



ENERGY STAR® Program Requirements for Room Air Cleaners

Partner Commitments

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

1. **Comply with current ENERGY STAR Eligibility Criteria**, which define performance requirements and test procedures for room air cleaners. A list of eligible products and their corresponding Eligibility Criteria can be found at 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 room air cleaners. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform room air cleaner testing. A list of EPA-recognized laboratories and Certification Bodies can be found at www.energystar.gov/testingandverification.

Using the ENERGY STAR Name and Marks

3. Comply with current ENERGY STAR Brand Book, 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 Brand Book are available at 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 room air cleaners.
 - 5.1. The ENERGY STAR mark must be clearly displayed on the top/front of the product, in product literature (i.e., user manuals, spec sheets, etc.), on product packaging, and on the manufacturer's Internet site where information about ENERGY STAR certified models is displayed.
 - 5.2. Partner shall adhere to the following product-specific commitments regarding use of the ENERGY STAR certified mark on certified products:
 - 5.2.1. In addition to the ENERGY STAR mark, or instead of the ENERGY STAR mark, **the ENERGY STAR disclaimer label**, available to partners via their [My ENERGY STAR Account \(MESA\)](#), shall be placed on the product packaging of ENERGY STAR certified air cleaners. The disclaimer logo includes the following statement:

“This product earned the ENERGY STAR label by meeting strict energy efficiency guidelines set by the U.S. EPA. Room air cleaners have demonstrated the potential for improving air quality and providing health benefits. EPA does not endorse manufacturer claims regarding the degree to which a specific product will produce healthier indoor air.”



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The minimum required dimensions for the vertical and horizontal disclaimer labels are 1.5" x 3.5" and 3.5" x 1.5". The graphic shall be scalable if the partner wishes to enlarge it for larger product packaging surfaces.

- 5.2.2. In addition to the text provided above, the following statement shall be included in the Instruction Manual that is shipped with the certified model and on the partner's Web site.

"The energy efficiency of this ENERGY STAR certified model is measured based on a ratio between the model's CADR for Smoke and the electrical energy it consumes, or CADR/Watt."

The placement of this statement shall be in close proximity to the ENERGY STAR mark and any text describing the ENERGY STAR program and/or certified products.

Verifying Ongoing Product Certification

6. Participate in third-party verification testing through a Certification Body recognized by EPA for room air cleaners, 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

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 room air cleaners 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 MESA tool available at www.energystar.gov/mesa.

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:

- 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.
- 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.



ENERGY STAR® Product Specification for Room Air Cleaners

Eligibility Criteria Version 2.0 Rev. April – 2021

Following is the Version 2.0 ENERGY STAR product specification for room air cleaners. A product must meet all of the identified criteria if it is to earn the ENERGY STAR.

1 DEFINITIONS

Below are the definitions of the relevant terms in this document.

- A. Room Air Cleaner: An electric appliance with the function of removing particulate matter from the air and which can be moved from room to room.
1. Fan with Filter¹: Air cleaner that operates with an electrical source of power and which contains a motor and fan for drawing air through a filter media.
 2. Fan with Electrostatic Plates¹: Air cleaner which operates with a fan and incorporates electrically charged plates or wires to electrostatically collect particulate matter. Such devices may include filter(s).
 3. Fan Filter with Ion Generator¹: Air cleaner that incorporates an ion generator in addition to a fan and filter.
 4. Ion Generator¹: Air cleaner that incorporates an ion generator only.
 5. Hybrid¹: An air cleaner employing a combination of the above definitions of fan with filter, electrostatic plate/wire, and ion generator.
 6. Combination Product: An air cleaner that provides an additional function, not related to air purification, within the same housing, such as a humidifier or dehumidifier.
 7. Ozone Generator: A device intended to reduce or eliminate microorganisms within a room solely by means of introducing ozone into the room environment.
- B. Clean Air Delivery Rate (CADR)¹: The measure of the delivery of contaminant free air, within a defined particle size range, by an air cleaner, expressed in cubic feet per minute (cfm). CADR is the rate of contaminant reduction in the test chamber when the air cleaner is turned on, minus the rate of natural decay when the air cleaner is not running, multiplied by the volume of the test chamber as measured in cubic feet. **Note:** CADR values are always the measurement of an air cleaner performance as a complete system and has no linear relationship to the air movement per se or to the characteristics of any particle removal methodology.
- C. Room Air Cleaner Functions:
1. Primary Function: Actively removing particulate matter from the air.
 2. Secondary Function: Function that enables, supplements or enhances a primary function. For Room Air Cleaners, Secondary Functions may include network connection, clocks, remote controls, or other programmable functions that may continue to be enabled when the primary function is inactive.
- D. Operational Modes:
1. On Mode: The condition during which the equipment provides the primary function. Secondary functions may also be enabled.
 2. Partial On Mode²: The condition during which the equipment provides at least one secondary function but no primary function. This term encompasses the Standby Mode and Network Mode

¹ ANSI/AHAM AC-1-2020

² IEC 62542, Environmental standardization for electrical and electronic products and systems - Glossary of terms
ENERGY STAR Program Requirements for Room Air Cleaners – Eligibility Criteria (Rev. April-2021)

terms from IEC 62301 Ed. 2.0.

