



ENERGY STAR® Program Requirements for Residential Ceiling Fans

Partner Commitments

Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified residential ceiling fans. The ENERGY STAR Partner must adhere to the following program requirements:

- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on residential ceiling fans and specifying the testing criteria for residential ceiling fans. EPA may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at EPA's request;
- comply with current ENERGY STAR Logo Use Guidelines, describing how the ENERGY STAR labels and name may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;
- qualify at least one ENERGY STAR labeled residential ceiling fan model within one year of activating the residential ceiling fans portion of the agreement. When Partner qualifies the product, it must meet the specification (e.g., Tier 1 or 2) in effect at that time;
- provide clear and consistent labeling of ENERGY STAR qualified residential ceilings fans. The ENERGY STAR label must be clearly displayed on product packaging, in product literature (i.e., user manuals, spec sheets, etc.), and on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed;
- provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying residential ceiling fan models. Once the Partner submits its first list of ENERGY STAR labeled residential ceiling fan models, the Partner will be listed as an ENERGY STAR Partner. Partner must provide annual updates in order to remain on the list of participating product manufacturers;
- provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total number of ENERGY STAR qualified residential ceiling fans shipped (in units by model) or an equivalent measurement as agreed to in advance by EPA and Partner. Partner is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g., capacity, size, speed, 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 to EPA, preferably in electronic format, no later than the following March and may be provided directly from the Partner or through a third party. The data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner;
- notify EPA of a change in the designated responsible party or contacts for residential ceiling fans within 30 days.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures and should keep EPA informed on the progress of these efforts:

- consider energy efficiency improvements in company facilities and pursue the ENERGY STAR label for buildings;
- purchase ENERGY STAR labeled products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR labeled product information to employees for use when purchasing products for their homes;
- ensure the power management feature is enabled on all ENERGY STAR qualified monitors in use in company facilities, particularly upon installation and after service is performed;
- provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR labeled product models;
- feature the ENERGY STAR label(s) on Partner Web site and in other promotional materials. If information concerning ENERGY STAR is provided on the Partner Web site as specified by the ENERGY STAR Web Linking Policy (this document can be found in the Partner Resources section on the ENERGY STAR Web site at www.energystar.gov). EPA may provide links where appropriate to the Partner Web site;
- provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, communicate, and/or promote Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR Web pages, etc. The plan may be as simple as providing a list of planned activities or planned milestones that Partner would like EPA to be aware of. For example, activities may include: (1) increase the availability of ENERGY STAR labeled products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrate the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) provide information to users (via the Web site and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products, and (4) build awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event;
- provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.



ENERGY STAR[®] Program Requirements for Residential Ceiling Fans

Eligibility Criteria

Below is the product specification (Version 1.0) for ENERGY STAR qualified residential ceiling fans. A product must meet all of the identified criteria if it is to be labeled as ENERGY STAR by its manufacturer.

- 1) Definitions: Below is a brief description of a ceiling fan and other terms as relevant to ENERGY STAR.
 - A. Residential Ceiling Fan: A non-portable device designed for home use that is suspended from the ceiling for circulating air via the rotation of fan blades. Some ceiling fans also have an integral or attached light kit.
 - B. Light Kit: A light kit is the equipment used to provide light from a ceiling fan. Light kits can be:
 - Integral – the light kit arrives hardwired to the ceiling fan
 - Attachable – the light kit is not, at the time of sale, physically attached to the fan. The light kit must be attached to the ceiling fan for the lights to work. Attachable light kits might be included inside the ceiling fan box at the time of sale or sold separately for subsequent attachment to the fan.
 - C. Controls: Controls enable the user to turn on/off or adjust the lighting and fan movement. Controls can be in the form of pull chain, slide switch, wall switch/panel, or remote control.
 - D. Airflow: The rate of air movement at a specific fan setting expressed in cubic feet per minute (CFM). Airflow is determined from testing done using the Solid State Test Method, defined below.
 - E. Airflow Efficiency: The ratio of airflow divided by power at a specific residential ceiling fan setting expressed in CFM per watt (CFM/watt). Airflow and power are determined from testing done using the Solid State Test Method, defined below.
 - F. Power Consumption: The active power expressed in watts. Power consumption is measured during residential ceiling fan testing at a specific speed using the Solid State Test Method, defined below.
 - G. Standby Mode: Mode when the lights are off and the fan blades are not rotating.
 - H. Solid State Test Method: A method developed by the Hunter Fan Company that specifies the apparatus and testing protocol for measuring a residential ceiling fan's airflow and power consumption. The method utilizes a hot-wire anemometer and requires a temperature controlled room and computer for recording test data.
 - I. Hugger Fans: Ceiling fans that are installed directly against the ceiling.
- 2) Qualifying Products: For the purposes of ENERGY STAR, the following two types of residential ceiling fans may qualify: those sold with light kits and those sold without light kits. **Hugger fans are not currently eligible for participation in ENERGY STAR for Residential Ceiling Fans as a result of the testing process producing efficiency and performance levels substantially greater than**

