GREENHECK
Energy Recovery Application
ERA/100-00

PRODUCT APPLICATION GUIDE

A technical bulletin for engineers, contractors and students in the air movement and control industry.

Energy Recovery Ventilators: The Engineer's Solution

The HVAC community plays a vital role in providing healthful indoor environments in which to live, learn, work, and play. National, state and local codes mandate minimum outdoor air ventilation rates based on ASHRAE Standard 62, *Ventilation for Acceptable Indoor Air Quality*. The challenge is to introduce the outdoor air at the levels required by the codes while maintaining indoor comfort and conserving energy.

Why Energy Recovery Ventilation?

Building code requirements for increased outdoor air ventilation rates have placed new demands on HVAC equipment and on building operating budgets. At the same time, new refrigerants being deployed to lower atmospheric ozone concerns have reduced equipment capacity and global warming is threatening to place even greater restrictions on our use of energy.

Energy Savings - By recovering up to 85% of the energy of the exhaust air, far less energy is spent cooling and heating the outside air supplied to the building. This energy savings can typically reduce the operating cost by thousands of dollars per year for a single unit.

Humidity Control - Energy recovery ventilators are perfectly suited to help control humidity. In the summer, when outside humidity is high, the energy wheel dehumidifies the outside air. This greatly reduces the latent load on the air conditioning equipment. It also eliminates the problems with high indoor moisture levels that can occur in hot, humid climates. In the winter, when outside air is dry, the energy wheel humidifies the incoming outside air. This result is increased comfort and reduced humidification required.

Air Conditioning Load Reduction - The ERV effectively reduces the outside air design conditions. For example, if outside design is 95°F DB/78°F WB, an 80% effective energy wheel would precondition the outside air to 79°FDB/66.1°F WB. This effectively changes the design conditions of the air

CITY	A/C EQUIPMENT SIZE REDUCTION (Tons)	CITY	A/C EQUIPMENT SIZE REDUCTION (Tons)
Albany, GA	4.6	Jackson, MS	4.2
Birmingham, AL	3.9	Kansas City, MO	3.9
Bismarck, ND	2.5	LaCrosse, WI	3.7
Boise, ID	1.2	Little Rock, AR	4.6
Boston, MA	3.0	Los Angeles, CA	2.2
Brunswick, ME	2.8	Lubbock, TX	2.5
Chicago, IL	3.7	Miami, FL	4.2
Cincinnati, OH	3.3	Minneapolis, MN	3.7
Cleveland, OH	3.7	Nashville, TN	3.9
Columbia, SC	4.2	New Orleans, LA	4.6
Denver, CO	2.1	Niagara Falls, NY	3.4
Des Moines, IA	3.9	Philadelphia, PA	3.7
Duluth, MN	2.2	Phoenix, AZ	3.3
Ft. Bragg, NC	3.9	Sioux Falls, SD	3.4
Ft. Worth/Dallas, TX	3.9	St. Louis, MO	3.9
Houston, TX	4.6	Tucson, AZ	2.2
Jacksonville, FL	4.2	Washington, DC	3.9

Calculations are based on indoor conditions of 75°F. Outside conditions were obtained from the ASHRAE Fundamentals Handbook 1997.

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conditioning equipment to 79°F DB/66.1°F WB, which results in a load reduction of 3.9 tons for each 1,000 cfm of outside air.

Tables on page one show tons of cooling equipment size reduction with ERV per 1000 cfm for various cities in the U.S.

Economic Solution

Greenheck ERVs are economically priced, which increases the potential for energy recovery applications. The contractor cost will typically be in the $3-4 per cfm range. This attractive pricing, combined with the air conditioning downsizing and energy savings makes Greenheck ERVs extremely economical for many climates. Payback is immediate for the southeastern U.S. and much of the Midwest.

Power of the Wheel

The powerful function of the total energy wheel is that it works on any outside air condition. Whether at full load or part load, high or low relative humidity, winter or summer. The wheel always transforms outside air into near room conditions. This graph illustrates the energy wheel's function for both winter and summer.

Part load operation is important because most building operating hours are at part load. Notice the summer condition marked with an asterisk is at the same DB temperature as the room, but still dehumidifies the outside air.

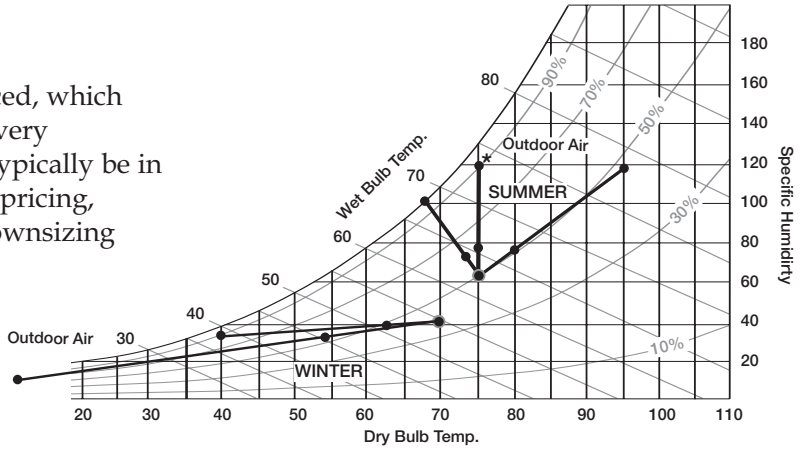
Wheel Technology

Then

Industry veterans may recall all of the problems with energy wheels when they were used following the 1970s energy crisis. Keep in mind, these wheels were designed for industrial applications with their hefty size and weight, purge sections and calibrated labyrinth seals. They required continual maintenance and adjustment to perform properly. The concept was sound, but the product was wrong.

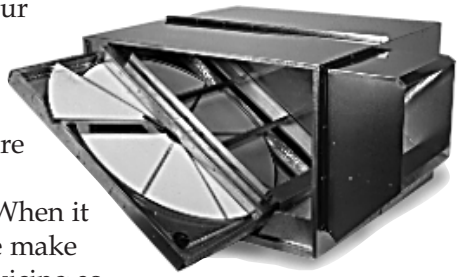
Now

Greenheck's energy recovery wheel design is based on advanced technology. ERVs are specifically for commercial and institutional installations with minimal maintenance in mind. The energy exchange



media is a light-weight polymer that minimizes bearing load and greatly increases wheel reliability. Silica gel desiccant is permanently bonded to the polymer, which provides a long energy transfer life.

Low Maintenance



We designed our energy recovery ventilators so that they require minimal maintenance. When it is required, we make access and servicing as simple as possible. Here's how:

- Removable side panels enable easy access to energy wheel, blowers, motors and drive components.
- Wheel cassette slides out easily for inspection and maintenance.
- Wheel sections are easily removable, without tools, for periodic cleaning.
- Filters are easily accessible.
- No need for condensate drains. Moisture is transferred entirely in the vapor phase.
- Light weight polymer enthalpy wheel contributes to low shaft and bearing loads, resulting in reliable, long life operation.