

Energy Recovery Ventilator with Heating

Model ERH

- Commercial
- Institutional

- 10,000 cfm
- 1.5 in. wg external static pressure



Model ERH

Energy Recovery Ventilator With Heating

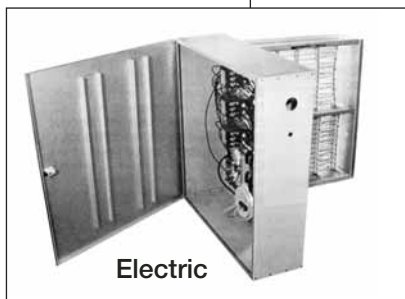
With the ERH, you save money with the total energy wheel and get the convenience of supplemental heating. The ERH provides preconditioned air in the summer and space neutral air in the winter which is ideal if your climate has prominent summer and winter seasons. For applications requiring cooling, refer to Model ERCH.

Total Energy Wheel recovers energy from the exhaust air stream and transfers it to the supply air stream. The wheel is constructed of a light-weight polymer and a permanently bonded silica gel desiccant. Eight wheel segments are easily removable for cleaning.



Energy recovery wheels certified by the ARI Air-to-Air Energy Recovery Ventilator Equipment Certification Program in accordance with ARI Standard 1060. Actual performance in packaged equipment may vary. Certified Ratings are available in the Certified Product Directory at <http://www.ari.org/directories/erv>

Optional Tempering Section provides supplemental heating of the outdoor air after pre-conditioning by the energy wheel. Tempering options include indirect gas, hot water, and electric.

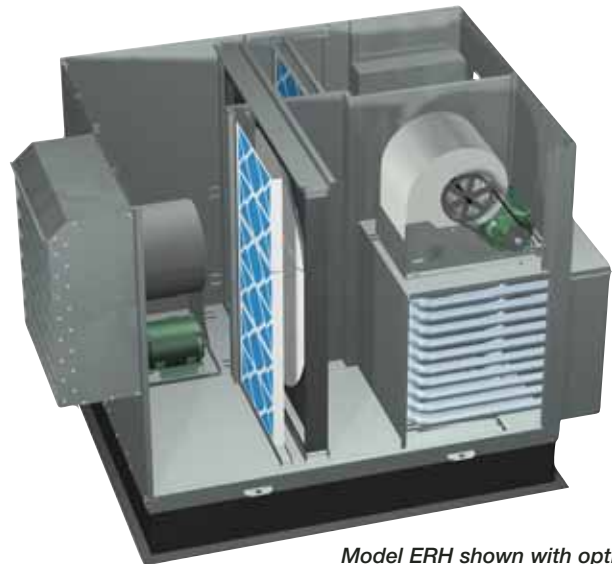


You Get a Product that is Simple to Operate:

- Fresh outdoor air is pre-conditioned by the total enthalpy wheel, recovering a majority of the energy from the exhaust air.
 - Saves 3-4 tons of cooling per 1000 cfm
 - Saves 50-60 MBH of heating per 1000 cfm
- The heating section further tempers cold outdoor air to desired conditions.

You Get a Product that is Flexible:

- Four housing sizes
- Airflow capacities up to 10,000 cfm
- External static pressures up to 1.5 in. wg

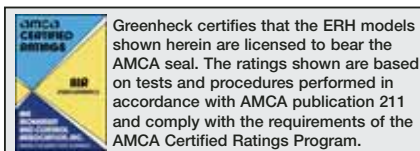


Model ERH shown with optional indirect gas heater, supply filters, and exhaust filters.

