

Carnes Energy Recovery Ventilators

Model WE Energy Recovery Ventilators (300 to 8,000 CFM)

Model WE Energy Recovery Ventilators provide affordable outside ventilation by combining an exhaust fan, make-up air handler, and Carnes Energy Recovery Wheel into a compact package that minimizes capital investment and maximizes payback for heating and cooling equipment. Units available for both inside and outside mounting.

BENEFITS:

- Low investment with maximum payback.
- Easy to use in new construction or renovation.
- Flexible, convenient installation and startup.

AVAILABLE OPTIONS INCLUDE:

- ETL/CSA Listing for quick Building Code approvals.
- Corrosion Protective Media coating, and edge coating.
- 4 Duct arrangements with Weather Hoods, Dampers, and Roof Curbs.
- Temperature and Enthalpy Economizers, Preheat or Defrost Controls.
- Remote panels, Time Clocks, BMS interface for effective control.
- Rotation Detector, Dirty Filter Switches for operation assurance.
- Double Wall Construction, Airflow Gauge for airflow quality.
- Optional 5 Year Warranty.



PRODUCT OVERVIEW

Carnes Model WE_C is a packaged energy recovery ventilator (ERV) suitable for 300 to 8,000 CFM that allows the designer or building owner to economically provide fresh outside air at near indoor conditions for commercial or institutional construction. First cost requirements for cooling and heating capacity are minimized. The total energy wheel

is the only recovery technology that passively corrects humidity levels (latent energy) and temperature (sensible energy) while pre-conditioning outside makeup air. The WE_C unit builds on Carnes thirty-plus years of manufacturing quality, commercial total energy recovery products.

APPLICATION BENEFITS

Carnes model WE_C helps designers economically meet ASHRAE Standard 62 Ventilation for Acceptable Indoor Air Quality guidelines for minimum fresh air ventilation of 15 to 20 CFM per person. ASHRAE Standard 62 guidelines require dramatically increased outside air intake to avoid sick building syndrome and related problems from indoor air contaminants. Adherence to ASHRAE Standard 62 is generally considered the best possible defense against liabilities related to design ventilation rates. Increased outside air intake

necessarily demands increased cooling capacity or preconditioning of outside air. ASHRAE 90.1 often requires energy recovery as well.

In many cases, a realistic design credit for energy recovery will result in lower first costs due to reduced cooling equipment requirements. In most middle latitude climates with moderate to high summer humidity levels, payback periods range from immediate to one year. Additional annual operating savings calculations are available by consulting the factory.

Benefits

- Improves comfort via humidity control
- Reduces peak capacity requirements by 75%
- Reduces first cost of conditioning equipment
- Reduces HVAC energy cost by up to 50%
- Reduced humidity improves duct conditions, with better health and less maintenance
- Reduces peak energy demand and utility service
- Reduces climate extremes to air handlers

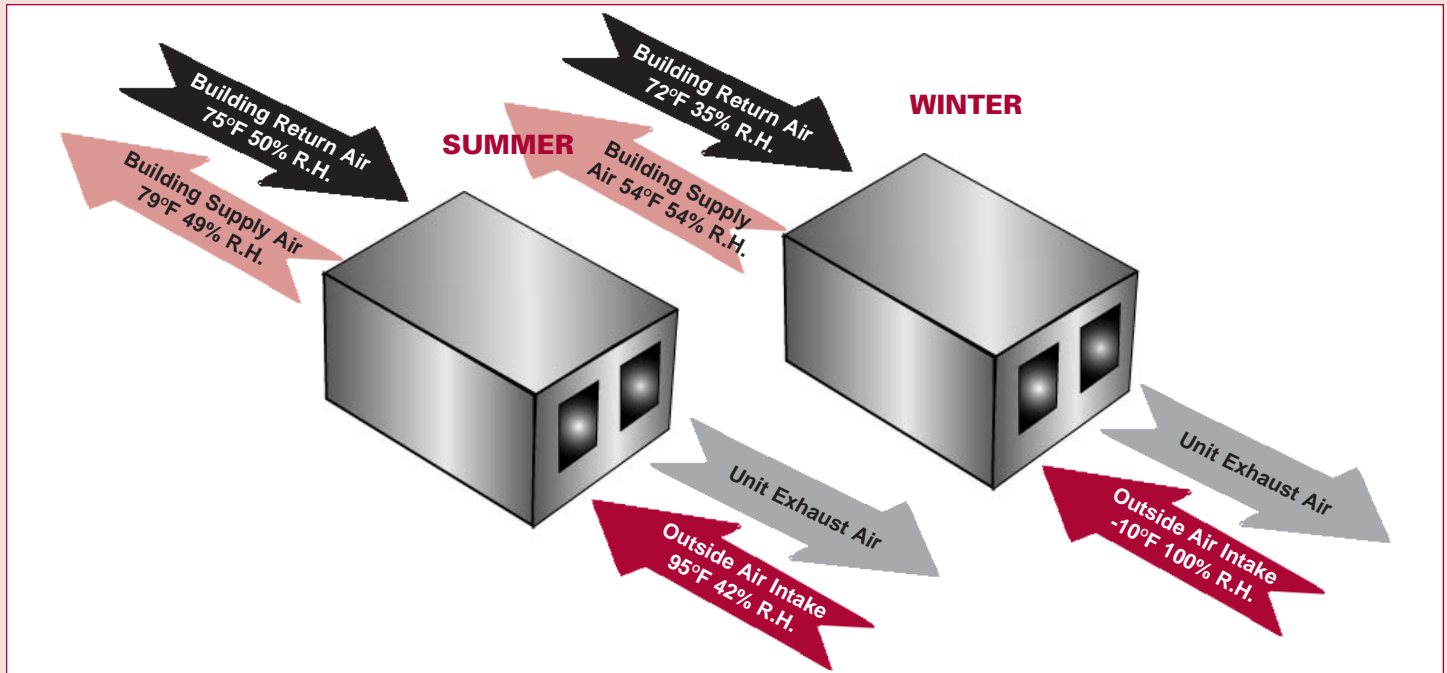
Typical Applications

- Hospitals
- Nursing Homes
- Animal Laboratories
- Pharmaceutical Manufacturing
- Casinos and Bars
- Smoking Lounges
- Schools
- Office Buildings
- Hotels/Motels
- Government Buildings, Prisons
- Military

APPLICATION EXAMPLE — Indianapolis, IN

A school requires fresh air ventilation for 4 classrooms containing 100 students and staff. ASHRAE Standard 62 requires 15 CFM per person, or 1,500 CFM total of outside air supply. Conventional air conditioning required to cool the outside air supply to 55°F is 10 tons. Applying a Carnes WE_C Energy Recovery Ventilator preconditions outside air to 79°F @ 49% RH, reducing cooling load by 5 tons.

RECOVERY VENTILATOR



Applying a 75% design credit, the required cooling capacity is reduced by 3.75 tons, reducing installed system cost by \$3,750, minus the cost of the Carnes WE_C unit. In addition, annual energy cost savings total approximately \$3,000. Net benefit is no first cost increase, continuing annual energy cost savings for the life of the unit, and compliance with design target for fresh air ventilation.

CONSTRUCTION DETAILS

The energy recovery wheel in Carnes model WECC features durable 8 inch (203mm) thick corrugated aluminum construction with a permanently bonded desiccant media. Alternate model WEBC provides uncoated, sensible only wheel media for applications where moisture recovery is not desired. Media salt corrosion protection is available.

