

ENERGY STAR® Technical Specifications for Residential Heat-Recovery Ventilators and Energy-Recovery Ventilators (H/ERVs)

Version 1.0 Qualifying Criteria

Below is the Version 1.0 product specification for ENERGY STAR qualified residential H/ERVs. A product must meet all of the identified criteria to earn the ENERGY STAR.

- 1) Definitions: Below is a brief description of heat/energy-recovery ventilators and other terms as relevant to ENERGY STAR.
 - 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 C439-09 equation 12 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. Total energy-recovery efficiency (TRE): The apparent total (enthalpy) effectiveness adjusted per clause 9.3.3 of CSA C439-09 equation 13 to take into account fan energy, leakage (exhaust air transfer), mass and flow imbalance and certain other external and internal gains and losses.
 - F. 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.
 - G. Test Airflow: The net airflow in cubic feet per minute (cfm) (Litres per second L/s) for an energy performance test for which a certified performance rating with -13°F (-25°C), 32°F (0°C), or 95°F (35°C) outdoor air temperature is provided in the current HVI 911 directory of certified performance.
 - H. Power Consumption in Watts (W): The average power consumed during a specific energy performance test as reported in the HVI 911 directory.
 - I. Fan Efficacy (cfm/W) ((L/s)/W): The test airflow listed in the HVI 911 directory during a heating mode energy performance test with 32°F (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 ((L/s)/W) shall be rounded to and reported at the nearest one decimal place (tenth) and used to determine compliance with this specification.
 - J. Standby Power (W): The power consumption determined when the HRV/ERV is not in use, measured in accordance with CSA C439-09. CSA C439-09 references IEC 62301.

- K. Certified data: Performance data published in the current edition of the HVI Publication 911: Certified Home Ventilating Products Directory[®] or an on-line HVI directory of certified products.
 - L. CSA C439-09: “Standard Laboratory Methods of Test for Rating the Performance of Heat/Energy-Recovery Ventilators”.
 - M. HVI Publication 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.
 - N. HVI 911: HVI Publication 911: Certified Home Ventilating Products Directory[®]: The Home Ventilating Institute (HVI) publishes a Certified Products Directory that is updated approximately monthly (www.hvi.org).
 - O. 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.
 - P. Disclaimer Label: The disclaimer label is a label that shall include the ENERGY STAR mark, a textual indication of the climate zones in which the product is ENERGY STAR qualified, and a climate zone map illustrating those zones. The label shall be available for download from the ENERGY STAR Web site.
- 2) Qualifying Products: In order to qualify as ENERGY STAR, a residential H/ERV must meet the definition in Section 1A or 1B, comply with the testing and minimum performance requirements provided in this specification, and *have a capacity of no greater than 500 cfm (236 L/s)*. H/ERVs with electric resistance heaters are ineligible for ENERGY STAR qualification.

Under Tier 1 of this specification, products are eligible for ENERGY STAR qualification only in Canada.

- 3) ENERGY STAR Criteria for Qualifying Products: Only those products described in Section 2, above, that meet the criteria outlined in Table 1 or Table 2 as applicable may qualify for ENERGY STAR. In addition, all ENERGY STAR H/ERVs must meet all the requirements listed in sections 4 to 13 of this specification.
- A. Tier 1 (effective January 1, 2010)

Products to be sold as ENERGY STAR qualified must be tested and meet SRE requirements at 32°F (0°C) and -13°F (-25°C). The net supply airflows (in cfm) used during testing at these two different temperatures must be within 10% of each other, and specified in product literature and labelling.
 - B. Products to be sold as ENERGY STAR qualified must meet fan efficacy requirements at 32°F (0°C).
 - C. Tier 2 (effective July 1, 2012)

For qualification under Tier 2, please see the climate zone map on the last page of this specification to determine the supply temperatures at which your product must be tested, and

thereby which minimum SRE and/or TRE requirements it must meet. Products to be sold as ENERGY STAR qualified only in heating zones (climate zones ≥ 6 (for the purpose of this specification, Canada is deemed to be in zone 6 or greater)) must be tested and meet SRE requirements at 32°F (0°C) and -13°F (-25°C). The net supply airflows (in cfm) used during testing at these two different temperatures must be within 10% of each other, and specified in product literature and labelling.

Products to be sold as ENERGY STAR qualified only in neutral zones (climate zones 2 B&C, 3 B&C, 4, and 5) must be tested and meet SRE requirements at 32°F (0°C).

Products to be sold as ENERGY STAR qualified only in cooling zones (climate zones 1, 2A, and 3A) must be tested and meet SRE and TRE requirements at 32°F (0°C) and 95°F (35°C). The net supply airflows (in cfm) used during testing at these two different temperatures must be within 10% of each other, and specified in product literature and labelling.

Products to be sold as ENERGY STAR qualified in any climate must meet fan efficacy requirements at 32°F (0°C).