Standard Construction

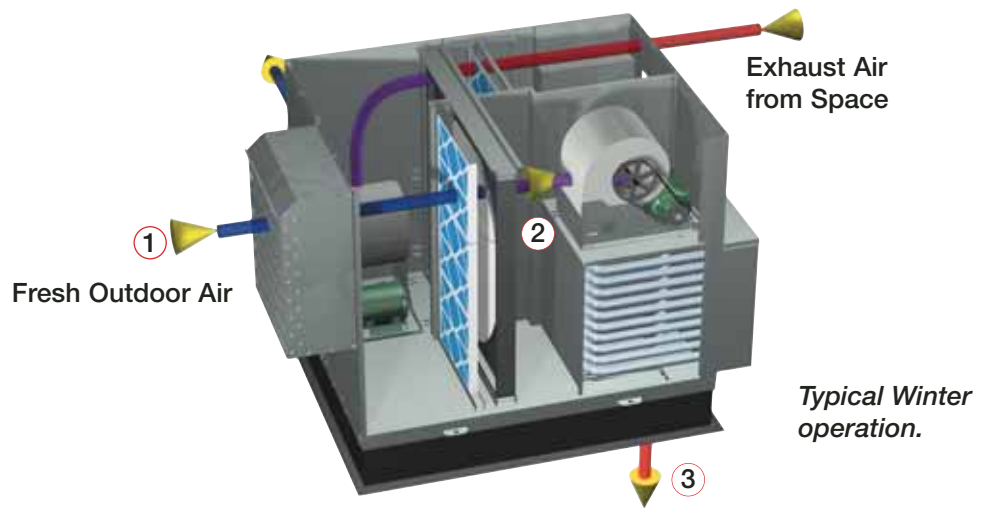
With every ERH, you automatically receive:

- ✓ **Forward Curved Blowers & Motor Assemblies** mounted on isolation bases with neoprene vibration isolators for smooth, quiet operation.
- ✓ **A Control Box** furnished with motor starters for the supply blower, exhaust blower, and energy wheel motors.
- ✓ **Double Wall Housing** which provides a galvanized steel-lined interior to prevent exposure of the insulation to the airstream.
- ✓ **Access Doors** to blowers, filters, energy wheel, and heater section to simplify inspection and routine service.
- ✓ **Single Point Wiring** with a disconnect switch and low voltage terminal strip.



The ERH preconditions outdoor air for summer operation. For winter operation, a variety of heating options are available to expand the tempering capabilities of the energy recovery wheel.

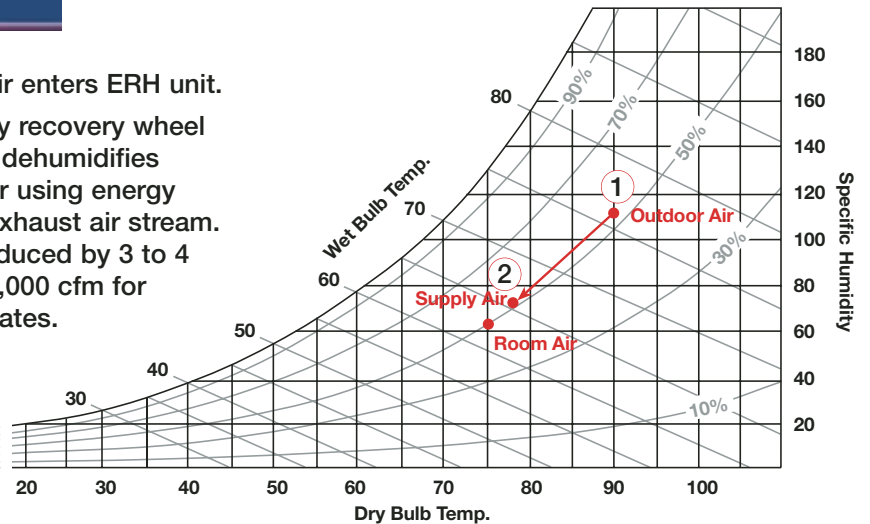
See below for a description of the summer and winter processes along with a psychrometric illustration. The numbers on the drawing at the right correspond to the numbers on the psychrometric charts.



Summer

Whether a design day or part load day, the ERH lowers the temperature and moisture levels of summer outdoor air prior to entering the ventilation system. This means you can downsize the cooling equipment *and* provide better humidity control to the space.

1. Outdoor air enters ERH unit.
2. The energy recovery wheel cools and dehumidifies outdoor air using energy from the exhaust air stream. Load is reduced by 3 to 4 tons per 1,000 cfm for many climates.

