



EPA ENERGY STAR® Program Requirements Product Specification for Commercial Coffee Brewers

Eligibility Criteria Draft Version 1.1

Following is the **Draft Version 1.1** product specification for ENERGY STAR certified commercial coffee brewers. 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. Commercial Coffee Brewers: Commercial appliances designed to heat water and brew coffee.¹
- B. Residential Coffee Brewers: Residential appliances designed to heat water and brew coffee.
- C. Brew Event: The sequence of brewing a single cup (*Type 1*) or batch (*Type II*) of coffee, starting with the initiation of a brew event by the user, and including the time for the remaining water to drip through the filter.²
- D. Brew Volume: The volume of brewed coffee per brew event. May be expressed in fluid ounces or gallons. May also be referred to as brew capacity.
- E. Tank Capacity: The volume of water the brewer tank can accommodate. Expressed in gallons.

Commercial Coffee Brewer Products

- F. Bean-to-Cup: Single serving commercial coffee brewers designed to automatically measure and grind whole coffee beans per brew event.
- G. Liquid Coffee Dispensers: Single serving dispensers that mix coffee concentrate with hot water prior to delivery.
- H. Powdered Drink Dispensers: Single serving dispensers that mix powdered coffee (i.e. Cappuccino) with hot water prior to delivery.
- I. Espresso Machines: Machines that prepare single servings of espresso coffee through high-pressure steam.
- J. Type I: A single serving commercial coffee brewer designed to use brewer-specific, single-use packages of pre-ground coffee and has a standard brew volume of 6 to 24 fluid ounces per brew event.
- K. Type II: A batch commercial coffee brewer designed to use loose, ground coffee and a re-usable or single-use coffee filter, and has a standard brew volume of >24 to 384 fluid ounces per brew event. Type II brewers shall not use disposable packages of pre-ground coffee.
 - a. Small Batch Type II: Brew volume capacity with a range of 24oz. – 128oz.
 - b. Medium Batch Type II: Brew volume capacity with a range of >128oz. – 256oz.
 - c. Large Batch Type II: Brew volume capacity of >256oz. – 384oz.
- L. Type II with Warming Plate(s): A batch commercial coffee brewer (Type II) with the addition of one or more decanter warming plates.

¹ American Society for Testing and Materials (ASTM) Standard F2990-12 *Standard Test Method for Commercial Coffee Brewers*.

² Ibid.

- M. Type III: An urn or satellite commercial coffee brewer and has a standard brew volume of greater than 384 oz. per brew event. These products may contain more than one dispense station for simultaneous or sequential dispensing into more than one holding reservoir.
- N. Urn Coffee Brewers: Bulk commercial coffee brewers that brew into large, self-contained, insulated warming vessels with internal heating elements to maintain product temperature. Warming vessels may also use heat transferred from the hot water reservoir to maintain optimal serving temperature.
- O. Satellite Coffee Brewers: Bulk commercial coffee brewers that brew into large, removable vessels without internal heating elements. These products may include a separate heated docking station for remote use.
- P. Warming Plate: A heated metal plate intended to hold a non-insulated coffee decanter at optimal serving temperature after a brew event.

Energy Efficiency Metrics

- Q. Normalized Heavy-Use Brew Energy Rate: The average rate of the coffee brewer energy consumption during a brew cycle, calculated across brew volumes for comparison. Also referred to as normalized brew energy rate.
- R. Normalized Ready-to-Brew Idle Energy Rate: The average rate of the coffee brewer energy consumption while it is maintaining or holding at a stabilized ready-to-brew operating temperature. Also referred to as normalized idle energy rate.
- S. Energy Save Mode: An optional low power mode that is designed by the manufacturer to be different from and use less energy than ready to brew state. The hot water tank temperature shall not drop below 140°F in this mode of operation.

Water Conditions

- T. Internal Tank Water Temperature: The average temperature of the water held in the tank. Internal water tank temperature should be measured and recorded during the ready-to-brew idle mode, energy save mode (if applicable), and heavy-use brew tests. (This may also be referred to as the coffee preparation temperature.)
- U. Serving Temperature: The maximum temperature of the beverage delivered from a brewing machine, measured at the dispensing outlet. The serving temperature of the brewed coffee should be measured, post-extraction during the heavy-use brew test.
- V. Holding Temperature: The maximum internal temperature of the brewed coffee product as it collects in a serving vessel (i.e., an insulated carafe or glass coffee decanter). The coffee holding temperature should be measured by securing a thermocouple at the geometric center of the serving vessel.

