



ENERGY STAR® Program Requirements for Residential Ventilating Fans

Eligibility Criteria

Below is the product specification (Version 2.0) for ENERGY STAR qualified residential ventilating fans. A product must meet all of the identified criteria to earn the ENERGY STAR.

- 1) **Definitions:** Below is a brief description of a residential ventilating fan and other terms as relevant to ENERGY STAR.
 - A. **Residential Ventilating Fan:** A ceiling, wall-mounted, or remotely mounted in-line fan designed to be used in a bathroom or utility room, or a kitchen range hood, whose purpose is to move objectionable air from inside the building to the outdoors. Residential ventilating fans used for cooling (e.g., whole-house fans) or air circulation are excluded. Heat/energy recovery ventilation fans ducted to the ventilated space and powered attic ventilators (e.g., gable fans) are excluded, but may be considered in a future version of this specification. Residential ventilating fans with heat lamps are excluded from this specification. This specification does not address passive ventilation of any kind.
 - B. **Combination Unit:** A residential ventilating fan that contains a light source for general lighting and/or a night light.
 - C. **In-line Ventilating Fan:** A fan designed to be located within the building structure and requires ductwork on both intake and exhaust. Those in-line fans with only one intake are referred to as "single port" in-line fans, while those with multiple intake ports are referred to as "multi-port" in-line fans in this specification.
 - D. **HVI 915, "HVI (Home Ventilating Institute) Procedure for Loudness Rating of Residential Fan Products":** Procedure used for testing and rating ventilation fan products for sound. This test procedure includes laboratory requirements and methods for obtaining sound pressure, sound power, and sone values.
 - E. **HVI 916, "HVI Airflow Test Standards":** Airflow test standard that establishes uniform methods for laboratory testing of powered residential ventilating equipment for airflow rate. This publication covers the test equipment, tests of specific HVI classification groups, test reports, and policies for maintaining the standard.
 - F. **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, and the use of HVI trademark and labels.
 - G. **Inch of Water Gauge (w.g.):** A traditional unit of pressure used to describe both water and gas pressures. The conventional equivalent of one inch of water is 249.0889 [pascals](#), which is 2.490889 [millibars](#), about 0.036127 pounds per square inch (psi) or about 0.073556 inches (1.86832 millimeters) of mercury. The word "gauge" after a pressure reading indicates that the pressure stated is actually the difference between the absolute, or total, pressure and the ambient air pressure at the time of the reading.

- H. **Light Source:** The lighting portion of a combination unit or a range hood. For units using a compact fluorescent or fluorescent lamp, the light source includes the lamp and the ballast.
- I. **Power Consumption:** The operation of the fan motor consumes electrical power measured in Watts (W). Under this specification, power used for lights, sensors, heaters, timers, or night lights is not included in the determination of power consumption.
- J. **Sone:** An internationally recognized unit of loudness, which simplifies reporting of sound output by translating laboratory logarithmic decibel readings into a linear scale that corresponds to the way people sense loudness. A sone is equal in loudness to a pure tone of 1,000 cycles per second at 40 decibels above the listener's threshold of hearing.
- K. **Working Speed:** The lowest speed above 100 CFM for a two-speed fan and a low setting above 90 CFM for a multi-speed fan as defined in "*HVI Supplement – Range Hood Working Speed.*"
- 2) **Qualifying Products:** *In order to qualify as ENERGY STAR, a residential ventilating fan must meet the definition in Section 1A and the specification and testing requirements provided in Sections 3 and 4, below. For the purposes of this specification, residential ventilating fans include the following product types: range hoods, in-line (single and multi-port), and bathroom and utility room; including ducted and direct-discharge models. Ventilating fans with sensors and timers may qualify under this specification. Residential ventilating fans qualifying under this specification can also be used in small commercial applications (e.g., bathroom of a restaurant).*
- 3) **ENERGY STAR Specification Requirements for Qualifying Products:** Only those products described in Section 2 that meet the energy-efficiency criteria outlined in Table 1, below, may qualify for the ENERGY STAR. In addition to these requirements, all qualifying residential ventilating fans must also meet those requirements listed in Sections A-C, as appropriate.

