ENERGY STAR® Product Specification for Room Air Cleaners

Eligibility Criteria
Final Draft Version 3.0

Following is the Final Draft Version 3.0 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. Air Cleaner[1]: A product for improving indoor air quality, other than a central air conditioner, room air conditioner, portable air conditioner, dehumidifier, or furnace, that is an electrically-powered, self-contained, mechanically encased assembly that contains means to remove, destroy, or deactivate particulates, VOC, and/or microorganisms from the air. It excludes products that operate solely by means of ultraviolet light without a fan for air circulation.

B. Conventional Room Air Cleaner[1]: An air cleaner that –

(1) Is a portable or wall mounted (fixed) unit, excluding ceiling mounted unit, that plugs into an electrical outlet;

(2) Operates with a fan for air circulation; and

(3) Contains means to remove, destroy, and/or deactivate particulates.

The term portable is as defined in section 2.1.3.1 of AHAM AC-7-2022 and fixed is as defined in section 2.1.3.2 of AHAM AC-7-2022.

1. Fan with Filter[2]: Conventional room 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 Plates[2]: Conventional room 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 Generator[2]: Conventional room air cleaner that incorporates an ion generator in addition to a fan and filter.
4. Ion Generator[2]: Conventional room air cleaner that incorporates an ion generator only.
5. Hybrid[2]: Conventional room an air cleaner employing a combination of the above definitions of fan with filter, electrostatic plate/wire, and ion generator.
6. Combination Product: Conventional room an air cleaner that provides an additional function, not related to air purification, within the same housing, such as a humidifier or space heater.
7. Ozone Generator: A device intended to reduce or eliminate microorganisms within a room solely by means of introducing ozone into the room environment.

[1] 10 CFR 430.2

[2] ANSI/AHAM AC-1-2020

C. Clean Air Delivery Rate (CADR)[3]: 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.

D. Integrated Energy Factor (IEF)[3]: The energy the air cleaner uses when it is in standby mode, as well as its active mode energy. This is fully defined as the measured $PM_{2.5}$ CADR per watt.

E. $PM_{2.5}$[3]: A particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers as measured by a reference method based on 40 C.F.R Part 50 Annex I. and designated in accordance with 40 C.F.R part 53 or by an equivalent method designated in accordance with 40 C.F.R. Part 53.

F. $PM_{2.5}$ CADR[4]**:** The combination of CADR of cigarette smoke particle sizes ranging from 0.1 and 0.5 microns with the CADR of dust particles that fall in the range of 0.5 to 2.5 microns and performing a geometric average calculation.

G. Room Air Cleaner Functions:

1. Primary Function[4]: An air cleaning function that reduces the concentration of one or more types of indoor air pollutants.

2. Secondary Function[4]: A function that enables, supplements, or enhances a primary function. For Room Air Cleaners, secondary functions are other functions which are not directly related to air cleaning. Examples may include a vacuum, heating, humidification, or additional ambient room lights (ex. night light).

I. Basic Model[5]: All units of a given type of 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.

Note: Based on stakeholder feedback, the DOE and the EPA have removed a note in the clean air delivery rate definition that was redundant. The DOE and the EPA have also added a definition for conventional room air cleaner to define the scope of included products.

Finally, the DOE and the EPA have corrected the footnote reference for definitions of fan with filter, fan with electrostatic plates, fan filter with ion generator, ion generator, and hybrid. These terms are defined in ANSI/AHAM AC-1-2020.

2 SCOPE

A. Included Products

1. Products that meet the definition of a conventional room air cleaner as specified herein are eligible for ENERGY STAR certification under this specification, with the exception of products listed in Section 2.B. Certified room air cleaner models shall have a $PM_{2.5}$ CADR between 30 to 600 cubic feet per minute (cfm), inclusive, to be eligible under this specification.

Note: The DOE and the EPA have updated the scope to define it in terms of conventional room air cleaner, which aligns with the scope of the DOE test procedure and standards as well as the EPA's scope for these products.

[3] Appendix FF to Subpart B of 10 CFR 430

[4] Appendix FF to Subpart B of 10 CFR 430

[5] 10 CFR 430.2

The EPA also received stakeholder comments to expand the scope to a minimum of 10 smoke CADR and dust CADR and to define the scope in terms of $PM_{2.5}$ CADR as opposed to smoke CADR and dust CADR. The EPA considered products that have a CADR under 30 but ultimately elected to exclude them because these products serve niche applications for small spaces. Further, while the DOE defines the test procedure scope in terms of smoke CADR and dust CADR and the energy conservation standards are based on $PM_{2.5}$ CADR, the DOE and the EPA agree that it would be more appropriate to define the scope of this specification in terms of $PM_{2.5}$ CADR to avoid inadvertently excluding products that may have a smoke or dust CADR below 30 cfm, while still having a $PM_{2.5}$ CADR at or above 30 cfm. Accordingly, the DOE and the EPA propose to update the scope for Conventional Room Air Cleaners in terms of $PM_{2.5}$ CADR and will maintain a minimum of 30 $PM_{2.5}$ CADR for certified products.

