



# ENERGY STAR® Program Requirements for Residential Ceiling Fans

## Partner Commitments

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Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR certified products. The ENERGY STAR Partner must adhere to the following partner commitments:

### Certifying Products

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1. Comply with current ENERGY STAR Eligibility Criteria, which define performance requirements and test procedures for residential ceiling fans. A list of eligible products and their corresponding Eligibility Criteria can be found at [www.energystar.gov/specifications](http://www.energystar.gov/specifications).
2. **Prior to associating the ENERGY STAR name or mark with any product**, obtain written certification of ENERGY STAR certification from a Certification Body recognized by EPA for residential ceiling fans. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform residential ceiling fan testing. A list of EPA-recognized laboratories and Certification Bodies can be found at [www.energystar.gov/testingandverification](http://www.energystar.gov/testingandverification).

### Using the ENERGY STAR Name and Marks

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3. Comply with current ENERGY STAR Identity Guidelines, which define how the ENERGY STAR name and marks may be used. Partner is responsible for adhering to these guidelines and ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance. The ENERGY STAR Identity Guidelines are available at [www.energystar.gov/logouse](http://www.energystar.gov/logouse).
4. Use the ENERGY STAR name and marks only in association with certified products. Partner may not refer to itself as an ENERGY STAR Partner unless at least one product is certified and offered for sale in the U.S. and/or ENERGY STAR partner countries.
5. Provide clear and consistent labeling of ENERGY STAR certified residential ceiling fans.
  - 5.1. The ENERGY STAR mark must be clearly displayed on the top/front of the product (on product labels and/or as a permanent mark), in product literature (i.e., user manuals, spec sheets, etc.), and on the Partner's Internet site where information about ENERGY STAR certified models is displayed.
  - 5.2. It is also recommended that the mark appear on the product packaging.

### Verifying Ongoing Product Certification

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6. Participate in third-party verification testing through a Certification Body recognized by EPA for residential ceiling fans, providing full cooperation and timely responses. EPA/DOE may also, at its discretion, conduct tests on products that are referred to as ENERGY STAR certified. These products may be obtained on the open market, or voluntarily supplied by Partner at the government's request.

### Providing Information to EPA

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7. Provide unit shipment data or other market indicators to EPA annually to assist with creation of ENERGY STAR market penetration estimates, as follows:

- 7.1. Partner must submit the total number of ENERGY STAR certified residential ceiling fans shipped in the calendar year or an equivalent measurement as agreed to in advance by EPA and Partner. Partner shall exclude shipments to organizations that rebrand and resell the shipments (unaffiliated private labelers).
- 7.2. Partner must provide unit shipment data segmented by meaningful product characteristics (e.g., type, capacity, presence of additional functions) as prescribed by EPA.
- 7.3. Partner must submit unit shipment data for each calendar year to EPA or an EPA-authorized third party, preferably in electronic format, no later than March 1 of the following year.

Submitted unit shipment 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.

8. Report to EPA any attempts by recognized laboratories or Certification Bodies (CBs) to influence testing or certification results or to engage in discriminatory practices.
9. Notify EPA of a change in the designated responsible party or contacts within 30 days using the My ENERGY STAR Account tool (MESA) available at [www.energystar.gov/mesa](http://www.energystar.gov/mesa).

### **Performance for Special Distinction**

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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:

- Provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR certified products, and to promote awareness of ENERGY STAR and its message.
- Consider energy efficiency improvements in company facilities and pursue benchmarking buildings through the ENERGY STAR Buildings program.
- Purchase ENERGY STAR certified 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 certified product information to employees for use when purchasing products for their homes.
- Feature the ENERGY STAR mark(s) on Partner website and other promotional materials. If information concerning ENERGY STAR is provided on the Partner website as specified by the ENERGY STAR Web Linking Policy (available in the Partner Resources section of the ENERGY STAR website), EPA may provide links where appropriate to the Partner website.
- Ensure the power management feature is enabled on all ENERGY STAR certified displays and computers 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 certified products.
- 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, and communicate Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR website, etc. The plan may be as simple as providing a list of planned activities or milestones of which Partner would like EPA to be aware. For example, activities may include: (1) increasing the availability of ENERGY STAR certified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrating the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) providing information to users (via the website and user's manual) about energy-saving features and operating characteristics of ENERGY STAR certified products; and (4) building awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event.