Table 1 Criteria for ENERGY STAR Qualified Residential Ventilating Fans – Minimum Efficacy Levels	
Airflow (cfm)	Minimum Efficacy Level (cfm/W)*
Range Hoods – up to 500 cfm (max)	2.8
Bathroom and Utility Room Fans – 10 to 80 cfm	1.4
Bathroom and Utility Room Fans – 90 to 130 cfm	2.8
Bathroom and Utility Room Fans – 140 to 500 cfm (max)	2.8
In-Line (single-port & multi-port) Ventilating Fans	2.8

**Based on static pressure reference measurement as specified in Section 4D of this specification.*

A. Lighting Requirements:

1. Starting October 1, 2003, the following products may qualify as ENERGY STAR:
 - a. Residential ventilating fans with no light source
 - b. Combination unit residential bathroom and utility room ventilating fans having a light source that meets the lighting performance criteria listed in Table 2, below. Residential bath and utility ventilating fans that have lamp sockets that can accept incandescent lamps are excluded.
 - c. Range hoods with incandescent light sources or sockets may qualify through December 31, 2004.

Table 2 – Light Source Criteria

Performance Characteristic	ENERGY STAR Specification
System Efficacy per lamp ballast combination, Lumens Per Watt (LPW) – see notes at end of this table	<p>≥ 46 LPW for all lamp types below 30 total listed lamp Watts.</p> <p>≥ 60 LPW for all lamp types that are ≤ 24 inches and ≥ 30 listed lamp Watts.</p> <p>≥ 70 LPW for all lamp types that are ≥ 24 inches and ≥ 30 listed lamp Watts.</p>
Lamp Start Time	<p>The time needed after switching on the lamp to start continuously and remain lighted must be an average of one second or less.</p> <p>For manufacturers using magnetic ballasts and lamps with integrated electronic starting chips, lamps <u>must</u> be included with the residential ventilating fan when shipped from the factory.</p>
Lamp Life	<p>For residential ventilating fans that are shipped with a lamp, the average rated life of the lamp must be ≥ 10,000 hours.</p> <p>For residential ventilating fans that are not shipped with lamps, a list of lamp types must be provided that would result in the lighting source complying with this specification requirement. This list must be clearly visible to the consumer on the residential ventilating fan packaging. Manufacturers are not required to provide specific lamp manufacturer names and model numbers on the packaging. Rather, generic lamp listings, such as the NEMA or ANSI generic descriptions will suffice.</p>

Color Rendering Index	<p>≥ 80 for compact fluorescent lamps. ≥ 75 for linear lamps.</p>
Correlated Color Temperature	<p>For residential ventilating fans that are shipped with a lamp and do not have a <i>rated</i> color temperature of 2,700 Kelvin (K) or 3,000 K (actual measured CCT of 2,700 to 3,000K ± 200K), the packaging should clearly describe the color of the product (cool or warm) and state its intended use.</p> <p>For residential ventilating fans that are not shipped with a lamp, a list of lamp types must be provided that would result in the light source complying with this specification requirement. This list must be clearly visible to the consumer on the residential ventilating fan packaging. Manufacturers are not required to provide specific lamp manufacturer names and model numbers on the packaging. Rather, generic lamp listings such as the NEMA or ANSI generic descriptions will suffice.</p>
Noise	<p>Class A sound rating for electromagnetic and electronic ballasts, outside the fixture. Not to exceed a measured level of 24 dBA when measured in a room with ambient noise no greater than 20 dBA.</p>
Maximum Total Lamp Wattage (excluding night lights)	<p>≤ 50 Watts.</p>
Maximum Night Light Wattage	<p>≤ 4 Watts.</p>