Carnes WE_C is designed for simple installation and maintenance. Wiring is via a single point exterior disconnect. Factory wheel control options include constant speed drive or a heating and

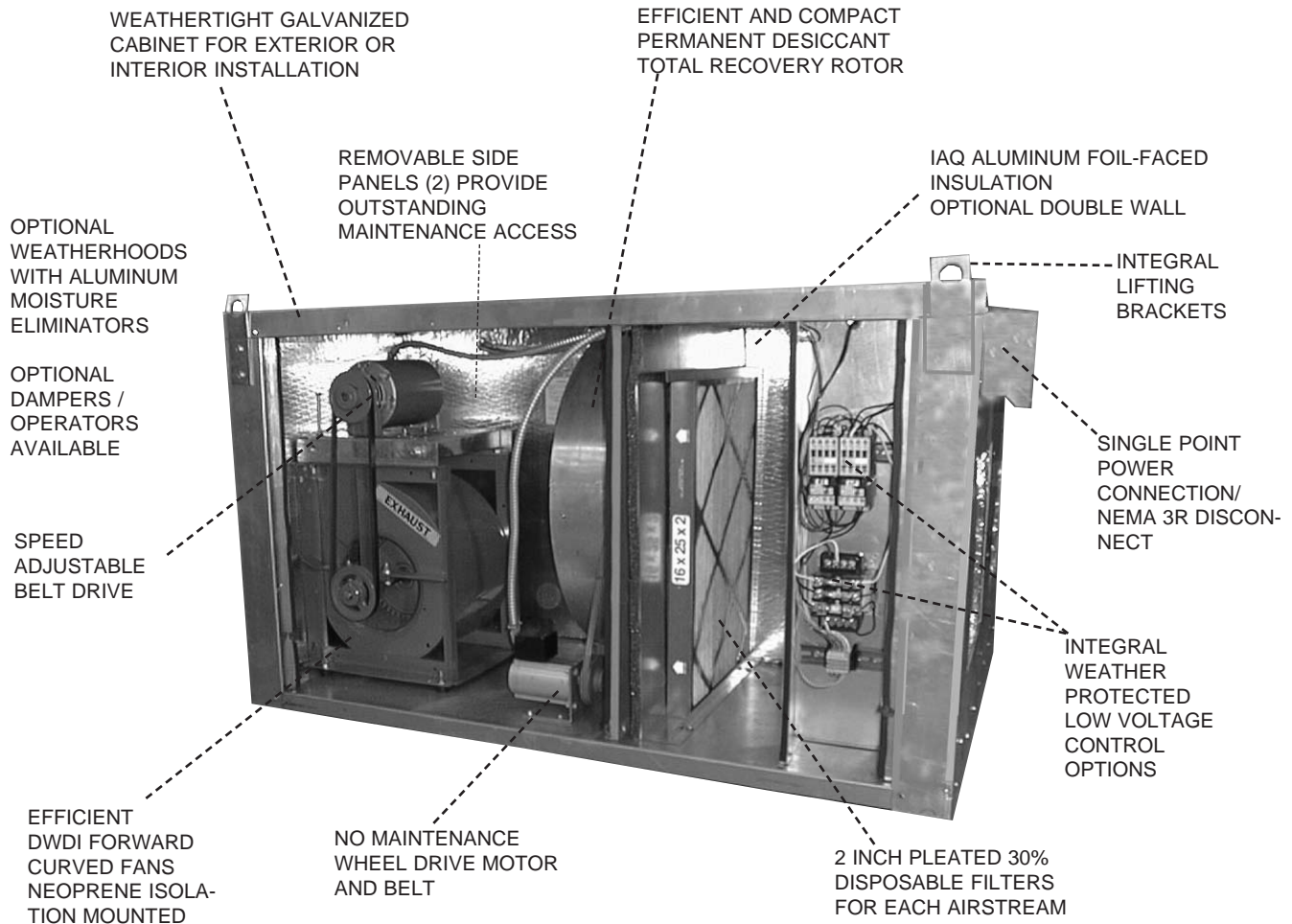
cooling mode for economizer operation using either outside air temperature or enthalpy set-points. Drain pans and associated field plumbing are not required as all moisture is transferred in the air streams without condensation.

The recovery wheel is self cleaning. Because the wheel alternates between opposite direction supply and exhaust air streams, any particulate matter too large to pass through the wheel corrugations will be removed by the opposite airstream. Disposable 2" pleated filters are standard.

RECOVERY VENTILATOR

WE SIZES 01 - 03

300 to 2,800 CFM — Up To 1.5 Inch w.g. E. S. P. — Compatible with all Energy Management Systems!



Model WE_C Energy Recovery Ventilator

CONSTRUCTION DETAILS

A variety of standard duct orientations make this product suitable for new or retrofit construction wherever supply and exhaust ductwork can be co-located. Units can be exterior or interior mounted. Standard unit construction is galvanized steel mill finish exterior.

Installation options include:

* Independent fresh air ventilation. This method provides constant quantities of fresh outside air to each space independent of variable heating and

cooling requirements. This technique provides assurance of fresh air ventilation goals without regard to variable room heating and cooling loads.

* Integrated with an existing or new duct system. This configuration intercepts room exhaust and preconditions fresh air supplied to a system air handler, rooftop unit or similar system device. Outside air is delivered to the air handler at near room neutral conditions of temperature and humidity.

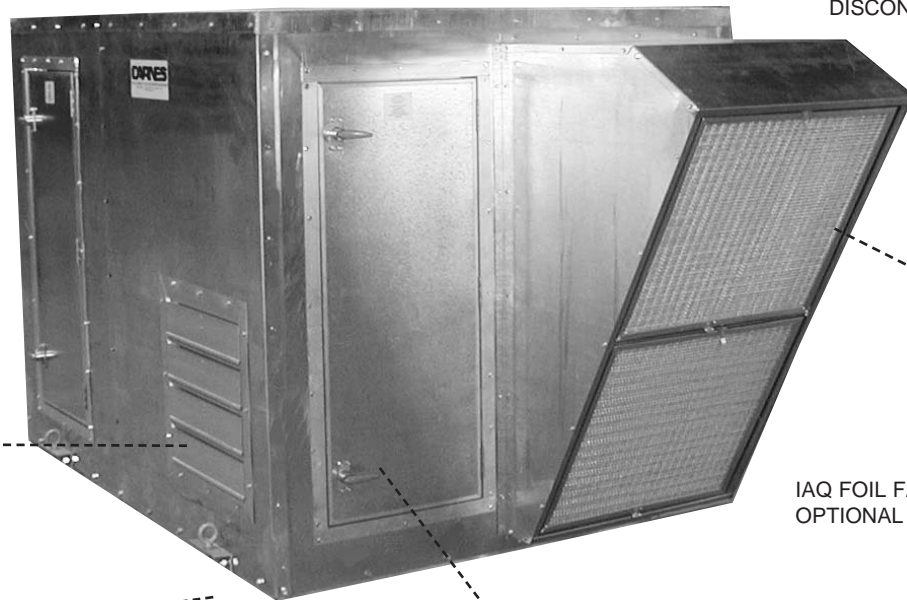
RECOVERY VENTILATOR

WE SIZES 04 - 08

1,600 to 8,000 CFM — To 1.5 Inch w.g. E. S. P.

WEATHERPROOF HEAVY GAUGE GALVANIZED CABINET FOR EXTERIOR OR INTERIOR INSTALLATION

SINGLEPOINT POWER CONNECTION/NEMA 3R DISCONNECT



STANDARD EXHAUST GBD OPTIONAL MOTORIZED DAMPERS

OPTIONAL WEATHERHOOD WITH ALUMINUM MOISTURE ELIMINATORS

IAQ FOIL FACED INSULATION OPTIONAL DOUBLE WALL

INTEGRAL LIFTING LUGS

EFFICIENT DWDI FORWARD CURVED FANS NEOPRENE MOUNTED ON ISOLATION RAILS. BELT DRIVE WITH ADJUSTABLE SHEAVES.

HINGED DOUBLE WALL ACCESS DOORS FOR EASY ACCESS TO BLOWERS, WHEEL, AND FILTERS

Model WE_C Energy Recovery Ventilator

UNIT SELECTION PROCEDURE

Carnes provides equipment selection and performance calculation software for the Energy Recovery Ventilators (Energy-C-Lect). This powerful tool is the simplest and fastest way to perform energy recovery performance, unit selection, and submittals. The latest Energy-C-Lect version is available upon request from the Carnes website.

The following manual selection guidelines are provided primarily so that you may understand the underlying assumptions and calculations behind the selection software. Use Energy-C-Lect for actual unit selection, performance, and submittals.

1. Determine the type of recovery media required. Total recovery (sensible + latent transfer) is recommended for most HVAC comfort to comfort ventilation applications to gain the maximum benefit for precooling. Sensible only media is required only where moisture transfer is not desired, such as heating only ventilation, or where the climate is so dry there is no air conditioning benefit. Under normal circum-

stances total recovery media will not result in condensation within the cabinet. However, a sensible recovery unit may experience condensation, and requires proper consideration of possible air conditions to minimize liquid water formation. Cabinet drains are available only on Model WM MiniSystems.

2. Determine the minimum unit size from the Performance Data Charts that provides the required airflow at the design external static pressure, and the desired wheel efficiency. Determine the desired horsepower for each fan. Note the drive range selection for the Product Identifier Description.
3. Determine the desired duct configuration for unit arrangement. Check for compliance with any dimensional limitations. Verify minimum clearance on unit sides for filter and service access. Special duct configurations are available only on Model WM MiniSystems.
4. Select the desired options and accessories for the installation.

FROST CONSIDERATIONS

Frost formation on energy recovery devices is a function primarily of outside air temperature (O.A.T.) and return air relative humidity (%RH). Typical frost formation temperatures with total recovery media range from 0 to 15 Degrees F. O.A.T. Frost control is not normally required if outside air temperatures are not less than 15 Degrees F. more than a few hours per year.

