

Note to the reader

This document was originally developed by NRCan as the draft final notice of a Canadian ENERGY STAR specification for heat recovery ventilators and energy recovery ventilators (H/ERVs).

A Canadian-only specification was not implemented. Instead, the final draft Canadian specification is now being merged into a common North American ENERGY STAR specification for H/ERVs. It is expected to form the basis of the cold-region portion of a first North American draft H/ERV ENERGY STAR specification.

The draft Canadian specification is being posted here to provide context and also to provide NRCan's rationale for some of the decisions that were incorporated within their draft specification.



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February 26, 2009

To: ENERGY STAR® Stakeholders, HRV/ERV Manufacturers, and concerned parties.

From: Brian Killins, Senior Standards Engineer
Office of Energy Efficiency, Natural Resources Canada

Final draft - Canadian ENERGY STAR® specification for heat recovery ventilators and energy recovery ventilators (H/ERVs)

In December 2008, NRCan sent out a first draft of the proposed Canadian ENERGY STAR specification for H/ERVs via an e-mail distribution that was sent to over 160 stakeholders including H/ERV manufacturers and distributors, utilities, regulators, testing agencies, the Home Ventilating Institute, trade industry associations, and others.

Thank you to the 30 or so individuals and organizations that provided comments. Your input has helped us to move towards the final ENERGY STAR H/ERV Specification for Canada. A Word document that includes a listing of comments that were received in a summary table matrix will be available as a separate file. A summary of key comments is provided below as well as the rationale provided for NRCan's decisions on the final specification.

Canada will adopt the ENERGY STAR specification for H/ERVs, effective July 1, 2009.

The Canadian ENERGY STAR specification covers both HRVs and ERVs and is based on certified performance data with the products operating in heating conditions.

Please see the attached technical specification for Canada. Stakeholders are encouraged to review the specification and provide comments to estahrhv@gmail.com no later than March 13, 2009.

To qualify for ENERGY STAR, a product must meet the technical requirements as stated in this document. Manufacturers, dealers and other interested organizations are required to enter into an administrative arrangement with Natural Resources Canada which identifies program requirements. For more information on this please go to:

<http://oee.nrcan.gc.ca/energystar/english/participants/index.cfm?PrintView=N&Text=N>

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Final Draft

Canadian ENERGY STAR® Specification for Heat Recovery Ventilators and Energy Recovery Ventilators (H/ERVs) sold in Canada

Effective date of Canadian ENERGY STAR H/ERV specification: July 1, 2009

According to program requirements, a product must meet all of the identified criteria to be labelled as ENERGY STAR qualified by its manufacturer.

1) Definitions:

- A. *Heat-recovery ventilator (HRV)* — a factory-assembled packaged unit including fans or blowers that transfers heat between two isolated airstreams.
- B. *Energy-recovery ventilator (ERV)* — a heat-recovery ventilator designed to transfer heat and moisture.
- C. *H/ERV* — a product that is either an HRV or an ERV as defined in 1A and 1B
- D. *Sensible heat recovery efficiency (SRE)* — the apparent effectiveness adjusted per clause 9.3.3 of CSA C439-08 to take into account fan energy, leakage (exhaust air transfer), mass and flow imbalance, frost control, and certain other external and internal energy gains and losses.
- E. *Net Airflow* — the gross airflow during an energy performance test reduced by the measured amount of leakage (identified in C439 as exhaust air transfer ratio (EATR)). Net airflow is the actual amount of outside air supplied by the unit and it is reported in the HVI 911 directory for each energy performance test.
- F. *Test Airflow* — the net airflow in cubic feet per minute (cfm) for an energy performance test for which a certified performance rating with 0°C outdoor air temperature and/or -25°C outdoor air temperature is provided in the current HVI 911 directory of certified performance.
- G. *Power Consumption in Watts (W)* — the average power consumed during a specific energy performance test as reported in the HVI 911 directory.
- H. *Fan Efficacy (cfm/W)* — the test airflow listed in the HVI 911 directory during a heating mode energy performance test with 0°C supply air temperature divided by the power consumption listed in the HVI 911 directory for the same test. Fan Efficacy in cfm/W shall be rounded to and reported at the nearest one decimal place (tenth) and used to determine compliance with this specification.
- I. *Standby Power (W)* — the power consumption determined when the HRV/ERV is not in use, measured in accordance with CSA C439-08.
- J. *Certified data* — Energy performance data published in the current edition of the HVI 911 Certified Home Ventilating Products Directory or an on-line HVI directory of certified products.
- K. CSA C439-08 “Standard Laboratory Methods of Test for Rating the Performance of Heat/Energy-Recovery Ventilators”.