Notes:

- Light Source efficacy shall be determined by the following equation:

$$\text{Light Source efficacy [Lumens per Watt]} = \frac{\text{Measured Lamp Lumens [Lumens]}}{\text{Measured Input Power [Watts]}}$$
- Lamp Lumens: Lamp lumens must be measured using the lamp and ballast that are shipped with the residential ventilating fan.
- Light Source Input Power: Light Source input power must be measured using the lamp and ballast that are shipped with the residential ventilating fan.
- For residential ventilating fans shipped without lamps, efficacy shall be determined by testing at least one of the lamp types listed on the product packaging.
- In some cases, original equipment manufacturers (OEMs) may already offer lamps and ballasts that meet the above criteria. Manufacturers may choose a lamp/ballast combination from the NEMA/ALA matrices at www.nema.org/lampballastmatrix/ or data from an ENERGY STAR Platform Letter of Qualification supplied by the OEM.

B. Quality Assurance Requirements: To assure the quality of ENERGY STAR qualified residential ventilating fans, the following quality assurance requirements must be met for a fan to earn the ENERGY STAR:

1. Warranty

Partner shall provide a minimum one-year warranty for a product to qualify for the ENERGY STAR.

2. Fan Sound Levels

For most ventilating fan products, fan noise is the most obvious indicator of product quality to the consumer. Table 3, below, provides maximum noise levels allowed for residential bath and utility ventilating fans and range hoods to earn the ENERGY STAR. There is no sound requirement for single or multi-port in-line fans.

Table 3 Criteria for ENERGY STAR Qualified Residential Ventilating Fans – Maximum Allowable Sound Levels	
Airflow (cfm)	Maximum Allowable Sound Level (Sones)*
Range Hoods – up to 500 cfm (max)	2.0**
Bathroom and Utility Room Fans – 10 to 80 cfm	2.0
Bathroom and Utility Room Fans – 90 to 130 cfm	2.0
Bathroom and Utility Room Fans – 140 to 500 cfm (max)	3.0

* Based on static pressure reference measurement as specified in Section 4D of this specification.

3. Installed Fan Performance

All qualifying ventilating fan models, with the exception of in-line and range hood models, when measured by industry standard testing procedures at 0.25 in. w.g. static pressure, shall deliver a rated airflow (cfm) equal to or greater than the following percentages of rated airflow delivered at 0.1 in. w.g. static pressure for that particular model:

Product Category	Rated Airflow (0.25 in. w.g.)
Bathroom and Utility Room Fans – 10 to 80 cfm	60%
Bathroom and Utility Room Fans – 90 to 130 cfm	70%
Bathroom and Utility Room Fans – 140 to 500 cfm	70%

C. Inclusion of Installation Instruction and Consumer Recommendations: Picture diagram-type installation instructions shall be included with each qualified ventilating fan. The instructions shall indicate the following:

1. How to properly seal the fan with caulk or other similar material to inhibit air leakage to the exterior of the thermal envelope of the building.
2. Recommended ductwork types, 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 around the fan to minimize building heat loss and gain.

In-Line Fan (Additional) Installation Instructions: Manufacturers must include the following information on the in-line product or in product literature:

To ensure quiet operation of ENERGY STAR qualified in-line and remote fans, each fan should be installed using sound attenuation techniques appropriate for the installation. For bathroom and general ventilation applications, at least 8 feet of insulated flexible duct must be installed between the exhaust or supply grille(s) and the fan. For kitchen range hood remote ventilation applications, where metal duct is generally required by code, a metal sound attenuator must be installed between the range hood and the fan.

Range Hoods with Incandescent Light Sources: Manufacturers must recommend the use of an ENERGY STAR qualified CFL light bulb or incandescent bulb that uses no more than 50 watts total. This recommendation must be provided in product literature, on product packaging, and on Partner's Web site.

