



ENERGY STAR® Program Requirements for Room Air Cleaners

Eligibility Criteria

Below is the product specification (Version 1.0) for ENERGY STAR qualified room air cleaners. A product must meet all of the identified criteria if it is to earn the ENERGY STAR.

- 1) **Definitions:** Below is a brief description of a room air cleaner and other terms as relevant to ENERGY STAR.
 - A. **Room Air Cleaner:** An electric cord-connected, portable appliance with the primary function of removing particulate matter from the air and which can be moved from room to room.
 1. **Fan with Filter:** Air cleaner that operates with an electrical source of power and contains a motor and fan for drawing air through a filter(s).
 2. **Fan with Filter and Electrostatic Plates:** Air cleaner which operates with a fan and filter(s) that incorporates electrically charged plates or wires to electrostatically collect particulate matter.
 3. **Fan Filter with Ion Generator:** Air cleaner that incorporates an ion generator in addition to a fan and filter.
 4. **Ion Generator:** Air cleaner that incorporates an ion generator only.
 5. **Hybrid:** An air cleaner embodying more than one distinctive cleaning modality.
 6. **Combination Product:** An air cleaner that includes a secondary function, other than air cleaning technology, within the same housing such as a humidifier or dehumidifier.
 7. **Ozone Generator:** A device intended to reduce or eliminate microorganisms within a chamber by means of introducing ozone into the room environment.
 8. **Other Types:** Devices that have the stated capability to reduce the concentration of particulate matter in a room.
 - B. **AHAM:** Association of Home Appliance Manufacturers.
 - C. **ANSI/AHAM AC-1-2002:** A test protocol for measuring the performance of portable household electric cord-connected room air cleaners. AC-1 measures the clean air produced by a room air cleaner as that clean air is defined within the standard. This public standard was developed under the auspices of AHAM and is recognized by ANSI. Throughout this specification, ANSI/AHAM AC-1-2002 will be referred to as AC-1.
 - D. **Clean Air Delivery Rate (CADR):** Within the parameters of AC-1, the measure of the delivery of specified, particulate-free air produced by a household electric, cord-connected room air cleaner. More technically, CADR represents the rate of particulate contaminant reduction in the test chamber when the unit is turned on, minus the rate of natural decay when the unit is not running, times the volume of the test chamber as measured in cubic feet $[(RCR - RND) * V]$. Each type of particulate contaminant receives a test value, which includes: CADR for Dust; CADR for Tobacco Smoke; and CADR for Pollen. **Note:** CADR always measures a unit's performance as a complete system and has no linear relationship to the air movement per se or to the characteristics of any particular filter medium.

- E. Standby Mode: The lowest power consumption mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when an air cleaner unit is connected to the main electricity supply and used in accordance with the manufacturer's instructions. For purposes of this specification, this is also defined as the mode at which energy is consumed by the air cleaner to support only the secondary consumer features such as: clocks, remote controls, and other programmable functions while the primary function is inactive.
- F. Standby Power: The average power in standby mode, measured in Watts.
- G. True RMS: RMS, or Root Mean Square, refers to the most common mathematical method of defining the effective voltage or current of an AC (alternating current) wave. RMS value is the effective voltage of an AC power source, equivalent to DC (direct current) voltage that would produce the same power dissipation as heat assuming a pure resistance.
- H. UL Standard 867: UL Safety Standard for Electrostatic Air Cleaners.
- 2) Qualifying Products: In order to qualify as ENERGY STAR, a room air cleaner must be covered by one of the definitions in Section 1.A and meet the specification requirements provided in Section 3, below. Combination products and ozone generators, as defined in Sections 1.A.6 and 7, *cannot* qualify under this specification at this time.
- 3) Energy-Efficiency Specification for Qualifying Products: To determine if a model qualifies, its CADR must be measured according to the latest ANSI/AHAM AC-1 test procedure. For purposes of this specification, CADR for Dust must be used when determining the energy efficiency (CADR/Watt) of the room air cleaner. **Qualifying air cleaner models must produce a minimum 50 CADR for Dust to be considered under this specification.** Only those air cleaner models covered in Section 2 that meet the following criteria may qualify as ENERGY STAR:
- a) **Room air cleaner minimum performance requirement: ≥ 2.0 CADR/Watt (Dust)**