what the fans will normally deliver in residential use. Data will be collected regarding hugger fans and the inclusion of such fans will be reevaluated for Tier II of these specifications.

- 3) Energy-Efficiency Specifications for Qualifying Products: Only those products listed in Section 2 that meet the criteria below may qualify as ENERGY STAR.

A. Airflow Efficiency

Qualifying products shall meet or exceed the following requirements for total airflow and for airflow efficiency when operating in a downward-blowing direction. Models sold with light kits or integrated light sources must be tested with those light sources mounted in their intended position and switched off. Individual models' measured performance may vary by +/- 5 percent and still be deemed compliant with this specification.

Table 1 – Tier I Specifications for Air Flow Efficiency		
Fan Speed	Minimum Airflow	Efficiency Requirement
Low	1,250 CFM	155 CFM/watt
Medium	2,500 CFM	110 CFM/watt
High	5,000 CFM	75 CFM/watt

Note: No standby power requirements are included in Tier I specifications.

Table 2 – Tier II Specifications for Air Flow Efficiency		
Fan Speed	Minimum Airflow	Efficiency Requirement
Low	TBD	TBD
Medium	TBD	TBD
High	TBD	TBD

Note: Under Tier II, fans may consume no more than 1 watt of power in standby mode. These standby requirements are included in Tier II to ensure that remote control circuits, if included, operate efficiently.

Airflow and efficiency requirements for Tier II may be divided into separate categories by fan diameter if data collected in 2002 indicate clear differences in achievable performance among fans of different sizes. Likewise, the Tier II specification may include consideration of power factor if warranted by product performance and utility request.

This specification defines residential ceiling fan airflow efficiency on a performance basis: CFM of airflow per watt of power consumed by the motor and controls. This treats the motor, blades, and controls as a system, allowing multiple approaches to reach a given efficiency level. Efficiency is to be measured on each of three fan speeds (low, medium and high) using the "Solid State Test Method" which was developed by Hunter Fan Company and is explained in more detail in Section 4, Test Criteria. Residential ceiling fans capable of operating at more than three speeds must meet the above levels at any three of those total speeds, though measurements should be taken and reported for all discrete operating speeds.

B. Controls

Tier I

Under Tier I, qualifying products shall permit convenient consumer adjustment of fan speed. This may be accomplished by means of one or more wall-mounted switch(es), a remote control, or readily accessible pull chains. For purposes of this specification, "readily accessible" shall be defined as a length sufficient to reach a height of no more than 80 inches above the floor when the residential ceiling fan is mounted according to the residential ceiling fan's installation instructions. For those residential ceiling fans that can accommodate lighting, the lights and the fans must be controllable separately, allowing users to switch off lights during fan operation or operate the lights without using the residential ceiling fan.

Tier II

In addition to meeting the requirements under Tier I, qualifying products shall provide for consumer adjustment of airflow direction (upward or downward) by one of the following means:

- A vertically mounted slide switch on the motor housing, in which the downward position corresponds to downward airflow
- A wall-mounted switch
- A remote control
- A readily accessible pull chain

C. Lighting

Tier I

Qualifying residential ceiling fans sold with integral or attachable light kits must meet one of the following requirements:

- Pin-Based Approach – The residential ceiling fan lighting systems shall meet the requirements of the ENERGY STAR specification for residential light fixtures; or
- Screw-Based Approach – The number of ENERGY STAR qualified screw-based bulbs needed to occupy each standard Edison-based socket shall be included within the residential ceiling fan packaging.

Qualifying residential ceiling fans sold without integral or attachable light kits need not meet any additional lighting requirements.

Tier II

Qualifying residential ceiling fans sold with integral or attachable light kits must meet the requirements of the ENERGY STAR specification for residential light fixtures.