Ventilating Fan Models with Electric Resistance Heating: Qualified products with electric resistance heating elements must include information on the product packaging, in product literature, and on partner's Web site explaining that the heating element is designed to be used for supplemental heating only and does not contribute to the ENERGY STAR qualification of the product.

4) Product Testing: Manufacturers are required to perform tests, according to the requirements included in this Version 2.0 specification, then submit qualifying model information to EPA for approval. **Each qualifying model must be tested and certified by HVI in accordance with HVI Standards 915, 916, and 920.** The test results must be reported using the Residential Ventilating Fan Qualified Product Information (QPI) Form. Manufacturers are required to report fan performance information on the QPI Form using the following units of measure:

- A. Airflow Rating (cfm): The airflow of a residential ventilating fan shall be measured in cubic feet per minute (cfm). The cfm values shall be certified by HVI and measured by the method described in HVI Standard 916.
- B. Efficacy (cfm/W): The efficacy of the residential ventilating fan shall be expressed in cubic feet per minute per Watt (cfm/W). Manufacturers shall calculate efficacy by using the airflow and fan motor electrical power values certified by HVI and described in HVI Standard 916. Fan motor electrical usage will be the only energy consumption considered for the efficacy calculation. Energy used for other fan auxiliaries, such as lights, is not included in the determination of fan efficacy.
- C. Sound Rating (sone): The sound output of a residential ventilating fan is measured in sones. The sound ratings shall be certified by HVI and measured by the method described in HVI Standard 915.
- D. Static Pressure Reference Measurements: Ventilating fan performance characteristics such as

motor wattage, cfm, and sones must be reported to EPA at specific static pressures. These reference measurements vary depending upon the fan type and follow HVI 920 rating points. Reference measurements shall be certified by HVI and conducted in accordance with HVI Standard 920. The static pressure reference measurements are listed below for each qualifying fan type.

1. Ducted products (products with one duct such as bathroom and utility room fans: 0.1 in. w.g. static pressure
 - a. Partner must also test and report products at 0.25 in. w.g. static pressure for airflow (cfm)
 - b. Partner is not required to test sound levels or wattage at 0.25 in. w.g. static pressure
 2. Ducted range hoods must be tested at working speed as defined in “*HVI Supplement – Range Hood Working Speed.*”
 3. Direct discharge (non-ducted) products: 0.03 in. w.g. static pressure
 4. In-line ventilating fans: 0.20 in. w.g. static pressure (Wattage and cfm only)
- 5) Effective Date: The date that manufacturers may begin to qualify products as ENERGY STAR under the Version 2.0 specification will be defined as the *effective date* of this agreement. The ENERGY STAR Residential Ventilating Fans (Version 2.0) specification shall go into effect on **October 1, 2003**. Any previously executed agreement on the subject of ENERGY STAR qualified vent fans, shall be terminated effective October 1, 2003.
- A. Qualifying and Labeling Products under the Version 2.0 Specification: All products, including models originally qualified under Version 1.0 with a **date of manufacture** on or after **October 1, 2003**, must meet the new Version 2.0 requirements 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.
 - B. Elimination of Automatic Grandfathering: EPA does not allow grandfathering under this Version 2.0 specification. **ENERGY STAR qualification under Version 1.0 is not automatically 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 in effect at that time.
 - C. Phase-Out of Ventilating Fan Models with Resistance Heating: Starting January 1, 2005, ventilating fans with electric resistance heaters will no longer qualify as ENERGY STAR.
 - D. Phase-Out of Range Hood Models with Incandescent Lighting: Starting January 1, 2005, range hoods with incandescent light sources or sockets that accept incandescent lamps, will no longer qualify as ENERGY STAR. Any range hood qualifying with lighting must meet the requirements of Table 2 in this Version 2.0 specification.
- 6) Future Specification Revisions: ENERGY STAR reserves the right to revise the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through industry discussions.