B. Excluded Products

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. The following products are not eligible for certification under this specification, as defined in Section 1:
   i. Combination products and
   ii. Ozone generators.

3 CERTIFICATION CRITERIA

A. General Requirements

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).

B. IEF Requirements

Table 1: Minimum IEF Requirements

$PM_{2.5}$ CADR Bins	Minimum IEF
$30 \leq PM_{2.5}$ CADR < 100	4.4
$100 \leq PM_{2.5}$ CADR < 150	5.4
$PM_{2.5}$ CADR ≥ 150	5.6

Note: The EPA received several comments regarding the proposed performance requirements. Many stakeholders expressed support for the Draft 1 proposal. One stakeholder supports the minimum efficiency requirements and the adoption of the integrated energy factor (IEF) and $PM_{2.5}$ CADR metrics. In the Final Draft, the EPA proposes to maintain the current proposal for Version 3.0.

C. Model Numbers

1. Report the model numbers used for ENERGY STAR certified product submissions which shall be consistent with DOE (as specified in 10 CFR 429.68(b)) submissions.

D. Additional Reporting Requirements

1. Report the filter type shipped with the product and the replacement filter model number.

2. Report the rated and measured CADR for pollen, dust and smoke per the Appendix FF.

3. Report the measured operating power in watts for pollen, dust, and smoke per the Appendix FF.

4. Report the ozone emissions in parts per billion (ppb) per the UL 867 Ed. 5.0 Electrostatic Air Cleaners.

Note: Additional reporting requirements will be collected through the certification body the same way as other product features (such as technology, auto cleaning mode, ability to connect to a network, etc).

Note: Based on stakeholder feedback, the EPA will allow partners to indicate the presence of an auto cleaning mode when certifying models. The DOE and the EPA are aware that stakeholders are working to develop a test method for products operating in auto mode and will monitor for updates to the industry standard.

Stakeholders requested the EPA include reporting of effective room size. The EPA currently calculates effective room size for ENERGY STAR room air cleaner models and displays the effective room size on the ENERGY STAR Qualified Products List for room air cleaners and the ENERGY STAR Product Finder for room air cleaners. The EPA references 10 CFR 429.68(a)(4) for the calculation of effective room size in ft^2, which is 1.55 multiplied by the represented Smoke CADR value.

4 TEST REQUIREMENTS

A. Test Methods.

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

Table 2: Test Methods for ENERGY STAR Certification

ENERGY STAR Requirement	Test Method Reference
$PM_{2.5}$ CADR and Integrated Energy Factor (IEF)	Appendix FF to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Air Cleaners OR DOE-approved test procedure waiver pursuant to 10 CFR 430.27
Ozone Generation Reporting	UL 867 Ed. 5.0 *Electrostatic Air Cleaners*

2. One of the following sampling plans shall be used to test energy performance for certification to ENERGY STAR:
   i. 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 greater than the ENERGY STAR specification requirements. Note that to determine the represented value per 10 CFR 429.68, additional testing outside of ENERGY STAR is required. The represented value must also be equal to or better than the ENERGY STAR specification requirements; or
   ii. At least two units are selected, obtained and tested. The represented value is calculated from the test results according to the sampling requirements defined in 10 CFR 429.68. The represented value must be equal to or greater than the relevant ENERGY STAR specification requirement. The measured performance (or mean of measured performance) of this unit and of all units sold must be equal to or greater than the ENERGY STAR specification requirements.

3. Represented Value: The represented value is the identical value certified to DOE, listed on the ENERGY STAR QPL, and shown on consumer facing materials.

Results of the tested unit(s) may be used to certify additional individual model variations within a Basic Model as long as the definition for Basic Model provided in Section 1, above, and in 10 CFR 430.2 is met.

4. Significant Digits and Rounding: All calculations shall be carried out as specified in Appendix FF to Subpart B of Part 430 and 10 CFR Part 430.23(hh). Do not round individual test results. Rounding is specified in 10 CFR Part 429.68 for the represented value.

5 EFFECTIVE DATE

1. Effective Date: The Version 3.0 ENERGY STAR Room Air Cleaner specification shall take effect on October 9, 2025. To certify 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.

Note: The EPA intends to finalize this Version 3.0 specification in early January 2025 with an effective date of October 9, 2025.

6 FUTURE SPECIFICATION REVISIONS

1. Future Specification Revisions: The 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 certification is not automatically granted for the life of a product model.