Qualifying residential ceiling fans sold without integral or attachable light kits must provide information on product packaging or with product instructions regarding ENERGY STAR qualifying light kits that may be used with that particular residential ceiling fan.

EPA recommends that manufacturers pursue the pin-based approach in both Tier I and Tier II, because it will tend to yield greater energy savings and performance, lower consumer cost, and fewer complications with retailers than the screw-based approach.

D. Noise

Tier I

None

Tier II

Qualifying products shall meet the following maximum standards for operational noise:

Fan Speed	Minimum Sound Pressure Level (SPL)
Low	TBD
Medium	TBD
High	TBD

In addition, qualifying products shall include a standardized label on the product package noting operational noise in dB at each of three operating speeds, measured by a method agreed to by all manufacturers that participate in ENERGY STAR for Residential Ceiling Fans. That method shall be finalized no later than October 1, 2002.

Each fan speed will be associated with a minimum airflow in CFM. The final Tier II specification will state a test procedure for measuring fan noise. This specification will need to address, among other things: test chamber size and characteristics, type of measurement equipment, and type of sound being measured. The specification could either measure total SPL or attempt to specify the particular harmonics that result from electrical and mechanical fan noise, but are not the product of wind noise from the blades. Allowable noise levels will be higher for higher fan speeds.

E. Warranty

Tier I

Qualifying products shall provide a warranty of at least 30 years for the motor and at least one year for all other components of qualifying residential ceiling fans. Residential ceiling fans sold with integral light kits shall also meet applicable warranty requirements for ENERGY STAR labeled residential light fixtures.

Tier II

No additional requirements

F. Consumer Information

Tier I

In addition to the ENERGY STAR label, packaging of ENERGY STAR qualified residential ceiling fans shall also state airflow, fan power consumption, and airflow efficiency at each of their three operating speeds, as determined by the test procedures specified in Section A, Airflow Efficiency. This information shall appear in the following form on the outside portion of the package:

Fan Speed	Airflow	Fan Power Consumption (without lights)	Airflow Efficiency (higher is better)
Low	__ CFM	__ watts	__ CFM/watt
Medium	__ CFM	__ watts	__ CFM/watt
High	__ CFM	__ watts	__ CFM/watt

Product operating and installation instructions shall include a short list of standardized information regarding how to operate the products efficiently. This list shall include, at a minimum, information about the following topics:

- adjusting fan speed and direction for season and room occupancy to maximize energy savings
- HVAC thermostat adjustment for energy savings when a ceiling fan is in use
- proper mounting distance from the ceiling to maximize efficient operation
- how to find proper replacement lamps for the light kit, if included

Tier II

No additional requirements

- 4) **Test Criteria:** Manufacturers are required to perform tests and self-certify those product models that meet the ENERGY STAR guidelines. In performing these tests, manufacturers must use Hunter's Solid State Test Method described below.

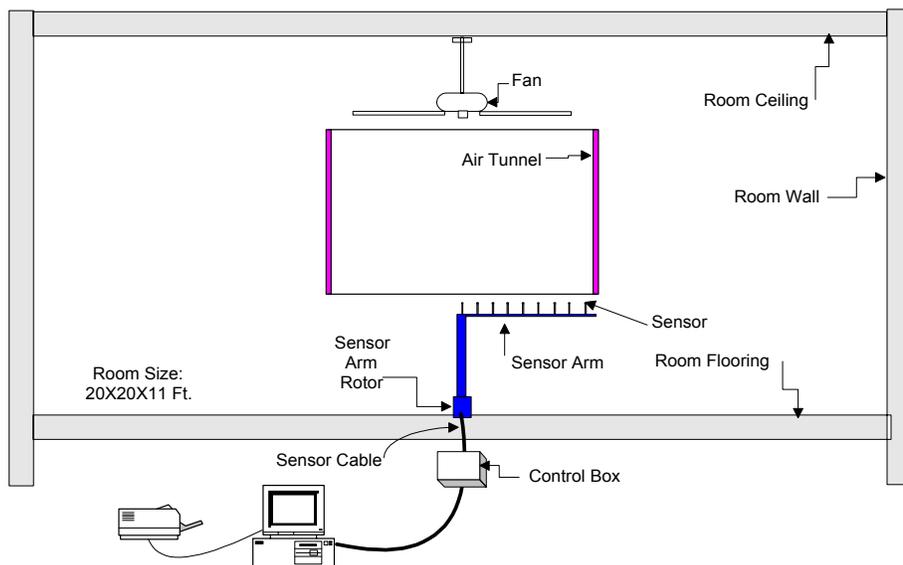
Solid State Test Method

The methodology behind the Solid State Test is designed to increase efficiency and improve accuracy. It provides an accurate representation of the air circulation created by the fan in the room. The method reduces the testing and validation time to a fraction of the time period required by NEMA or IEC standards.