Sensible only media may frost and condense at much higher temperatures. Consult Energy-C-Lect to determine expected condensation and frost temperatures and determine a suitable control strategy.

Consider the following factors to decide which option is most suited to the application utilizing total recovery media.

Unit On/Off Frost Control shuts the unit off whenever the outside air temperature falls below an adjustable setpoint temperature. The unit returns to normal operation when the outside tem-

perature rises above the setpoint. This option is suitable for climates with limited hours below 0 Degrees F., and such that supply air is not required during those hours. Buildings occupied during daytime only may experience such low temperatures for very limited times when occupied.

Exhaust Only Defrost shuts off the supply blower for a customer adjustable interval when frost is detected on the wheel to defrost the wheel with warm exhaust air, then restarts the supply air blower. The defrost cycle only occurs when frost is detected, and thus minimizes supply air shutoff. This option is suitable for applications where momentary stoppages of supply air are acceptable, and where temperatures are below 15 Degrees F. for extended occupied periods.

Electric Preheat is suitable where temperatures will be below 15 Degrees F. for extended periods of occupied time and supply air must be continuously provided. An electric coil is provided to heat

FROST CONSIDERATIONS

outside air above the expected frost temperature via a customer adjustable temperature setpoint. Independent mounting support at supply air inlet to be provided by others. A separate power circuit may be required. Optional ETL Listing is not avail-

able.

Typical preheat design temperature rises are less than 20OF, with relatively low initial and operating expense in most climates.

OPTIONS

• WHEEL MEDIA OPTIONS

Sensible Only Wheel Media Model WEBC uncoated aluminum wheel media is available for applications in which moisture transfer is not desired. Most comfort to comfort HVAC applications provide the greatest savings with total recovery media.

Acrylic Coating is recommended for coastal or salt air environments. Available for total recovery (sensible & latent) (Model WEFC) and for sensible only (WEDC).

Epoxy Edge Coating on the recovery media for additional corrosion protection from coastal or salt air is available.

• WHEEL CONTROLS

Constant Speed Drive Wheel continuously operates at constant speed. An external on/off wheel control circuit is supplied.

Temperature Controlled Economizer Mode Adjustable temperature actuated thermostats operate wheel for heating and cooling, and stop wheel for "free cooling" economizer mode. Most appropriate for low humidity climates.

Enthalpy Controlled Economizer Mode Adjustable enthalpy controller operates wheel for cooling, and stops wheel for economizer mode. Ideal for use in high humidity climates where latent recovery is the major contributor to total energy savings. Override circuit for heating mode is

required.

• UNIT OPTIONS

Double Wall Construction securely isolates insulation to prevent damage and air supply contamination.

Dirty Filter Sensors provide adjustable setpoint pressure drop indication for supply and exhaust air streams.

Rotation Detector provides output signal for remote alarm (by others) upon rotation failure.

ETL Listing Available listing shows tests for conformity to UL Standard 1812, and certification to CAN/CSA C22.2 No. 236.

7-Day Programmable Time Clock

Remote Panel with customer selected display is available to be field installed and wired.

Security Cables are available on Sizes 01-03 to prevent loss or damage to access panels.

Painted Cabinets are available to match existing building equipment.

Air Flow Monitor Gage allows reading of actual supply or return airflow at the unit.

• EXTENDED WARRANTIES

- Optional mechanical only extended warranties are available for up to 5 years from shipment.

- Available on rotor only, or on unit and rotor.

ACCESSORIES

• DAMPERS

- Gravity backdraft dampers for both outside air and exhaust opening.

- Motorized supply damper with gravity damper on

exhaust.

- Motorized supply and exhaust damper.

- On unit sizes 01-03, dampers will be mounted in the weatherhoods or in external duct sleeves.

ACCESSORIES

- On unit sizes 04-08, motorized supply and exhaust will have motorized outside and return air dampers and GBD exhaust damper.

• **WEATHERHOODS**

- Galvanized steel weatherhoods are available. Outside air intakes are complete with aluminum

moisture eliminators.

• **ROOF CURBS**

- Prefabricated roof curbs of galvanized or galvalume construction with fiberglass insulation are available in 8 inch and 14 inch heights for outdoor installation. Other curb heights are available.

PERFORMANCE DATA

WE_C 01 (300 to 700 CFM)

EXTERNAL STATIC PRESS, INCH W. G. (Pa)



RECOVERY VENTILATOR

CFM (L/s)		0.000 (0)	0.125 (31)	0.250 (62)	0.375 (93)	0.500 (124)	0.750 (186)	1.000 (249)	1.250 (311)	Wheel Efficiency
300 (142)	RPM					1,275				85%
	BHP					0.12				
	[KW]					[0.09]				
400 (189)	RPM	1,111	1,172	1,240	1,317	1,402	1,592	1,782	1,949	83%
	BHP	0.12	0.13	0.15	0.17	0.19	0.23	0.32	0.39	
	[KW]	[0.09]	[0.10]	[0.11]	[0.13]	[0.14]	[0.17]	[0.24]	[0.29]	
500 (236)	RPM	1,392	1,442	1,483	1,545	1,605	1,734	1,879	2,040	81%
	BHP	0.24	0.25	0.26	0.28	0.30	0.34	0.41	0.52	
	[KW]	[0.18]	[0.19]	[0.19]	[0.21]	[0.22]	[0.25]	[0.31]	[0.39]	
600 (283)	RPM	1,669	1,708	1,753	1,789	1,836	1,939	2,041	2,160	79%
	BHP	0.41	0.42	0.43	0.45	0.48	0.53	0.58	0.67	
	[KW]	[0.31]	[0.31]	[0.32]	[0.34]	[0.36]	[0.40]	[0.43]	[0.50]	
700 (330)	RPM	1,947	1,981	2,021	2,053	2,084				77%
	BHP	0.65	0.66	0.68	0.69	0.71				
	[KW]	[0.48]	[0.49]	[0.51]	[0.51]	[0.53]				

PERFORMANCE DATA



WE_C 02 (600 to 1,700 CFM)

RECOVERY VENTILATOR

EXTERNAL STATIC PRESS, INCH W. G. (Pa)

CFM (L/s)		0.000 (0)	0.125 (31)	0.250 (62)	0.375 (93)	0.500 (124)	0.750 (186)	1.000 (249)	1.250 (311)	1.500 (373)	Wheel Efficiency
600 (283)	RPM				988	1,081					85%
	BHP				0.20	0.25					
	[KW]				[0.15]	[0.19]					
700 (330)	RPM			958	1,052	1,097	1,346				84%
	BHP			0.21	0.25	0.27	0.43				
	[KW]			[0.15]	[0.19]	[0.20]	[0.32]				
800 (378)	RPM		943	1,040	1,087	1,156	1,397	1,510	1,606	1,707	83%
	BHP		0.21	0.26	0.29	0.34	0.50	0.62	0.71	0.83	
	[KW]		[0.16]	[0.20]	[0.22]	[0.25]	[0.37]	[0.46]	[0.53]	[0.62]	
900 (425)	RPM	938	1,034	1,083	1,146	1,223	1,450	1,544	1,650	1,751	82%
	BHP	0.25	0.29	0.32	0.36	0.42	0.59	0.71	0.82	0.94	
	[KW]	[0.19]	[0.22]	[0.24]	[0.27]	[0.32]	[0.28]	[0.53]	[0.61]	[0.70]	
1,000 (472)	RPM	1,043	1,085	1,147	1,220	1,294	1,504	1,589	1,696	1,796	81%
	BHP	0.34	0.36	0.39	0.44	0.52	0.69	0.81	0.94	1.07	
	[KW]	[0.26]	[0.27]	[0.29]	[0.33]	[0.39]	[0.52]	[0.60]	[0.70]	[0.80]	
1,100 (519)	RPM	1,089	1,159	1,233	1,300	1,334	1,538	1,640	1,743		80%
	BHP	0.40	0.45	0.51	0.57	0.60	0.81	0.93	1.07		
	[KW]	[0.30]	[0.34]	[0.38]	[0.43]	[0.45]	[0.60]	[0.70]	[0.80]	[0.80]	
1,200 (566)	RPM	1,173	1,248	1,309	1,340	1,395	1,588	1,695	1,794		79%
	BHP	0.50	0.57	0.63	0.65	0.70	0.88	1.08	1.22		
	[KW]	[0.38]	[0.42]	[0.47]	[0.48]	[0.52]	[0.67]	[0.80]	[0.91]		
1,300 (614)	RPM	1,271	1,319	1,347	1,409	1,471	1,649	1,751			78%
	BHP	0.63	0.69	0.70	0.77	0.83	0.99	1.12			
	[KW]	[0.47]	[0.51]	[0.52]	[0.57]	[0.62]	[0.74]	[0.84]			
1,400 (661)	RPM	1,331	1,373	1,427	1,488	1,524	1,714	1,809			77%
	BHP	0.75	0.79	0.85	0.92	0.97	1.24	1.31			
	[KW]	[0.56]	[0.59]	[0.63]	[0.68]	[0.72]	[0.92]	[0.98]			
1,500 (708)	RPM	1,404	1,464	1,507	1,533	1,574	1,780				76%
	BHP	0.89	0.96	1.02	1.06	1.12	1.39				
	[KW]	[0.66]	[0.72]	[0.76]	[0.79]	[0.83]	[1.03]				
1,600 (755)	RPM	1,497	1,523	1,548	1,598	1,651	1,753				75%
	BHP	0.97	1.12	1.16	1.23	1.31	1.44				
	[KW]	[0.72]	[0.84]	[0.87]	[0.92]	[0.98]	[1.07]				
1,700 (802)	RPM	1,538	1,577	1,630	1,680	1,728					74%
	BHP	1.21	1.27	1.37	1.45	1.53					
	[KW]	[0.90]	[0.95]	[1.02]	[1.08]	[1.14]					