Note: EPA is proposing several changes to terms and definitions in Section 1, including replacing the term *Average Tank Temperature* with *Internal Tank Water Temperature*. This new term specifies measuring and reporting the temperature during the heavy-use-brew tests, while still aligning closely with the previous definition. (See ASTM F2990-12, Section 4.2 and Section 9.6 for references.) For increased clarity, EPA is proposing the addition of the terms *Serving Temperature* and *Holding Temperature*. (See ASTM F2990-12 Section 3.2.9 and Section 3.2.10, respectively, for references.) These clarifications and additional terms are important to outline the information EPA seeks to collect with proposed new reporting requirements. (See sections 3.A and 4.D for discussion of additional reporting requirements.)

EPA is under the impression that all Type II coffee brewers have an internal heated water tank. Therefore, it should be possible to measure and record internal tank water temperature measurements for every product that meets the definition of a Type II coffee brewer.

Note Cont. The Agency encourages stakeholder feedback on the proposed definitions. EPA is also interested in learning of any challenges that may prevent the measurement and reporting of internal tank water temperatures, as per the ASTM F2990-12 *Standard Test Method for Commercial Coffee Brewers*.

Certification Terms

W. Product Family: Individual models offered within a product line based on the same engineering design, including brew capacity and number of warming plates, as applicable. Acceptable differences within a product family for purposes of certification include aesthetic additions that do not impact coffee brewer energy consumption while in operation or during any idle situation. The addition of energy save mode options does not preclude products from a product family if all other design elements remain constant.

2) Scope:

A. Included Products: Products, that meet the definitions of Type II Commercial Coffee Brewers as specified herein, including Satellite Coffee Brewers without a heated docking station, are eligible for ENERGY STAR certification.

To ensure only eligible coffee brewers qualify under this specification, products shall be third-party certified to UL 197, *Standard for Commercial Electric Cooking Equipment*.

B. Excluded Products: This specification is intended for commercial coffee brewers. Products designed for residential applications are ineligible for ENERGY STAR under this specification. The following commercial coffee brewers are ineligible for ENERGY STAR:

- a. Type I Commercial Coffee Brewers.
- b. Type III Commercial Coffee Brewers.
- c. Bean-to-Cup Brewers.
- d. Liquid Coffee Dispensers.
- e. Powdered Coffee Dispenser.
- f. Espresso Machines.
- g. Urn Brewers.

3) Certification Criteria:

A. Energy Efficiency Requirements:

Table 1: Energy Efficiency Requirements Type II Commercial Coffee brewers	
Normalized Ready-to-Brew Idle Energy Rate	≤ 65 watts/gal
Normalized Heavy-Use Brew Energy Rate	≤ 350 watt-hrs/gal

Note: EPA worked extensively with manufactures and stakeholders to assemble energy performance data and outline ENERGY STAR certification requirements prior to releasing the final Version 1.0 Specification. The Agency received performance data on a variety of Type II batch commercial coffee brewers. However, the data did not include the internal water tank temperature during the heavy-use brew tests for all products. There is a strong relationship between internal water tank temperature and energy consumption.

Note Cont. In general, the most energy-intensive functions of a brewer are heating water and holding it at the coffee preparation or brewing temperature. Since the release of the Version 1.0 Specification, EPA has learned through stakeholder outreach, that many stakeholders align with the Specialty Coffee Association of America's recommended coffee preparation temperature of 200°F ± 5°F.

The importance of recording the internal water tank temperature and considering the range outlined by SCAA was not brought to EPA's attention during the specification development process. Understanding that the internal water tank temperature may be viewed by some stakeholders as a key quality assurance metric, EPA is proposing to include it as a reporting requirement for ENERGY STAR certification.

ENERGY STAR seeks to recognize products that achieve energy efficiency without sacrificing performance. EPA recognizes that the optimal internal water tank temperature may vary depending on product design. The design and components of coffee brewers, specifically the type of heating unit, may affect energy consumption. The energy efficiency of a coffee brewer is also impacted by standby energy consumption, the degree to which components are insulated, and the presence of power management or energy save mode features. The Agency would like to ensure a diverse mix of products are able to earn the ENERGY STAR. EPA considered normalized brew energy data from the Version 1.0 dataset where it was available, as well as the supplemental data from the recent data assembly effort. The Agency carefully considered the internal water tank temperature data on available models, and how it may have impacted overall energy performance. Recognizing the limited data available to EPA, the Agency is proposing a conservative, new normalized heavy-use brew energy rate of 350 watt-hrs/gal, which allows products with a range of internal tank water temperatures to certify. EPA encourages stakeholders to review this proposed change and to provide feedback to the Agency.