- E. **Product Family:** A group of product models that are (1) made by the same manufacturer, (2) subject to the same ENERGY STAR certification criteria, and (3) of a common basic design. Product models within a family may differ from each other according to one or more characteristics or features that (1) have no impact on product performance with regard to ENERGY STAR certification criteria, and (2) are specified herein as acceptable variations within a product family. For room air cleaners, acceptable variations within a product family include:

1. Color
2. Housing

2 SCOPE

2.1 Included Products

- 2.1.1 Products that meet the definition of a Room Air Cleaner as specified herein are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.2. Certified air cleaner models shall produce a minimum 30 CADR for Smoke to be considered under this specification.

2.2 Excluded Products

- 2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for certification under this specification. The list of specifications currently in effect can be found at www.energystar.gov/specifications.
- 2.2.2 The following products are not eligible for certification under this specification, as defined in Section 1:
- a. Combination products and
 - b. Ozone generators.

3 CERTIFICATION CRITERIA

3.1 Significant Digits and Rounding

- 3.1.1 All calculations shall be carried out with directly measured (unrounded) or observed values. Values that will be reported shall be rounded using the following principles:
- i. CADR and Operating Power (W): According to guidance provided in ANSI/AHAM AC-1-2020.
 - ii. CADR/W: The reported value shall be rounded to one decimal place and determined per Section 3.3.1.
 - iii. Partial On Mode Power: According to guidance provided in IEC 62301 Ed. 2.0.
 - iv. Ozone Generation: The reported value shall be rounded to the nearest significant digit as expressed in UL 867 Ed. 5.0.
- 3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using exact values without any benefit from rounding.

3.2 General Requirements

- 3.2.1 UL Safety Requirements for Ozone Emitting Models: To certify for ENERGY STAR, measured ozone, per UL 867 Ed. 5.0, shall not exceed 50 parts per billion (ppb).

3.3 On Mode Requirements

- 3.3.1 CADR/Watt Requirement: To certify for ENERGY STAR, the Rated Smoke CADR divided by the operating power consumption measured during the smoke particle removal test (equal to Smoke CADR / Watt) shall be greater than or equal to the Minimum Smoke CADR/Watt Requirement shown in Table 1.

Table 1: Minimum Smoke CADR/W Requirement

Smoke CADR Bins	Minimum Smoke CADR/W
$30 \leq \text{CADR} < 100$	1.9
$100 \leq \text{CADR} < 150$	2.4
$\text{CADR} \geq 150$	2.9

3.4 Partial On Mode Requirements

3.4.1 Measured Partial On Mode Power ($P_{\text{Partial_On}}$) shall be less than or equal to the Maximum Partial On Mode Requirement ($P_{\text{Maximum_Partial_On}}$) as calculated per Equation 1, subject to the following requirements:

- i. For a model that has Wi-Fi network connection capability, the model shall have Wi-Fi network connection enabled during testing and a Partial On Mode Network Connected power allowance ($P_{\text{Network_Connected}}$) defined in Table 2 shall be applied in Equation 1. These models shall be tested with a properly configured wireless network available and connected to the product when testing. These models will not need to be tested again with Wi-Fi capability disabled.

Equation 1: Calculation of Maximum Partial On Mode Power Requirement

$$P_{\text{Maximum_Partial_On}} = P_{\text{Base_Allowance}} + P_{\text{Network_Connected}}$$

Where:

- $P_{\text{Maximum_Partial_On}}$ is the Maximum Partial On Mode Power Requirement, in watts;
- $P_{\text{Base_Allowance}}$ is the Partial On Mode Base power allowance for all products; and
- $P_{\text{Network_Connected}}$ is the Partial On Mode Network Connected power allowance.