- L. HVI 920 “HVI Product Performance Certification Procedure Including Verification and Challenge”: Publication that defines and specifies certain aspects of the procedures, covering such points as the actual testing, the certification process, challenge procedures, etc.
- M. HVI 911 “Certified Home Ventilating Products Directory”: HVI publishes a Certified Products Directory that is updated approximately monthly (www.hvi.org).
- N. Manufacturer Limited Warranty: Manufacturer limited warranty is an assurance by the ENERGY STAR Participant that purchased system equipment and components are warranted for a certain required period-of-time. The ENERGY STAR Participant is to comply with the warranty requirements as standard for all ENERGY STAR qualified models. ENERGY STAR can request the Participant to submit warranty documentation at any time. The exact terms of the limited warranty, given the minimum requirements, shall be determined by the Participant.

2) Qualifying Products: In order to qualify as ENERGY STAR, a heat/energy recovery ventilator must meet the definition in Section 1A or 1B and comply with the testing and minimum performance requirements provided in this specification.

3) ENERGY STAR Criteria for Qualifying Products: Only those products described in Section 2 that meet the criteria outlined in Table 1 or Table 2 as applicable may qualify for the ENERGY STAR designation. In addition, all ENERGY STAR H/ERVs must meet all requirements listed in this specification.

Table 1: ENERGY STAR Criteria for Qualified Heat/Energy Recovery Ventilators - Minimum SRE and Fan Efficacy – Effective July 1, 2009 to June 30, 2012.

<i>Minimum SRE</i>	
@ 0°C supply temperature	60 %
@ -25°C supply temperature	55 %
<i>Minimum Fan Efficacy with 0°C supply temperature</i>	
SRE less than 75%	1.0 cfm/W (.028 m ³ /min/W)
SRE 75% or greater	Any

Note: The net supply flows at which the H/ERV qualifies for ENERGY STAR designation must be specified in product literature and labelling.

Table 2: ENERGY STAR Criteria for Qualified Heat/Energy Recovery Ventilators - Minimum SRE and Fan Efficacy – Effective July 1, 2012

<i>Minimum SRE</i>	
@ 0°C supply temperature	65 %
@ -25°C supply temperature	60 %
<i>Minimum Fan Efficacy with 0°C supply temperature</i>	
SRE less than 75%	1.2 cfm/W (.034 m ³ /min/W)

SRE 75% or greater	0.8 cfm/W (.023 m ³ /min/W)
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Note: The net supply flows at which the H/ERV qualifies for ENERGY STAR designation must be specified in product literature and labelling.

4. Quality Assurance Requirements: To assure the quality of ENERGY STAR qualified H/ERVs, the following quality assurance requirements must be met for an H/ERV to qualify as ENERGY STAR:

4.1. Warranty

Partner shall provide a minimum one-year warranty.

5. Inclusion of Installation Instruction and Consumer Recommendations:

5.1 Picture diagram-type installation instructions shall be included with each qualified H/ERV. The instructions shall indicate the following:

1. How to properly seal the openings to the exterior of the thermal envelope of the building with caulk or other similar material to inhibit air leakage.
2. Recommended ductwork installation including type, elbows (including radii), terminations, sealants, and lengths that will minimize static pressure losses and promote adequate airflow.
3. Proper installation of vibration deadening materials such as short pieces of flexible duct.
4. Proper installation of insulation and connecting ducts to minimize building heat loss and gain.