Table 1. Tier 1 (effective January 1, 2010) SRE and Fan Efficacy Minimum Requirements

Climate Zone	Zone Definition	Minimum SRE at 32°F (0°C)	Minimum SRE at -13°F (-25°C)	Minimum Fan Efficacy with 32°F (0°C) supply temperature	
Heating	Canada	60%	55%	SRE < 75%	1 cfm/W (0.47 L/s/W)
				SRE \geq 75%	any cfm/W (L/s/W)

Table 2. Tier 2 (effective July 1, 2012) SRE, TRE and Fan Efficacy Minimum Requirements

Climate Zone	Zone Definition	Minimum SRE at 32°F (0°C)	Minimum SRE at -13°F (-25°C)	Minimum TRE at 95°F (35°C)	Minimum Fan Efficacy with 32°F (0°C) supply temperature	
Heating	≥ 6 , Canada	65%	60%	N/A	SRE < 75%	1.2 cfm/W (0.57 L/s/W)
					SRE \geq 75%	0.8 cfm/W (0.38 L/s/W)
Neutral	2 B&C, 3 B&C, 4, 5	TBD	TBD	TBD	SRE < TBD	TBD cfm/W (L/s/W)
					SRE \geq TBD	TBD cfm/W (L/s/W)
Cooling	1, 2A, 3A	TBD	TBD	TBD	SRE < TBD	TBD cfm/W (L/s/W)
					SRE \geq TBD	TBD cfm/W (L/s/W)

- 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:

Warranty: Participant shall provide a minimum one-year warranty.

- 5) Inclusion of Installation Instructions: Picture diagram-type installation instructions shall be included with each qualified H/ERV. The instructions shall indicate the following:
- A. 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.
 - B. Recommended ductwork installation including type, impact of elbows, terminations, sealants, and lengths that will minimize static pressure losses and promote adequate airflow.
 - C. Proper installation of vibration deadening materials such as short pieces of flexible duct.
 - D. Proper installation of thermal insulation and connecting ducts to minimize heat loss and gain.
- 6) Consumer Information: Manufacturers must include the following information on the product or in product literature and on the Participant's Web site:
- A. "To ensure quiet operation of ENERGY STAR qualified HRV/ERVs, each product should be installed using sound attenuation techniques appropriate for the installation."
 - B. "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 airhandler for room-to-room ventilation, an electrically efficient furnace that has an electronically commutated (EC) variable speed blower motor will minimize your electrical energy consumption and operating cost."
 - C. "Installation of a user-accessible control with your product will improve comfort and may significantly reduce the product's energy use."
 - D. Disclaimer Label: The content of the ENERGY STAR disclaimer label shall be contingent upon the climate zone(s) in which it is to be marketed as ENERGY STAR qualified, as described in Tables 1 and 2, and detailed as follows:
 - 1. Tier 1

The label shall read:

"This product earned the ENERGY STAR by meeting strict energy efficiency guidelines set by Natural Resources Canada and the US EPA. It meets ENERGY STAR requirements only when used in Canada."
 - 2. Tier 2

The label shall begin:

*"This product earned the ENERGY STAR by meeting strict energy efficiency guidelines set by Natural Resources Canada and the US EPA. It meets ENERGY STAR requirements only when used in"*and depending on the climate zone(s) in which the product is intended to be sold, continue:

- Heating zones: *“Canada and/or climate zones ≥ 6 on the adjacent map.”*
- Neutral zones: *“climate zones 2 B&C, 3 B&C, 4, or 5 on the adjacent map.”*
- Cooling zones: *“climate zones 1, 2A, or 3A on the adjacent map.”*
- Heating and neutral zones: *“climate zones ≥ 4 , or zones 2 B&C or 3 B&C on the adjacent map.”*
- Heating and cooling zones: *“Canada and/or climate zones ≥ 6 , or zones 1, 2A, or 3A on the adjacent map.”*
- Neutral and cooling zones: *“climate zones ≤ 5 on the adjacent map (excluding Canada).”*
- Heating, neutral, and cooling zones: The term, “only” should be removed, such that the disclaimer reads, *“This product earned the ENERGY STAR by meeting strict energy efficiency guidelines set by the Natural Resources Canada and the US EPA. It meets ENERGY STAR requirements when used in any zone on the adjacent map.”*

3. Tiers 1 and 2

The placement of this statement must be adjacent to the ENERGY STAR mark and any text describing the ENERGY STAR program and/or qualified products.

The disclaimer label will be available for Participants to download from the ENERGY STAR Web site with other ENERGY STAR marks. It shall be at least 3” x 2” in size, and may be vertical or horizontal. The Participant may enlarge it for larger product packaging surfaces if so desired.

The disclaimer label shall be clearly displayed on the same side as the ENERGY STAR mark on the product and product packaging, in the installation/instruction manual, and on the Participant’s Web site where information about ENERGY STAR qualified models is displayed.

