ENERGY STAR® Program Requirements
Product Specification for Room Air Conditioners

Eligibility Criteria
Draft 1 Version 6.0

Following is the **Draft 1 Version 6.0** 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. Where noted below, definitions are identical to the definitions in the U.S Department of Energy (DOE) test procedure at 10 Code of Federal Regulations (CFR) 430, Subpart B, Appendix F or in 10 CFR 430.2. The definitions from the CFR have been reprinted for ease of use, however, the CFR definitions take precedence and may be modified by DOE during the rulemaking process.

A. Room Air Conditioner (RAC)[1]: A window-mounted or through-the-wall-mounted encased assembly, other than a "packaged terminal air conditioner," that delivers cooled, conditioned air to an enclosed space, and is powered by single-phase electric current. It includes a source of refrigeration and may include additional means for ventilating and heating.

   1. Casement-only[1]: 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[1]: 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[2]: 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. Room Heat Pump[3]: A room air conditioner as defined at 10 CFR 430.2 that utilizes reverse cycle refrigeration as its prime source for heating the indoor space.

   1. Type 1 Heat Pump[3]: A room heat pump that does not have active defrost or for which the specified compressor cut-in and cut-out temperatures are not both less than 40°F.
   2. Type 2 Heat Pump[3]: A room heat pump that has active defrost and for which the specified compressor cut-in and cut-out temperatures are both less than 40°F but not both less than 17°F.
   3. Type 3 Heat Pump[3]: A room heat pump that has active defrost and for which the specified compressor cut-in and cut-out temperatures are both less than 17°F but not both less than 5°F.
   4. Type 4 Heat Pump[3]: A room heat pump that has active defrost and for which the specified compressor cut-in and cut-out temperatures are both less 5°F.

C. Basic Model[1]: 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.

D. Tested Basic Connected Model (TBCM): A basic model that has been tested to validate it meets Demand Response criteria in section 4.G.

E. Cooling Capacity[4]: The amount of cooling, in British thermal units per hour (Btu/h), provided to a conditioned space, measured under the specified conditions.

F. Heating Capacity[3]: The amount of heating, in British thermal units per hour (Btu/h), provided to a conditioned space, measured under the specified conditions and determined in section 6 of this test method.

G. Cooling Mode[4]: An active mode in which a room air conditioner has activated the main cooling function according to the thermostat or temperature sensor signal or switch (including remote control).

H. Combined Energy Efficiency Ratio (CEER): The energy efficiency of a room air conditioner as measured in accordance with the test procedure at 10 CFR 430, Subpart B, Appendix F or, a DOE-approved test procedure waiver pursuant to 10 CFR Part 430.27 expressed in units of BTU per watt-hour (BTU/Wh).

I. Heating Energy Efficiency Ratio (HEER)[3]: The energy efficiency of a room air conditioner in British thermal units per watt-hour (Btu/Wh) when in heating mode, as calculated in section 7 of this test method.

J. Ethylene Propylene Diene Monomer (EPDM): A closed-cell rubber that is used for outdoor gasketing and/or heating, ventilating, and air conditioning applications.

K. Louvered Sides: Exterior side vents on a RAC enclosure to facilitate airflow over the outdoor coil.

L. Packaged Terminal Air Conditioner (PTAC)[1]: 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.

M. Portable Air Conditioner[5]: A portable encased assembly, other than a "packaged terminal air conditioner," "room air conditioner," or "dehumidifier," that delivers cooled, conditioned air to an enclosed space, and is powered by single-phase electric current. It includes a source of refrigeration and may include additional means for air circulation and heating.

N. Represented Value: The represented value is determined pursuant to 10 CFR Part 429, Subpart B § 429.15 and is the identical value certified to DOE, listed on the ENERGY STAR QPL, and shown on consumer facing materials.

Note: Definitions relevant to room heat pumps have been added from the ENERGY STAR Test Method to Determine Room Air Conditioner Heating Mode Performance.

2 SCOPE:

A. Included Products: Products that meet the definition of a room air conditioner or room heat pump as specified herein are eligible for ENERGY STAR certification, with the exception of those products listed in Section 2.B.

B. Excluded Products: PTACs, portable air conditioners, and room air conditioner models with electric resistance heat as the primary heat source are not eligible for ENERGY STAR certification under this specification. Products that are covered under other ENERGY STAR product specifications, e.g., dehumidifiers, are not eligible for certification under this specification.

