



ENERGY STAR® Program Requirements Product Specification for Room Air Conditioners

Eligibility Criteria Draft Version 3.1

Following is the **draft Version 3.1** ENERGY STAR Product Specification for Room Air Conditioners. A product shall meet all of the identified criteria to earn the ENERGY STAR.

- 1) **Definitions:** Below are the definitions of the relevant terms in this document. Unless otherwise specified, these definitions are consistent with the definitions in the DOE test procedure at 10 CFR 430, Subpart B, Appendix F.
 - A. **Room Air Conditioner (RAC):** A consumer product, other than a “packaged terminal air conditioner,” which is powered by a single phase electric current and which is an encased assembly designed as a unit for mounting in a window or through the wall for the purpose of providing delivery of conditioned air to an enclosed space. It includes a prime source of refrigeration and may include a means for ventilating and heating.
 1. **Casement-only:** A RAC designed for mounting in a casement window with an encased assembly with a width of 14.8 inches or less and a height of 11.2 inches or less.
 2. **Casement-slider:** A RAC with an encased assembly designed for mounting in a sliding or casement window with a width of 15.5 inches or less.
 3. **Reverse Cycle:** A RAC that employs a means for reversing the function of the indoor and outdoor coils such that the indoor coil becomes the refrigerating system condenser, allowing for heating of the air in the conditioned space; similarly, the outdoor coil becomes the evaporator, utilizing outdoor air as a source of heat.
 4. **Through the Wall (TTW):** A RAC without louvered sides. These units may also be referred to as “built-in” units.
 5. **Electromechanical:** A RAC that measures room temperature with a thermostat that undergoes a physical change (dimensional, phase change, etc.) relative to temperature, and utilizes mechanical rotary, switch, or similar user controls for cooling output, fan speed, desired temperature, or other features.
 - B. **Basic Model:** 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. **Energy Efficiency Ratio (EER):** The ratio of measured cooling output (in BTU per hour) to the measured average electrical energy input (in Watts).
 - D. **Combined Energy Efficiency Ratio (CEER):** The ratio of measured cooling output (in BTU per hour) to measured average electrical energy input (in Watts) and measured standby/off-mode power consumption (in Watts.)
 - E. **Louvered Sides:** Exterior side vents on a RAC enclosure to facilitate airflow over the outdoor coil.
 - F. **Packaged Terminal Air Conditioner (PTAC):** A wall sleeve and a separate unencased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability energy.
 - G. **Portable Air Conditioner:** A single package air conditioner typically mounted on wheels for the purpose of moving the unit from place to place within a building or structure.

Note: EPA has incorporated a new definition for Combined Energy Efficiency Ratio (CEER) into Section 1 that is based upon the test procedures and calculations in Appendix F, including the provisions that measure the energy consumption of room ACs in standby mode and off mode. EPA and DOE also incorporated minor changes to the definitions for Basic Model and EER.

2) **Scope:**

- A. **Included Products:** Products that meet the definition of a Room Air Conditioner as specified herein are eligible for ENERGY STAR qualification, with the exception of those products listed in Section 2.B.
- B. **Excluded Products:** PTACs, portable air conditioners, and models with electric resistance heat as the primary heat source are not eligible for ENERGY STAR qualification under this specification. Products that are covered under other ENERGY STAR product specifications are not eligible for qualification under this specification.

3) **Core Qualification Criteria:**

- A. **Energy Efficiency Ratio (EER) or Combined Energy Efficiency Ratio (CEER):**

EER shall be greater than or equal to the Minimum EER (EER_{MIN}) as calculated per Equation 1.

Equation 1. Calculation of Minimum EER

$$EER_{MIN} = EER_{BASE} - EER_{Adder_Connected}$$

where,

EER_{BASE} is the base EER, per Table 1, 2 or 3

$EER_{Adder_Connected}$ is the EER connected allowance, per Table 4

Alternatively, CEER shall be greater than or equal to the Minimum CEER ($CEER_{MIN}$) as calculated per Equation 2.

Equation 2. Calculation of Minimum CEER

$$CEER_{MIN} = CEER_{BASE} - CEER_{Adder_Connected}$$

where,

$CEER_{BASE}$ is the base CEER, per Table 1, 2 or 3

$CEER_{Adder_Connected}$ is the CEER connected allowance, per Table 4

Table 1: Units Without Reverse Cycle

Capacity (BTU/hour)	EER_{BASE} (units with louvered sides)	EER_{BASE} (units without louvered sides)	$CEER_{BASE}$ (units with louvered sides)	$CEER_{BASE}$ (units without louvered sides)
< 6,000	11.2	10.4	11.0	10.2
6,000 to 7,999				
8,000 to 10,999	11.3	9.8	11.2	9.7
11,000 to 13,999				
14,000 to 19,999				
20,000 to 27,999	9.8	9.8	11.1	9.8
≥ 28,000				

Table 2: Units With Reverse Cycle

Capacity (BTU/hour)	EER _{BASE} (units with louvered sides)	EER _{BASE} (units without louvered sides)	CEER _{BASE} (units with louvered sides)	CEER _{BASE} (units without louvered sides)
< 14,000		9.8		9.7
≥ 14,000		9.2		9.1
< 20,000	10.4		10.3	
≥ 20,000	9.8		9.8	

Table 3: Casement Units

Casement Type	EER _{BASE}	CEER _{BASE}
Casement-Only	10.0	9.9
Casement-Slider	10.9	10.8

Table 4: Connected Allowance

Product Type	EER _{Adder_Connected}	CEER _{Adder_Connected}
All RAC types covered in Tables 1, 2 and 3	TBD	TBD

