



# ENERGY STAR® Program Requirements

## Product Specification for Packaged Terminal Heat Pumps

### Eligibility Criteria

#### Draft 1 Version 1.0

Following is the Draft 1 Version 1.0 product specification for ENERGY STAR certified packaged terminal heat pumps. A product shall 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. Packaged Terminal Air Conditioner (PTAC)<sup>1</sup>: A wall sleeve and a separate un-encased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall, and that is industrial equipment. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builder's choice of hot water, steam, or electricity.
- B. Packaged Terminal Heat Pump (PTHP)<sup>1</sup>: A packaged terminal air conditioner that utilizes reverse cycle refrigeration as its prime heat source, that has a supplementary heat source available, with the choice of hot water, steam, or electric resistant heat, and that is industrial equipment.
- C. Basic Model<sup>1</sup>: All units manufactured by one manufacturer within a single equipment class, having the same primary energy source (e.g., electric or gas), and which have the same or comparable compressors, same or comparable heat exchangers, and same or comparable air moving systems that have a cooling capacity within 300 Btu/h of one another.
- D. Coefficient of Performance (COP)<sup>1</sup>: The ratio of the produced cooling effect of an air conditioner or heat pump (or its produced heating effect, depending on the mode of operation) to its net work input, when both the cooling (or heating) effect and the net work input are expressed in identical units of measurement.
- E. Energy Efficiency Ratio (EER)<sup>1</sup>: The ratio of the produced cooling effect of an air conditioner or heat pump to its net work input, expressed in Btu/watt-hour.
- F. Standard Size<sup>1</sup>: A PTAC or PTHP with wall sleeve dimensions having an external wall opening of greater than or equal to 16 inches high or greater than or equal to 42 inches wide, and a cross-sectional area greater than or equal to 670 square inches.
- G. Non-Standard Size<sup>1</sup>: A PTAC or PTHP with existing wall sleeve dimensions having an external wall opening of less than 16 inches high or less than 42 inches wide, and a cross-sectional area less than 670 square inches.
- H. Room Air Conditioner<sup>2</sup>: 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.
- I. Space constrained product<sup>2</sup>: A central air conditioner or heat pump:
  - (1) That has rated cooling capacities no greater than 30,000 BTU/hr;
  - (2) That has an outdoor or indoor unit having at least two overall exterior dimensions or an overall displacement that:

<sup>1</sup> 10 CFR part 431, Subpart F, § 431.92

<sup>2</sup> 10 CFR part 430, Subpart A, § 430.2

- (i) Is substantially smaller than those of other units that are:
    - (A) Currently usually installed in site-built single family homes; and
    - (B) Of a similar cooling, and, if a heat pump, heating capacity; and
  - (ii) If increased, would certainly result in a considerable increase in the usual cost of installation or would certainly result in a significant loss in the utility of the product to the consumer; and
- (3) Of a product type that was available for purchase in the United States as of December 1, 2000.

**2) Scope:**

A. Included Products:

- 1. Units that meet the definition of a PTHP, as specified herein, are eligible for ENERGY STAR certification, with the exception of products listed in Section 2.B.

B. Excluded Products:

- 1. Any PTAC without a heat pump as its primary mode of heating, per the PTHP definition in Section 1.
- 2. Any space-constrained residential heat pump or room air conditioner.

**3) Certification Criteria:**

A. Energy Efficiency Requirements:

**Table 1: Energy-Efficiency Criteria for Certified PTHPs**

Product Type		Cooling Capacity (Btu/h)	COP*	EER*
PTHPs	Standard size	<7,000	$\geq 3.5$	$\geq 12.6$
		7,000-15,000	$\geq 4 - (0.064 \times \text{Cap}/1,000)$	$\geq 14.9 - (0.324 \times \text{Cap}/1,000)$
		>15,000	$\geq 3.0$	$\geq 10.0$
	Non-standard size	<7,000	$\geq 2.9$	$\geq 9.9$
		7,000-15,000	$\geq 3.1 - (0.025 \times \text{Cap}/1,000)$	$\geq 11.5 - (0.226 \times \text{Cap}/1,000)$
		>15,000	$\geq 2.7$	$\geq 8.1$