3 CERTIFICATION CRITERIA:

A. Combined Energy Efficiency Ratio (CEER): CEER shall be greater than or equal to the minimum CEER as shown in Table 1.

B. Heating Energy Efficiency Ratio (HEER): HEER shall be greater than or equal to the minimum HEER as shown in Table 2.

[1] 10 CFR 430, Subpart A, Section 430.2
[2] Derived from ASHRAE 58 – Method of Testing for Rating Room Air Conditioner and Package Terminal Air Conditioner Heating Capacity
[3] ENERGY STAR Test Method to Determine Room Air Conditioner Heating Mode Performance
[4] 10 CFR 430, Subpart B, Appendix F
[5] 10 CFR 430.2

Table 1: Room Air Conditioner Cooling Efficiency Requirements

Product Class	Version 6.0 CEER (Btu/Wh)
1. Without reverse cycle, with louvered sides, and less than 6,000 Btu/h	13.1
2. Without reverse cycle, with louvered sides, and 6,000 to 7,999 Btu/h	13.7
3. Without reverse cycle, with louvered sides, and 8,000 to 13,999 Btu/h	14.7
4. Without reverse cycle, with louvered sides, and 14,000 to 19,999 Btu/h	14.4
5a. Without reverse cycle, with louvered sides, and 20,000 to 27,999 Btu/h	12.7
5b. Without reverse cycle, with louvered sides, and 28,000 Btu/h or more	12.2
6. Without reverse cycle, without louvered sides, and less than 6,000 Btu/h	12.8
7. Without reverse cycle, without louvered sides, and 6,000 to 7,999 Btu/h	12.8
8a. Without reverse cycle, without louvered sides, and 8,000 to 10,999 Btu/h	13.0
8b. Without reverse cycle, without louvered sides, and 11,000 to 13,999 Btu/h	12.8
9. Without reverse cycle, without louvered sides, and 14,000 to 19,999 Btu/h	12.6
10. Without reverse cycle, without louvered sides, and 20,000 Btu/h or more	12.7
11. With reverse cycle, with louvered sides, and less than 20,000 Btu/h	13.2
12. With reverse cycle, without louvered sides, and less than 14,000 Btu/h	12.6
13. With reverse cycle, with louvered sides, and 20,000 Btu/h or more	12.6
14. With reverse cycle, without louvered sides, and 14,000 Btu/h or more	11.7
15. Casement-Only	12.8
16. Casement-Slider	14.0

Table 2: Heating Mode Requirements* for Product Classes 11-14

Room Heat Pump Type	Version 6.0 HEER (Btu/Wh)	COP at 5°F	COP at 17°F	Percent of Heating Capacity at 5°F of that at 47°F	Percent of Heating Capacity at 17°F of that at 47°F
Type 1	5.1	-	-	-	-
Type 2	5.1	-	-	-	-
Type 3	6.8	-	1.5	-	70%
Type 4	6.8	1.5	-	70%	-

*Measured in accordance with the ENERGY STAR Test Method to Determine Room Air Conditioner Heating Mode Performance[3].

Note: CEER requirements remain unchanged from Version 5.0. HEER and low ambient temperature performance requirements have been added for the reverse-cycle (room heat pump) units. The proposed 5.1 HEER requirement for Types 1 and 2 corresponds to seasonal heating performance 1.5 times more efficient than resistance heating, using 2/3rd the energy. The 1.5 COP at 17°F and 5°F requirement for Types 3 and 4 will ensure adequate efficiency at cold temperatures, while the 70% capacity requirement will ensure the rated heating capacity more honestly reflects the unit's heating capacity when heating load is the greatest. Depending on the room heat pump type, these HEER requirements result in annual heating electric savings ranging from 276 kWh to 783 kWh for product class 11, the most popular reverse cycle class, when compared to electric resistance heating in homes that use portable space heaters or built-in electric appliances as their primary heating source.

C. 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 compressor off 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. TTW 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.

d. The fan may continue to run when necessary for compliance with the applicable safety standards.

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 to cooling mode. 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.