The room details and the setup for ceiling fan testing by the Hunter method is explained in the illustration, below.

A fan is hung above the predefined tunnel or a large diameter tube in a standard temperature and humidity controlled room. The air delivered by the fan is made to pass through the tunnel. At the end of the tunnel, a row of velocity sensors is mounted on a rotating arm. The airflow at various points in the tube is measured simultaneously and instantaneously for several seconds. The average reading of air velocities is then used to compute the air delivery by calculations similar to IEC and NEMA suggested methods.

The important characteristic of the Solid State Test Method is the use of the latest method of measurement of air velocities by multiple probes. Instead of moving a mechanical or an electronic probe from point to point to measure the airflow (velocity), this method allows you to perform simultaneous monitoring of air velocity instantly. The information is recorded in real time and can be analyzed as the measurement is being taken. The probes utilize the time-tested technology of hot wire thermister anemometry. Each probe has a temperature and cooling rate sensor. The signal from these sensors is fed into the computer via the control box. Using the appropriate software, calculations are made to compute the air delivery of the fan. This multi-point measurement of airflow velocity as well as air surface temperature analysis is a crucial step in the development of this method. The complete test takes under two minutes, not including the time to hang the fan.



Hunter Air Delivery Measurement Room Setup

Reporting Requirements

The company whose brand name appears on the product packaging shall, for purposes of this specification, be considered the manufacturer. **Manufacturers must furnish to EPA by December 1 of each year a list of qualifying models for labeling in the subsequent year.** This list must be accompanied by reports from a qualified laboratory containing airflow, power consumption, and airflow efficiency data for each residential ceiling fan model proposed for labeling. Families of residential ceiling fan models that are identical in every respect but housing and blade finish may be qualified through submission of test data for a single representative model. Likewise, models that are unchanged or that differ only in housing or blade finish from those sold in a previous year may remain qualified without the submission of new test data. However, separate test data are required for all models that differ in any of the following characteristics:

- motor type or size
- rotational speed
- control type (if included with fan)
- blade weight, number, size, or pitch

Any manufacturer or EPA may challenge the test results for a particular product. Under the rules of a challenge, an independent laboratory recognized by EPA will purchase a sample of the challenged product from a US retail store and conduct a set of measurements. If the testing of this sample meets the requirements of the ENERGY STAR specification, the challenger must pay for the cost of the independent laboratory test.

If the sample fails to meet those requirements, its manufacturer must pay for the cost of the independent laboratory test. Failure to pass the challenge will result in further investigation by the EPA. The EPA may request minor modifications or other actions by the manufacturer to meet the labeling requirements. If the product does not meet the requirements of the EPA investigation, it may be removed from ENERGY STAR's qualified product list.

Laboratory Testing

Manufacturers may elect to use a qualifying in-house or independent laboratory to provide these results. Qualified laboratories will conduct "round-robin" testing at least every six months with identical fan samples to verify that they can consistently obtain results for CFM/watt within +/- 3 percent of each other for testing done on the same fan. Qualifying test facilities will be provided on the ENERGY STAR Web site at www.energystar.gov.

- 5) Effective Date: The date that manufacturers may begin to qualify products as ENERGY STAR will be defined as the *effective date* of the agreement.

Tier I: The first phase, Tier I, shall commence on January 1, 2002 and conclude on September 30, 2003. Partners can qualify ceiling fan models for Tier I starting January 1, 2002. All products shipped after this date and through September 30, 2003 must meet Tier I requirements in order to bear the ENERGY STAR label.

Tier II: The second phase, Tier II, shall commence on October 1, 2003. Specifications for Tier II shall apply to products that are shipped after September 30, 2003. All products, including models originally qualified under Tier I, shipped after this date must meet Tier II requirements in order to bear the ENERGY STAR label (including additional shipments of models originally qualified under Tier I). Final revisions to Tier II specifications will be completed in late 2002, to provide manufacturers sufficient lead time for making needed product revisions.

- 6) Future Specification Revisions: ENERGY STAR 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.