ENERGY STAR® Program Requirements Product Specification for Residential Ventilating Fans

Eligibility Criteria

Version 3.0

Following is the **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. The light source is integral to the ventilation fan consisting of lamp(s) and ballasting (as applicable) or LED Light Engine(s) and together with the parts designed to distribute the light, position and protect the lamps, and connect the lamps to the mains. For the purposes of this specification, a night light is any light source that draws less than 4W total.

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

I. 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.

J. 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 lighting shall meet the lighting performance criteria for non-directional luminaires found in *ENERGY STAR® Program Requirements, Product Specification for Luminaires - Eligibility Criteria* in effect at the time of qualification. **Note:** Ventilating fan lighting shall be exempt from the Safety Requirements, Product Labeling & Packaging Requirements, in the Luminaires specification. Night lights shall be exempt from the total light output requirement as well.

C. Warranty: Partner shall provide a minimum one-year warranty for a product to qualify for the ENERGY STAR. Lighting warranty requirements are provided in the ENERGY STAR Luminaires specification.

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

* 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 directly measured (unrounded) values.

b. Unless otherwise specified below, compliance with specification limits shall be evaluated using directly measured or calculated values without any benefit from rounding.

c. Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

d. When calculating efficacy for ENERGY STAR qualification, fan cfm shall be rounded down to the nearest whole cfm.

e. 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, Product Specification 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.

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 on which a unit is considered to be completely assembled.

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.