PERFORMANCE DATA

WE_C 03 (1,200 to 2,800 CFM)



EXTERNAL STATIC PRESS, INCH W. G. (Pa)

CFM (L/s)		0.000 (0)	0.125 (31)	0.250 (62)	0.375 (93)	0.500 (124)	0.750 (186)	1.000 (249)	1.250 (311)	1.500 (373)	Wheel Efficiency
1,200 (566)	RPM			672	796	818					84%
	BHP			0.25	0.32	0.40					
	[KW]			[0.19]	[0.24]	[0.30]					
1,400 (661)	RPM		660	735	803	865	986				83%
	BHP		0.29	0.36	0.41	0.51	0.69				
	[KW]		[0.21]	[0.27]	[0.30]	[0.38]	[0.52]				
1,600 (755)	RPM	662	734	800	863	922	1,019	1,115			82%
	BHP	0.36	0.42	0.48	0.58	0.64	0.82	1.02			
	[KW]	[0.27]	[0.31]	[0.36]	[0.44]	[0.48]	[0.61]	[0.76]			
1,800 (850)	RPM	745	809	869	927	982	1,048	1,147			81%
	BHP	0.51	0.59	0.67	0.74	0.83	0.93	1.12			
	[KW]	[0.38]	[0.44]	[0.50]	[0.55]	[0.62]	[0.70]	[0.84]			
2,000 (944)	RPM	827	886	941	993	1,023	1,100	1,183	1,261		80%
	BHP	0.70	0.76	0.85	0.96	1.02	1.14	1.34	1.46		
	[KW]	[0.52]	[0.57]	[0.63]	[0.72]	[0.76]	[0.85]	[1.00]	[1.09]		
2,200 (1,038)	RPM	910	963	1,007	1,031	1,060	1,152	1,228	1,307	1,383	79%
	BHP	0.92	1.00	1.08	1.14	1.18	1.37	1.60	1.62	2.00	
	[KW]	[0.69]	[0.75]	[0.80]	[0.85]	[0.88]	[1.02]	[1.19]	[1.21]	[1.49]	
2,400 (1,133)	RPM	993	1,020	1,042	1,080	1,124	1,198	1,280	1,358		78%
	BHP	1.20	1.25	1.27	1.36	1.46	1.71	1.93	2.13		
	[KW]	[0.90]	[0.93]	[0.95]	[1.01]	[1.09]	[1.27]	[1.44]	[1.59]		
2,600 (1,227)	RPM	1,036	1,067	1,107	1,150	1,179	1,255	1,336			77%
	BHP	1.40	1.43	1.57	1.67	1.76	2.01	2.29			
	[KW]	[1.04]	[1.07]	[1.17]	[1.25]	[1.31]	[1.50]	[1.71]			
2,800 (1,321)	RPM	1,101	1,143	1,170	1,197	1,236	1,316	1,391			76%
	BHP	1.68	1.79	1.90	1.99	2.11	2.38	2.69			
	[KW]	[1.26]	[1.34]	[1.41]	[1.48]	[1.57]	[1.78]	[2.00]			

RECOVERY VENTILATOR

PERFORMANCE DATA

WE_C 04 (1,550 to 4,100 CFM)



EXTERNAL STATIC PRESS, INCH W. G. (Pa)

RECOVERY VENTILATOR

CFM (L/s)		0.000 (0)	0.125 (31)	0.250 (62)	0.375 (93)	0.500 (124)	0.750 (186)	1.000 (249)	1.250 (311)	1.500 (373)	Wheel Efficiency
1,544 (729)	RPM	619	686	743	801						83%
	BHP	0.25	0.29	0.33	0.37						
	[KW]	[0.19]	[0.22]	[0.25]	[0.28]						
1,758 (830)	RPM	677	733	791	840	892					82%
	BHP	0.35	0.39	0.44	0.48	0.53					
	[KW]	[0.26]	[0.29]	[0.33]	[0.36]	[0.40]					
1,971 (930)	RPM	726	778	832	879	928	1,016				81%
	BHP	0.46	0.51	0.56	0.61	0.66	0.77				
	[KW]	[0.34]	[0.38]	[0.42]	[0.45]	[0.49]	P0.57]				
2,185 (1,031)	RPM	769	828	868	913	960	1,044	1,124			80%
	BHP	0.59	0.65	0.70	0.76	0.81	0.93	1.04			
	[KW]	[0.44]	[0.48]	[0.52]	[0.57]	[0.60]	[0.69]	[0.78]			
2,375 (1,121)	RPM	813	859	907	950	994	1,076	1,152	1,224		79%
	BHP	0.73	0.79	0.85	0.91	0.97	1.09	1.22	1.34		
	[KW]	[0.54]	[0.59]	[0.63]	[0.66]	[0.72]	[0.81]	[0.91]	[1.00]		
2,556 (1,206)	RPM	850	899	941	985	1,024	1,103	1,177	1,247	1,314	78%
	BHP	0.88	0.95	1.01	1.08	1.14	1.27	1.40	1.53	1.66	
	[KW]	[0.66]	[0.71]	[0.75]	[0.81]	[0.85]	[0.95]	[1.04]	[1.14]	[1.24]	
2,746 (1,296)	RPM	888	933	974	1,016	1,054	1,130	1,202	1,271	1,336	77%
	BHP	1.04	1.12	1.19	1.26	1.33	1.47	1.61	1.75	1.89	
	[KW]	[0.78]	[0.84]	[0.89]	[0.94]	[0.99]	[1.10]	[1.20]	[1.30]	[1.41]	
2,921 (1,379)	RPM	921	961	1,003	1,042	1,081	1,155	1,225	1,291	1,355	76%
	BHP	1.21	1.29	1.37	1.44	1.52	1.67	1.81	1.96	2.11	
	[KW]	[0.90]	[0.96]	[1.02]	[1.07]	[1.13]	[1.25]	[1.35]	[1.46]	[1.57]	
3,088 (1,457)	RPM	962	1,000	1,041	1,078	1,116	1,187	1,254	1,335	1,386	75%
	BHP	1.40	1.49	1.57	1.665	1.74	1.89	2.05	2.20	2.36	
	[KW]	[1.04]	[1.11]	[1.17]	[1.23]	[1.30]	[1.41]	[1.53]	[1.64]	[1.76]	
3,240 (1,529)	RPM	986	1,026	1,02	1,101	1,136	1,205	1,271	1,335	1,396	74%
	BHP	1.57	1.66	1.75	1.84	1.92	2.09	2.25	2.42	2.58	
	[KW]	[1.17]	[1.24]	[1.30]	[1.37]	[1.43]	[1.56]	[1.68]	[1.80]	[1.92]	
3,406 (1,607)	RPM	1,026	1,061	1,098	1,133	1,169	1,236	1,301	1,363	1,422	73%
	BHP	1.79	1.88	1.98	2.07	2.17	2.35	2.52	2.69	2.86	
	[KW]	[1.33]	[1.40]	[1.48]	[1.54]	[1.62]	[1.75]	[1.88]	[2.01]	[2.13]	
3,577 (1,688)	RPM	1,062	1,098	1,132	1,167	1,199	1,265	1,328	1,388	1,446	72%
	BHP	2.03	2.14	2.23	2.33	2.43	2.62	2.80	2.99	3.16	
	[KW]	[1.51]	[1.60]	[1.66]	[1.74]	[1.81]	[1.95]	[2.09]	[2.23]	[2.36]	
3,753 (1,771)	RPM	1,100	1,132	1,167	1,198	1,232	1,296	1,357	1,416	1,473	71%
	BHP	2.31	2.40	2.51	2.61	2.72	2.92	3.12	3.31	3.50	
	[KW]	[1.72]	[1.79]	[1.87]	[1.95]	[2.03]	[2.18]	[2.33]	[2.47]	[2.61]	
3,938 (1,859)	RPM	1,128	1,161	1,191	1,225	1,254	1,316	1,377	1,434	1,490	70%
	BHP	2.58	2.69	2.79	2.90	3.01	3.22	3.44	3.64	3.84	
	[KW]	[1.92]	[2.01]	[2.08]	[2.16]	[2.24]	[2.40]	[2.57]	[2.71]	[2.86]	
4,104 (1,937)	RPM	1,153	1,182	1,213	1,243	1,274	1,334	1,393	1,450	1,505	69%
	BHP	2.84	2.94	3.05	3.16	3.28	3.50	3.73	3.95	4.16	
	[KW]	[2.12]	[2.19]	[2.27]	[2.36]	[2.45]	[2.61]	[2.78]	[2.95]	[3.10]	