Verification Test Protocol

Verification Testing:

EPA may at random select and test certain ENERGY STAR labeled room air cleaner models for verification purposes. Verification testing will be conducted in accordance with the procedures provided in ANSI/AHAM AC-1 and the Energy Consumption Test provided in Section 4 of this specification. An average CADR/Watt will be measured based upon three separate CADR/Watt readings taken for three separate sample units identical to the representative model that was originally tested and qualified as ENERGY STAR. This average CADR/Watt value must fall within - 5% of the value initially reported to EPA and listed on the ENERGY STAR Qualified Product List to remain in compliance with this specification. EPA will conduct the product performance review process according to the guidelines provided below.

Product Performance Review Process:

To the extent ENERGY STAR is a self-certification program, EPA relies on the integrity of participating companies to ensure all products for which ENERGY STAR claims are made, meet all aspects of the ENERGY STAR performance specification. When mistakes are made and products are mislabeled or fail to perform as expected, EPA is committed to ensuring prompt corrective action. In the event EPA is provided test data from a third-party, accredited laboratory or other product information indicating a performance problem or mislabeling situation, EPA will take the following steps:

1. Inform the product manufacturer about the apparent performance and/or labeling problem.
2. Affirm the basis for qualification by requiring any relevant test data not already provided to EPA.
3. In the event that a definitive conclusion cannot be reached based on the manufacturer's response, EPA will make every effort to test the product in question as part of its in-use screening initiative.

4. If EPA concludes, based on the testing performed on behalf of EPA or an independent entity in accordance with the ENERGY STAR specified test procedure, that the product in question does not fully qualify with the ENERGY STAR performance criteria, the product manufacturer will be asked to provide a “corrective action” plan to EPA within 90 days, outlining the process by which the product will be modified and retested to demonstrate qualification to the specification.
 5. If the product manufacturer fails to submit a corrective action plan or exceeds the deadline for implementing it, the product in question will be removed from the Qualified Product List on the ENERGY STAR Web site. At this time, manufacturing partner will be notified of EPA’s decision, and will be asked to stop labeling the affected product (i.e. model number) and associating it with the ENERGY STAR immediately.
 6. EPA may take action to terminate the partnership with manufacturers whose products are repeatedly found to be in violation of the ENERGY STAR specification requirements.
- b) **UL Safety Requirements:** For models that emit ozone as a byproduct of air cleaning, the ozone production by the room air cleaner must not exceed 50 ppb in accordance with the UL Standard 867.
- c) **Standby Power Requirement:** ≤ 2 Watt(s) while in standby mode to activate secondary consumer features. Standby power must be tested in accordance with the Standby Power Test Procedure outlined in Section 4, below. This test procedure was developed in accordance with the International Electrotechnical Commission (IEC) document “IEC Standard 62301, Ed. 1.0: Household Electrical Appliances – Measurement of Standby Power”. For detailed instructions on this test procedure, please refer to IEC Standard 62301. **Note: The IEC Standard 62301 is currently in Draft form; however, EPA will expect the manufacturing partners to conduct standby power measurements using the following test procedure and report results.** For information about how to obtain a copy of the standard, visit the IEC “Web Store” at www.iec.ch.
- 4) **Testing and Reporting Procedures:** Manufacturers are required to perform tests according to the requirements outlined in this specification, and submit self-certification information to EPA on models that they intend to qualify as ENERGY STAR.
- A. In performing these tests, partner agrees to measure CADR according to the latest ANSI/AHAM AC-1 Standard. (Go to www.aham.org for information regarding the latest edition of the ANSI/AHAM AC-1 Standard). Also, during the ANSI/AHAM AC-1 test, a Watt meter or equivalent measuring instrument shall be required to quantify the energy consumption of the model. The test protocol for measuring energy consumption of the air cleaner is provided below.

Energy Consumption Test Protocol

Purpose: This protocol formalizes the process of testing the electrical energy consumption of room air cleaners.

Conditions of Test: The test described in this protocol should be conducted under the following conditions:

Ambient room-temperature:	70° F \pm 5° F [21° C \pm 1.5° C]
Relative humidity:	40% RH \pm 5% RH
Electrical frequency:	60 Hertz \pm 1 Hertz
Voltage:	120 volts \pm 1 volt

Conditioning of Room Air Cleaner Unit Before Test: Testers should assure that the air cleaner unit's motor is properly broken in by running the unit, without filters, for 48 hours.