B. Normalized Calculations:

- a. Ready-to-Brew Idle Rate and Heavy-Use Brew Rate: The following calculations shall be used to normalize the ready-to-brew idle and heavy-use brew energy rates:

Normalized Ready-to-Brew Idle Energy Rate, W/gal:

$$q_{idle,n} = \frac{q_{ready}(W)}{Tank\ Capacity\ (gal)}$$

Normalized Heavy-Use Brew Energy Rate, Wh/gal:

$$q_{brew,n} = \frac{q_{brew}(W)}{PC\ \left(\frac{gal}{h}\right)}$$

Where

q_{ready} = Ready-to-brew energy rate (W)

$Tank\ Capacity$ = (gal)

q_{brew} = Heavy-use brewing energy rate (W)

PC = Production capacity of the coffee brewer (gal/hr)

C. Significant Digits and Rounding:

- a. All calculations shall be carried out with directly measured (unrounded) values.
- b. Unless otherwise specified, compliance with specification limits shall be evaluated using exact values without any benefit from rounding.
- c. Normalized Heavy-Use Brew Energy Rate: Calculated heavy-use brew energy rate values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest one hundredth (0.01).
- d. Normalized Ready-to-Brew Idle Energy Rate: Calculated idle rate values that are submitted

for reporting on the ENERGY STAR website shall be rounded to the nearest one hundredth (0.01).

4) Test Requirements:

- A. Representative models shall be selected for testing per the following requirements:
 - a. For certification of an individual product model, the representative model shall be equivalent to that which is intended to be marketed and labeled as ENERGY STAR.
 - b. For certification of a product family, any model within that product family can be tested and serve as the representative model. When submitting product families, manufacturers continue to be held accountable for any efficiency claims made about their products, including those not tested or for which data was not reported.
- B. When testing commercial coffee brewers, the following test method shall be used to determine ENERGY STAR certification.

Table 2: Test Method for ENERGY STAR Certification		
Category	ENERGY STAR Requirement	Test Method Reference
Commercial Coffee Brewers	Normalized Heavy-Use Brewing Energy Rate; Normalized Ready-to-Brew Idle Energy Rate	ASTM F-2990-12, <i>Standard Test Method for Commercial Coffee Brewers</i>

- C. Products with a single heated water supply tank and more than one brew head shall undergo heavy-use brew testing with each brew head dispense station brewing at maximum capacity simultaneously. If a product has individual designated heated water supply tanks for each brew head, then only one brew head shall be tested in accordance with the heavy-use test procedure. The heavy-use brew energy rate and capacity shall then be multiplied by the number of brew heads in the machine.
- D. Additional Reporting Requirements:
 - a. The pre-heat time and energy for all commercial coffee brewers shall be reported.
 - b. The production capacity (gal/h) for all commercial coffee brewer heavy-use brew tests shall be reported.
 - c. The average internal water tank temperature operating in the ready-to brew idle mode shall be reported.
 - d. The average internal water tank temperature during heavy-use brew tests shall be reported.
 - e. The maximum serving temperature during heavy-use brew tests shall be reported.
 - f. The average holding temperature shall be reported.
 - g. Commercial coffee brewers that include energy saving feature(s) and that meet the minimum requirement of the energy save mode definition in Section 1.S. shall be reported, if applicable.
 - h. The normalized idle rate (watts/gal) in an energy save mode may be reported, if applicable.

Note: EPA is proposing to include the internal water tank temperature during ready-to-use idle mode and the heavy-use brew test, the maximum serving temperature during the heavy-use brew test, and the coffee holding temperature as a reporting requirement for ENERGY STAR certification. This information may be useful to consumers looking to better understand the correlation between energy performance and a products' ability to retain and recover heat.

Note Cont. EPA intends to continue conversations with manufacturers who lower the internal tank water temperature, incorporate innovative energy-saving features and are still able to deliver a quality product. EPA is interested in stakeholder feedback on the proposed additional reporting requirements.

- 5) **Effective Date:** The ENERGY STAR Commercial Coffee Brewer Specification shall take effect July 8, 2016. 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 on which a unit is considered to be completely assembled.
- 6) **Future Specification Revisions:** 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.