

Backdraft & Pressure Relief Dampers

- Backdraft
- Barometric Relief
- Pressure Relief



 **GREENHECK**
Building Value in Air.

December
2010

Greenheck dampers bring the same quality engineering and manufacturing that has earned Greenheck its position as an industry leader. Aggressive research and development keeps Greenheck a major player in the damper and louver industry. Greenheck has the most UL classified dampers and the largest selection of AMCA licensed dampers and louvers in the industry.

In-House Testing

State-of-the-art laboratory and testing facilities have always been important to Greenheck's ongoing business success. Greenheck has a laboratory facility devoted exclusively to development and testing of damper and louver related products for testing to the latest versions of AMCA, ANSI, ASHRAE, UL, Miami-Dade County, and other industry standards of performance.



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Greenheck operates five manufacturing locations, five national distribution centers, and two international distribution centers:



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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.

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- Greenheck's free Computer Aided Product Selection program (CAPS), rated by many as the best in the industry, 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.
- Our 3D service allows you to download, at no charge, easy-to-use AutoDesk™ Revit™ 3D drawings for many of our ventilation products.

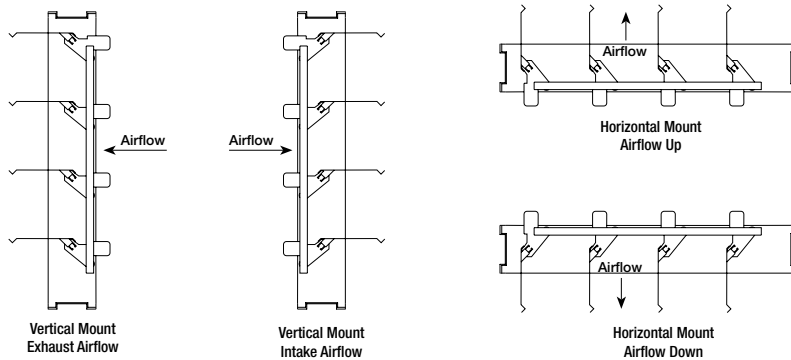
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Backdraft dampers are used in ventilation systems to allow airflow in one direction and prevent airflow in the opposite direction. A pressure relief damper is developed with an elevated and adjustable start-open pressure while providing the backdraft function. When selecting the correct damper for your application, you need to know:

- System velocity and back pressure requirements
- Mounting orientation and airflow direction
- Mounting configuration (inserted into duct/opening or flange mounted)
- Damper operation (gravity or motorized)
- Start-open pressure

Mounting Orientation

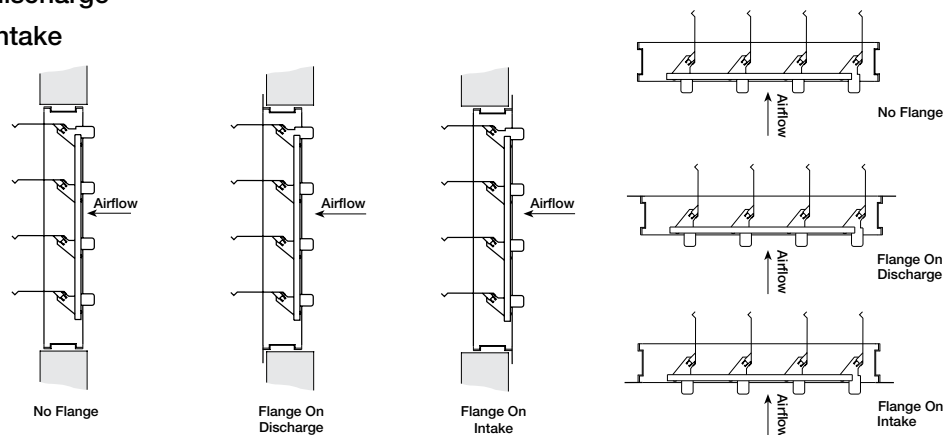
There are two mounting and four airflow configurations available on backdraft dampers:



Frame Construction

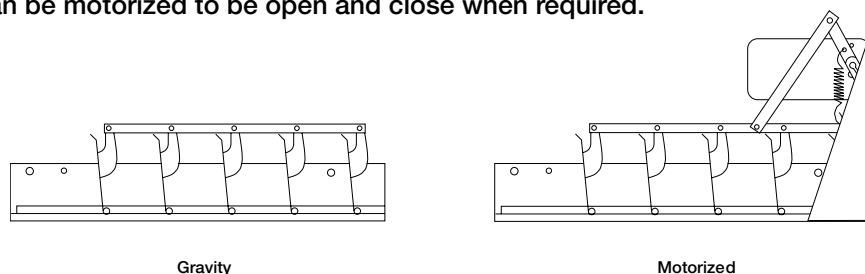
Three types of frame construction are available on all backdraft damper models:

- No flange
- Flange on discharge
- Flange on intake



Damper Operation

Backdraft dampers can either be operated by gravity (where pressure or velocity opens and closes the damper) or they can be motorized to be open and close when required.



A commercial backdraft damper is an isolation damper allowing airflow in one direction only. When placed on a propeller fan, for example, it will prevent the wind from causing the fan to run backwards when the power is off.

To assist with opening the damper blades, backdraft dampers may utilize springs, adjustable counterbalance weights, or a motorpack.

- **Spring assist** is a spring attached to the damper that helps in opening or closing the damper blades. The spring is adjustable by using a series of holes in the frame or blade assembly to increase or decrease the tension.
- **Adjustable counterbalance** weights are a more precise means of reducing the pressure that is required to open the damper.
- A **motorpack** is used when it is necessary that the damper opens and closes without having to rely on air velocity or pressure.

Backdraft damper selection begins by determining the damper construction required based on system velocity and static pressure. Level I damper models are used in applications up to 2500 ft/min (12.7 m/s) and 2 in. (0.5 kPa) of static pressure. This includes the WD and ES series. Level II damper models are used in applications up to 3500 ft/min (17.8 m/s) and 10 in. wg (2.5 kPa) of static pressure. This includes the EM series.

WD, ES, and EM Series dampers can be used in applications for:

- Exhaust
- Roof ventilation
- In-duct ventilation
- Air Intake
- Sidewall ventilation

WD Series

The WD series are backdraft dampers constructed of a galvanized steel frame and aluminum blades. The dampers are opened by air pressure differential (assisted by springs) and closed by gravity. WD series dampers are rated for velocities up to 2500 ft/min (12.7 m/s) and pressures up to 2 in. wg (0.5 kPa).

Options available are:

- Flanges
- Motorpacks (WD-100, WD-300, standard on WD-200)
- End switch kit (WD-100, 200, 300)
- Stainless steel bearings (WD-100, 200, 300)
- Stainless steel axles



WD-100 Series

WD-100 Series

WD-100 series dampers are horizontally mounted to allow vertical airflow. The primary application is for roof mounted exhaust fans.

WD-200 Series

WD-200 series dampers are electric motorized backdraft dampers that open when energized and spring return close when de-energized. These dampers can be used for horizontal or vertical mount applications. The primary application is to prevent undesirable reverse airflow when installed with roof or sidewall supply (intake) fans.



End Switch Kit

Commercial Backdraft WD Series

WD-300 Series

WD-300 series dampers are vertical mount for horizontal exhaust applications. These dampers are designed to remain open under low velocity conditions.

WD-400 Series

WD-400 is a non-motorized damper that can be mounted vertically (for horizontal intake airflow) or horizontally (for vertical airflow down).

WDR-53/SSWDR-53

WDR-53 and SSWDR-53 are round backdraft dampers. These models can be mounted horizontally for vertical airflow down or up, or mounted vertically for horizontal airflow. The WDR-53 and SSWDR-53 are rated for velocities up to 2000 ft/min (10.2 m/s) and pressure up to 3 in. wg (0.75 kPa).



