

AIR-TO-AIR HEAT EXCHANGER VENTILATION

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Introduction

Air-to-air heat exchangers, technically referred to as energy recovery units (ERU's) have recently become a popular method of providing ventilation air to occupied spaces, including offices, classrooms and places of assembly. The main attraction of ERU's is that they recover energy from exhaust air and use it to preheat fresh supply air, reducing the energy costs associated with ventilation.

Energy recovery units are usually used in conjunction with a baseboard radiation heating system.

What is an energy recovery unit.

An energy recovery unit consists of a heat exchanger, supply and exhaust fans, and auxiliary heating coil and controls located in a metal cabinet. The heat exchanger can take several forms, including parallel metal plates, wheels, a heat pipes. In all cases, the heat exchanger transfers energy from the outgoing exhaust air to the incoming fresh air units usually recover about 2/3 of the energy from the exhaust air. If the room air is 72°F and the outside air is 0° F, for example, the fresh air will be heated to $0^{\circ} F + 2/3 (72^{\circ} F - 0^{\circ} F) = 48^{\circ} F$. The supply air is usually heated to 60° F or so the prevent drafts.

Air Distribution.

Energy recovery units are usually sized to provide ventilation air to a discrete section of a building, for example, a classroom wing. The unit is usually located in an attic in a pitched roof building. Supply air is ducted from the ERU to every room and return air is from each room to the ERU. We recommend delivering supply air to the center of each room and removing exhaust air from the corner of every room. There are other schemes, such as "displacement ventilation" that provide more elaborate distribution, but this increases the cost and may not offer any real advantages.

Advantages of Energy Recovery Ventilation.

The primary advantage of energy recovery ventilation is that heating costs are reduced because energy recovered from the exhaust air is used to preheat the ventilation air. This reduces total energy costs by about 25% for a typical building. There is not a great a temptation to shut down the ventilation system to reduce operating costs as there is with other systems.

Disadvantages of Energy Recovery Ventilation.

Unlike air handling units on unit ventilators, energy recovery systems do not have the capability to provide sufficient outside air for cooling overheated rooms. This can lead to overheating, especially in the late spring and early fall. *Any building employing energy recovery ventilation should have operable windows (or air conditioning) to provide cooling during warm weather. Energy recovery ventilation is not a good choice for interior spaces unless those spaces are air conditioned.*

A second area of concern involves the fact that there is little standardization in the heat recovery industry. Manufactures and products come and go, and there is some concern that products specified

today may not have manufactures' support a few years from now.

Energy recovery systems also suffer from the fact that they can not be adapted to provide mechanical cooling because they do not typically (cost effectively) circulate enough air.

Energy recovery units are usually designed around a specific ventilation rate as dictated by codes in effect of the time of design. It is not feasible to increase the amount of ventilation air once the system is installed.