

# PRODUCT APPLICATION GUIDE

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

## Sizing Air Conditioning Equipment to Maximize Energy Recovery Benefits

Many designers have realized the benefits of energy recovery. In addition to complying with ASHRAE 62-1999 while controlling operating expenses, a properly designed ventilation system that incorporates total enthalpy recovery will realize the following benefits.

**Control Indoor Humidity** — With the high percentage of outdoor air mandated for commercial and institutional buildings, controlling indoor humidity levels can become a challenge. Applying an ERV to the system reduces the latent load of the outdoor air entering the space.

**Control Initial Cost** — Because the ERV reduces the outdoor air load (both sensible and latent), the cooling equipment size may be reduced, which leads to an initial cost reduction.

Some engineers have not yet realized that sizing the air conditioning equipment properly is important to optimize the total system performance and initial cost. A common mistake is to be “conservative” and not take full credit for the load reduction afforded by the energy wheel. The result is an oversized air conditioning system that falls short of realizing the potential benefits.

### Initial Cost Credit

In many climates, the energy wheel eliminates three to four tons of air conditioning load for every 1,000 cfm of ventilation air. When this benefit is claimed in the form of air conditioning equipment right-sizing, the initial cost of the system is typically on par with a system that does not utilize energy recovery. Payback periods are usually less than two years. In some cases the energy recovery system actually has a lower initial cost than the system not using energy recovery.

### Humidity Control

Sizing air conditioning equipment appropriately is also very important for humidity control. Here is where the temptation to be “conservative” may actually inhibit humidity control performance. The following highlights the importance relative to direct expansion (DX) equipment systems, especially with a single stage.

When the DX system is over-sized, the air is cooled very rapidly and the room thermostat is satisfied shortly after the call for cooling is made. While the compressors are operating, the coil is stripping moisture from the airstream as condensate forms on the coil. When the compressor cycles off, the condensate remains on the coil, but re-evaporates as the unconditioned air flows through the coil. Therefore, the moisture that was stripped out during the compressor operation is re-introduced during the off cycle.

If the condensing unit is properly sized to accommodate the reduction in load from the ERV, the compressor run-time will be longer, allowing a greater volume of air to be conditioned during the on-cycle. Also, the condensate will have more time to run off the coil and down the drain.

### Summary

Money and indoor air quality are two concepts that owners clearly understand. The bottom line is that taking full credit for the cooling load reduction of the energy recovery wheel gives you the best of both worlds, a more attractive initial cost and a better performing system. Avoid the oversized air conditioning equipment trap and realize the full potential of your HVAC system.