



ENERGY STAR® Program Requirements Product Specification for Residential Electric Cooking Products

Eligibility Criteria Draft 2 Version 1.0

Following is the **Draft 2 Version 1.0** product specification for ENERGY STAR certified residential electric cooking products. A product shall meet all of the identified criteria to earn the ENERGY STAR.

1. DEFINITIONS:

- A. Active mode¹: a mode in which the product is connected to a mains power source, has been activated, and is performing the main function of producing heat by means of electric resistance heating or electric inductive heating.
- B. Basic model²: 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 characteristics that affect energy consumption or energy efficiency.
- C. Combined electric cooking product¹: a household cooking appliance that combines an electric cooking product with other appliance functionality, which may or may not include another cooking product. Combined electric cooking products include the following products: conventional electric range, microwave/conventional electric cooking top, microwave/conventional electric oven, and microwave/conventional electric range.
- D. Combined low-power mode³ the aggregate of available modes other than active mode, but including the delay start mode portion of active mode.
- E. Conventional electric cooking top²: a category of cooking products which is a household cooking appliance consisting of a horizontal surface containing one or more surface units that utilize electric resistance heating or electric inductive heating. This includes any conventional electric cooking top component of a combined electric cooking product.
- F. Cooking area¹: an area on a conventional electric cooking top surface heated by an inducted magnetic field where cookware is placed for heating, where more than one cookware item can be used simultaneously and controlled separately from other cookware placed on the cooking area, and that may or may not include limitative markings.
- G. Cooking zone¹: a part of a conventional electric cooking top surface that is either a single electric resistance heating element, multiple concentric sizes of electric resistance heating elements, or an inductive heating element that is defined by limitative markings on the surface of the electric cooking top and can be controlled independently of any other cooking area or cooking zone.
- H. Inactive mode³: a standby mode that facilitates the activation of active mode by remote switch (including remote control), internal sensor, or timer, or that provides continuous status display.

¹ Modified from 10 CFR 430, Subpart B, Appendix I1 for ENERGY STAR's purposes.

² Modified from 10 CFR 430 Subpart A, Section 430.2 for ENERGY STAR's purposes.

³ 10 CFR 430, Subpart B, Appendix I1.

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- I. Integrated Annual Energy Consumption (IAEC): the sum of the conventional electric cooking top annual active mode energy consumption and the annual combined low-power mode energy consumption of a conventional electric cooking top or any conventional electric cooking top component of a combined electric cooking product.
 - J. Multi-ring cooking zone⁴: a cooking zone on a conventional electric cooking top with multiple concentric sizes of electric resistance heating elements.
 - K. Off mode⁵: any mode in which a product is connected to a mains power source and is not providing any active mode or standby function, and where the mode may persist for an indefinite time. An indicator that only shows the user that the product is in the off position is included within the classification of an off mode.
 - L. Portable conventional electric cooking top: a conventional electric cooking top designed to be moved from place to place.
 - M. Smoothened water temperature⁵: the 40-second moving-average temperature as calculated in 10 CFR 430, Subpart B, Appendix I1 according to Section 7.5.4.1 of IEC 60350-2, rounded to the nearest 0.1 degree Celsius.
 - N. Specialty cooking zone⁵: a warming plate, grill, griddle, or any cooking zone that is designed for use only with non-circular cookware, such as a bridge zone. Specialty cooking zones are not tested as part of 10 CFR 430, Subpart B, Appendix I1.
 - O. Standby mode⁵: any mode in which a product is connected to a mains power source and offers one or more of the following user-oriented or protective functions which may persist for an indefinite time:
 - (1) Facilitation of the activation of other modes (including activation or deactivation of active mode) by remote switch (including remote control), internal sensor, or timer;
 - (2) Provision of continuous functions, including information or status displays (including clocks) or sensor-based functions. A timer is a continuous clock function (which may or may not be associated with a display) that allows for regularly scheduled tasks and that operates on a continuous basis.
 - P. Time t_{90} ⁵: the first instant during the simmering test for each cooking zone at which the smoothened water temperature is greater than or equal to 90°C.

87 2. SCOPE:

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- A. Included Products: Products that meet the definition of a conventional electric cooking top are eligible for ENERGY STAR certification. The following product types are eligible for ENERGY STAR certification:
 - Electric cooking top component of conventional electric ranges (a combined electric cooking product)
 - Standalone conventional electric cooking tops (including portable conventional electric cooking tops)
 - B. Excluded Products: The following product types are ineligible for ENERGY STAR certification under this specification:
 - Commercial or other non-residential products
 - Combined cooking products that include a microwave oven component (*i.e.*,

⁴ Modified from 10 CFR 430, Subpart B, Appendix I1 for ENERGY STAR's purposes.

