



ENERGY STAR® Program Requirements Product Specification for Residential Ventilating Fans

Eligibility Criteria

DRAFT Version 3.0

Note: EPA recently updated the ventilating fan specification to support upcoming ENERGY STAR program changes effective January 1, 2011. A note box was included in the Final Version 2.3 specification that conveys EPA's plans to adopt the ENERGY STAR Version 1.0 Luminaires specification for purposes of qualifying ventilating fan light kits. As such, all lighting requirements have been removed from this Version 3.0 document and Section 3B now references the Version 1.0 Luminaires specification. Stakeholders are encouraged to review the Final Draft Version 1.0 Luminaires specification and comment on feasibility and timing for ventilating fans. The Final Draft Version 1.0 document is available on the ENERGY STAR website at: www.energystar.gov/luminaires.

Range Hoods with a Recirculation Option

It was recently brought to EPA's attention that many range hoods are offered in ducted and recirculation (ductless) configurations to allow flexibility in installation. EPA understands that performance in the recirculation configuration is not typically measured or reported. In the short term, EPA will include a statement in the ENERGY STAR Partner Commitments that manufacturers selling ENERGY STAR qualified range hoods offering a recirculation option must clearly indicate that the product has not been ENERGY STAR qualified in this configuration. EPA will evaluate these product types more closely during the next revision cycle to determine whether ducted performance and ranking tracks to performance in recirculation mode and evaluate additional requirements, as needed.

Following is the **DRAFT Version 3.0** product specification for ENERGY STAR qualified residential ventilating fans. A product shall meet all of the identified criteria to earn the ENERGY STAR.

1) Definitions: Below are the definitions of the relevant terms in this document.

- 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.
- 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 that 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. Base Model: A fan model from which other models may be derived.
- E. Base-Derived Model: A fan model derived from another fan model such that differences between the two models 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.
- F. Product Family: A Base model and all associated Base-Derived Models.
- 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 pascal, 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 Kit: A lighting unit integral to the ventilation fan consisting of lamp(s) and ballasting (as applicable) or LED Light Engine(s), together with the parts designed to distribute the light, position and protect the lamps, and connect the lamps to the mains.
- I. Night Light: For the purposes of this specification, a night light is any light that draws less than 4W total.

Note: EPA is proposing to use a consistent terminology for the lighting portion of ceiling and ventilating fans, i.e. light kit. The definition proposed above is based on the definition for light kit provided in the ENERGY STAR Version 2.4 Ceiling Fan specification. Stakeholders are encouraged to provide feedback on this proposed definition. A definition for night light has also been added.

- J. Power Consumption: The operation of the fan motor consumes electrical power measured in Watts (W).
- K. 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.
- L. 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.

2) Scope:

- A. Included Products: Products that meet the definitions of a Residential Ventilating Fan as specified herein are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.B. The following product types are eligible: range hoods; and, in-line (single and multi-port), bathroom, and utility room fans, including ducted and direct-discharge models. Ventilating fans with sensors and timers may qualify under this specification. Residential ventilating fans that qualify under this specification may also be appropriate for some light commercial applications, such as the bathroom of a restaurant.
- B. Excluded Products: The following product types are not eligible for ENERGY STAR: heat/energy recovery ventilation fans ducted to the ventilated space; powered attic ventilators (e.g., gable fans); ventilating fans with heat lamps; ventilating fans with resistance heating; and ventilating fans used for cooling (e.g., whole-house fans) or air circulation. This specification does not address passive ventilation of any kind. Ventilating fans that have lamp holders which typically accept incandescent lamps e.g., ANSI lamp holders E11, E26, G4, GX5.3, GY6.35, GY8.6 and R7S are excluded.

3) **Qualification Criteria:**

A. Efficacy Requirements:

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 89 cfm	1.4
Bathroom and Utility Room Fans – 90 to 500 cfm (max)	2.8
In-Line (single-port & multi-port) Fans	2.8

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

Efficacy shall be calculated by using airflow and fan motor electrical power values as tested per the requirements of this specification. Fan motor electrical usage is the only energy consumption considered for the efficacy calculation. Energy used for other fan auxiliaries (e.g., lights, sensors, heaters, timers, or night lights) is not included in the determination of fan efficacy.

- B. Lighting Requirements: To qualify for ENERGY STAR, residential ventilation fans that include a light kit shall meet the lighting performance criteria for non-directional luminaires found in *ENERGY STAR® Program Requirements for Luminaires - Eligibility Criteria* in effect at the time of qualification. **Note:** Ventilation fan light kits shall be exempt from the Safety Requirements, Product Labeling & Packaging Requirements, and Warranty Requirements in the Luminaires specification. Night lights shall be exempt from the total light output requirement as well.

Note: The light source criteria for fluorescent fixtures and LED light engines (i.e., Tables 2 and 3 in the existing Version 2.3 specification) have been replaced by a reference to the ENERGY STAR Luminaires specification, which light kits will need to meet to be ENERGY STAR qualified. Exclusions specific to ventilating fans are also noted. EPA is proposing to keep the night light maximum wattage allowance of 4 Watts. In addition to the exclusion provided for all ventilating fan light kits, night lights would also be exempt from the total light output requirement.

- C. Warranty: Partner shall provide a minimum one-year warranty for a product to qualify for the ENERGY STAR.
- D. Fan Sound Levels: Residential bath and utility ventilating fans and range hoods shall meet the sound levels provided in Table 4, below. There is no sound requirement for single or multi-port in-line fans.

Table 2: 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 139 cfm	2.0

Bathroom and Utility Room Fans – 140 to 500 cfm (max)	3.0
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* Based on static pressure reference measurement as specified in Section 4.C. of this specification.