D. 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. TTW 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.

E. Installation Requirements:

1. *Installation Materials (window units only)*: Room air conditioners intended for window installations shall be shipped with weather stripping and/or gasket materials appropriate for all intended applications, including the window size(s) the unit is typically used for, when installed according to provided instructions. The materials shall minimize air leaks (seal) between the room air conditioner and the window opening, including the area between the room air conditioner and the window sash, and the area between the room air conditioner and the windowsill (if bottom-mounted) or the window head (if top-mounted). The materials shall also seal gaps between fixed and movable window sashes. Acceptable weather stripping or gasket material includes, but is not limited to, vinyl clad foam, EPDM cellular rubber, silicone rubber, or comparable alternatives that resist air and water infiltration as well as degradation due to ultraviolet (UV) radiation exposure. Room air conditioner side curtains must be tight fitting to minimize air leaks and contain insulation in the panel with a minimum insulation value of R1 as determined by the Federal Trade Commission's (FTC) Labeling and Advertising of Home Insulation regulations, 16 CFR part 460.

2. *Installation Instructions*: Products shall ship with detailed installation documentation that includes text and, where applicable, diagrams intended to facilitate installation that minimizes air leakage and thermal losses. Instructions shall include recommendations on the proper locations to install weather stripping or gaskets and, optionally, the use of temporary tape or removable caulk to seal the unit in place. If the product is a TTW unit, instructions shall also include a recommendation that the consumer install an appropriately sized cover, to include recommended specifications that facilitate satisfactory fit, when the RAC is not in use to provide additional insulation and air

sealing.

F. Model Numbers: Model numbers used for ENERGY STAR certified product submissions shall be consistent with FTC (as specified in 16 CFR 305) and DOE (as specified in 10 CFR 429.15(b)) submissions.

G. Additional Reporting Requirements**:**

1. Report the type of refrigerant used in the room air conditioner, for example R-32 or R-290.
2. Report the compressor cut-in and cut-out temperatures for room heat pumps.
3. Report whether the room air conditioner conforms to CTA-2045 or (when connected to a network) to OpenADR, or to a similar protocol for grid service requests.

Note: 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. Because the DR Protocol is not necessarily available along with other product information, the EPA is calling this out as a separate reporting requirement since it is valuable information for utilities.

4 TEST REQUIREMENTS:

Table 3: Test Methods for ENERGY STAR Certification

ENERGY STAR Requirement	Required For	Test Method Reference
CEER	All RAC/RHP	10 CFR 430, Subpart B, Appendix F OR DOE-approved test procedure waiver pursuant to 10 CFR Part 430.27*
HEER, Cut-in Temperature, Cut-out Temperature	RHP Only	ENERGY STAR Test Method to Determine Room Air Conditioner Heating Mode Performance[3]
COP @ 17°F, Percentage of Heating Capacity @ 17°F over 47°F	RHP Type 3 Only	
COP @ 5°F, Percentage of Heating Capacity @ 5°F over 47°F	RHP Type 4 Only	

* DOE anticipates that various basic models may need a test procedure waiver to show the benefits of various operations pursuant to 10 CFR Part 430.27.

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

1. 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 better than the ENERGY STAR specification requirements. Note that to determine the represented value per 10 CFR Part 429, Subpart B § 429.15, additional testing outside of ENERGY STAR is required. The represented value must also be equal to or better than the ENERGY STAR specification requirements.
2. 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 Part 429, Subpart B § 429.15. The represented value must be equal to or better than the ENERGY STAR specification requirements.

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 Part 430.2 is met.

B. Compliance with Energy Saver Mode, Filter Reminder, and Installation criteria shall be assessed through examination of product and/or product documentation.

C. 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). Do not round individual test results. Rounding is specified in 10 CFR Part 429 for the represented value.

Note: Partner must ensure the product continues to meet the certification criteria through subsequent firmware, software, or other changes to the certified product.

Note: The ENERGY STAR Test Method to Determine Room Air Conditioner Heating Mode Performance has been added as the reference for the HEER requirement.

5 EFFECTIVE DATE:

A. Effective Date: The ENERGY STAR Room Air Conditioner specification shall take effect on **TBD**. Any product model with a date of manufacture on or after this date shall meet this specification to earn the ENERGY STAR. The date of manufacture is specific to each unit and is the date on which a unit is considered completely assembled.

Note: Version 6.0 will be effective nine months after finalizing. However, manufacturers will be able to early certify to Version 6.0 immediately upon finalization.

6 CONSIDERATIONS FOR FUTURE REVISIONS:

The EPA reserves the right to change the criteria should federal requirements, 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.