PERFORMANCE DATA

WE_C 06 (2,450 to 6,200 CFM)



EXTERNAL STATIC PRESS, INCH W. G. (Pa)

CFM (L/s)		0.000 (0)	0.125 (31)	0.250 (62)	0.375 (93)	0.500 (124)	0.750 (186)	1.000 (249)	1.250 (311)	1.500 (373)	Wheel Efficiency
2,438 (1,151)	RPM	503	552	594	638						83%
	BHP	0.40	0.47	0.53	0.60						
	[KW]	[0.30]	[0.36]	[0.40]	[0.45]						
2,775 (1,310)	RPM	543	595	637	674	713					82%
	BHP	0.55	0.63	0.70	0.78	0.86					
	[KW]	[0.41]	[0.47]	[0.52]	[0.58]	[0.64]					
3,113 (1,469)	RPM	595	633	672	706	743	809				81%
	BHP	0.73	0.81	0.89	0.97	1.06	1.24				
	[KW]	[0.54]	[0.60]	[0.66]	[0.72]	[0.79]	[0.92]				
3,450 (1,628)	RPM	638	673	709	742	776	839	898			80%
	BHP	0.94	1.03	1.12	1.21	1.31	1.50	1.69			
	[KW]	[0.70]	[0.77]	[0.84]	[0.90]	[0.98]	[1.12]	[1.26]			
3,750 (1,770)	RPM	675	708	742	773	805	865	922	977		79%
	BHP	1.16	1.25	1.35	1.44	1.55	1.75	1.96	2.18		
	[KW]	[0.87]	[0.93]	[1.01]	[1.07]	[1.16]	[1.30]	[1.46]	[1.63]		
4,035 (1,904)	RPM	708	742	772	804	832	889	944	997	1,048	78%
	BHP	1.38	1.49	1.59	1.70	1.80	2.02	2.24	2.47	2.70	
	[KW]	[1.03]	[1.11]	[1.19]	[1.27]	[1.34]	[1.51]	[1.67]	[1.84]	[2.01]	
4,335 (2,046)	RPM	743	775	804	835	862	917	969	1,020	1,069	77%
	BHP	1.65	1.77	1.87	1.99	2.10	2.33	2.57	2.80	3.05	
	[KW]	[1.23]	[1.32]	[1.39]	[1.48]	[1.57]	[1.74]	[1.92]	[2.09]	[2.27]	
4,613 (2,177)	RPM	779	808	838	866	893	945	996	1,045	1,092	76%
	BHP	1.95	2.06	2.18	2.30	2.42	2.66	2.91	3.16	3.42	
	[KW]	[1.45]	[1.54]	[1.63]	[1.72]	[1.80]	[1.98]	[2.17]	[2.36]	[2.55]	
4,875 (2,301)	RPM	812	839	868	893	921	972	1,021	1,068	1,114	75%
	BHP	2.25	2.36	2.49	2.61	2.74	3.00	3.26	3.52	3.79	
	[KW]	[1.68]	[1.76]	[1.86]	[1.95]	[2.04]	[2.24]	[2.43]	[2.62]	[2.83]	
5,115 (2,414)	RPM	838	866	892	919	944	993	1,041	1,087	1,131	74%
	BHP	2.53	2.66	2.79	2.92	3.05	3.32	3.59	3.86	4.13	
	[KW]	[1.89]	[1.98]	[2.08]	[2.18]	[2.27]	[2.48]	[2.68]	[2.88]	[3.08]	
5,378 (2,538)	RPM	871	897	923	948	973	1,021	1,067	1,112	1,155	73%
	BHP	2.89	3.02	3.16	3.29	3.44	3.71	4.00	4.28	4.57	
	[KW]	[2.16]	[2.25]	[2.36]	[2.45]	[2.57]	[2.77]	[2.98]	[3.19]	[3.41]	
5,648 (2,666)	RPM	904	931	955	980	1,003	1,049	1,093	1,137	1,179	72%
	BHP	3.29	3.44	3.57	3.72	3.86	4.15	4.44	4.74	5.04	
	[KW]	[2.45]	[2.57]	[2.66]	[2.77]	[2.88]	[3.09]	[3.31]	[3.53]	[3.76]	
5,925 (2,796)	RPM	939	963	988	1,010	1,034	1,079	1,122	1,164		71%
	BHP	3.74	3.88	4.04	4.18	4.34	4.64	4.95	5.26		
	[KW]	[2.79]	[2.89]	[3.01]	[3.12]	[3.24]	[3.46]	[3.69]	[3.92]		
6,218 (2,935)	RPM	965	989	1,011	1,035	1,057	1,100	1,143	1,183		70%
	BHP	4.19	4.35	4.50	4.66	4.81	5.13	5.44	5.76		
	[KW]	[3.12]	[3.24]	[3.36]	[3.47]	[3.59]	[3.83]	[4.06]	[4.30]		
6,480 (3,058)	RPM	991	1,013	1,036	1,057	1,080	1,122	1,162			69%
	BHP	4.63	4.79	4.96	5.11	5.28	5.61	5.93			
	[KW]	[3.45]	[3.57]	[3.70]	[3.81]	[3.94]	[4.18]	[4.42]			

RECOVERY VENTILATOR

PERFORMANCE DATA

WE_c 08 (3,000 to 8,000 CFM)



EXTERNAL STATIC PRESS, INCH W. G. (Pa)