- a. Bathroom and utility room fans with more than one speed shall be tested and meet the sound level requirements of this specification at each speed. Fans of this type that have a rotary speed dial or similar mechanism that allows for a theoretically infinite number of speeds between the minimum and maximum speed shall be tested and meet the sound level requirements of this specification at their minimum and maximum speeds, and at a speed half-way between them.
 - b. Range hoods shall be tested and meet the sound level requirements of this specification in each possible configuration (e.g., vertical, horizontal). The Partner shall report to EPA the sound level at each configuration.
- E. 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 percentages presented in Table 5, below, of rated airflow delivered at 0.1 in. w.g. static pressure for that particular model.

Table 3: Criteria for ENERGY STAR Qualified Residential Ventilating Fans – Rated Airflow Requirements	
Product Category	Rated Airflow (0.25 in. w.g.)
Bathroom and Utility Room Fans – 10 to 89 cfm	60%
Bathroom and Utility Room Fans – 90 to 500 cfm	70%

- F. Significant Digits and Rounding:
- a. All calculations shall be carried out with actual measured or observed values. Only the final result of a calculation shall be rounded. Unless otherwise directed below, calculated results shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.
 - b. Unless otherwise specified, compliance with specification limit shall be evaluated using exact values without any benefit from rounding.
 - c. When calculating efficacy for ENERGY STAR qualification, fan cfm shall be rounded down to the nearest whole cfm.
 - d. Fan motor electrical power shall be rounded up to, three significant digits when wattage is greater than 10 Watts, (e.g., 51.6 Watts, 516 Watts), or two significant digits when wattage is less than 10 Watts (e.g., 5.2 Watts). Watt readings should assume standardized air (as defined in AMCA 210-07) and as tested watts.

4) Test Requirements:

- A. Representative Models shall be selected for testing per the following requirements:
 - a. For qualification of an individual product model, the representative product shall be equivalent to that which is intended to be marketed and labeled as ENERGY STAR.
 - b. For qualification of a product family, the base model shall serve as the representative model.

- B. When testing residential ventilating fans, the following test methods shall be used to determine ENERGY STAR qualification:

Table 4: Test Methods for ENERGY STAR Qualification	
ENERGY STAR Requirements	Test Method Reference
Airflow Rating (cfm) ^{1,2}	ANSI/AMCA 210-07 “Laboratory Methods of Testing Fans for Aerodynamic Performance Rating” OR HVI 916-09 “Airflow Test Procedure”.
Sound Rating (sone) ³	HVI 915-06 “Procedure for Loudness Rating of Residential Fan Products” OR ANSI/AMCA Standard 300-08 “Reverberant Room Method for Sound Testing of Fans” and AMCA Publication 311-05 “Certified Ratings Program - Product Rating Manual for Fan Sound Performance” (spherical sones method only)
Lighting Requirements	See ENERGY STAR® Program Requirements for Luminaires - Eligibility Criteria

- Note:** 1) Airflow certification cannot be performed for geometrically similar fans tested at other speeds or sizes.
2) Fan testing setup shall conform to HVI 916-09 Section 6, Test Setups and Diagrams.
3) Fan testing setup shall conform to HVI 915-06 Section 8, Test Setups.

Note: A reference to the ENERGY STAR Luminaires specification has been added to Table 4, above, for purposes of testing and qualifying ventilating fan light kits. The version number is not included since test standard references could change depending on specification versioning and qualifying light sources will be required to meet the specification in effect at the time of qualification.

- C. **Static Pressure Reference Measurements:** Ventilating fan performance characteristics such as motor wattage, cfm, and sones shall be collected at specific static pressures. These reference measurements vary depending upon the fan type and follow HVI 920, *HVI Product Performance Certification Procedure Including Verification and Challenge* rating points. The static pressure reference measurements are listed below for each qualifying fan type:
- a. Ducted products (products with one duct such as bathroom and utility room fans): 0.1 in. w.g. static pressure
 1. Products shall be tested at 0.25 in. w.g. static pressure for airflow (cfm)
 2. Sound levels and wattage do not need to be tested at 0.25 in. w.g. static pressure
 - b. Ducted range hoods shall be tested at working speed as defined in HVI 916.
 - c. Direct discharge (non-ducted) products shall be tested at 0.03 in. w.g. static pressure
 - d. In-line ventilating fans shall be tested at 0.20 in. w.g. static pressure (wattage and cfm only)

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

- 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.

- Recommended ductwork types, elbows (including radii), terminations, sealants, and lengths that will minimize static pressure losses and promote adequate airflow.
- Proper installation of vibration deadening materials such as short pieces of flexible duct.
- Proper installation of insulation around the fan to minimize building heat loss and gain.

In-Line Fan (Additional) Installation Instructions: Manufacturers shall 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 shall be installed using sound attenuation techniques appropriate for the installation. For bathroom and general ventilation applications, at least 8 feet of insulated flexible duct shall 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 shall be installed between the range hood and the fan.

- 6) Effective Date:** The ENERGY STAR Ventilating Fan Version 3.0 specification shall take effect on **October 1, 2011**. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on the model's date of manufacture. 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.

Note: To align with the ENERGY STAR Version 1.0 Luminaires specification effective date, EPA is proposing that this Version 3.0 specification take effect on October 1, 2011. As of this date, all ventilating fan light kits will be required to meet the Version 1.0 Luminaires specification requirements as detailed in section 3B to qualify for ENERGY STAR. In addition to meeting the performance requirements, *existing and new* ventilating fans with light kits will also be need to be third-party certified by an EPA-recognized Certification Body to appear on the ENERGY STAR Qualified Product list.

- 7) Future Specification Revisions:** EPA reserves the right to change 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. In the event of a specification revision, please note that the ENERGY STAR qualification is not automatically granted for the life of a product model.