- Join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. The SmartWay Transport Partnership works with freight carriers, shippers, and other stakeholders in the goods movement industry to reduce fuel consumption, greenhouse gases, and air pollution. For more information on SmartWay, visit [www.epa.gov/smartway](http://www.epa.gov/smartway).
- Join EPA's Green Power Partnership. EPA's Green Power Partnership encourages organizations to buy green power as a way to reduce the environmental impacts associated with traditional fossil fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune 500 companies, small and medium businesses, government institutions as well as a growing number of colleges and universities. For more information on Green Power, visit [www.epa.gov/greenpower](http://www.epa.gov/greenpower).



# ENERGY STAR® Program Requirements Product Specification for Residential Ceiling Fans

## Eligibility Criteria Version 4.1

Following is the Version 4.1 product specification for ENERGY STAR certified residential ceiling fans. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

### 1 DEFINITIONS

- A. Airflow<sup>1</sup>: The rate of air movement at a specific fan-speed setting expressed in cubic feet per minute (CFM)
- B. Basic Model<sup>2</sup>: All units of a given type of covered product (or class thereof) manufactured by one manufacturer; having the same primary energy source; and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.
- C. Belt-Driven Ceiling Fan<sup>1</sup>: A ceiling fan with a series of one or more fan heads, each driven by a belt connected to one or more motors that are located outside of the fan head.
- D. Blade Span<sup>1</sup>: Measurement of the largest swept circle by any part of the fan blade assembly, including any blade attachments. This equals the lateral distance from the center of the axis of rotation of the fan blades to the furthest fan blade edge from the center of the axis of rotation, multiplied by two. Sometimes referred to as “diameter” in this specification.
- E. Ceiling Fan Efficiency<sup>1</sup>: The ratio of the total airflow to the total power consumption, in units of cubic feet per minute per watt (CFM/W). For low-speed small-diameter ceiling fans, this is a weighted efficiency based on the ceiling fan performance in low speed, high speed, and standby mode. For low-mount high-speed small-diameter ceiling fans, this is a weighted efficiency based on the ceiling fan performance in high speed and standby mode.
- F. Ceiling Fan Light Kit<sup>2</sup> (CFLK): Equipment designed to provide light from a ceiling fan that can be: (1) integral, such that the equipment is attached to the ceiling fan prior to the time of retail sale; or (2) attachable, such that at the time of retail sale the equipment is not physically attached to the ceiling fan, but may be included inside the ceiling fan at the time of sale or sold separately for subsequent attachment to the fan.
- G. Controls: Controls enable the user to turn on/off or adjust fan movement (i.e., fan speed and airflow direction). Controls may be in the form of pull chain, slide switch, wall switch/panel, remote control, and/or mobile device application.
- H. Highly Decorative Ceiling Fan<sup>1</sup>: A ceiling fan with a maximum rotational speed of 90 RPM and less than 1,840 CFM airflow at high speed, as determined by 10 CFR Appendix U to Subpart B of Part 430.
- I. High Speed<sup>1</sup>: The highest available ceiling fan speed, i.e., the fan speed corresponding to the maximum blade revolutions per minute (RPM).
- J. High-Speed Small-Diameter (HSSD) Ceiling Fan<sup>1</sup>: A ceiling fan that is not very-small-diameter, highly decorative, or belt driven, is less than or equal to seven feet in blade span, and has a blade thickness of less than 1/8 inch (3.2 mm) at the edge or a maximum tip speed greater than the applicable limit specified in the table below:

<sup>1</sup> Based on 10 CFR Part 430, Subpart B, Appendix U, *Definitions*. In the case of conflict, the definition in the CFR is authoritative.

<sup>2</sup> 10 CFR Part 430, Subpart A §430.2

Airflow Direction	Blade Edge Thickness (t)		Tip Speed Threshold	
	[mm]	[inch]	[m/s]	[feet/min]
Downward	4.8 > t ≥ 3.2	3/16 > t ≥ 1/8	16.3	3,200
Downward	t ≥ 4.8	t ≥ 3/16	20.3	4,000
Reversible	4.8 > t ≥ 3.2	3/16 > t ≥ 1/8	12.2	2,400
Reversible	t ≥ 4.8	t ≥ 3/16	16.3	3,200

- K. **Low-Mount High-Speed Small-Diameter Ceiling Fan**: A high-speed small-diameter ceiling fan considered safe for mounting in a residential setting (i.e., between 7 and 10 feet from the ground) per UL 507,<sup>3</sup> with a blade thickness greater than or equal to 1/8 inch at the edge and a maximum tip speed within the applicable limits in each direction as specified in the table immediately below:

Airflow Direction	Blade Edge Thickness (t)		Tip Speed [feet/min]	
	[mm]	[inch]	>	≤
Downward blowing	4.8 > t ≥ 3.2	3/16 > t ≥ 1/8	2,400	3,200
Downward blowing	t ≥ 4.8	t ≥ 3/16	3,200	4,000
Upward blowing	4.8 > t ≥ 3.2	3/16 > t ≥ 1/8	-	2,400
Upward blowing	t ≥ 4.8	t ≥ 3/16	-	3,200

- L. **Low Speed**<sup>1</sup>: The lowest available ceiling fan speed, i.e., the fan speed corresponding to the minimum, non-zero blade RPM.

- M. **Low-Speed Small-Diameter (LSSD) Ceiling Fan**<sup>1</sup>: A ceiling fan that is less than or equal to seven feet in blade span, has a blade thickness greater than or equal to 1/8 inch (3.2 mm) at the edge and a maximum tip speed less than or equal to the applicable limit specified in the table immediately below, and which are considered safe for mounting in a residential setting (i.e., between 7 and 10 feet from the ground) per UL 507.<sup>3</sup>

Airflow Direction	Blade Edge Thickness (t)		Tip Speed Threshold	
	[mm]	[inch]	[m/s]	[feet/min]
Reversible	4.8 > t ≥ 3.2	3/16 > t ≥ 1/8	12.2	2,400
Reversible	t ≥ 4.8	t ≥ 3/16	16.3	3,200

- N. **Power Consumption**: Defined as the active (real) and standby power and expressed in watts (W).

- O. **Residential Ceiling Fan**<sup>2</sup>: 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 are sold with ceiling fan light kits.

- a) **Standard Ceiling Fan**<sup>1</sup>: A low-speed small-diameter ceiling fan that is not a very-small-diameter ceiling fan, highly decorative ceiling fan or belt-driven ceiling fan; for which the lowest point on fan blades is greater than 10 inches from the ceiling.
- b) **Hugger Ceiling Fan**<sup>1</sup>: A low-speed small-diameter ceiling fan that is not a very-small-diameter ceiling fan, highly-decorative ceiling fan or belt-driven ceiling fan; for which the lowest point on the fan blades is less than or equal to 10 inches from the ceiling.

- P. **Standby Mode**<sup>2</sup>: The condition in which an energy-using product is connected to a main power source; and offers one or more of the following user-oriented or protective functions: to facilitate the activation or deactivation of other functions (including active mode) by remote switch (including remote control), internal sensor, or timer; or continuous functions, including information or status displays (including clocks) or sensor-based functions.

- Q. **Very-Small-Diameter Ceiling Fan**<sup>1</sup>: A small-diameter ceiling fan that is not a highly-decorative ceiling fan or belt-driven ceiling fan; and has one or more fan heads, each of which has a blade span of 18 inches or less.

<sup>3</sup> UL Standard for Safety for Electric Fans, UL 507

## 2 SCOPE

### 2.1 Included Products

- Products that meet the definition of a Residential Ceiling Fan (i.e., Standard and Hugger) or Low-Mount High-Speed Small-Diameter Ceiling Fan as specified herein are eligible for ENERGY STAR certification.

As noted in the definition above, residential ceiling fans may be sold with a ceiling fan light kit (CFLK). EPA will continue to grant the ENERGY STAR to fans sold with CFLKs, but not CFLKs sold separately.

### 2.2 Excluded Products

- High-Speed Small-Diameter ceiling fans that do not meet the definition of Low-Mount HSSD.
- Large-Diameter ceiling fans, as defined in 10 CFR Part 430, Subpart B.
- Very-Small-Diameter, Highly Decorative, and Belt-driven ceiling fans, per Section 1, are not covered by the definition of a Residential Ceiling Fan for ENERGY STAR certification.
- Products that meet the definition of a Ceiling Fan Light Kit as specified herein that are sold separately from a residential ceiling fan are not eligible for ENERGY STAR certification.

## 3 CERTIFICATION CRITERIA

Below are the certification criteria for ceiling fans. Products shall meet all applicable requirements to be certified as ENERGY STAR.

Partners must ensure that all configurations certified as ENERGY STAR continue to meet the certification criteria through subsequent firmware, software, or other changes to the certified product.

