



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

Eligibility Criteria Draft 1: Version 1.0

Following is the **Draft 1 Version 1.0** 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 I*) 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.

Commercial Coffee Brewer Products

- E. Bean-to-Cup: Single serving commercial coffee brewers designed to automatically measure and grind whole coffee beans per brew event.
- F. Liquid Coffee Dispensers: Single serving dispensers that mix coffee concentrate with hot water prior to delivery.
- G. Powdered Drink Dispensers: Single serving dispensers that mix powdered coffee (i.e. Cappuccino) with hot water prior to delivery.
- H. Espresso Machines: Machines that prepare single servings of espresso coffee through high-pressure steam.
- I. Satellite Coffee Brewers: Bulk commercial coffee brewers that brew into large, removable vessels with or without internal heating elements. May include a separate heated docking station for remote use.
- 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.

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

² Ibid.

- 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 Plates: A batch commercial coffee brewer (Type II) with the addition of 1 or more decanter warming plates.
- M. Type III: An urn or satellite commercial coffee brewer and has a standard brew volume of < 384 fluid ounces or greater 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.

Note: EPA is proposing a definition for Commercial Coffee Brewers, in Section 1.A., that is derived from the American Society for Testing and Materials (ASTM) F2990-12, *Standard Test Method for Commercial Coffee Brewers*. The Type I, Type II, and Type III commercial coffee brewer classifications are also derived from ASTM F2988-12, *Standard Specification for Commercial Coffee Brewers*.

Based on stakeholder feedback received on the framework document issued in 2014, EPA has expanded the brew volume for Type I brewers from 12 oz. to 24 oz. Stakeholders have indicated that many single-cup brewers include a range of up to 24 oz. per brew event.

EPA is proposing additional classifications for Type II brewers at the request of stakeholders. EPA received feedback from several stakeholders suggesting that providing classifications for Type II brewers based on brew volume would be useful. Several stakeholders suggested that EPA include more specific classifications for Type II brewers that specified: “small batch” (50oz. to 85oz.), “large batch” (64oz. to 256oz.), and “extra-large batch” (256oz. or greater). While EPA understands the value of further characterization among batch types, the Agency believes the overlap in these suggested categories could cause confusion among end users. In response to stakeholder interest, EPA is proposing alternative classifications, in Section 1.K.a-c., for size bins that more closely align with those of ASTM F2988-12.

EPA is proposing additional clarifications to the Type III brewer definition in Section 1.M. EPA is also proposing definitions for Liquid Coffee Dispensers and Powdered Drink Dispensers in Section 1.F-G, in response to stakeholder requests.

Stakeholders are encouraged to provide feedback on these proposed terms, definitions, and brew classifications.

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.

Note: EPA believes that normalizing the brew and idle energy rates allows the Agency, stakeholders, and end-users to better evaluate and compare performance of brewers across brew volumes. (For more information on the normalized approach, please see the note box below Section 3.A.a.)

- 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. This is an optional idle energy rate used for reporting purposes only.

Water Conditions

- T. Average Tank Temperature: The average temperature of the water held in the reservoir tank during ready-to-brew idle and energy save mode conditions.

Note: EPA is proposing definitions for energy save mode and the average tank temperature, in Section 1.S-T, which are derived from the ASTM F2990-12 standard test method. The average tank temperature would be used as a reporting requirement for Type II machines that operate with a holding tank.

EPA encourages stakeholder feedback on the average tank temperature and energy save mode definitions as well as the proposed respective reporting conditions.

Certification Terms

- U. 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.

Note: To reduce testing burden, EPA will allow multiple products within a family to be certified for ENERGY STAR using a representative model. All products certified within the family must have the exact same energy performance ratings.

EPA is interested in learning of other attributes of various models considered part of a product family and encourages stakeholders to comment on the proposed definition.

2) Scope:

- A. Included Products: Products that meet the definitions of Commercial Coffee Brewers and Type II (with or without warming plates) as specified herein 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. Coffee brewers designed for residential applications are ineligible for ENERGY STAR under this specification. The following commercial coffee brewers are ineligible for ENERGY STAR:

- a. Bean-to-Cup Brewers.
- b. Liquid Coffee Dispensers.
- c. Powdered Coffee Dispenser.
- d. Espresso Machines.
- e. Satellite Brewers.

f. Urn Brewers.