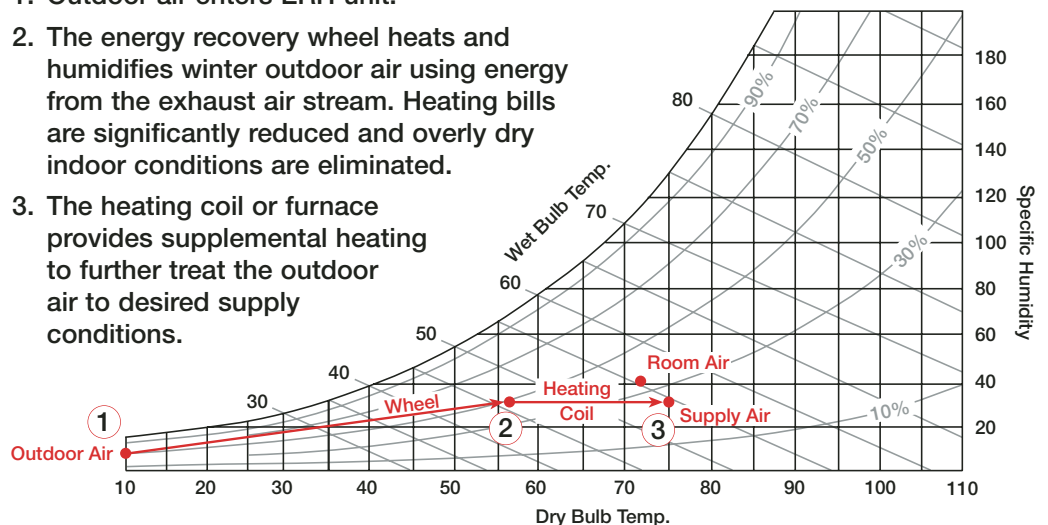


Winter

The ERH preconditions winter outdoor air typically to 45-65°F. If your design requires additional heating, three heating options are available:

- Electric
- Hot Water
- Indirect Gas

1. Outdoor air enters ERH unit.
2. The energy recovery wheel heats and humidifies winter outdoor air using energy from the exhaust air stream. Heating bills are significantly reduced and overly dry indoor conditions are eliminated.
3. The heating coil or furnace provides supplemental heating to further treat the outdoor air to desired supply conditions.



ERH-20M

CFM	OV		EXTERNAL STATIC PRESSURE in inches of WG							
			0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50
1000	1142	RPM	1141	1344	1498					
		BHP	0.36	0.51	0.53					
1300	1485	RPM	1265	1426	1578	1857				
		BHP	0.55	0.72	0.90	1.05				
1600	1828	RPM	1418	1553	1684	1934	2189			
		BHP	0.87	1.03	1.21	1.67	2.17			

ERH-20H

CFM	OV		EXTERNAL STATIC PRESSURE in inches of WG							
			0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50
1600	1828	RPM	1308	1446	1575	1816				
		BHP	0.74	0.89	1.04	1.37				
1900	2171	RPM	1453	1574	1691	1907	2108	2306		
		BHP	1.10	1.27	1.45	1.80	2.19	2.65		
2200	2514	RPM	1608	1717	1820	2020	2205	2375		
		BHP	1.57	1.77	1.96	2.39	2.79	3.20		

ERH-45L

CFM	OV		EXTERNAL STATIC PRESSURE in inches of WG							
			0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50
2200	2109	RPM	797	892	986	1166	1329			
		BHP	0.68	0.81	0.96	1.29	1.65			
2700	2588	RPM	900	977	1053	1209	1359	1494	1628	
		BHP	1.10	1.25	1.40	1.77	2.18	2.58	3.03	
3200	3068	RPM	1010	1079	1143	1274	1406	1533	1655	1768
		BHP	1.67	1.87	2.04	2.41	2.86	3.33	3.82	4.29

ERH-45H

CFM	OV		EXTERNAL STATIC PRESSURE in inches of WG							
			0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50
3200	2184	RPM	900	989	1071	1220	1360	1495		
		BHP	1.17	1.34	1.53	1.92	2.35	2.83		
3800	2593	RPM	1004	1083	1157	1297	1422	1542	1654	1769
		BHP	1.79	1.99	2.20	2.64	3.11	3.61	4.12	4.70
4400	3003	RPM	1114	1185	1252	1380	1499	1609	1713	1815
		BHP	2.60	2.85	3.08	3.57	4.09	4.64	5.18	5.78