WD-320 series



WDR-53/SSWDR-53

Commercial Backdraft (WD Series) Quick Selection Guide

Model	Material		Counter-balance Weights	Motorized	Mounting Positions	Airflow Direction	Flange	Maximum Velocity ft/min (m/s)	Maximum Back Pressure in. wg (kPa)	Start-Open Pressure* in. wg (kPa)
	Frame	Blade								
WD-100	Galvanized Steel	Aluminum	N/A	Opt	H	Vertical Up	No	2500 (12.7)	1 (0.25)	0.01 (0.002)
WD-110				Opt	H	Vertical Up	Discharge	2500 (12.7)	1 (0.25)	0.01 (0.002)
WD-120				Opt	H	Vertical Up	intake	2500 (12.7)	1 (0.25)	0.01 (0.002)
WD-200				Std	H or V	H or V	No	2500 (12.7)	2 (0.5)	N/A
WD-210				Std	H or V	H or V	Motor Side	2500 (12.7)	2 (0.5)	N/A
WD-220				Std	H or V	H or V	Opposite Motor Side	2500 (12.7)	2 (0.5)	N/A
WD-300				Opt	V	H	Intake	2500 (12.7)	2 (0.5)	0.015 (0.003)
WD-320				Opt	V	H	Discharge	2500 (12.7)	2 (0.5)	0.015 (0.003)
WD-330				Opt	V	H	No	2500 (12.7)	2 (0.5)	0.015 (0.003)
WD-400				N/A	V	H	No	2500 (12.7)	2 (0.5)	0.026 (0.006)
WD-410				N/A	H	Vertical Down	No	2500 (12.7)	2 (0.5)	0.014 (0.003)
WD-420				N/A	V	H	Discharge	2500 (12.7)	2 (0.5)	0.026 (0.006)
WD-430				N/A	V	H	Intake	2500 (12.7)	2 (0.5)	0.026 (0.006)
WDR-53				N/A	H or V	Vertical Up or Down, or Horizontal	No	2000 (10.2)	3 (0.75)	N/A**
SSWDR-53				304SS	304SS	N/A	N/A	H or V	Vertical Up or Down, or Horizontal	No

H = Horizontal; V = Vertical; N/A = Not Available; Opt = Optional; Std = Standard

* Note that start-open is the pressure at which damper blades just begin to rotate, blades are not fully open at this point. Damper size and bearing selection may cause start-open pressure to vary from this value.

** Not available at time of publication, consult factory.

Commercial Backdraft EM & ES Series

EM & ES series are extruded aluminum backdraft dampers that open by air pressure differential and close by gravity.

ES Series

ES series is a lighter weight version of the EM series. These dampers are rated for velocities up to 2000 ft/min (10.2 m/s) and pressure up to 2.5 in. wg (0.6 kPa).

Options available are:

- Flanges
- Bird screen
- Insect screen

EM Series

EM series uses a heavier aluminum compared to the ES series. These dampers are rated for velocities of 2500 to 3500 ft/min (12.7-17.8 m/s) and pressure of 4-10 in. wg (1 kPa-2.5 kPa).

Options available are:

- Flanges
- Adjustable pressure controller (APC) used for field setting of relief pressure
- Paint finishes



EM Series with APC
(Adjustable Pressure Controller)