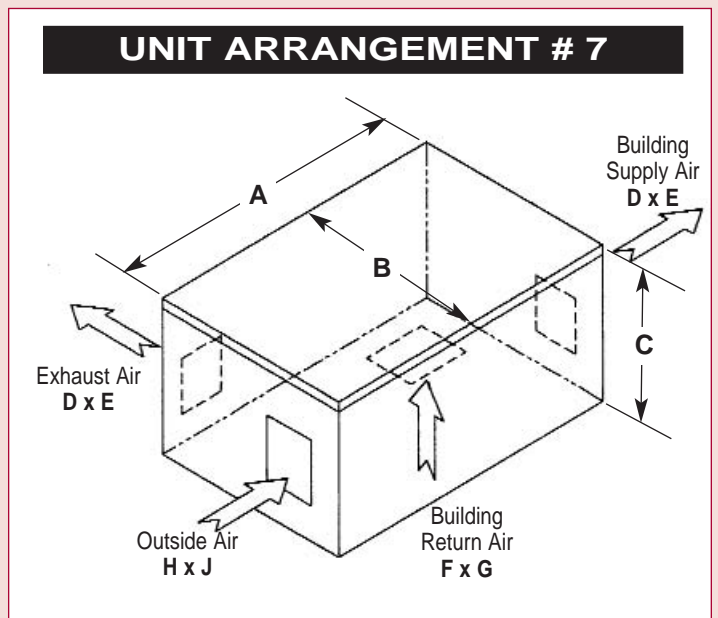
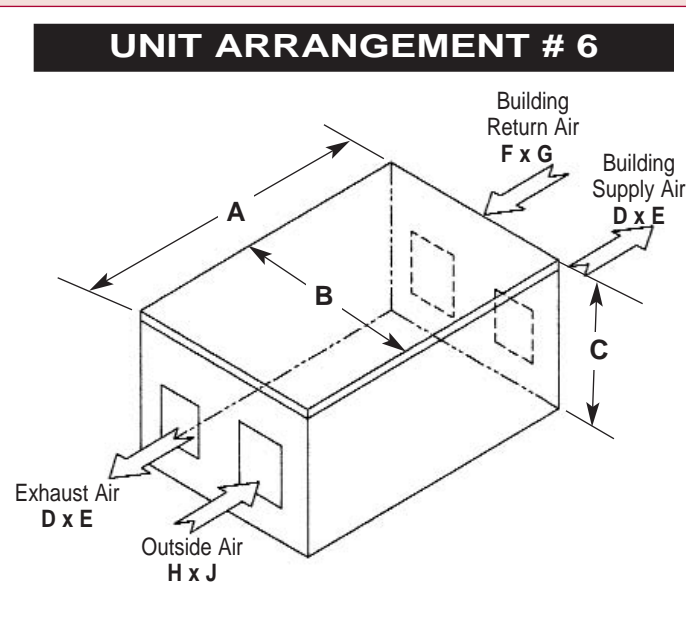
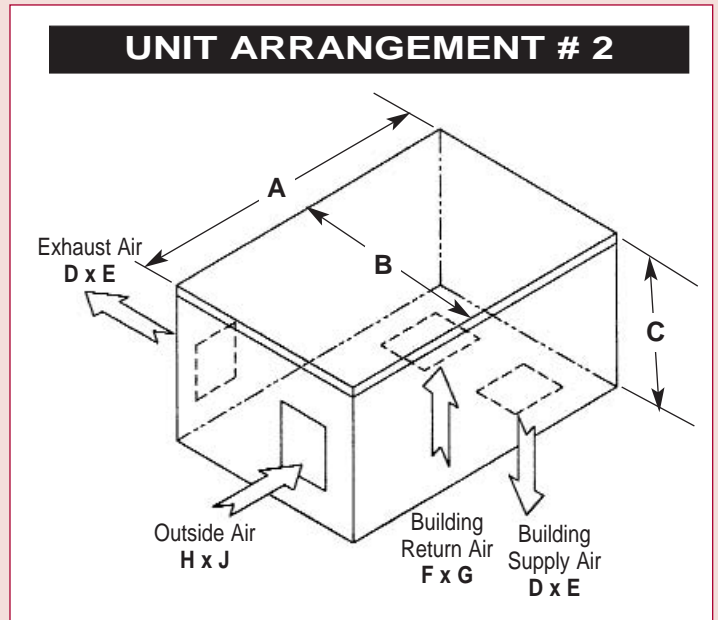
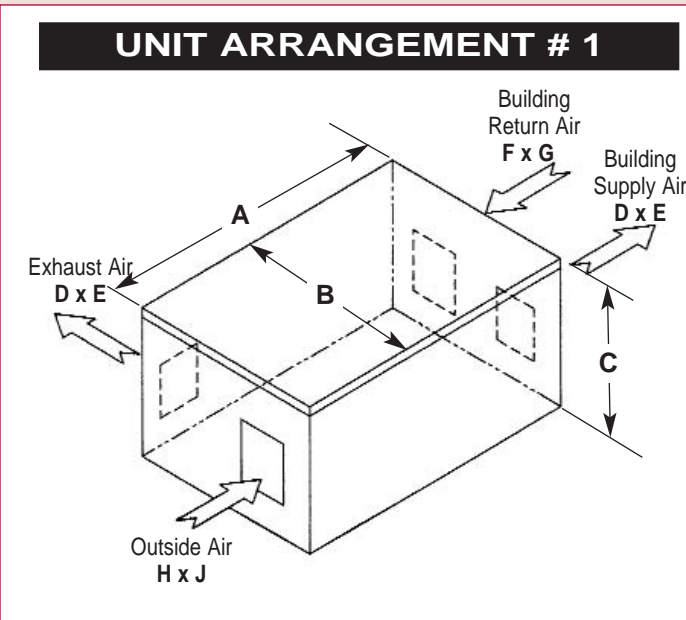
RECOVERY VENTILATOR

CFM (L/s)		0.000 (0)	0.125 (31)	0.250 (62)	0.375 (93)	0.500 (124)	0.750 (186)	1.000 (249)	1.250 (311)	1.500 (373)	Wheel Efficiency
3,023 (1,427)	RPM	438	484	523							83%
	BHP	0.47	0.56	0.64							
	[KW]	[0.35]	[0.42]	[0.48]							
3,441 (1,624)	RPM	480	521	558	595						82%
	BHP	0.64	0.74	0.84	.095						
	[KW]	[0.48]	[0.55]	[0.63]	[0.71]						
3,860 (1,822)	RPM	513	551	585	620	651					81%
	BHP	0.84	0.95	1.05	1.17	1.28					
	[KW]	[0.63]	[0.71]	[0.78]	[0.87]	[0.95]					
4,278 (2,019)	RPM	545	581	612	645	675	733				80%
	BHP	1.06	1.18	1.29	1.42	1.53	1.79				
	[KW]	[0.79]	[0.88]	[0.96]	[1.06]	[1.14]	[1.33]				
4,650 (2,195)	RPM	571	601	634	663	693	750	803			79%
	BHP	1.28	1.40	1.52	1.65	1.78	2.05	2.33			
	[KW]	[0.95]	[1.04]	[1.13]	[1.23]	[1.33]	[1.53]	[1.74]			
5,003 (2,361)	RPM	605	636	664	694	721	775	826	874		78%
	BHP	1.56	1.69	1.82	1.96	2.09	2.37	2.67	2.96		
	[KW]	[1.16]	[1.26]	[1.36]	[1.46]	[1.56]	[1.77]	[1.99]	[2.21]		
5,375 (2,537)	RPM	634	664	690	718	744	795	845	892	937	77%
	BHP	1.85	2.00	2.13	2.28	2.42	2.72	3.02	3.34	3.66	
	[KW]	[1.38]	[1.49]	[1.59]	[1.70]	[1.80]	[2.03]	[2.25]	[2.49]	[2.73]	
5,720 (2,670)	RPM	662	690	715	742	767	816	863	909	953	76%
	BHP	2.17	2.31	2.46	2.61	2.76	3.07	3.39	3.72	4.06	
	[KW]	[1.62]	[1.72]	[1.83]	[1.95]	[2.06]	[2.29]	[2.53]	[2.77]	[3.03]	
6,045 (2,853)	RPM	691	717	742	767	791	838	884	928	971	75%
	BHP	2.50	2.66	2.81	2.97	3.12	3.45	3.78	4.13	4.48	
	[KW]	[1.86]	[1.98]	[2.10]	[2.21]	[2.33]	[2.57]	[2.82]	[3.08]	[3.34]	
6,343 (2,994)	RPM	712	738	761	786	809	855	899	942	984	74%
	BHP	2.81	2.98	3.13	3.30	3.46	3.79	4.14	4.49	4.86	
	[KW]	[2.10]	[2.22]	[2.33]	[2.46]	[2.58]	[2.83]	[3.09]	[3.35]	[3.62]	
6,668 (3,147)	RPM	740	763	787	809	832	877	920	962	1,002	73%
	BHP	3.21	3.37	3.54	3.70	3.88	4.23	4.59	4.95	5.33	
	[KW]	[2.39]	[2.51]	[2.64]	[2.76]	[2.89]	[3.15]	[3.42]	[3.69]	[3.97]	
7,003 (3,305)	RPM	765	789	811	834	855	897	939	979	1,019	72%
	BHP	3.63	3.81	3.98	4.16	4.33	4.69	5.06	5.44	5.83	
	[KW]	[2.71]	[2.84]	[2.97]	[3.10]	[3.23]	[3.50]	[3.77]	[4.06]	[4.35]	
7,347 (3,467)	RPM	792	813	836	857	878	920	960	999	1,037	71%
	BHP	4.11	4.28	4.47	4.64	4.84	5.21	5.59	5.99	6.39	
	[KW]	[3.06]	[3.19]	[3.33]	[3.46]	[3.61]	[3.89]	[4.17]	[4.47]	[4.77]	
7,710 (3,639)	RPM	816	836	858	878	899	939	970	1,016	1,053	70%
	BHP	4.61	4.79	4.99	5.17	5.37	5.76	6.08	6.56	6.98	
	[KW]	[3.44]	[3.57]	[3.72]	[3.86]	[4.00]	[4.30]	[4.53]	[4.89]	[5.20]	
8,035 (3,792)	RPM	838	860	879	900	919	958	996	1,033		69%
	BHP	5.11	5.31	5.5	5.7	5.89	6.30	6.71	7.12		
	[KW]	[3.81]	[3.96]	[4.10]	[4.25]	[4.39]	[4.70]	[5.00]	[5.31]		