ERH-55H

CFM	OV		EXTERNAL STATIC PRESSURE in inches of WG							
			0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50
4200	1989	RPM	749	832	906	1038	1155			
		BHP	1.54	1.82	2.10	2.65	3.21			
5100	2415	RPM	839	913	982	1107	1216	1318	1412	1520
		BHP	2.43	2.77	3.11	3.80	4.45	5.15	5.81	6.73
6000	2842	RPM	940	1003	1065	1181	1287	1382	1472	1558
		BHP	3.67	4.05	4.45	5.26	6.06	6.84	7.64	8.44

ERH-90H

CFM	OV		EXTERNAL STATIC PRESSURE in inches of WG							
			0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50
6000	2066	RPM	612	682	746	862	962	1058		
		BHP	1.99	2.37	2.75	3.52	4.33	5.21		
8000	2755	RPM	723	783	841	941	1036	1122	1202	1275
		BHP	3.91	4.41	4.95	5.94	6.97	7.98	9.08	10.14
10,000	3444	RPM	845	897	946	1040	1124	1201	1277	1348
		BHP	7.00	7.56	8.18	9.50	10.78	12.00	13.29	14.52

Gross supply air performance ratings (airflow, pressure, and power) are at port 2 with port 1, port 3 and port 4 at 0.0 in. wg. Gross exhaust air performance ratings (airflow, pressure, and power) are to port 3 with port 1, port 2 and port 4 at 0.0 in. wg. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in the airstream.



Greenheck certifies that the ERH models shown herein are licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA publication 211 and comply with the requirements of the AMCA Certified Ratings Program.

The air performance data on page 4 accounts for the pressure drop across the energy recovery wheel and the internal housing losses, but does *not* include pressure drop for filters or tempering options. Add filter and/or tempering option pressure drop (from tables below) to external static pressure to determine correct rpm and horsepower.

Filter Pressure Drop (30% eff.)

Model	CFM	Pressure Drop (in. wg)
ERH-20	1000	0.04
	2200	0.22
ERH-45	2200	0.06
	4400	0.24
ERH-55	4200	0.09
	6000	0.18
ERH-90	6000	0.10
	10,000	0.27

Tempering Options Pressure Drop

Model	CFM	Heating Coil (in. wg)	Indirect Gas (in. wg)
ERH-20	1000	0.02	0.03
	2200	0.08	0.13
ERH-45	2200	0.04	0.09
	4400	0.08	0.34
ERH-55	4200	0.04	0.10
	6000	0.08	0.26
ERH-90	6000	0.03	0.24
	10,000	0.08	0.55

NOTE: Coil data assumes 1 row heating coils.

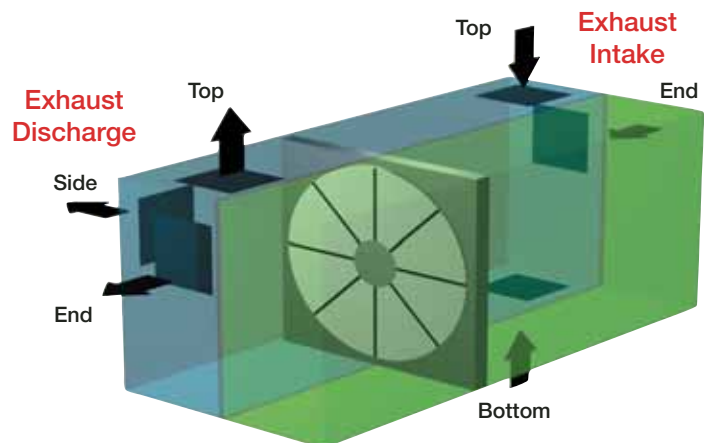
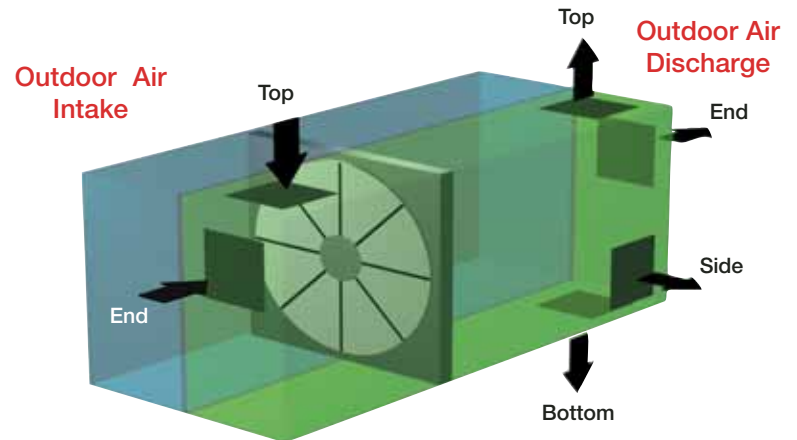
Intake & Discharge Options