\*Cap represents the cooling capacity (Btu/h)

**Note:** The EPA estimates that, on average, a PTHP meeting the proposed energy-efficiency criteria would save 215 kWh of electricity annually compared to a baseline PTAC unit meeting current DOE minimum efficiency standards. This would translate to average lifetime unit savings of 1,719 kWh and \$215, resulting in an estimated simple payback of 5.8 years. This payback, however, greatly varies with PTHP heating loads and the unit cost, and in many cases, it can be less than 4 years.

When compared to a baseline PTHP meeting current DOE minimum efficiency standards, the proposed criteria would, on average, save 70 kWh of electricity annually, translating to lifetime unit savings of 563 kWh and \$70, resulting in an estimated simple payback of 3.8 years.

B. Reporting Requirements:

Qualifying units shall be required to report refrigerant(s) used and whether the unit supplies fresh air in accordance with ASHRAE 90.2.

**Note:** A reporting requirement for refrigerant use is included to allow potential purchasers the opportunity to consider the global warming potential associated with the refrigerants used in various certified products. A reporting requirement pertaining to ventilation is included, as some jurisdictions and projects will need this information to select applicable equipment.

C. Significant Digits and Rounding:

1. All calculations shall be carried out with actual measured or observed values. Only the final result of a calculation shall be rounded. Unless otherwise directed below, calculated results shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.
2. Unless otherwise specified, compliance with specification limit shall be evaluated using exact values without any benefit from rounding.
3. As specified in 10 CFR, 429.43(a)(1)(iii), capacity shall be rounded to the nearest 100 Btu/h.

**Note:** The EPA is aware of considerable energy savings potential for PTHPs paired with connected thermostats and energy/building management systems and/or occupancy sensors. However, it is the Agency's understanding that the ability for a PTHP to connect to such thermostats and to use these systems is nearly, if not entirely, universal in the market. Therefore, connected criteria are not included in this specification, but the EPA is considering other approaches to educate buyers on the savings potential of using connected systems with PTHPs when applicable.

**4) Test Requirements:**

- A. One of the following sampling plans shall be used for purposes of testing for ENERGY STAR certification:
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. Results of the tested unit 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, is met; or
  2. Ratings are determined pursuant to the sampling requirements defined in 10 CFR Part 429, Subpart B § 429.43 either by selecting units for testing or by the application of an alternative efficiency determination method (AEDM) as defined in 10 CFR Part 429.70. The certified rating must be equal to or better than the ENERGY STAR specification requirements. Results of the tested or simulated unit may be used to certify additional model variations within a Basic Model as long as the definition provided above and in 10 CFR Part 431.92 is met. Further, all individual models within a Basic Model must have the same certified rating per DOE's regulations in Part 429 and this rating must be used for all manufacturer literature, the certified product list, and certification of compliance to DOE energy conservation standards.

B. When testing PTHPs, the following test method shall be used to determine ENERGY STAR certification:

**Table 2: Test Method for ENERGY STAR Certification**

ENERGY STAR Requirement	Required For	Test Method Reference*
COP, EER	PTHPs	10 CFR part 431 Subpart F § 431.96

**5) Effective Date:** This ENERGY STAR PTHP Specification shall take effect on **TBD**. To earn the ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on the 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.

**Note:** The EPA intends to finalize this Version 1.0 specification in Q4 2024. In covering a new product, this ENERGY STAR specification will be effective as soon as it is finalized.

**6) Considerations for 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 the ENERGY STAR certification is not automatically granted for the life of a product model.

- A. Part load cooling metric: Once a test method is finalized, the EPA plans to review and address any appropriate changes.
- B. The EPA anticipates that in the future it will be useful to recognize PTHPs that are able to use compressor-based heating at lower ambient temperatures. Future versions of the specification may include criteria related to this.