conveniently and efficiently select the right products for the challenge at hand.



- Greenheck has been Green for a long time! Our energy-saving products and ongoing corporate commitment to sustainability can help you qualify for LEED credits.

Find out more about these special Greenheck services at greenheck.com or greenheck.co.in.



Building Value in Air

Greenheck delivers value to mechanical engineers by helping them solve virtually any air quality challenges their clients face with a comprehensive selection of

top quality, innovative air-related equipment. We offer extra value to contractors by providing easy-to-install, competitively priced, reliable products that arrive on time.

And building owners and occupants value the energy efficiency, low maintenance and quiet dependable operation they experience long after the construction project ends.

Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranties.



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Green Building Efforts

