2001 STANDARD for

RATING AIR-TO-AIR HEAT EXCHANGERS FOR ENERGY RECOVERY VENTILATION EQUIPMENT

AIR-CONDITIONING &
REFRIGERATION
INSTITUTE

Standard 1060

4301 NORTH FAIRFAX DRIVE • ARLINGTON, VIRGINIA 22203

IMPORTANT

SAFETY RECOMMENDATIONS

It is strongly recommended that the product be designed, constructed, assembled and installed in accordance with nationally recognized safety requirements appropriate for products covered by this standard.

ARI, as a manufacturers' trade association, uses its best efforts to develop standards employing state-of-the-art and accepted industry practices. However, ARI does not certify or guarantee safety of any products, components or systems designed, tested, rated, installed or operated in accordance with these standards or that any tests conducted under its standards will be non-hazardous or free from risk.

ARI CERTIFICATION PROGRAM PROVISIONS

Scope of the Certification Program

The certification program includes air-to-air heat exchangers for use in Energy Recovery Ventilation Equipment, rated at or above 50 scfm but below or equal to 5,000 scfm at ARI Standard Rating Conditions. In addition, air-to-air heat exchangers for use in energy recovery ventilation equipment rated above 5,000 scfm are included if the Participant's Basic Model Group(s) for those models include at least one model rated at above 50 scfm but below or equal to 5,000 scfm.

This certification program does not include heat exchangers joined by circulated heat transfer medium (run-around loop).

Certified Ratings

The following certification program ratings are verified by test:

1. Airflow, scfm
2. Pressure Drop, in Hg
3. Sensible and Net Sensible Effectiveness (at 100% and 75% Rated Airflow for heating and cooling conditions)
4. Latent and Net Latent Effectiveness (at 100% and 75% Rated Airflow for heating and cooling conditions)
5. Total and Net Total Effectiveness (at 100% and 75% Rated Airflow for heating and cooling conditions)
6. Exhaust Air Transfer Ratio, Outdoor Air Correction Factor, and Purge Angle or Setting (if applicable) at 0.00 in H_2O [0.0 Pa] and two or more pressure differentials
7. Tilt Angle, ^{o}, (at heating and cooling conditions, if applicable)

Note:

This standard supersedes ARI Standard 1060-2000.

Price $10.00 (M) $20.00 (NM)
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APPENDICES

RATING AIR-TO-AIR HEAT EXCHANGERS FOR ENERGY RECOVERY VENTILATION EQUIPMENT

Section 1. Purpose

1.1 *Purpose*. The purpose of this standard is to establish for air-to-air heat exchangers intended for use in Energy Recovery Ventilation Equipment: definitions; test requirements; rating requirements; minimum data requirements for Published Ratings; marking and nameplate data; and conformance conditions.

1.1.1 *Intent*. This standard is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors and users.

1.1.2 *Review and Amendment*. This standard is subject to review and amendment as technology advances.

Section 2. Scope

2.1 *Scope*. This standard applies to factory-made air-to-air heat exchangers for use in Energy Recovery Ventilation Equipment as defined in Section 3.

2.2 *Exclusions*. This standard does not apply to the rating and testing of heat exchangers joined by circulated heat transfer medium (run-around loop). A run-around loop employs liquid-containing coils connected in a closed loop and placed in each of two or more air streams.

Section 3. Definitions

All terms in this document shall follow the standard industry definitions in the current edition of *ASHRAE Terminology of Heating, Ventilation, Air Conditioning and Refrigeration* and ASHRAE Standard 84, unless otherwise defined in this section.

3.1 *Effectiveness*. The measured energy recovery Effectiveness not adjusted to account for that portion of the psychrometric change in the Leaving Supply Airflow that is the result of leakage of Entering Exhaust Airflow rather than exchange of heat or moisture between the airstreams. The equation for determining Effectiveness is given in Appendix C.

3.2 *Energy Recovery Ventilation Equipment*. Energy recovery components and packaged energy recovery ventilation units which employ air-to-air heat exchangers to recover energy from exhaust air for the purpose of pre-conditioning Outdoor Air prior to supplying the conditioned air to the space, either directly or as part of an air-conditioning (to include air heating, air cooling, air circulating, air cleaning, humidifying and dehumidifying) system.

3.2.1 *Heat Pipe Heat Exchanger*. A device employing tubes charged with a fluid for the purpose of transferring sensible energy from one air stream to another. Heat transfer takes place through the vaporization of the fluid exposed to the warmer air stream and condensation of the fluid in the cooler air stream.

3.2.2 *Plate Heat Exchanger*. A device for the purpose of transferring energy (sensible or total) from one air stream to another with no moving parts. This exchanger may incorporate parallel, cross or counter flow construction or a combination of these to achieve the energy transfer.

3.2.3 *Rotary Heat Exchanger*. A device incorporating a rotating cylinder or wheel for the purpose of transferring energy (sensible or total) from one air stream to the other. It incorporates heat transfer material, a drive mechanism, a casing or frame, and includes any seals which are provided to retard the bypassing and leakage of air from one air stream to the other.

3.3 *Exhaust Airflow*. Airflow leaving the conditioned space.

3.3.1 *Entering Exhaust Airflow*. The exhaust air stream before passing through the heat exchanger, also referred to as *Return Air*, and defined in ASHRAE Standard 84 as Station 3.

3.3.2 *Leaving Exhaust Airflow*. The exhaust air stream after passing through the heat exchanger, also referred to as *Exhaust Air (to outside)*, and defined in ASHRAE Standard 84 as Station 4.

3.4 *Exhaust Air Transfer Ratio (EATR)*. The tracer gas concentration difference between the Leaving Supply Airflow and the Entering Supply Airflow divided by the tracer gas concentration difference between the Entering Exhaust Airflow and the Entering Supply Airflow at the 100% Rated Airflows, expressed as a percentage. The equation for *EATR* is given in Appendix C.

3.5 *Net Effectiveness*. The measured energy recovery Effectiveness adjusted to account for that portion of the psychrometric change in the Leaving Supply Airflow that is the result of leakage of Entering Exhaust Airflow rather than