### 3.1 Ceiling Fan Requirements

#### 3.1.1 Ceiling Fan Efficiency Requirements

Certified products shall meet or exceed the minimum requirements presented in Table 1, below, when operating in a downward-blowing direction.

Products that can be matched with several blade options shall be tested and meet these requirements with the blade option resulting in the highest energy consumption. Products that can be configured as either standard or hugger fans, depending on installation, shall meet the applicable requirements in each configuration. All Low-Mount HSSD fans must meet the requirements in Table 1, regardless of the installed configuration.

**Table 1: Ceiling Fan Efficiency Requirements**

Ceiling Fan Type	Blade Span <sup>†</sup> (inch)	Minimum Efficiency <sup>†</sup> (cfm/W)	Minimum High-Speed Airflow <sup>†</sup> (cfm)	Test Method & Supplemental Testing Guidance
Standard and Low-Mount HSSD Ceiling Fans	D ≤ 36 inches	≥ 0.72*D + 41.93	≥ 1767	10 CFR Part 430, Subpart B, Appendix U
	36 inches < D < 78 inches	≥ 2.63*D - 26.83	≥ 250*π*(D/24) <sup>2</sup>	
	D ≥ 78 inches		≥ 8296	
Hugger Ceiling Fan	D ≤ 36 inches	≥ 0.31*D + 36.84	≥ 1414	
	36 inches < D < 78 inches	≥ 1.75*D - 15	≥ 200*π*(D/24) <sup>2</sup>	
	D ≥ 78 inches		≥ 6637	

<sup>†</sup>D represents the fan blade span in inches

## 4 CONTROL AND STANDBY REQUIREMENTS

### 4.1 Wired and Remote Controls

Certified products shall permit convenient consumer adjustment of fan speed. This may be accomplished by means of one or more:

- Wall-mounted switch(es)
- Readily accessible pull chain(s)
- Remote control(s)
- Mobile device application(s)

For purposes of this specification, “readily accessible” shall be defined as a chain length sufficient to reach a height of no more than 80 inches (203 cm) above the floor when the residential ceiling fan is mounted according to the residential ceiling fan’s installation instructions.

Certified products shall also provide for consumer adjustment of airflow direction (upward or downward) by one of the following means:

- A vertically or horizontally mounted slide switch on the motor housing. For vertically mounted switches, the downward position shall correspond to downward airflow. For horizontally mounted switches, airflow direction shall be clearly identified on the switch housing or within the product literature.
- A wall-mounted switch
- A readily accessible pull chain
- A remote control or mobile device application

Certified products that offer Wi-Fi-based remote control must provide at least one alternative control measure as a backup in case of Wi-Fi connectivity failure and the backup shall, at a minimum, control on/off and fan speed.

## **4.2 Products with Connected Functionality – Optional**

### **4.2.1 Connected Product Criteria**

Connected functionality is optional and products may be certified as ENERGY STAR without meeting these requirements. Those that meet these connected criteria will be identified as connected in the ENERGY STAR Product Finder.

To be identified as connected, a certified product shall include the base product plus elements (hardware and software or firmware), or instructions required to enable communication in response to consumer-authorized energy or performance related commands (e.g., instructions for downloading a mobile application, Bluetooth syncing guidance) and shall meet the requirements in sections 4.2.2-4.2.6. These elements may be resident inside or outside of the base product. Connected products typically communicate with controls via a radio frequency system (e.g., Wi-Fi, DALI, ZigBee, Bluetooth), although some versions use other methods (e.g., DMX).

The specific design and implementation of the connected product is at the partner's discretion provided it enables economical, consumer-authorized third-party access to the functions provided in sections 4.2.3, 4.2.4, and 4.2.5. Compliance with connected functionality requirements shall be demonstrated through examination of product and/or product documentation.

### **4.2.2 Open Access**

The certified product shall enable connectivity by one of following means:

1. Open-standards communications from the certified product, or
2. Open-standards communications from an external controller, included with the product or available separately.
3. Where no suitable open standards communications method exists (e.g., an IP interface), an available and documented communication method must be used. In these cases, a manufacturer-specific method to implement the functions in sections 4.2.3, 4.2.4 and 4.2.5 shall be published for use with the product.

To enable interconnection with the product, an interface specification, Application Programming Interface (API) or similar documentation shall be made available to interested parties that enables section 4.2.3, 4.2.4 and 4.2.5 connected functionality, and includes accuracy, units, and measurement intervals for Energy Consumption Reporting.