5.2 Installation Instructions: Manufacturers must include the following information on the product or in product literature and on Partner's Web site:

To ensure quiet operation of ENERGY STAR qualified HRV/ERVs, each product should be installed using sound attenuation techniques appropriate for the installation.

The way that your Heat/Energy recovery ventilator is installed may make a significant difference to the electrical energy that you will use. To minimize the electricity use of the Heat/Energy recovery ventilator, a stand-alone fully ducted installation is recommended. If you choose a simplified installation that operates your furnace air-handler for room-to-room ventilation, an electrically efficient furnace that has an electronically commutated (EC) variable speed blower motor will reduce your electrical energy consumption and operating cost.

6. Product Testing: Manufacturers are required to perform tests, according to the requirements included in this specification, and then submit qualifying model information for approval. Each qualifying model must be tested in accordance with CSA C439 and be certified by HVI.

7. Effective Date: The effective date is July 1, 2009. A manufacturer has one year after signing the ENERGY STAR Administrative Arrangement to ensure that the ENERGY STAR mark appears directly on at least one ENERGY STAR qualified H/ERV model.

8. Qualifying and Labelling Products under the Specification: Manufacturers must sign an ENERGY STAR administrative arrangement for products to qualify for ENERGY STAR. Participants must provide clear and consistent labelling of ENERGY STAR qualified H/ERVs by displaying the certification mark on the top/front of the product (on product label or a permanent mark), on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed, and in product literature (including user manuals, specification sheets, and other related information). All products, including models originally qualified to the Table 1 criteria with a date of manufacture on or after July 1, 2012, must meet the Table 2 criteria in order to use the ENERGY STAR on the product or in product literature. The date of manufacture is specific to each unit, and is the date (e.g., month and year) of which a unit is considered to be completely assembled.

9. Exclusion of Automatic Grandfathering: ENERGY STAR qualification will not automatically be granted for the life of the product model. Therefore, any product sold, marketed, or identified by the manufacturing partner as ENERGY STAR must meet the current specification that is in effect at that time.

10. Heat/Energy Recovery Ventilators Models with Resistance Heating: Heat/Energy recovery ventilators with electric resistance heaters will not qualify as ENERGY STAR.

11. Reporting of Unit Sales: Manufacturers shall provide, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR. Specifically, the Partner must submit the total number of ENERGY STAR qualified HRVs and ERVs shipped (in units by model) or an equivalent measurement as agreed to in advance. The Partner is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g. efficiency, capacity, power consumption or other as relevant), total unit shipments for each model in its product line, and percent of total unit shipments that qualify as ENERGY STAR. The data for each calendar year should be submitted, preferably in electronic format, no later than the following March and may be provided directly from the Partner or through a third party to be designated. The data will be used for program evaluation purposes and will be closely controlled. Any information released will be in a generic format to protect the confidentiality of the Partner.

12. Future Specification Revisions: Natural Resources Canada (NRCan) reserves the right to change the criteria should technological and/or market changes affect the usefulness of this specification to consumers, industry, or the environment. It is anticipated that a more stringent H/ERV Specification will be developed within five years of the effective date of this Specification. This will provide H/ERV ENERGY STAR partners with some lead-time to improve the overall performance of their products while allowing them to benefit from ENERGY STAR market development programs.

Discussion of comments received from stakeholders

Program Scope

A number of comments were received requesting clarification on the scope of the proposed H/ERV ENERGY STAR specification. This is a Canadian ENERGY STAR specification and it is based on HVI-certified performance ratings for the H/ERV operating in heating mode. To avoid confusion, the title of the H/ERV ENERGY STAR specification has been revised to now include the word “Canadian”.