- 7) Product Testing and Certification: 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 certified by HVI, or another such organization as approved by NRCAN (see Section 9, Requirements of Organizations Certifying Products for ENERGY STAR). Certification testing includes both initial qualification testing, as well as ongoing verification testing.
- 8) Verification and Challenge Testing: The Participant shall be subject to the verification and challenge testing procedures of the organization that certifies its H/ERV products, and ensure that the certification organization shares with NRCAN the results of this testing.
- 9) Requirements of Organizations Certifying Products for ENERGY STAR Qualification: This specification does not grant any organization the exclusive right to certify the performance of an H/ERV product for ENERGY STAR qualification. NRCAN will maintain a list of organizations authorized under this specification. As NRCAN approves certification organizations, it will add them to this list. NRCAN will consider the following elements when reviewing a certification organization for inclusion on this list:

A. Laboratory Requirements:

Laboratory accreditation: To test H/ERV products under this specification, the certification organization must ensure that all ENERGY STAR models are tested by an independent 3rd party laboratory that is accredited by an accreditation body that is a signatory, in good standing, to a mutual recognition arrangement of a laboratory accreditation cooperation (i.e. ILAC, APLAC, etc.) that verifies, by evaluation and peer assessment, that its signatory members are in full compliance with ISO/IEC 17011 and that their accredited laboratories comply with ISO/IEC 17025 or CAN-P-4E. Laboratories must be specifically qualified to carry out tests to determine whether H/ERVs meet key product criteria as outlined in this document. A laboratory's Scope of Accreditation must reflect its specific competence to carry out the applicable test procedures referenced in CSA C439.

B. Verification procedure requirements:

1. The organization shall have in place a verification testing procedure.
2. Product procurement: Products to undergo verification testing shall be procured from the marketplace. In order to ensure the organization's ability to procure a production unit, the organization shall not inform the Participant which models will be tested or where they will be obtained. Where this is not possible, and the products must be procured from the Participant, the organization shall ensure the samples are randomly selected from the production line.
3. Frequency of testing, and number of products to be tested: The organization shall ensure that 100% of each Participant's certified base model products that are ENERGY STAR qualified undergo verification testing every five years. The proportion or number of a Participant's products to be tested annually may be determined by the certification organization.
4. Resolution of failures: The organization shall have in place a procedure to resolve product failures, and provide NRCAN with details of this procedure.

C. Challenge procedure requirements:

1. The organization shall have in place a challenge testing procedure.
2. Product procurement and resolution of failures shall follow Section 9.B, Verification procedure requirements.

D. Certification of base-derived or similar products: The certification organization shall not certify an ENERGY STAR qualified product based on the ratings of another product unless the differences between the two products are limited to those that do not adversely affect product performance. Examples of acceptable differences include but are not limited to color, finish, and nameplate.

E. Membership requirements: The organization shall not require that a party seeking product certification be a member of the organization. Product verification and challenge testing shall only require that the product has been certified by the organization.

F. Consideration of the organization's procedures: The certification, verification, and challenge testing procedures, as well as all other relevant aspects of any certification organization, must be available in written format to current or prospective ENERGY STAR H/ERV program Participants, and must be submitted in this format to NRCAN for its review.

- G. Reporting results to NRCan: The certification organization shall report to NRCan on an annual basis the outcomes of verification and challenge testing for all ENERGY STAR qualified products certified by the organization.
- 10) Effective Date: The date from which products must meet the requirements specified under the Version 1.0 H/ERV specification will be defined as the effective date of the agreement.
- A. Qualifying and Marking products under the Tier 1 Version 1.0 specification: The effective date of the Tier 1 Version 1.0 ENERGY STAR Technical Specifications for H/ERVs is **January 1, 2010**. All products with a date of manufacture on or after the applicable Tier 1 Version 1.0 effective date must meet Tier 1 Version 1.0 requirements to qualify for ENERGY STAR. The date of manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is considered to be completely assembled.
- B. Qualifying and Marking products under the Tier 2 Version 2.0 specification: The effective date of the Tier 2 Version 1.0 ENERGY STAR Technical Specifications for H/ERVs is **July 1, 2012**. All products with a date of manufacture on or after the applicable Tier 2 Version 1.0 effective date must meet Tier 2 Version 1.0 requirements to qualify for ENERGY STAR. The date of manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is considered to be completely assembled.
- 11) 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 Participant as ENERGY STAR must meet the current specification that is in effect at that time.
- 12) Lab Accreditation: All third party laboratories testing for certification programs authorized by NRCan to test H/ERVs for ENERGY STAR qualification will have until January 1, 2011 to meet the laboratory accreditation requirements described in Section 9.A, above, to continue testing these products for the purpose of ENERGY STAR qualification.
- 13) Future Specification Revisions: The US EPA and Natural Resources Canada reserve 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 Participants with some lead-time to improve the overall performance of their products while allowing them to benefit from ENERGY STAR market development programs.

For the purpose of this specification, Canada is deemed to be in zone 6 or higher.