Testing Instrumentation: Under this specification, a Watt meter, or equivalent instrument capable of measuring true RMS Watts with an accuracy of $\pm 1\%$ at 120 volts, 60 Hertz; calibrated within the last 12 months to a standard traceable to the U.S. National Institute for Standards and Technology (NIST)

should be used to measure the total Watts consumed.

Test Procedure: After the unit motor has been properly conditioned, in accordance with equipment manufacturer's instructions, connect the test instrument between the power supply and the air cleaner unit under test and follow steps 1-3, below:

Step 1: Turn the air cleaner ON with all settings/options (i.e., filter check indicator, fan control, etc.) set at maximum level and reset the power-measuring instrument (this will ensure capture of the full cycle power consumption).

Step 2: Adjust the power supply indicator to 120V - 60 Hz.

Step 3: Allow the air cleaner to run for 2 minutes without taking Watt readings. After this 2-minute initial runtime, begin recording Watt readings at one-minute intervals for 13 minutes. The entire energy consumption test will take 15-minutes total.

Testing Notes:

Three of the 13 readings may be thrown out as anomalous to address potential line surges and other variables. The average of the 10 remaining data points constitutes the electrical energy consumption by the unit.

In the instance that energy consumption is measured using a unit other than Watts (e.g. Watt-hours), convert and record Wattage consumed.

Test Procedure for Measuring Standby Power

1. Test Conditions and Equipment

a. Test Room:

The tests shall be carried out in a room that has an air speed close to the air cleaner under test of ≤ 0.5 m/s. The ambient temperature shall be maintained at (23 ± 5) °C throughout the test. **Note:** The measured power for some products and modes may be affected by the ambient conditions (e.g. illuminance, temperature).

b. Test Instrumentation:

The power measurement instrument shall have an accuracy of one percent and a resolution of 0.01 Watt or better. Voltage supply shall be at 115 volts, ± 1 volt.

2. Preparation of Room Air Cleaner Model for Testing

Tests are to be performed on a single room air cleaner model. The room air cleaner model shall be prepared and set up in accordance with the manufacturer's instructions, except where these conflict with the requirements of this test procedure. If no instructions are given, then factory or "default" settings shall be used, or where there are no indications for such settings, the air cleaner model is tested as supplied.

For portable air cleaners having a rechargeable battery, standby mode is measured on the charger or docking/base station with the air cleaner detached from its regular source of power in the 'on' position.

3. Test Procedure

This test procedure may only be used where the selected mode and measured power are stable. A variation of less than 5% in the measured power over 5 minutes is considered stable for the purposes of testing for standby power usage under this specification. Instrument power readings may be used in this case.

Connect the air cleaner model to be tested to the metering equipment in the stable mode. After the air cleaner model has been allowed to stabilize for at least 5 minutes, monitor the power consumption for not less than an additional 5 minutes. If the power level does not drift by more than 5% (from the maximum value observed) during the latter 5 minutes, the load can be considered stable and the power can be recorded directly from the instrument at the end of the 5

minutes.

4. Test Results

Standby power must be reported to EPA as the average power in Watts rounded to the second decimal place.

B. Test results must be reported to EPA using the Room Air Cleaner Qualifying Product Information (QPI) Form.

5) Consumer Information: The ENERGY STAR disclaimer label, which includes the following statement, must be placed on the product packaging of ENERGY STAR qualified air cleaners:

“This product earned the ENERGY STAR by meeting strict energy efficiency guidelines set by the US EPA. US EPA does not endorse any manufacturer claims of healthier indoor air from the use of this product.”

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 will be scalable if the partner wishes to enlarge it for larger product packaging surfaces. This disclaimer graphic will be available for partners to download on the ENERGY STAR Web site with other ENERGY STAR marks.

Instruction Manual and Partner Web Site:

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

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

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

6) Effective Date: The date that manufacturers may begin to qualify products as ENERGY STAR will be defined as the *effective date* of the agreement. The ENERGY STAR Room Air Cleaner specification effective date is **July 1, 2004**.

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 stakeholder 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.** To carry the ENERGY STAR, a product model must 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.