Table 2: Partial On Mode Power Allowances

	Partial On Mode Power Allowance (W) for models without Wi-Fi capability	Partial On Mode Power Allowance (W) for models with Wi-Fi capability
$P_{\text{Base_Allowance}}$	1.00	1.00
$P_{\text{Network_Connected}}$	0	1.00

3.5 Additional Reporting Requirements

- 3.5.1 Report the filter type shipped with the product and the replacement filter model number.
- 3.5.2 Report the rated and measured CADR for pollen and dust and the measured CADR for smoke per the ANSI/AHAM AC-1-2020 Method of Measuring the Performance of Portable Household Electric Room Air Cleaners.
- 3.5.3 Report the measured operating power in watts for pollen and dust per the ANSI/AHAM AC-1-2020 Method of Measuring the Performance of Portable Household Electric Room Air Cleaners.
- 3.5.4 Report the ozone emissions in parts per billion (ppb) per the UL 867 Ed. 5.0 Electrostatic Air Cleaners.

4 OPTIONAL CONNECTED CRITERIA

- 4.1.1 To be recognized as connected, a room air cleaner shall include the base room air cleaner plus ENERGY STAR Program Requirements for Room Air Cleaners – Eligibility Criteria (Rev. April-2021)

all elements (hardware, software) required to enable communication in response to consumer-authorized energy related commands (not including third-party remote management which may be made available solely at the discretion of the manufacturer).

- 4.1.2 The specific design and implementation of the connected room air cleaner is at the manufacturer's discretion provided it is interoperable with other devices via open communications protocol and enables economical, consumer-authorized third-party access to the functionalities provided for in Section 4.4. The capabilities shall be supported through one or more means, as identified in Section 4.2.2. A product that enables economical and direct, on-premises, open-standards based interconnection is the preferred option for meeting this requirement, but alternative approaches are also acceptable.
- 4.1.3 The product must continue to comply with the applicable product safety standards – the addition of the functionality described below shall not override existing safety protections and functions. The appliance must meet manufacturer's internal minimum performance guidelines, e.g., air cleaning.

4.2 Communications

- 4.2.1 Open Standards – Communication with entities outside the connected room air cleaner that enables connected functionality (Section 4.4) must use, for all communication layers, standards that are:
 - A. Included in the Smart Electric Power Alliance Catalog of Standards, and/or
 - B. Included in the NIST Smart Grid framework Tables 4.1 and 4.2, and/or
 - C. Adopted by the American National Standards Institute (ANSI) or another well-established international standards organization such as the International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), International Telecommunication Union (ITU), Institute of Electrical and Electronics Engineers (IEEE), or Internet Engineering Task Force (IETF).
- 4.2.2 Communications Hardware Architecture – Communication with entities outside the connected room air cleaner that enables connected functionality (Section 4.4) shall be enabled by any of the following means, according to the manufacturer's preference:
 - A. Built-in communication technology
 - B. Manufacturer-specific external communication module(s) and/or device(s)
 - C. Open standards-based communication port on the appliance combined with open standards-based communications module
 - D. Open standards-based communication port(s) on the appliance in addition to A, B or C, above

If option B or C is used, the communication module/device(s) must be easy for a consumer to install and shipped with the appliance, provided to the consumer at the time of sale, or provided to the consumer in a reasonable amount of time after the sale.

4.3 Open Access

- 4.3.1 To enable interconnection with the product, in addition to Section 4.2.1 that requires open-standards, an interface specification, API or similar documentation shall be made available to interested parties that at a minimum, allows transmission, reception, and interpretation of the following information:
 - A. Energy Consumption Reporting specified in Section 4.4 (must include accuracy, units, and measurement interval).

4.4 Energy Consumption Reporting

- 4.4.1 In order to enable simple, actionable energy use feedback to consumers and consumer authorized energy use reporting to third-parties, the product shall be capable of transmitting energy consumption data via a communication link to energy management systems and other consumer authorized devices, services, or applications. This data shall be representative of the product's interval energy consumption. It is recommended that data be reported in watt-hours for intervals of 15 minutes or less, however, representative data may also be reported in alternate

units and intervals as specified in the product manufacturer’s interface specification or API detailed in Section 4.3.

- 4.4.2 The product may also provide energy use feedback to the consumer on the product itself. On-product feedback, if provided, may be in units and format chosen by the manufacturer (e.g., \$/month).

4.5 Information to Consumers

- 4.5.1 If additional modules, devices, services, and/or infrastructure are part of the configuration required to activate the product’s communications capabilities, prominent labels, or other forms of consumer notifications with instructions shall be displayed at the point of purchase and in the product literature. These shall provide specific information on what consumers must do to activate these capabilities (e.g. “*This product has Wi-Fi capability and requires Internet connectivity and a wireless router to enable interconnection with an Energy Management System, and/or with other external devices, systems or applications.*”).

5 TEST REQUIREMENTS

5.1 Test Methods

- 5.1.1 Test methods identified in Table 2 shall be used to determine certification for ENERGY STAR.