⁵ 10 CFR 430, Subpart B, Appendix I1.

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microwave/conventional electric cooking top, microwave/conventional oven, and microwave/conventional electric range)

- Gas cooking tops, ranges, or standalone ovens
- Griddles

3. CERTIFICATION CRITERIA:

A. Energy Use Requirement:

Table 1: Energy Use Requirement for Standalone Conventional Electric Cooking Tops	
IAEC	≤ 190 kWh/yr

Table 2: Energy Use Requirements for Combined Electric Cooking Products	
IAEC	≤ 190 kWh/yr
E _{TLP,O} *	≤ 7 kWh/yr

* E_{TLP,O} is the annual combined low-power mode energy consumption of the conventional electric oven component of a combined electric cooking product and is calculated in kWh/year as follows:

$$E_{TLP,O} = [(P_{IA} \times F_{IA}) + (P_{OM} \times F_{OM})] \times K \times S_{TOT} \times H_o$$

Where:

P_{IA}, F_{IA}, P_{OM}, F_{OM}, K, S_{TOT} are as defined in Section 4.2.2 of 10 CFR 430, Subpart B, Appendix I1
H_o is equal to 40% for conventional electric ranges.

B. Significant Digits and Rounding:

- 1) All calculations shall be carried out with directly measured (unrounded) values. Only the final result of a calculation shall be rounded.
- 2) The IAEC value shall be rounded off to the nearest kWh per year. If the calculation is halfway between the nearest two kWh per year values, the IAEC shall be rounded up to the higher of these values.

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

Note: A couple stakeholders encourage EPA to consider a more stringent IAEC level given DOE tested models as low as 179 kWh/yr. Three stakeholders recommend EPA relax the IAEC level to allow more models to qualify. One stakeholder suggests EPA consider providing a necessary reporting margin in the certification levels to cover manufacturing and test procedure variability, stating manufacturers generally use about a 3% allowance to account for such variability and recommends EPA relax the IAEC level from 190 to 195 kWh/year. Another commenter supports the levels proposed in draft 1 acknowledging that with additional data the levels may become more stringent over time. EPA appreciates these stakeholder comments. Through EPA's analysis of the available test data, EPA believes that the originally proposed levels are justified. EPA also agrees with the commenter who notes that with time more data would become available and enable further criteria refinements.

Electric cooking is present in 60% of U.S. homes according to the 2020 Residential Energy Consumption Survey (RECS). As momentum has rapidly built around the expansion of electric cooking, many are eager to understand the savings potential. The ENERGY STAR proposed efficiency level is 16% more efficient in annual energy consumption, operational costs to consumers, and emissions compared to the weighted efficiency level using DOE's market share estimates to weight smooth (54% of market) and coil (46% of market) electric product types.⁶ (Note more recent 2022 shipment data from AHAM has radiant at 69.8%, coil at 25.6%, and induction at 4.6%. EPA is evaluating this new data and, if warranted, will update the savings

⁶ See DOE's [National Impact Analysis for Consumer Conventional Cooking Products](#), published on December 23, 2022.

