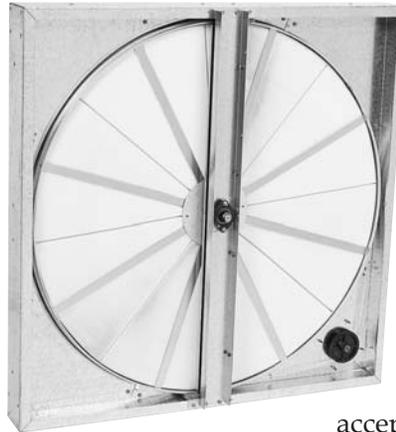


PRODUCT APPLICATION GUIDE

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

Cross Leakage – Application and Purge Considerations

There appears to be some misconceptions surrounding energy recovery wheels and the need to minimize airstream cross leakage. One area of confusion relates to acceptable cross leakage rates to differing applications. Another area of misunderstanding pertains to energy wheel purge sections. This article gives insight to both topics to help provide a better understanding for good energy recovery design practices.



less are acceptable for commercial applications.

Rest room applications are a special case of commercial applications. The air is being breathed by the occupants of the rest room, so it is not contaminated as in the case of industrial applications. But the air is not suitable for use as return air and, therefore, must be exhausted. The question is “How much leakage is acceptable?” for rest room applications.

Applications

Industrial applications can involve exhaust air that contains dangerous contaminants in the form of chemicals or other harmful products. The need to control leakage of exhaust air into the ventilation air in these applications is understandable and appropriate measures should be made to minimize or eliminate the leakage. For industrial process applications with contaminated exhaust, Greenheck does not recommend the use of an energy recovery wheel.

Commercial applications are very different from industrial and should be treated as such. These comfort ventilation applications for spaces such as classrooms, offices, or auditoriums require a different mindset in regard to cross leakage. Consider that the exhaust air used for energy recovery is not “contaminated”. It is the same air that was being breathed by building occupants just a minute ago. Based on this understanding, Greenheck believes that cross leakage rates of 5% or

To help evaluate this question, consider the perspective offered by our industry’s committee that authored the proposed revision to the ASHRAE 62-1989R ventilation standard. The language states “(rest room) air may be recirculated in the process of recovering energy from the exhaust airstream provided the percentage of exhausted air that is recirculated does not exceed 10% of the air supplied by the energy recovery unit”. Also consider that air is “leaked” to adjacent spaces every time a person exits a rest room and that many duct systems have a 5% leakage factor. With this information in mind, the following guidelines are suggested for rest room applications:

- Practical leakage limit: 5%
- Conservative leakage limit: 3%

Purge

An energy recovery wheel purge section is a feature that may reduce cross leakage. But purge does not necessarily drive leakage rates down to purported levels (say less than 0.1%).

Purge can actually result in greater leakage which is evident in the data below. The information shown is ARI certified data from two energy wheels in the 1400 - 1600 cfm nominal airflow range and at the same pressure rating point. Note: ARI's term for cross leakage is EATR (Exhaust Air Transfer Ratio).

ARI Certified Data:

Novel Aire ECW 324

2.4% EATR

9° purge angle

Airxchange ERC-3615

0.4% EATR

no purge

Notice that EATR is 2 percentage points lower for the wheel WITHOUT purge. Another little known implication of purge is that it can increase fan brake horsepower by as much as 50%. The reality is that cross leakage is driven by multiple energy wheel design factors and purge has significant power consumption side effects.

Also, energy recovery wheels now have ARI certified performance ratings that verify low leakage rates without purge. In many cases, actual cross leakage rates are less than 3% EATR.

Key Summary Points

1. Determination of acceptable cross leakage is application dependent.
2. Airstream cross leakage of 5% is acceptable for most commercial applications.
3. Purge does not ensure ultra-low leakage rates and drives up power consumption greatly.
4. Good energy wheel designs effectively control leakage to less than 3% without purge, which is actually better performance than most commercial applications require.

By understanding your application and ARI certified cross leakage data, you can confidently match the right energy recovery product to each job. The bottom line — well designed energy recovery wheels without purge allow minimal cross leakage and are far more energy efficient than purge systems.