



ENERGY STAR® Product Specification for Room Air Cleaners

Eligibility Criteria Draft 1 Version 3.0

Following is the Draft 1 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. Consumer Room Air Cleaner¹: A consumer 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.
- Fan with Filter²: Air cleaner that operates with an electrical source of power and which contains a motor and fan for drawing air through a filter media.
 - Fan with Electrostatic Plates²: 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).
 - Fan Filter with Ion Generator²: Air cleaner that incorporates an ion generator in addition to a fan and filter.
 - Ion Generator²: Air cleaner that incorporates an ion generator only.
 - Hybrid²: An air cleaner employing a combination of the above definitions of fan with filter, electrostatic plate/wire, and ion generator.
 - 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.
 - 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)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.
- 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. 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.
- D. 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.

¹ 10 CFR 430.2

² ANSI/AHAM AC-7-2022

³ Appendix FF to Subpart B of 10 CFR 430

- 41 E. PM_{2.5}CADR⁴: The combination of CADR of cigarette smoke particle sizes ranging from 0.1 and 0.5 microns with
42 the CADR of dust particles that fall in the range of 0.5 to 2.5 microns and performing a geometric average
43 calculation.
- 44 F. Room Air Cleaner Functions:
- 45 1. Primary Function⁴: An air cleaning function that reduces the concentration of one or more types of indoor air
46 pollutants.
- 47 2. Secondary Function⁴: A function that enables, supplements, or enhances a primary function. For Room Air
48 Cleaners, secondary functions are other functions which are not directly related to air cleaning. Examples
49 may include a vacuum, heating, humidification, or additional ambient room lights (ex. night light).
- 50 G. Active Mode⁴: A product mode where the energy using product is connected to a mains power source and at
51 least one primary function is activated.
- 52 I. Basic Model⁵: All units of a given type of product (or class thereof) manufactured by one manufacturer, having
53 the same primary energy source, and which have essentially identical electrical, physical, and functional (or
54 hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water
55 efficiency.

56 **Note:** The EPA proposes the addition of new definitions and updates to existing definition to align with those in used
57 in the referenced DOE Appendix FF test procedure for room air cleaners.

58 2 SCOPE

59 A. Included Products

- 60 1. Products that meet the definition of a room air cleaner as specified herein are eligible for ENERGY STAR
61 certification under this specification, with the exception of products listed in Section 2.B. Certified room air
62 cleaner models shall have a smoke CADR and a dust CADR between 30 to 600 cubic feet per minute (cfm),
63 inclusive, to be eligible under this specification.

64 **Note:** The EPA proposes adding an upper limit value of 600 for smoke CADR and dust CADR to the scope to align
65 with the DOE Appendix FF test procedure for room air cleaners.

66 B. Excluded Products

- 67 1. Products that are covered under other ENERGY STAR product specifications are not eligible for certification
68 under this specification. The list of specifications currently in effect can be found at
69 www.energystar.gov/specifications.
- 70 2. The following products are not eligible for certification under this specification, as defined in Section 1:
71 i. Combination products and
72 ii. Ozone generators.
73

74 **Note:** The EPA has not proposed but is interested in feedback on potentially allowing some combination products
75 within scope. The EPA is interested if there are certain combination products that the EPA should consider allowing
76 within scope.

77 3 CERTIFICATION CRITERIA

78 A. General Requirements

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

⁴ Appendix FF to Subpart B of 10 CFR 430

⁵ 10 CFR 430.2

81 B. IEF Requirements

82 **Table 1: Minimum IEF Requirements**

| PM _{2.5} CADR Bins | Minimum IEF |
|------------------------------------|-------------|
| 30 ≤ PM _{2.5} CADR < 100 | 4.4 |
| 100 ≤ PM _{2.5} CADR < 150 | 5.4 |
| PM _{2.5} CADR ≥ 150 | 5.6 |

83
 84 **Note:** ENERGY STAR currently uses the Smoke CADR/W metric which is calculated using smoke CADR and active
 85 mode energy consumption. The EPA proposes to adopt the metric in the DOE Appendix FF test procedure for room
 86 air cleaners, IEF, which is calculated using PM_{2.5} CADR and active and inactive mode energy consumption. The DOE
 87 references AHAM AC-7-2022, which defines PM_{2.5} as particulate matter with an aerodynamic diameter less than or
 88 equal to a nominal 2.5 micrometers. The DOE found a strong correlation between PM_{2.5} CADR and measured Smoke
 89 CADR and Dust CADR values. The EPA evaluated current ENERGY STAR models and estimated the PM_{2.5} CADR
 90 and IEF for current ENERGY STAR models. The EPA found that IEF values for models are often similar to the
 91 Smoke CADR/W values but can be slightly different. The EPA proposes to change the ENERGY STAR criteria to IEF
 92 which accounts for active and standby mode. Thus, the EPA proposes the removal of partial on mode requirements
 93 due to the inclusion of partial on mode energy consumption in the IEF metric.
 94