142 analysis by the time the final specification is released.) All estimates are based on cooking tops and ranges;
143 however, stand-alone ovens were not a part of the savings analysis. Low-power mode energy is included
144 within the IAEC estimate and is thus a part of the savings analysis.
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146 Emissions savings were also calculated utilizing a national average emissions factor for electric generation;
147 operational cost savings were calculated utilizing a national average cost for electric power. Given there are a
148 range of emissions factors and energy prices throughout the U.S., those interested in emissions and cost
149 savings in a particular region should apply their local emission factors for electric generation and local cost of
150 energy into their respective savings calculations. Additionally, DOE's Consumer Conventional Cooking
151 Products Test Procedure Final Rule describes the assumed national average of 418 cycles per year, where
152 the median cycle time is 31 minutes.⁷ In the Draft 2 Data Package, EPA demonstrates where States and
153 utilities may apply their own average cycles per year and cycle duration values to calculate the savings for
154 their region.
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156 EPA is sharing the dataset associated with this proposal and understands that it is the best available data at
157 this time. While we have limited data with which to perform a payback analysis at this stage, EPA did find
158 examples of similarly featured products at the baseline performance and at the ENERGY STAR proposed
159 level at comparable prices. EPA analyzes payback for consumers by assessing whether a consumer has the
160 choice of a model with good consumer payback. EPA focuses on identifying and comparing like-models
161 (baseline model vs. one at or just above the ENERGY STAR level), with the goal of isolating the incremental
162 cost due to the efficiency improvement.
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164 As a result, for the Draft 1 Version 1.0 analysis, EPA gathered pricing information from representative brands
165 (e.g., from Empava, Frigidaire, Ikea, Sharp, and Samsung) in the fall of 2022 using an online search of
166 appliance retailers. EPA identified sets of residential cooking top models with comparable features, one of
167 each pair being induction as a proxy for at or above the ENERGY STAR Version 1.0 levels, and the other not
168 being induction as a proxy for at or near the baseline level. These pairs included models priced as low as \$429
169 and as high as \$2,000. EPA notes most induction models are priced at a mid-tier price or higher. EPA found a
170 few induction models from major brands closer to an opening price point. Utilizing this simple analysis, EPA
171 found a payback as low as zero. Given EPA found examples where efficient products were priced similar to
172 baseline products, EPA believes with increasing demand, additional efficient products will be available with a
173 reasonable payback compared to baseline products. DOE's payback analysis of Efficiency Level 2 (i.e., close
174 to EPA's proposed level) yields a payback of 2.5 years.⁸

175 **4. TEST REQUIREMENTS:** 176

- 177 A. One of the following sampling plans shall be used to test energy performance for certification to
178 ENERGY STAR:
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- 180 1) A representative unit shall be selected for testing based on the definition for basic model
181 provided in Section 1 of this specification; or
 - 182 2) Units shall be selected for testing per the sampling requirements defined in 10 CFR § 429.23
183 for cooking products.
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- 185 B. When testing energy consumption of residential cooking tops, the following test methods shall be
186 used to determine ENERGY STAR certification:
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⁷ See Section III.J.2. of DOE's [Consumer Conventional Cooking Products Test Procedure Final Rule](#), published August 22, 2022.

⁸ See Table 8.3.3 of DOE's [Technical Support Document for Consumer Conventional Cooking Products](#), published December 23, 2022.

Table 3: Test Method for ENERGY STAR Certification

Cooking Product Category	ENERGY STAR Requirement	Test Method Reference
Standalone Conventional Electric Cooking Tops and Conventional Electric Ranges	Integrated Annual Energy Consumption (IAEC) (kWh/year)	10 CFR 430, Subpart B, Appendix I1 - Uniform Test Method for Measuring the Energy Consumption of Conventional Cooking Products
Conventional Electric Ranges	Annual combined low-power mode energy consumption of the conventional electric oven component of a combined electric cooking product ($E_{TLP,O}$) (kWh/year)	Methodology in 10 CFR 430, Subpart B, Appendix I1 - Uniform Test Method for Measuring the Energy Consumption of Conventional Cooking Products Formulas in Section 3.A. Table 2 of this document.

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

C. Additional Reporting Requirements:

- 1) The total number of cooking zones in the cooking top.
- 2) The maximum input rate of each cooking zone.
- 3) The size⁹ of each cooking zone.
- 4) Time t_{90} (in seconds) for each cooking zone.
- 5) Annual combined low-power mode energy consumption of the cooking top (E_{TLP})¹⁰
- 6) Cooking top type (*i.e.*, coil, radiant, induction)
- 7) Cooking top configuration (*i.e.*, part of a combined electric cooking product or standalone)

Note: EPA simplified wording for the additional reporting requirement of the annual combined low-power mode energy consumption (E_{TLP}), excluding the following clause: “of the conventional electric cooking top component of a combined electric cooking product,” and replacing it with “of the cooking top.” The reporting requirement is written as follows: “annual combined low-power mode energy consumption of the cooking top (E_{TLP}).” The annual combined low-power mode energy consumption for the combined cooking product (conventional range) and conventional electric oven component can be calculated from the annual combined low-power mode energy consumption of the conventional electric cooking top component.

5. EFFECTIVE DATE:

- A. Effective Date: This ENERGY STAR Residential Electric Cooking Products Version 1 specification shall take effect on XX. To certify 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 summer of 2023. Upon finalization, manufacturers will be able to immediately begin certifying products.

⁹ Section 3.1.1.1.1 of 10 CFR 430, Subpart B, Appendix I1.

¹⁰ Section 4.2 of 10 CFR 430, Subpart B, Appendix I1.

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- B. 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.