Inclusion of a low-temperature (-25°C) performance criterion

A number of comments were received stating that the ENERGY STAR specification should not include a Sensible Recovery Efficiency (SRE) test at -25°C. The comments include claims that this operating condition never occurs in the majority of the North American market and assertions that the specific test method and metric does not reliably indicate the relative energy efficiency of different models under general winter conditions

A low temperature test was developed by the CSA C439 Technical Sub-Committee (TSC) more than twenty years ago. At that time, the CSA C439 TSC had been notified by installers and regulators that a number of installed H/ERVs were not performing adequately during Canadian winters. One commenter provided the following insight into the low temperature test:

During the forming years of R-2000 Program in 1984-88, many HRV installations in northern Ontario, Prairies and in the North failed due to core freeze up during winter months. It was that time HRV testing at -25°C was introduced. There was an HRV replacement program for R2000 Homes. Replacement HRVs were all tested and certified at -25 C, and in all cases, alleviated the core-freeze up problems. Since then, R2000 Standard requires HRVs which meets the -25 C testing requirements.

As captured in the above comment, it is clear that the low temperature test was incorporated into the CSA Standard specifically to provide a standard method to determine whether the test unit operated correctly with very low supply air (i.e. outdoor air) temperature and high indoor humidity as well as to provide independent information that would enable users and product specifiers to assess whether the products’ defrost mechanisms worked. Essentially, a low temperature test for H/ERVs can be considered analogous to the maximum high temperature and low temperature tests that are included in the CSA C656-05 *Performance standard for split-system and single-package central air conditioners* and similar tests in other standards. Those tests are required before heat pump equipment can be certified and marketed, even though those abnormal operating conditions rarely, if ever, occur in the majority of the North American market. It is noteworthy that there are no abnormal operating condition tests in the CSA C439 H/ERV test standard, and none are required to obtain HVI certification of H/ERVs. Therefore a low temperature performance criterion has been included in the Canadian H/ERV ENERGY STAR specification.

Inclusion of a cfm per watt criterion

NRCan proposed that cfm per watt be included in the Specification, to be calculated using the certified ratings data published by the Home Ventilating Institute. A number of comments

suggested that no performance metric of this type be included, “because electrical energy use of H/ERVs is taken into account in the efficiency calculation”. While it is true that the thermal impact of the electrical energy use is accounted for in the SRE calculation, H/ERVs require electricity to operate. The power consumption of H/ERVs increases overall electricity consumption and it also represents an incremental electrical load and is of great interest to home owners and electrical utilities. Analysis of the HVI certified data indicates that there is a range of more than five-to-one in the calculated cfm per watt (ranging from less than 0.4 to over 2) and the data also indicates that there is little or no correlation between cfm per watt and SRE. To address concerns that a cfm per watt requirement might eliminate the best performing H/ERVs from ENERGY STAR, a three-year exemption from the cfm per watt criterion has been included in the Specification for H/ERVs that have an SRE of 75% or higher at 0°C

Warranty Period

A number of comments suggested that the minimum warranty period should be reduced from the proposed five year time period to one year for consistency with other ENERGY STAR specifications. This has been done in the specification.

Schedule

A number of comments were received suggesting that the requirements from Table 2 of the specification should not take effect until three years from the effective date of the specification rather than two years as proposed in the draft specification. Other comments suggested that the Table 2 criteria should come into effect immediately. In consideration for the time to design and test new models, the Table 2 criteria will come into effect three years after the effective start date.

Other comments

Some comments indicated that portions of the proposed wording for inclusion in installation manuals may contradict certain codes and standards, but did not provide any specific examples. Nevertheless, the wording has been revised in this Specification to alleviate those concerns.

There were some comments that suggested that an ENERGY STAR program for H/ERVs would not be acceptable unless it covered both Canada and the US. This specification has been focused on a cold climate specification and it is intended specifically for Canada. Development and adoption of ENERGY STAR specifications in the US is not within the mandate of NRCAN, however we expect this work will be the basis for a US specification.

Please forward your comments or questions on this document to:

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