95 There is currently a sizeable selection of available models in the most popular product classes from a range of
 96 manufacturers that would meet the proposed levels. We estimate that 24% of models currently on the market can
 97 meet the new requirements. The EPA expects a reasonable payback for certified room air cleaners based on an
 98 assessment of a limited set of products with similar features – between 0 and 2 years depending on the product
 99 class.

100 C. Model Numbers

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

103 D. Additional Reporting Requirements

- 104 1. Report the filter type shipped with the product and the replacement filter model number.
 105
 106 2. Report the rated and measured CADR for pollen, dust and smoke per the Appendix FF.
 107
 108 3. Report the measured operating power in watts for pollen, dust, and smoke per the Appendix FF.
 109
 110 4. Report the ozone emissions in parts per billion (ppb) per the UL 867 Ed. 5.0 Electrostatic Air Cleaners.
 111

112 *Note: Additional reporting requirements will be collected through the certification body the same way as other*
 113 *product features (such as technology, capacity, ability to connect to a network, etc).*
 114

Note: The EPA proposes to change the references from the AHAM standard to the DOE Appendix FF test procedure. The EPA also added a Model Numbers reporting requirement to align with other ENERGY STAR specifications for products that are federally regulated.

Additionally, the EPA removed the Optional Connected Criteria but will collect information on the capability to connect to a network and the connected features along with other product information through the certification body. The EPA is making this adjustment to simplify the process for sharing information about connected features.

115 **4 TEST REQUIREMENTS**

116 A. Test Methods.

117 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 <i>Electrostatic Air Cleaners</i> |

118 2. One of the following sampling plans shall be used to test energy performance for certification to ENERGY
119 STAR:

120 i. A single unit is selected, obtained, and tested. The measured performance of this unit and of each
121 subsequent unit manufactured must be equal to or greater than the ENERGY STAR specification
122 requirements. Note that to determine the represented value per 10 CFR 429.68, additional testing
123 outside of ENERGY STAR is required. The represented value must also be equal to or better than the
124 ENERGY STAR specification requirements; or

125 ii. At least two units are selected, obtained and tested. The represented value is calculated from the test
126 results according to the sampling requirements defined in 10 CFR 429.68. The represented value must
127 be equal to or greater than the relevant ENERGY STAR specification requirement. The measured
128 performance (or mean of measured performance) of this unit and of all units sold must be equal to or
129 greater than the ENERGY STAR specification requirements.

130 3. Where represented value is the identical value certified to DOE, listed on the ENERGY STAR QPL, and
131 shown on consumer facing materials. The measured value is the test result.

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

134 **Note:** The EPA proposes changing the test method reference to the DOE test procedure, Appendix FF, as well as
135 remove the reference to IEC 62301 for Partial On Mode Power which is covered under the Appendix FF.

136 4. Significant Digits and Rounding: All calculations shall be carried out as specified in Appendix FF to Subpart
137 B of Part 430 and 10 CFR Part 430.23(hh). Do not round individual test results. Rounding is specified in 10
138 CFR Part 429 for the represented value.

139 **5 EFFECTIVE DATE**

140 1. Effective Date: The Version 3.0 ENERGY STAR Room Air Cleaner specification shall take effect on TBD.
141 To certify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on the
142 model's date of manufacture. The date of manufacture is specific to each unit and is the date on which a
143 unit is considered to be completely assembled.

144 **Note:** The EPA intends to finalize this Version 3.0 specification in 2024 and anticipates it would take effect 9 months
145 later. Once this specification is finalized, brand owners will be free to certify products to it immediately. Products that
146 are currently certified will remain on the list of certified products until the effective date of the specification.

147

148 **6 FUTURE SPECIFICATION REVISIONS**

- 149 1. Future Specification Revisions: The EPA reserves the right to change the specification should technological
150 and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with
151 current policy, revisions to the specification are arrived at through industry discussions. In the event of a
152 specification revision, please note that ENERGY STAR certification is not automatically granted for the life of
153 a product model.
154