Commercial Backdraft (EM & ES Series) Quick Selection Guide

Model	Material		Counter-balance Weights	Mounting Position	Airflow Direction	Flange	Maximum Velocity ft/min (m/s)	Maximum Back Pressure in. wg (kPa)	Start-Open Pressure* in. wg (kPa)
	Frame	Blade							
EM-10	Aluminum	Aluminum	Std	H	Vertical Up	No	3500 (17.8)	10 (2.5)	0.05 (0.01)
EM-11			Std	H	Vertical Up	Discharge	3500 (17.8)	10 (2.5)	0.05 (0.01)
EM-12			Std	H	Vertical Up	Intake	3500 (17.8)	10 (2.5)	0.05 (0.01)
EM-30			Opt	V	H	No	3500 (17.8)	10 (2.5)	0.03 (0.01) ¹ 0.01 (0.002) ²
EM-31			Opt	V	H	Discharge	3500 (17.8)	10 (2.5)	0.03 (0.01) ¹ 0.01 (0.002) ²
EM-32			Opt	V	H	Intake	3500 (17.8)	10 (2.5)	0.03 (0.01) ¹ 0.01 (0.002) ²
EM-40			Std	H	Vertical Down	No	3500 (17.8)	10 (2.5)	0.07 (0.017)
EM-41			Std	H	Vertical Down	Discharge	3500 (17.8)	10 (2.5)	0.07 (0.017)
EM-42			Std	H	Vertical Down	Intake	3500 (17.8)	10 (2.5)	0.07 (0.017)
ES-10			Std	H	Vertical Up	No	2000 (10.2)	2.5 (0.6)	0.035 (0.008)
ES-11			Std	H	Vertical Up	Discharge	2000 (10.2)	2.5 (0.6)	0.035 (0.008)
ES-12			Std	H	Vertical Up	Intake	2000 (10.2)	2.5 (0.6)	0.035 (0.008)
ES-30			Opt	V	H	No	2000 (10.2)	2.5 (0.6)	0.05 (0.012) ¹ 0.015 (0.004) ²
ES-31			Opt	V	H	Discharge	2000 (10.2)	2.5 (0.6)	0.05 (0.012) ¹ 0.015 (0.004) ²
ES-32			Opt	V	H	Intake	2000 (10.2)	2.5 (0.6)	0.05 (0.012) ¹ 0.015 (0.004) ²
ES-40			Std	H	Vertical Down	No	2000 (10.2)	2.5 (0.6)	0.075 (0.019)
ES-41			Std	H	Vertical Down	Discharge	2000 (10.2)	2.5 (0.6)	0.075 (0.019)
ES-42			Std	H	Vertical Down	Intake	2000 (10.2)	2.5 (0.6)	0.075 (0.019)

H = Horizontal; V = Vertical; N/A = Not Available; Opt = Optional; Std = Standard; ¹ = w/o weights; ² = w/ weights

* Note that start-open is the pressure at which damper blades just begin to rotate, blades are not fully open at this point. Damper size and bearing selection may cause start-open pressure to vary from this value.

Barometric Relief BR & SEBR Series

A barometric relief damper is a backdraft damper with an adjustable start-open pressure. It is used for gravity ventilation and low velocity systems. Counterbalance weights provide the ability to fine tune start-to-open and full-open operation.

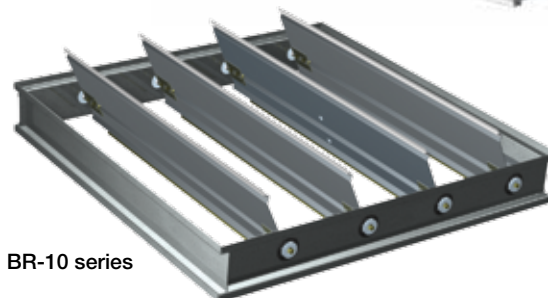
BR series dampers are constructed with a galvanized steel frame and aluminum blades. The SEBR series is constructed of 316 stainless for severe or corrosive environments. Vinyl blades seals are used on both series of dampers. They are rated for velocities up to 2000 ft/min (10.2 m/s) and back pressure up to 2 in. wg (0.5 kPa). The start-open pressure is selectable from .05 to .13 in. wg (0.01 kPa to .03 kPa).