Note: Working with the U.S. Department of Energy (DOE), EPA has translated the current EER efficiency requirements into equivalent CEER levels, using DOE’s methodology that was published during the most recent room AC standards rulemaking and documented in *Room Air Conditioner CEER Standard Level Calculations for All Product Classes*. The new CEER levels reflect the energy efficiency of room ACs including active mode energy use (i.e., energy use to cool a space) as well as the more recent standby and off-mode power consumption provisions that are part of the DOE room AC test procedure in 10 CFR 430, Subpart B, Appendix F. This crosswalk analysis assumes representative capacities for each equipment class, a standby power of 1.4 W, an active mode of 750 operational hours, and standby mode of 5115 hours based on data from DOE’s final rule regarding energy standards for residential room air conditioners. 76 FR 22454. DOE determined standby power consumption of room ACs by conducting energy measurements of control boards, showing typical baseline control boards have a total standby power mode of approximately 1.4W, and that transformer power consumption accounts for about 75 percent of the power draw. DOE found products that used switch mode power supplies also contained more complex circuit boards with smaller transformers, which decreased standby power consumption to 0.7 W. DOE’s analysis is further discussed in Chapter 5 of the Technical Support Document. EPA believes the use of the 1.4 W standby power consumption for the purposes of translating EER criteria to CEER criteria is representative of the control board technology available in market.

As indicated in Section 5 of this specification, consistent with DOE’s regulatory programs, manufacturers must use the set of CEER requirements to certify room ACs to ENERGY STAR beginning on June 1, 2014. Models certified to the EER requirements prior to June 1 will remain ENERGY STAR certified. However, manufacturers of products subject to federal minimum efficiency standards that experience certified ratings change are responsible for updating their product claims, including those associated with their ENERGY STAR certification, by notifying their CB to ensure that this data is reflected on the ENERGY STAR lists of certified products per [Directive #2011-05: Measured versus Reported Values for ENERGY STAR Certification](#).

Note (cont): Manufacturers should also work with CBs to remove any model from the ENERGY STAR product list that is no longer available (i.e., have been discontinued and are no longer available for purchase). EPA welcomes feedback on the proposed CEER requirements.

B. Energy Saver Mode:

1. Product shall have an “Energy Saver Mode,” which may be consumer override-able. In this mode, fan operation shall occur only in conjunction with compressor operation, with the following exceptions:
 - a. The fan may continue to run for a period not exceeding 5 minutes after the compressor is switched off.
 - b. After the above period, when the compressor is off, the fan may be cycled on for up to 17% of the total cycle time to facilitate accurate control of room temperature. For example, the fan may run for 1 minute then cycle off for at least 5 minutes or the fan may run for 2 minutes then cycle off for at least 10 minutes. Manufacturers may use other fan run durations, but fan run time shall not exceed 17% of total cycle time.
 - c. Through the Wall RACs, as defined in Section 1 may include an installer accessible setting that disables Energy Saver Mode functionality. The setting may be accessible from the product’s controls or may use a physical switch, jumper or the like. Appropriate measures shall be taken to ensure that the setting is implemented as an installer setting not intended to be consumer accessible. For example, physical switches or jumpers shall require the use of tool(s), removal of a panel, or the like; settings accessible in the product’s controls shall require a unique sequence of button presses, shall be in a hidden menu, shall require an installer password, or the like.
2. Products, excepting electromechanical RACs as defined in Section 1, shall ship with Energy Saver Mode enabled as the default setting.
3. Products, excepting electromechanical RACs as defined in Section 1, shall default to Energy Saver Mode each time the unit is switched on. However, products are not required to default to Energy Saver Mode upon restoration of power after an electrical power outage that results in a loss of power to the unit.

C. Filter Reminder:

1. Products, excepting electromechanical RACs as defined in Section 1, shall have a filter reminder that provides visual notification recommending the filter be checked, cleaned or replaced, as applicable. The filter reminder may be based on operating hours, sensing technology, or other means.
2. Through the Wall RACs, as defined in Section 1, may include an installer accessible setting that disables Filter Reminder functionality. The setting may be accessible from the product’s controls or may use a physical switch, jumper or the like. Appropriate measures shall be taken to ensure that the setting is implemented as an installer setting not intended to be consumer accessible. For example, physical switches or jumpers shall require the use of tool(s), removal of a panel, or the like; settings accessible in the product’s controls shall require a unique sequence of button presses, shall be in a hidden menu, shall require an installer password, or the like.

D. Significant Digits and Rounding: All calculations shall be carried out as specified in Appendix F to Subpart B of Part 430 and 10 CFR Part 430.23(f).

E. Model Numbers: Model numbers used for ENERGY STAR qualified product submissions shall be consistent with Federal Trade Commission (FTC) and Department of Energy (DOE) submissions.

4) **Connected Product Criteria: TBD**

5) **Test Requirements:**

- A. One of the following sampling plans shall be used to test energy performance for qualification to ENERGY STAR:
 - 1. A representative unit shall be selected for testing based on the definition for Basic Model provided in Section 1. above; or
 - 2. Units shall be selected for testing per the sampling requirements defined in 10 CFR 429.15.
- B. When testing energy efficiency of room air conditioners, the following test method shall be used to determine ENERGY STAR qualification:

Table 5: Test Methods for ENERGY STAR Qualification

ENERGY STAR Requirement	Test Method Reference
EER	10 CFR 430, Subpart B, Appendix F
CEER <i>Required for models certified on or after 6/1/2014</i>	

- C. Compliance with Energy Saver Mode and Filter Reminder criteria shall be through examination of product and/or product documentation.
- 6) **Effective Date:** The ENERGY STAR Room Air Conditioner specification shall take effect on October 1, 2013. 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 (e.g., month and year) on which a unit is considered to be completely assembled.
- 7) **Future Specification Revisions:** EPA reserves the right to change the criteria 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.