ENERGY STAR Requirement	Test Method Reference
Cigarette Smoke CADR	ANSI/AHAM AC-1-2020: <i>Method of Measuring the Performance of Portable Household Electric Room Air Cleaners</i>
Measurement of Operating Power	
Ozone Generation	UL 867 Ed. 5.0 <i>Electrostatic Air Cleaners</i>
Measured Partial on Mode Power ($P_{Partial_On}$)	IEC 62301 Ed. 2.0 <i>Household electrical appliances – Measurement of standby power</i>

5.2 Additional Test Set-up Instructions

- 5.2.1 When configuring a model for testing to the ANSI/AHAM AC-1-2020 and the IEC 62301 test methods to determine Cigarette Smoke, Dust, and Pollen CADR, Operating Power, and Measured Partial On Mode Power, the tester shall:
 - i. Install the unit in accordance with manufacturer instructions. Use the manufacturer default (i.e., as-shipped) configuration for all secondary functions. However, if the model has network connection capabilities, follow the instructions below.
 - ii. Verify if the unit under test (UUT) has network connection capabilities:
 - a. Network connections should be listed in the user manual or installation instructions.
 - b. If no connections are specified, verify that the Room Air Cleaner does not have network capabilities by checking for the absence of network settings on the product (e.g., control panel or product display).
 - iii. If the UUT has Wi-Fi network connection capabilities, the capabilities shall be activated using any standard or optional hardware provided by the manufacturer³, and the UUT shall be connected to an active communication link (including wireless Radio Frequency).
 - a. The network shall support the highest and lowest data speeds of the UUT’s network function. Manufacturer shall specify connection information related to data speed.
 - b. An active communication link is defined as the mechanism for bi-directional data transfer between the room air cleaner and one or more external applications, devices, or systems. An active connection is defined as the capability to pass traffic across the UUT endpoint and test network device endpoint.

³ All non-standard networking equipment and gateways need to be provided by the manufacturer (e.g., Zigbee, Zwave, etc.) but Wi-Fi, Bluetooth, and Ethernet can be configured with non-manufacturer provided equipment.

- c. If the UUT is equipped with multiple network capabilities (e.g., Bluetooth, Ethernet, etc.), ensure a Wi-Fi connection be made and all other capabilities shall remain in their default, as-shipped configuration (e.g., Bluetooth searching but not connecting).
- d. The tester shall configure the address layer of the protocol, taking note of the following:
 - i. Internet Protocol (IP) IP v6 has Neighbor Discovery and will generally configure a limited, non-routable connection automatically.
 - ii. IP can be configured manually or using Dynamic Host Configuration Protocol (DHCP) with an address in the 192.168.xxx.xxx Network Address Translation (NAT) address space if the UUT does not behave normally when autoIP is used. The network shall be configured to support the NAT address space and/or autoIP.
- e. The UUT shall maintain this live connection to the network for the duration of testing, with the exception of brief lapses (e.g., when transitioning between link speeds).
- f. Ensure there is a connection to the Wide Area Network (WAN) if required in the manufacturer's instructions. Configure WAN connection according to manufacturer provided network connection requirements, if applicable.
- g. If the UUT needs to install any software updates, wait until these updates have occurred; otherwise, if it will operate without updates, skip these updates.
- iv. In the case of a UUT that has no data/network capabilities, the UUT shall be tested as-shipped.

5.3 Number of Units Required for Testing

5.3.1 Representative Models shall be selected for testing per the following requirements:

- i. For certification of an individual product model, the Representative Model shall be equivalent to that which is intended to be marketed and labeled as ENERGY STAR. Because of the inherent statistical variance in counting low density particulate matter particles, manufacturers have the option of testing the unit three times, each time with a new filter. The measured performance (or mean of measured performance) of this unit and of all units sold must be equal to or better than the ENERGY STAR specification requirements:

$$CADR_{Test} (CADR_{Test_Mean}) \geq \text{ENERGY STAR CADR Criteria}$$

$$\text{Measured Ozone}_{Test} (\text{Measured Ozone}_{Test_Mean}) \leq \text{ENERGY STAR Ozone Criteria}$$

$$\text{Measured Partial On Mode Power}_{Test} (\text{Measured Partial On Mode Power}_{Test_Mean}) \leq \text{ENERGY STAR Maximum Partial On Mode Power Criteria}$$

- ii. For certification of a Product Family, any model within that Product Family can be tested and serve as the Representative Model. Any subsequent testing failures (e.g., as part of verification testing) of any model in the family will have implications for all models in the family.

5.3.2 A single unit of each Representative Model shall be selected for testing.

6 EFFECTIVE DATE

6.1.1 **Effective Date:** The Version 2 ENERGY STAR Room Air Cleaner specification shall take effect on **October 17, 2020**. 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.

6.1.2 **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 ENERGY STAR qualification is not automatically granted for the life of a product model.