BR and SEBR Series dampers can be used in applications for:

- Gravity hood intake and exhaust
- Stairwell pressurization
- Room pressurization
- Ductwork outlets

Options available are:

- EPDM jamb seals
- 304 stainless steel or aluminum frame (BR series)
- 304 stainless steel axles or linkage (BR series)
- 316 stainless steel ball bearings with acetal races (BR series, standard on SEBR series)



Barometric Relief (BR & SEBR Series) Quick Selection Guide

Model	Material		Mounting Position	Airflow Direction	Flange	Maximum Velocity ft/min (m/s)	Maximum Back Pressure in. wg (kPa)	Start-Open Pressure* in. wg (kPa)
	Frame	Blade						
BR-10	Galvanized Steel	Aluminum	H	Vertical Up	No	2000 (10.2)	2 (0.5)	0.05 (0.01)
BR-11			H	Vertical Up	Discharge	2000 (10.2)	2 (0.5)	0.05 (0.01)
BR-12			H	Vertical Up	Intake	2000 (10.2)	2 (0.5)	0.05 (0.01)
BR-30			V	H	No	2000 (10.2)	2 (0.5)	0.05 (0.01)
BR-31			V	H	Discharge	2000 (10.2)	2 (0.5)	0.05 (0.01)
BR-32			V	H	Intake	2000 (10.2)	2 (0.5)	0.05 (0.01)
BR-40			H	Vertical Down	No	2000 (10.2)	2 (0.5)	0.05 (0.01)
BR-41			H	Vertical Down	Discharge	2000 (10.2)	2 (0.5)	0.05 (0.01)
BR-42			H	Vertical Down	Intake	2000 (10.2)	2 (0.5)	0.05 (0.01)
SEBR-10			316 Stainless Steel	316 Stainless Steel	H	Vertical Up	No	2000 (10.2)
SEBR-11	H	Vertical Up			Discharge	2000 (10.2)	2 (0.5)	0.05 (0.01)
SEBR-12	H	Vertical Up			Intake	2000 (10.2)	2 (0.5)	0.05 (0.01)
SEBR-30	V	H			No	2000 (10.2)	2 (0.5)	0.05 (0.01)
SEBR-31	V	H			Discharge	2000 (10.2)	2 (0.5)	0.05 (0.01)
SEBR-32	V	H			Intake	2000 (10.2)	2 (0.5)	0.05 (0.01)
SEBR-40	H	Vertical Down			No	2000 (10.2)	2 (0.5)	0.05 (0.01)
SEBR-41	H	Vertical Down			Discharge	2000 (10.2)	2 (0.5)	0.05 (0.01)
SEBR-42	H	Vertical Down			Intake	2000 (10.2)	2 (0.5)	0.05 (0.01)

H = Horizontal; V = Vertical

* Note that start-open is the pressure at which damper blades just begin to open. The blades are not fully open at this point. Damper size and bearing selection may cause start-open pressure to vary from this value.

Heavy Duty/Industrial Backdraft HB Series

Heavy duty/Industrial backdraft dampers are designed to prevent backflow at static pressures up to 20 in. wg (5 kPa) and velocities up to 6400 ft/min (32.5 m/s). Counterbalance weights are mounted externally for easy adjustment and balancing in the field. HB series dampers are flange frame mounted.

HB Series dampers can be used in applications for:

- Blower outlets
- Branch duct isolation
- Industrial process isolation
- Emergency generator radiator outlets

HB-110

- Aluminum frame
- Aluminum blade
- Corrosion resistant
- Spark B & C resistant
- Optional 304 or 316 stainless steel frame



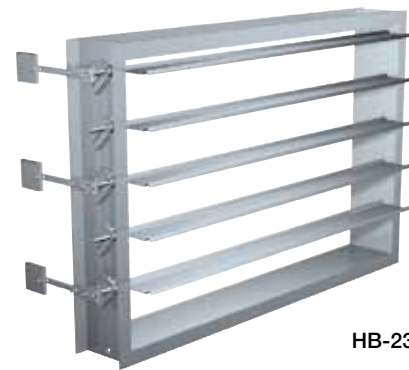
HB-110

HB-120

- Galvanized steel frame
- Galvanized steel 2V blade
- Optional 304 stainless steel frame and blade
- Optional 316 stainless steel frame

HB-230

- Galvanized steel frame
- Galvanized steel airfoil blade
- Optional 304 or 316 stainless steel frame and blade



