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Heat recovery ventilators and energy recovery ventilators — Method of test for performance

Ventilateurs-récupérateurs de chaleur et ventilateurs-récupérateurs d'énergie — Méthode d'essai des performances

Reference number
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Foreword

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The committee responsible for this document is ISO/TC 86, *Refrigeration and air-conditioning*, Subcommittee SC 6, *Testing and rating of air-conditioners and heat pumps*.

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Heat recovery ventilators and energy recovery ventilators — Method of test for performance

1 Scope

This International Standard prescribes a method of testing the ventilation and energy related performance of heat recovery ventilators (HRVs)and energy recovery ventilators (ERVs) that do not contain any supplemental heating (except for defrost), cooling, humidification or dehumidification components.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3966:2008, *Measurement of fluid flow in closed conduits — Velocity area method using Pitot static tubes*

ISO 5167-1:2003, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 1: General principles and requirements*

ISO 5801:2007, *Industrial fans — Performance testing using standardized airways*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
outdoor airflow
OA
volume of outside air entering the ventilator

Note 1 to entry: Indicated in Figure 1 as 1.

Note 2 to entry: Also referred to as ‘entering supply air’.

3.2
supply airflow
SA
outside air after passing through the ventilator

Note 1 to entry: Indicated in Figure 1 as 2.

Note 2 to entry: Also referred to as ‘leaving supply air’.

3.3
return (extract) airflow
RA
indoor air entering the ventilator

Note 1 to entry: Indicated in Figure 1 as 3.

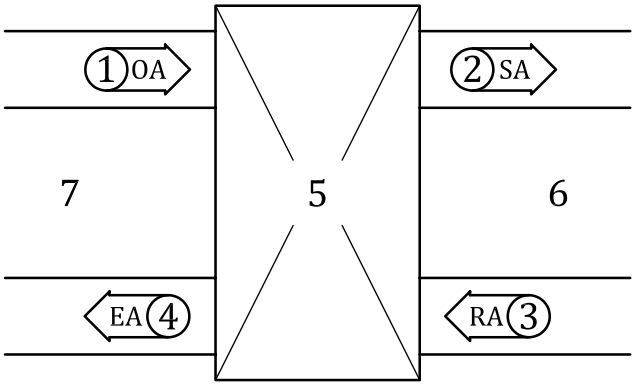
Note 2 to entry: Also referred to as ‘entering exhaust air’.

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3.4
exhaust airflow
EA
indoor air after passing through the ventilator

Note 1 to entry: Indicated in Figure 1 as 4.

Note 2 to entry: Also referred to as 'leaving exhaust air'.



Key
1 outdoor airflow (OA) (entering)
2 supply airflow (SA) (leaving)
3 return airflow (RA) (entering)
4 exhaust airflow (EA) (leaving)
5 ventilator
6 indoor side
7 outdoor side

Figure 1 — Schematic numbering of airflows for heat and energy recovery ventilators

3.5
station
location in the test apparatus at which conditions such as temperature, humidity, pressure, or airflow are measured

Note 1 to entry: These locations are identified as "station 1", "station 2", "station 3" and "station 4" for each of the airflows indicated in Figure 1.

3.6
coefficient of energy
COE
total exchanged energy between the airstreams plus the power value of moving air, divided by the power input

Note 1 to entry: The equation for determining the coefficient of energy is given in 8.6.

3.7
rating points
sets of supply and return airflows, static pressures at inlets and outlets, and speed control setting, achieved during the airflow performance measurement, at which thermal performance tests (and exhaust air transfer tests, if applicable) are performed

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3.8
effective work
EW
total exchanged energy between the airstreams plus the power value of moving air minus the power input

Note 1 to entry: The equation for determining the effective work is given in 8.7.

Note 2 to entry: Effective work is expressed in W.

3.9
power value of moving air
rate of pressure energy and kinetic energy of the air delivered by the ventilator

Note 1 to entry: The equation that determines the power value of moving air is given in 8.6.1.

Note 2 to entry: Power value of moving air is expressed in J/s for P_{vma}.

3.10
gross effectiveness
measured effectiveness, not adjusted for leakage, motor heat gain, or heat transfer through the unit casing

Note 1 to entry: The sensible, latent or total gross effectiveness of an HRV or ERV, at equal airflows, is described in 8.5.

3.11
maximum rated airflow
the largest supply and return airflows, specified by the manufacturer, at which an airflow test is performed

Note 1 to entry: For ventilators with speed control devices, different maximum rated airflows may be defined for each speed control setting at which the test is performed.

3.12
minimum rated airflow
the smallest supply and return airflows, specified by the manufacturer, at which an airflow test is performed

Note 1 to entry: For ventilators with speed control devices, different minimum rated airflows may be defined for each speed control setting at which the test is performed.

3.13
net supply airflow
portion of the leaving supply airflow that originated as entering supply airflow

Note 1 to entry: The net supply airflow is represented by the variable Q_{SANet}, measured in m^3/s.

Note 2 to entry: The equations for determining net supply airflow are given in 8.4.1 (ducted units) and 8.4.2 (unducted units).

3.14
net supply airflow ratio
ratio determined by dividing net supply airflow by supply airflow

Note 1 to entry: Expressed as a percentage, and described in 8.4.1 and 8.4.2.

3.15
speed control device
device incorporated into the ventilator which controls the speed of the fan

3.16
standard air
dry air with a density of $1,2\ kg/m^3$

Note 1 to entry: These conditions approximate dry air at 20°C and 101,325 kPa absolute.

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3.17
static pressure differential
absolute difference between inlet static pressure and outlet static pressure for each of the two airstreams

EXAMPLE Static pressures measured at $|X_2\text{-}X_1|$, or $|X_4\text{-}X_3|$.

3.18
thermal performance measurement
test procedure which measures the temperature and humidity of the supply air when a ventilator is operating with the outside air and return air at specific psychrometric conditions

3.19
unit exhaust air transfer ratio
UEATR
tracer gas concentration difference between the supply airflow and the outdoor airflow divided by the tracer gas concentration difference between the return airflow and the outdoor airflow, at a specified airflow

Note 1 to entry: The equation for UEATR is given in 8.3.

Note 2 to entry: UEATR is expressed as a percentage.

3.20
ventilator
self contained unit that includes fans to move air through the heat/energy exchanger

3.21
energy recovery ventilator
ERV
ventilator which is designed to transfer both heat and moisture between two isolated airstreams

3.22
fresh air mass flow rate
qm_2
leaving supply mass airflow rate at station 2

3.23
heat recovery ventilator
HRV
ventilator which is designed to transfer only heat between two isolated airstreams

3.24
unducted ventilator
heat recovery ventilator or energy recovery ventilator which is not intended for connection of ducts to any of the airflow inlets or outlets except for model specific exterior termination systems as defined in 3.27

3.25
ducted ventilator
heat recovery ventilator or energy recovery ventilator which is intended for connection of ducts to one or more of the airflow inlets or outlets and intended to address a range of static pressure differentials from the duct(s)

3.26
duct
insulated or uninsulated closed passage for air that is installed as part of the ventilation system in lengths determined by the needs of application, and is separate, prior to installation from exterior terminations such as weather hoods

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