With the ERH, you have many air intake and discharge options available to simplify duct layout for rooftop and equipment room installations. Refer to the table below for the intake and discharge locations available for outdoor air (OA) and exhaust air (EA).

	Bottom	Top	Side	End
OA Intake		X		X
OA Discharge	X	X	X ¹	X ²
EA Intake	X	X		X
EA Discharge		X	X	X

¹ Side OA Discharge is **ONLY** available with the Indirect Gas (IG) heater.

² End OA Discharge is **NOT** available with the Indirect Gas (IG) heater.



Weatherhoods

A louvered intake hood with 2-inch aluminum mesh filters, and an exhaust hood with an integral backdraft damper are available.



Dampers - Internally Mounted

A variety of motorized control dampers are available. Intake and exhaust dampers are internally mounted at the outdoor and exhaust air inlets. Dampers are factory wired to a single point power disconnect.



Filters

Standard size 2-inch, pleated, medium efficiency filters and filter racks are available for outdoor air and/or exhaust air streams.

Frost Control

In cold climates, the recovery wheel may develop frost, which will decrease airflow. Three factory mounted options are available to address frosting:

- **Timed Exhaust Frost Control**
The timed exhaust frost control turns the supply blower off and on intermittently. Control is triggered by an outdoor air temperature set point in conjunction with an increased pressure drop across the energy wheel.
- **Modulating Wheel Frost Control**
The modulating wheel frost control enables continuous unit operation. A variable frequency drive (VFD) reduces wheel speed when the outdoor air temperature falls below the frost threshold set point **and** upon an increase in the differential pressure across the energy wheel. The temperature and pressure differential set points are set at the factory, but are field-adjustable. The VFD will be fully programmed and wired at the factory.
- **Preheat Frost Control**
The preheat frost control enables continuous unit operation. An electric heater warms the outdoor air above the frost threshold before it enters the energy recovery wheel. Control is triggered by the outdoor air temperature set point in conjunction with increased pressure drop across the energy wheel.

Rotation Sensor

Senses when a wheel rotation failure occurs and sends a signal to an indicator light. The light is available on a remote control panel from the factory.

Discharge Temperature Control

Manual control is available allowing the user to adjust the discharge temperature off the heater as required.



Dirty Filter Sensors

Pressure taps sense excessive pressure drop across the filter and send a signal to a dirty filter indicator light. Light and control box available from the factory.

Economizer Control (Free Cooling)

When cool outdoor air is available, the energy wheel may be controlled to provide free cooling.

Economizer operation can be initiated by the unit sensors alone or in conjunction with a call for cooling (field wired) Two factory installed options are available.

- **Wheel Off:** De-energizes the wheel when the outdoor temperature is below the field adjustable set point (enthalpy sensor also available). An automatic economizer override is included to engage the wheel for winter heating operation.
- **Wheel Modulation:** Modulates the energy recovery wheel to maintain a 55°F discharge temperature during economizer operation.

Note: Control centers in Greenheck energy recovery ventilators enable the control of the energy wheel and fans via 24-volt control signals (by others). Controls by others may be preferred when air handling units are equipped with an economizer section.

Variable Air Volume

Model ERH utilizes belt driven blowers that are available with optional variable frequency drives.