HB-230

HB-240

- Galvanized steel frame
- Extruded aluminum airfoil blade
- Spark B & C resistant
- Optional Spark A resistant
- Optional 304 or 316 stainless steel frame

HB-330

- Galvanized steel frame
- Galvanized steel airfoil blade
- Fan Class III
- Optional 304 or 316 stainless steel frame and blade

Wide variety of options are available:

- Frame gauge
- Blade seals
- Axles
- Bearings
- Flanges
- Mounting holes in flanges
- Paint finishes



HB-330

*Note: HB series dampers are flange frame mounted.
Width and height dimensions are to the inside of the frame.*

Heavy Duty/Industrial Pressure Relief - HPR Series

A pressure relief damper is a backdraft damper having an adjustable start-open pressure, which is capable of maintaining a relatively constant pressure at various airflows and which closes upon a decrease in differential pressure. Pressure relief dampers do not immediately open fully upon reaching their start-open pressure, they maintain tight leakage to approximately 60% of the start-open pressure and have a relatively flat flow control somewhat above the start-open pressure. Counterbalance weights are mounted externally for easy adjustment and balancing in the field. HPR series dampers are flange frame mounted. They are designed to handle velocities up to 6400 ft/min (32.5 m/s).

A pressure relief damper is generally used as a safety or controlling device. In a duct section, it would be mounted on the duct to either relieve an unexpected overpressure or to relieve negative pressure downstream of a rapidly closing fire damper. It can also be used as a control device, such as opening to admit additional air when used in parallel to a direct-fired gas burner or to admit additional air into fume exhaust so as to maintain 3000 ft/min (15.2 m/s) exhaust velocity.

HPR Series dampers can be used in applications for:

- Fume exhaust
- Duct/plenum protection

Additional material and coating selections are available in aluminum and stainless steel for corrosive or clean room applications.

HPR-120

- Galvanized steel frame
- Galvanized steel 2V blade
- Optional 304 stainless steel frame and blade



HPR-120

HPR-230

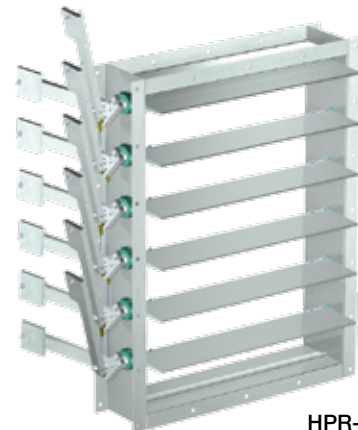
- Galvanized steel frame
- Galvanized steel airfoil blade
- Optional 304 stainless steel frame and blade



HPR-230

HPR-330

- Galvanized steel frame
- Galvanized steel airfoil blade
- Optional 304 stainless steel frame and blade



HPR-330

Wide variety of options available:

- 8-12 in. (203-305 mm) frame depth
- 304 stainless steel axle and linkage
- Flanges
- Mounting holes in flanges
- Paint finishes

Note: HPR series dampers are flange frame mounted. Width and height dimensions are to the inside of the frame.

Heavy Duty/Industrial (HB & HPR Series) Quick Selection Guide

Damper Type	Model	Material		Counter-balance	Maximum Velocity ft/min (m/s)	Maximum Back Pressure in. wg (kPa)	Start-Open Pressure* in. wg (kPa)	Pressure Relief in. wg (kPa)
		Frame	Blade					
Heavy Duty/Industrial Backdraft	HB-110	Aluminum	Aluminum Single	Std	3900 (20)	5 (1.2)	0.02 (0.005)	N/A
	HB-120	Galvanized Steel	Galvanized Steel 2V	Std	5150 (26)	8.5 (2.1)	0.045 (0.11)	N/A
	HB-230	Galvanized Steel	Galvanized Steel Airfoil	Std	5150 (26)	13.5 (3.4)	0.04 (0.010)	N/A
	HB-240	Galvanized Steel	Extruded Aluminum Airfoil	Std	5150 (26)	13.5 (3.4)	0.04 (0.010)	N/A
	HB-330	Galvanized Steel	Galvanized Steel Airfoil	Std	6400 (33)	20 (5)	0.25 (0.06)	N/A
Heavy Duty/Industrial Pressure Relief	HPR-120	Galvanized Steel	Galvanized Steel 2V	Std	5150 (26)	5-8.5 (1.2-2)	N/A	0.10-2 (0.02-.5)
	HPR-230	Galvanized Steel	Galvanized Steel Airfoil	Std	5150 (26)	6-13.5 (1.5-3)	N/A	0.25-4 (0.06-1)
	HPR-330	Galvanized Steel	Galvanized Steel Airfoil	Std	6400 (33)	13.5-20 (3.4-5)	N/A	0.50-6 (0.12-1.5)