Note: Eligible products for this Version 1.0 specification include Type II commercial coffee brewers that are third-party certified to UL 197, *Standard for Commercial Electric Cooking Equipment*. EPA has worked with manufactures and other industry stakeholders to assemble performance data, and succeeded in gathering sufficient data to propose requirements for Type II commercial coffee brewers. EPA is optimistic about expanding the scope of this product category once viable test methods and performance data associated with other product types are available. EPA is particularly optimistic about including products with an existing test procedure (i.e., Type I commercial coffee brewers included in the scope of the ASTM F2990-12 standard test method). EPA encourages manufacturers to continue to work with laboratories and other testing facilities to advance efforts to develop test procedures and create robust datasets for additional product categories.

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	≤ 280 watts/gal

Note: The idle and brew energy rates provided in Table 1, are based on data provided by PG&E's Food Service Technology Center (FSTC), EPA testing, and other industry stakeholders. EPA's dataset includes products from major manufacturers of commercial coffee brewers of this type. At the proposed levels, purchasers would have a reasonable selection of top performing models.

EPA conducted an analysis and identified a trend that supports a normalized-based approach that fairly compares brewers with different tank capacities and brew rates. EPA is proposing this normalized approach for determining brewer compliance. The calculations provided in Section 3.B, allow EPA to create single levels regardless of tank capacity.

EPA is proposing requirements that evaluate the overall energy required to operate the brewers. Considering the ready-to-brew idle and heavy-use brewing energy of these products ensures that the ENERGY STAR will be associated with well-designed, highly energy efficient brewers. EPA has evaluated options for requiring or crediting energy save mode. However, approaches to energy save mode vary, making it hard to compare between products. Some energy save modes may shut heating elements off completely, while others dial back the heating elements while keeping the tank water at a reduced temperature, minimizing the re-heat time. Further, a well-designed brewer that has effective insulation but no low power mode, may use less energy in ready-to-brew mode because it maintains temperature without a constant or frequent energy draw. Another model may have poor insulation, but does have a low power mode. In this case, if the tank temperature drops significantly while in low power mode, it may require significant energy to re-heat. In order to have confidence that including energy save mode in the ENERGY STAR eligibility criteria would offer end users meaningful savings, EPA is requesting that stakeholders submit data on the specific tank temperature reduction and energy use reduction that this feature offers in specific models.

A subset of products in EPA's dataset include warming plates. Based on available data, a single warming plate can more than double the ready-to-brew idle energy use of the coffee brewer, a second warming plate may triple this energy use. EPA understands that there are alternative strategies for holding brewed coffee at ready-to-serve temperatures while maintaining coffee quality. As such, EPA is not proposing an energy adder for brewers with warming plates in this Draft 1 specification.

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, W/Gal:

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

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.

Note: Once a product has become certified, manufacturers remain responsible for ensuring that all subsequent models promoted as ENERGY STAR meet the requirements of this specification.

- 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. 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 tank temperature operating in the ready-to brew idle mode shall be reported.

Note: EPA has included reporting requirements for pre-heat time and energy; production capacity (gal/h); and average tank temperature during the idle test, to benefit the end-user in calculating total cost of ownership and inform a more complete energy and operational performance profile.

EPA is interested in stakeholder feedback on these reporting requirements.

5) Effective Date: The ENERGY STAR Commercial Coffee Brewer Specification shall take effect on **TBD**. 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.

Note: EPA anticipates finalizing this Version 1.0 specification in the spring of 2016. Upon finalization, manufacturers will be able to immediately begin certifying products. Stakeholders are encouraged to provide suggestions on potential conferences or trade shows where EPA can announce the new product category and support manufacturer efforts to promote newly certified products.

EPA will be hosting an in-person stakeholder meeting in conjunction with the National Automated Merchandising Association (NAMA) Coffee, Tea, and Water Show in Washington, D.C. on November 4, 2015. Stakeholders are encouraged to participate.

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.