DIMENSIONS and WEIGHTS

SIZE	DIMENSIONS LISTED IN INCHES (In Millimeters)									HOOD LENGTH		WGT Lbs.(Kg)
	A	B	C	D	E	F	G	H	J	Intake	Exhaust	
01	46 (1168)	32 (813)	24 (610)	7-1/8 (181)	8-1/2 (216)	8 (203)	10 (254)	8 (203)	10 (254)	12-1/2 (318)	14-1/4 (362)	350 (159)
02	54 (1372)	46 (1168)	31-1/2 (800)	9-3/8 (238)	10-1/2 (267)	14 (356)	14 (356)	14 (356)	14 (356)	18-1/4 (464)	18-1/4 (464)	525 (238)
03	66 (1676)	54 (1372)	42 (1067)	12-1/2 (318)	13-3/4 (349)	18 (457)	18 (457)	18 (457)	18 (457)	21 (534)	20-1/4 (515)	775 (352)
04	72 (1829)	54 (1372)	55-1/2 (1410)	18 (457)	18 (457)	18 (457)	18 (457)	18 (457)	24 (610)	28-1/2 (724)	20-1/4 (514)	1400 (635)
06	80 (2032)	72 (1829)	67-1/2 (1715)	24 (610)	20 (508)	24 (610)	20 (508)	22 (559)	26 (660)	34-1/2 (876)	24-3/4 (629)	1900 (862)
08	87-1/2 (2223)	78 (1981)	72-1/2 (1842)	24 (610)	24 (610)	24 (610)	24 (610)	28 (711)	34 (864)	34-1/2 (876)	24-3/4 (629)	2400 (1089)

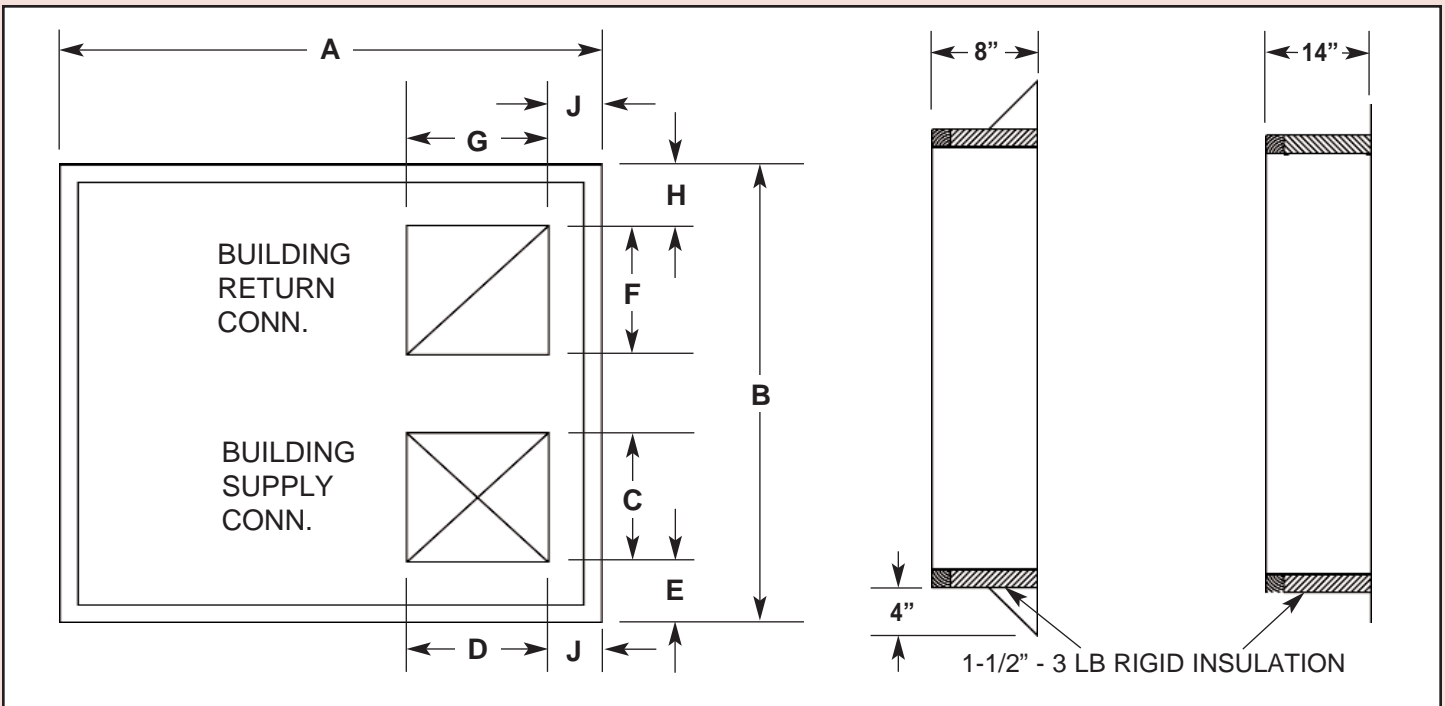
RECOVERY VENTILATOR



CURB & ROOF OPENING

RECOVERY VENTILATOR

DIMENSIONS LISTED IN INCHES (IN MILLIMETERS)									
SIZE	A	B	C	D	E	F	G	H	J
01	44 (1118)	30 (762)	7-1/8 (181)	8-1/2 (216)	3-1/8 (79)	8 (203)	10 (254)	5-3/8 (137)	2-1/4 (57)
02	52 (1321)	44 (1118)	9-1/2 (238)	10-1/2 (267)	5-7/8 (149)	14 (356)	14 (356)	6-1/4 (159)	2-1/4 (57)
03	64 (1626)	52 (1321)	12-1/2 (318)	13-3/4 (349)	7 (179)	18 (457)	18 (457)	6 (152)	2-1/4 (57)
04	69 (1753)	51 (1295)	18 (457)	18 (457)	3 (76)	18 (457)	18 (457)	3 (76)	
06	77 (1956)	69 (1753)	24 (610)	20 (508)	5 (127)	24 (610)	20 (508)	5 (127)	2-1/2 (64)
08	84-1/2 (2070)	75 (1905)	24 (610)	24 (610)	6-1/4 (159)	24 (610)	24 (610)	6-1/4 (159)	2-1/2 (64)