N/A = Not Applicable; Std = Standard

* Note that start-open is the pressure at which damper blades just begin to rotate, blades are not fully open at this point. Damper size and bearing selection may cause start-open pressure to vary from this value.

Specialty Dampers

PS-32

PS-32 is an economical backdraft damper constructed of UV-stabilized PVC plastic. This damper is designed for corrosion resistance and quiet operation. It is rated up to 2000 ft/min (10.2 m/s) and pressures up to 2 in. wg (0.5 kPa). Optional motorpacks are available.

PS-32

- No tie bar
- Acetal pin axles

PS-32T

- Tie bars
- Acetal pin axles

PS-32R

- No tie bar
- Full length fiberglass rod reinforced blade

PS-32TA

- Tie bars
- Full length fiberglass rod reinforced blade



PS-32

Backdraft dampers are used on sidewall prop fans, sidewall exhaust fans, and centrifugal utility fans for exhaust or supply applications. They can be used alone or in conjunction with a wall housing or wall collar.



WD series installed on sidewall prop fan with a weatherhood and wall collar



EM series installed on a filtered supply wall housing

Industrial backdraft dampers are used on blower outlets for automatic isolation. They allow air to pass in one direction and restrict flow in the opposite direction. Each damper is factory adjusted for its intended flow direction. Multiple nested counterbalance arms and weights are adjusted to reduce load on bearings and linkage. Industrial backdraft dampers are recommended for low temperatures and clean air applications.



HB-230

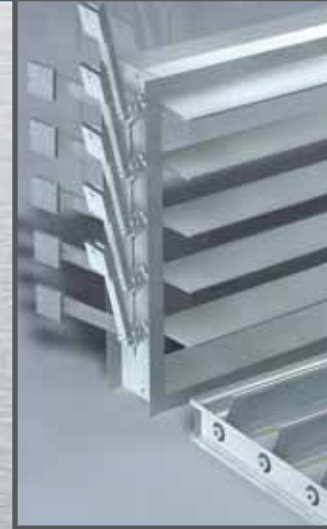
Greenheck's experienced staff can also work with you to develop custom products to meet your needs. An example of a custom job is this HPR-330 designed for a tunnel sewage system in Singapore. The customer required a large pressure relief damper to vent-off excessive gasses upward due to rapid storm water influx. The design used blade weights to provide the initial 2 in. wg (0.5 kPa) relief pressure and movable weights to extend start-open pressure to 6.3 in. wg (1.6 kPa). The HPR-330 was constructed of 316 stainless steel.



HPR-330

Greenheck has a complete line of dampers for your needs!

- Commercial Control Dampers
- Industrial Control Dampers
- Combination Fire Smoke, Fire & Smoke Dampers
- Ceiling Radiation Dampers
- Backdraft Dampers
- Pressure Relief Dampers
- Manual Balancing Dampers
- Access Doors
- Marine Products
- Severe Environment Dampers
- Industrial Smoke Dampers
- Insulated Thermally Broken Dampers
- Air Measuring Dampers
- Pressure Relief Access Doors
- Barometric Relief Dampers
- Industrial Backdraft Dampers
- Tunnel Transit Dampers



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 Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the shipment date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid. Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.

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



Prepared to Support Green Building Efforts