Additional Accessories:

- Remote Panels
- GFCI Service Outlet (control power by others)
- Service Lights (control power by others)
- Spare Wheel Segments
- Roof Curbs
- Painted Exteriors
- Duct Flanges
- Sensible Wheel Only

General: Energy Recovery Ventilator shall be as manufactured by "Greenheck" or approved equal provided all specifications are met. Greenheck Model ERH is used as the basis of design. Units shall be Listed per ANSI/UL 1995, Heating and Cooling Equipment. Ventilators shall bear the AMCA Certified Ratings Seal for air performance. Energy transfer ratings of the energy recovery wheel shall be ARI Certified. Performance shall be as scheduled on plans. Exhaust discharge and outside air intake shall not be located on the same side on roof top units.

Unit Casing and Frames: Unit shall be of internal frame type construction of galvanized steel. Frame and panels shall be G90 galvanized steel. All panels exposed to the weather shall be a minimum of 18 gauge galvanized steel. Unit shall be internally lined with galvanized sheet metal creating a double wall. Where top panels are joined there shall be an overlapping, standing seam to insure positive weather protection. All metal-to-metal seams shall be factory sealed, requiring no caulking at job site. Permatector exterior finish is available for outdoor units. Unit base to be designed for curb mounting. Unit base shall overhang the curb for a positive seal against water run-off.

Weatherhoods: Weatherhoods shall be the same finish as the unit. Outdoor air weatherhood shall incorporate a louvered design and moisture eliminator. Weatherhoods shall be tested in accordance with AMCA Standard 500-L to prevent water penetration up to 3 in/hr at 29 mph.

Insulation: Unit casing to be insulated with 1 inch fiberglass. Insulation shall meet requirements of NFPA 90A and tested to meet UL 181 erosion requirements. Insulation to be enclosed in double wall construction.

Energy Recovery Wheel: Wheel shall be of the enthalpy type for both sensible and latent heat recovery and be designed to insure laminar flow. Energy transfer ratings must be ARI Certified to Standard 1060 and bear the ARI Certification symbol for ARI Air-to-Air Energy Recovery Ventilation Equipment Certification Program based on ARI 1060. Ratings "in accordance with 1060" without certification are not acceptable. Desiccant shall be silica gel for maximum latent energy transfer. Wheel shall be constructed of lightweight polymer media to minimize shaft and bearing loads. Polymer media shall be mounted in a stainless steel rotor for corrosion resistance.

Wheel design shall consist of removable segments for ease of service and/or cleaning. Silica gel desiccant shall be permanently bonded to wheel media to retain latent heat capability after cleaning. Wheels with sprayed on desiccant coatings are not acceptable. Wheels with desiccant applied after wheel formation are not acceptable. Energy recovery device shall transfer moisture entirely in the vapor phase.

Energy recovery drive belt material shall be high strength urethane and shall be factory installed in a pre-stretched state, eliminating the need for field belt tension adjustment. Link style belts are not acceptable.

Access Doors: All components shall be easily accessible through removable doors for exhaust, supply, filter, and damper compartments. Energy recovery wheels (smaller than 58 inches) shall be mounted in a slide-out track for ease of inspection, removal, and cleaning.

Roof Curbs: Roof curb to be supplied by unit manufacturer for field assembly. Curb shall consist of die formed

galvanized steel sections. Curb shall be full perimeter type with gasketing provided for field installation between curb and unit base.

Fan Sections: Centrifugal fans to be double width, double inlet, forward curved type. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated, sealed ball bearing pillow blocks. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speeds. Separate motors for exhaust and supply blowers shall be provided. Adjustable sheaves on belt-driven fans with motors less than 10 hp shall allow independent balancing of exhaust and supply airflow. Fan and motor assemblies are mounted to unit base with neoprene isolators as standard. Fans shall be located in draw-through position in reference to the energy recovery wheel.

Motors and Drives: Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy-duty type, matched to the fan load and furnished at the specified voltage, phase, and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast type, keyed and securely attached to the fan wheel and motor shafts; 10 horsepower and less shall be supplied with an adjustable drive pulley. Energy wheel motors shall have integral overload protection.

Filters: Supply and exhaust air filters shall be 2-inch thick pleated fiberglass, 30% efficient and tested to meet UL Class 2. Filter racks shall be die-formed galvanized steel.