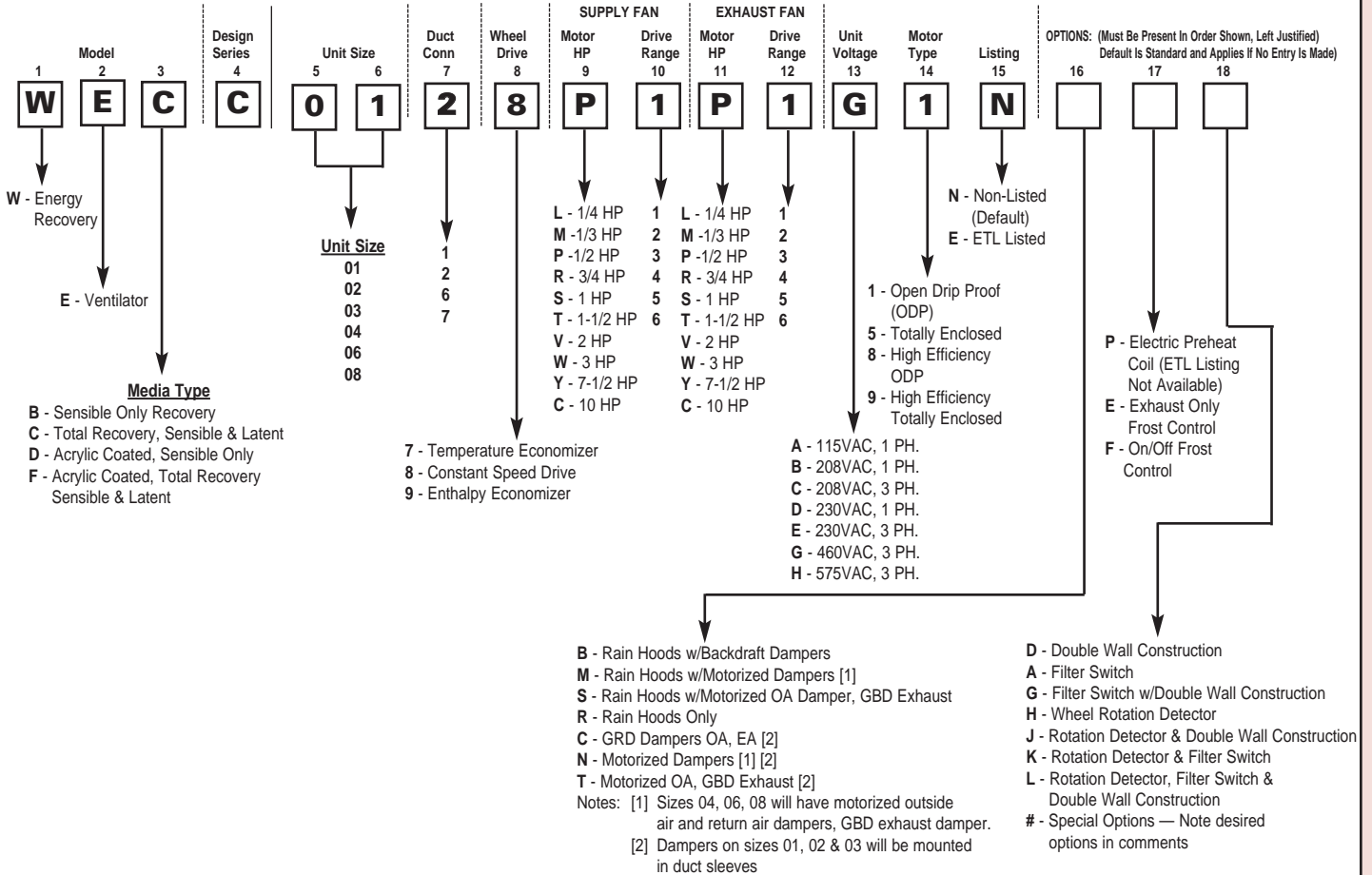


SIZE	SERVICE CLEARANCE		FILTERS QTY AND SIZE
	SUPPLY SIDE	EXHAUST	
01	32 (813)	30 (762)	2 - 12 x 20 x 2 (305 x 508 x 51)
02	46 (1168)	32 (813)	2 - 16 x 25 x 2 (406 x 635 x 51)
03	54 (1372)	42 (1067)	4 - 18 x 20 x 2 (457 x 508 x 51)
04	54 (1372)	42 (1067)	4 - 24 x 24 x 2 (610 x 610 x 51)
06	72 (1829)	42 (1067)	12 - 16 x 20 x 2 (406 x 508 x 51)
08	78 (1981)	42 (1067)	8 - 16 x 25 x 2 (406 x 635 x 51) 4 - 20 x 25 x 2 (508 x 635 x 51)

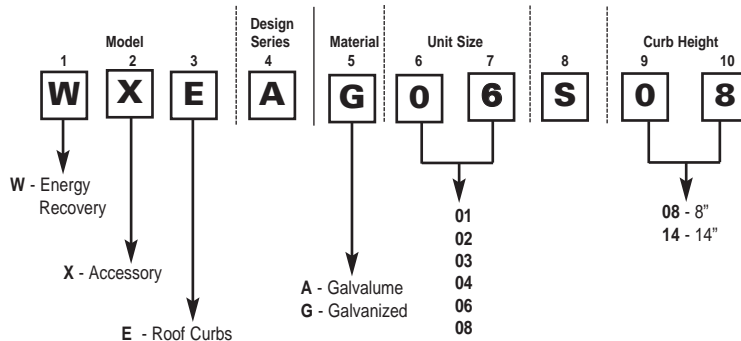
Integral Control Panel mounted inside return air plenum.

ORDERING INFORMATION

VENTILATORS



ROOF CURBS



TYPICAL SPECIFICATIONS

• GENERAL

Furnish and install where shown the Carnes Energy Recovery Ventilator, Model WE_C. Unit manufacturer shall have a minimum of 10 years experience in the design, application, and manufacture of Energy Recovery Wheels and associated air handling devices.

Option: Unit shall be ETL listed in Category 169 and Category 294 for Heating and Cooling Equipment in accordance with UL Standard 1995, Heating and Cooling Equipment, and CSA C22.2 No. 236.

• UNIT CASING

Unit casing shall be heavy gauge galvanized steel construction designed for outdoor installation; with unit base and internal components of heavy gauge galvanized or painted steel. Housing roof, sides, and internal partition shall be furnished with one inch foil faced fiberboard fiberglass insulation of minimum 4 pound density. 2 inch pleated, 30% efficient, disposable filters shall be provided in supply and exhaust air streams. Lifting points shall be provided. On outside mounted units, outside air intake and exhaust air outlet shall not be located on same side of unit.

Option: Double wall of galvanized sheet metal shall enclose insulation.

• ACCESS

Access shall be provided through removable access panels (Optionally with Security Cables) or hinged and latched double wall access doors.

• ENERGY RECOVERY WHEEL

Wheel shall be an enthalpy (sensible + latent) energy recovery rotor constructed of corrugated aluminum coated with a non migrating, water selective, permanently bonded, desiccant coating to permit sensible and latent energy transfer. Energy recovery ratings shall be in accordance with ASHRAE Standard 84, and performance presented in accordance with ARI 1060 testing. Wheel media shall be independently tested in accordance with ASTM-E-87, and shown to conform to the requirements of NFPA-90A by documenting a flame spread of less than 25 and a

D-32

smoke generations rating of less than 50.

Moisture transfer shall take place in the vapor phase and media shall remain dry to the touch in both summer and winter operation. A purge section shall be incorporated to limit carryover of exhaust air contaminants into the supply air. Rotor shall be driven by maintenance free speed reducer and welded urethane belt. Rotor shall require no cleaning under normal operating conditions. However, if cleaning should be required, the rotor shall be capable of being cleaned with vacuum, compressed air, dry steam, hot water, or light detergent.

Option: Provide sensible only transfer media for no latent energy transfer. (Model WEBC)

Option: Provide sensible only media coated with blue acrylic coating for salt air corrosion protection. Coating must be tested in accordance with ASTM B117 salt spray testing for a minimum of 500 hours with no corrosion. (Model WEDC)

Option: Provide total recovery media coated with blue acrylic coating for salt air corrosion protection, plus acrylic polymer desiccant for latent transfer. Coating must be tested in accordance with ASTM B117 salt spray testing for a minimum of 500 hours with no corrosion. (Model WEFC)

Option: The two faces of the energy recovery wheel shall be covered and sealed with an epoxy coating chosen for corrosion resistance.

Option: Economizer Mode - adjustable temperature or enthalpy controlled operate wheel for heating and cooling modes, and stops wheel for "free cooling" economizer mode.

Option: Rotation detector provides output signal for remote alarm (by others) upon rotation failure.

• FANS

Fans shall be double width, double inlet, forward curved type, with individual motors and adjustable belt sheaves to enable independent balancing of

TYPICAL SPECIFICATIONS

supply and exhaust air streams. All blower wheels shall be statically and dynamically balanced.

• MOTORS

Motors shall be permanently lubricated, heavy duty, sealed bearing type. Motors shall meet EPACT minimum efficiency standards. Fan/motor assembly shall be mounted on neoprene vibration isolators to unit base.

• ELECTRICAL

Electrical components shall be prewired to a single point power connection, complete with all required operating circuitry installed in an internal control panel, integral fuse protection, 24 volt control circuit, fan motor starters with overload protection, terminal strip connections, and externally mounted NEMA 3R disconnect as standard. External circuit connections to control unit on/off, and independently, recovery rotor on/off, shall be provided.

Option: Intake weather hood shall be complete with moisture eliminator. Exhaust weather hood shall contain an integral gravity backdraft damper or motorized damper.

Option: Gravity backdraft or motorized dampers shall be mounted in duct sleeves, weather hoods, or flush to cabinet exterior.

Option: Dirty Filter Sensors provide adjustable set point pressure drop indication for supply and exhaust air stream filters for alarm circuits by others.

Option: Painted cabinet is available.

Option: Air flow monitor gauges are available to set and ensure supply and exhaust airflows.

Option: 7 Day Programmable Time Clock mounted in internal control panel or remotely is available.

Option: Remote control panel of customer defined configuration may be provided.

Option: Electric Preheat Coil shall be weatherproof, of sufficient capacity to raise outside air from winter design to calculated frost formation potential

temperature, and complete with supply air thermostat of appropriate temperature range. A separate electrical power circuit shall be provided to the preheat coil.

Option: Exhaust Fan Only Frost Control shall initiate field adjustable timed defrost cycle upon sensing low supply air temperature, shutting off supply blower momentarily for wheel defrost.

Option: On/Off Frost Control will shut unit off when low outside air temperatures are sensed. Unit shall restart when outside air temperature rises above adjustable setpoint.

• ROOF CURBS

Full perimeter prefabricated roof curbs of galvanized or galvalume construction with fiberglass insulation in standard 8 inch or 14 inch heights for outdoor installation shall be provided by the unit manufacturer.