### **4.2.3 Energy Consumption Reporting**

The product, or the gateway device or cloud service connected to it, shall be capable of interconnecting with consumer authorized entities to communicate data representative of its interval energy consumption. It is recommended that data be reported in watt-hours for intervals of 30 minutes; however, representative data may also be reported in alternate units and intervals as specified in the product manufacturer's interface specification or API. If the product does not provide power consumption directly in watts, the manufacturer shall make available a method for estimating power consumption, in watts, from the representative data that is provided by the product.

### **4.2.4 Operational Status Reporting**

At a minimum, the product, or the gateway device or cloud service connected to it, shall be capable of providing the operational status (e.g., on/off status, speed, direction) to energy management systems and other consumer authorized devices, services, or applications via a communication link.

### **4.2.5 Remote Management**

The product shall be capable of receiving and responding to energy management system or other consumer authorized remote requests, via devices, services, or applications, similar to hard-wired consumer controllable functions.



## 4.2.6 Information to Consumers

If additional devices, services, and/or infrastructure are required to activate the product's connected capabilities, prominent labels, or other forms of consumer notifications shall be displayed at the point of purchase and in the product literature. (e.g., "This product has Z-wave control capability and requires interconnection with a Z-wave controller to enable local control.")

## 4.3 Standby Power Consumption

Table 5: Standby Power Consumption Requirements

ENERGY STAR Requirements	Methods of Measurement and/or Reference Documents
Standby power consumptions of certified ceiling fans shall be reported.	10 CFR Part 430, Subpart B, Appendix U
Laboratory test results shall detail standby power consumption to at least the tenth of a watt.	

## 5 MINIMUM WARRANTY

Certified ceiling fans shall provide a warranty of at least 3 years.

Partners must provide a copy of the actual warranty that is included with the product packaging. Partner is solely responsible for honoring warranty; intermediate parties (e.g., showrooms, electrical distributors, retailers) are not responsible for warranty requirements.

## 6 PRODUCT CERTIFICATION

### 6.1 Significant Digits and Rounding

1. All calculations shall be carried out with directly measured (unrounded) values.
2. Unless otherwise specified, compliance with specification limits shall be evaluated using directly measured or calculated values without any benefit from rounding.
3. 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.
4. Ceiling Fan Efficiency shall be expressed as a whole number in accordance with Section 3.1 of 10 CFR Part 430, Subpart B, Appendix U.

### 6.2 Ceiling Fan Sampling

One of the following sampling plans shall be used for purposes of testing for ENERGY STAR certification of ceiling fans:

1. A single unit is selected, obtained, and tested. The measured performance of this unit and of each subsequent unit manufactured must be equal to or better than the ENERGY STAR specification requirements. Results of the tested unit may be used to certify additional individual model variations within a basic model group as long as the definition for basic model group provided in Section 1, above, is met; or
2. Units are selected for testing and results calculated according to the sampling requirements defined in 10 CFR Part 429, Subpart B §429.32 for ceiling fans. The certified rating must be equal to or better than the ENERGY STAR specification requirements. Results of the tested unit may be used to certify additional model variations within a basic model group as long as the definition for basic model group provided in Section 1, above, is met. Further, all individual models within a basic model group must have the same certified rating. Based on the applicable sampling criteria, this rating must be used for all manufacturer literature, the qualified product list, and certification of compliance to DOE standards.

## **7 LABELING & PACKAGING**

### **7.1 Ceiling Fans Sold without Ceiling Fan Light Kits**

Certified residential ceiling fans shall provide information on product packaging or with product instructions regarding ceiling fan light kits that may be used with that particular residential ceiling fan.

### **7.2 Ceiling Fans Sold with Ceiling Fan Light Kits**

Certified residential ceiling fans that are sold with ceiling fan light kits (CFLKs) shall provide information on product packaging regarding the:

- Initial light output of the CFLK consistent with 10 CFR Part 430, Subpart B. This value will appear on the list of certified models as Reported Light Output (lm).
- Input power of the CFLK consistent with 10 CFR Part 430, Subpart B. This value will appear on the list of certified models as Reported Input Power of Light Kit (W).

## **8 EFFECTIVE DATE**

The ENERGY STAR Residential Ceiling Fans specification shall take effect on **June 15, 2018**. To be certified as 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.

## **9 FUTURE SPECIFICATION REVISIONS**

EPA reserves the right to change this 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 certification is not automatically granted for the life of a product model.