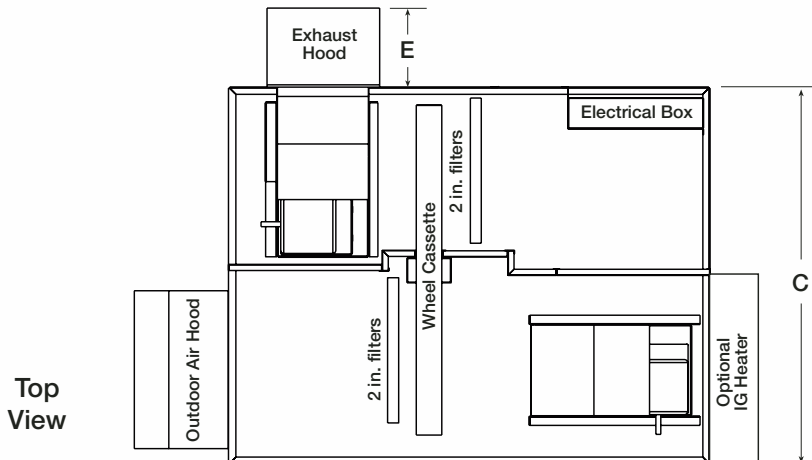
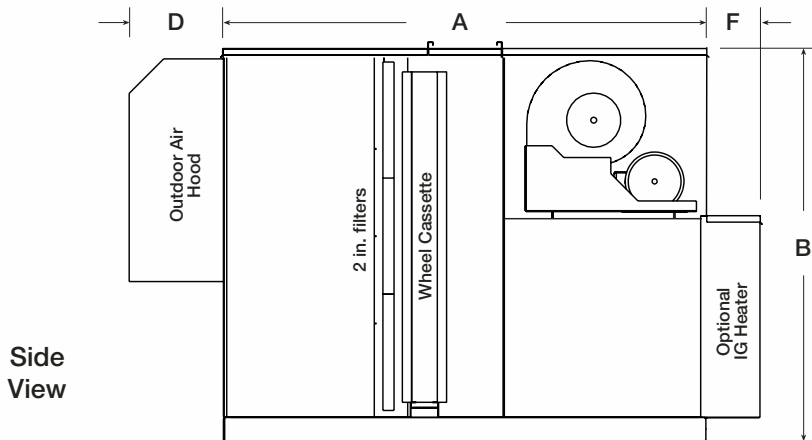
Electrical: All internal electrical components shall be factory wired for single point power connection. Units with electric reheat will be wired with independent power supply. All electrical components shall be UL Listed, Approved, or Classified where applicable and wired in compliance with the National Electrical Code.

Weatherproof, integral door interlocking disconnect switch, motor starters, control circuit fusing, control transformer for 24 VAC circuit, and terminal strip shall be supplied as standard components in the control center. Motor starters consist of a contactor and Class 20 electronic adjustable overload protection and shall be provided for all fan motors in the unit.

Indirect Gas: Indirect fired gas furnace shall be 80% efficient, UL Certified and Listed per ANSI Z83.8 - 2002, C.G.A. approved per 2.6 - 2002 and have a blow through fan design. Furnace shall be capable of operation with natural or LP gas and have a power venting system. The burner and heat exchanger shall be constructed of aluminized steel. Standard furnace features shall include main gas pressure regulator, main gas valve, electronic staged or electronic modulating controls, direct spark ignition system, high limit and a 24 volt control transformer.

Hot Water Coil: Hot water coil shall be factory tested and rated in accordance with ARI 410. Coils shall have copper tubes with permanently expanded aluminum fins, 12 fpi or less.

Electric Heat: Electric heat shall be UL listed and circuit fused per NEC over 48 amps. Heater shall be SCR control, factory wired and installed. Control will be 24 volt with class 2 transformer. Standard air flow switch to shut down heater if air ceases to flow across heater.



Dimensions and Weight

Unit Size	A	B	C	D	E	F	Approximate Weight (lbs.)
ERH-20	78	50	56	18	18	9	1000
ERH-45	86	69	66	16	20	11	1800
ERH-55	99	70	76	16	25	11	2500
ERH-90	111	85	96	16	27	11	4500

All dimensions shown are in inches. Actual weight is dependent upon unit configuration

Our Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the purchase date. The energy recovery wheel is warranted to be free from defects in material and workmanship for a period of five years from the purchase 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.

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