



ENERGY STAR® Program Requirements Product Specification for Commercial Electric Cooktops

Eligibility Criteria Draft 2 Version 1.0

Following is the **Draft 2 Version 1.0** product specification for ENERGY STAR certified commercial electric cooktops. 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 Electric Cooktop: A commercial cooking unit that provides direct heat to a cooking container (i.e., a pot or pan), or works with the cooking container to generate heat, which is transferred to the product within the cooking container. There are multiple variations of these devices which utilize electric resistance heating or electric inductive heating.

Cooktop Types

- B. Cooktop Electric Element (Open Coil Cooktops): Open coil electrical elements supported to withstand the weight of filled cooking container.¹
- C. Counter Top Cooktop Unit: A cooktop intended to be operated on a counter or table and does not include a standard conventional or convection oven base.
- D. Heavy-Duty Range: An appliance used for pot or pan surface cooking, griddling, frying, broiling, steaming, baking, roasting, and reheating food products with a standard oven or convection oven. It is of the most durable construction, varying in size, offers increased heat input than medium (restaurant) or specialty ranges. Typical industry widths are 32 in. (812 mm), 34 in. (863 mm), and 36 in. (914 mm) for electric ranges. The top cooking surface can be 1/3, 2/3, or full top options of any style noted.¹
- a. Commercial Electric Range: A multi-purpose unit (integrated cooking platforms as a single unit) that may include an electric commercial oven positioned directly beneath the commercial electric cooktop, as a base.
- E. French Top: Sheathed electric heating element with permanent cover over entire heating element; round and sealed to the range top to resist drips and splash.¹
- F. Hot Top/Hot Plate: Flat cast iron surface sometimes called a “boiling plate” or “uniform heat top” with heat transferred from electric heating elements under the cooking surface where pots are set to warm or keep hot food contained.¹
- G. Induction Cooktop: A commercial or institutional food cooking or warming device using magnetic induction as the heating energy source, which includes countertop, counter drop-in, and floor standing units.²
- a. Counter Top (or Tabletop) Unit: An induction unit intended to be operated on a counter or table.²

¹ Modified definition from ASTM F2521-09 (2022) *Standard Specification for Heavy-Duty Ranges, Gas and Electric*.

² ASTM F2834-10a (2017) *Standard Specification for Induction Cooktops, Counter Top, Drop-in Mounted, or Floor Standing*.

- 53
54 b. Counter Drop-In Unit: An induction unit intended to be installed in a counter top or
55 application specific cut-out.²
56
57 c. Floor Standing Unit: An induction unit intended to be operated standing on the floor.²
58

59 **Note:** In response to stakeholder request for further clarification, EPA proposes the addition of the Counter
60 Top Cooktop Unit term defined in Section 1.C. The definition for hot top and hot plate are the same (per
61 Section 1.F.). Additionally, the Agency maintained the referenced term and definition of a Heavy-Duty
62 Range in Section 1.D. For further clarification EPA proposes further sub-classification defining a
63 commercial electric range Section 1.D.a.
64

65 Stakeholders are encouraged to provide feedback on these proposed terms and definitions and to offer
66 suggestions for further clarification, if needed.

67
68 ***Preheat Value***
69

- 70 H. Measured Energy Input Rate: The electrical power (measured in Watts and reported in kW) to
71 preheat and/or maintain the desired temperature of the water within the cooking vessel.
72 Preheating is done at the maximum control setting. Maintaining temperature may be done at
73 less than the maximum control setting.³
74
75 I. Measured Energy Input: The amount of electrical energy (measured in Joules) to preheat
76 and/or maintain the desired temperature of the water within the cooking vessel. Preheating is
77 done at the maximum control setting. Maintaining temperature may be done at less than the
78 maximum control setting.
79
80 J. Heat-up Temperature Response: The temperature increase on the surface of a plate during the
81 test period in accordance with the heat-up temperature-response test.⁴
82

83 **Note:** EPA proposes new definitions for measured energy input rate (Section 1.H) and measured energy
84 input (Section 1.I) to account for the difference between energy input rate and amount of energy. Amount
85 of energy is measured in Joules and energy input rate (or power) is a rate at which equipment consumes
86 energy measured in Joules/second, or Watts (W), and reported in kilowatts (kW).
87

88 Stakeholders are encouraged to provide feedback on these proposed terms and definitions and to offer
89 suggestions for further clarification, if needed.

90
91 ***Energy Efficiency Metric***
92

- 93 K. Cooking Energy-Efficiency: Quantity of energy imparted to the specified load (20 lbs of water
94 at 70°F to 200 °F), expressed as a percentage of energy consumed by the cooktop during the
95 cooking (boil) event. Also known as the “Cooking (Boil) Energy Efficiency” or “Boil Test”.⁵
96
97 L. Production Capacity: Maximum rate at which the commercial electric cooktop unit heats water in
98 accordance with the cooking energy-efficiency test, expressed in pounds per hour (lbs/hr).⁶
99
100 M. Simmer Energy-Efficiency: Quantity of energy imparted to the specified load (20 lbs of water),
101 expressed as a percentage of energy consumed by the cooktop for 30min at a steady input rate
102 while maintaining water at an average 200°F.⁷
103

³ Modified definition from ASTM F1521-22 *Standard Test Methods for Range Tops*. Amended section 10.2.

⁴ ASTM F1521-22 *Standard Test Methods for Range Tops*.

⁵ ASTM F1521-22 *Standard Test Methods for Range Tops*. Amended Definition 3.1.3 and Sections 10.5.4 and 10.5.8.

⁶ Modified definition from ASTM F1521-22 *Standard Test Methods for Range Tops*. Amended Definition 3.1.7 and Section 11.8.1.

⁷ Modified ASTM F1521-22 *Standard Test Methods for Range Tops*. Amended Section 4.3.

- 104 N. Simmer Energy Rate: The electrical power (measured in Watts and reported in kW) to maintain
105 the desired temperature (an average of 200 °F) of the water within the cooking vessel throughout
106 the 30min simmering period.⁸
107

108 **Note:** EPA modifies the definition for simmer energy efficiency (Section 1.M) and adds a definition for
109 simmer energy rate (Section 1.N).

110
111 Stakeholders are encouraged to provide feedback on these proposed terms and definitions and to offer
112 suggestions for further clarification, if needed.

113 **Certification Terms**

- 114
115
116 O. Cooking Container: A stainless-steel vessel used to hold the water being heated by the cooktop.
117 The ASTM F1521-22 Section 6.3 dimensions for testing are 13in (330mm) diameter, 20qt (19L),
118 sauce pot with matching lid. The bottom of the pot shall be flat to within 0.0625in (1.6mm) over
119 the diameter. The inside diameter (ID) shall be measured to confirm the specified 13in diameter
120 of the cookware.
121
122 P. Heat-Up Time: The time required to heat the allotted volume of water from 70°F to 200°F, per
123 ASTM F1521-22
124
125 Q. Hob: An individual heating element or cooking zone that is independently controlled; typically
126 associated with an individual induction coil.⁹
127
128 R. Product Family: Individual models offered within a product line based on the same engineering
129 design, including number of hobs, as applicable. Acceptable differences within a product family
130 for purposes of certification include controls knobs and any aesthetic additions that have no
131 impact on the cooktop energy consumption in any operating mode(s).
132
133 S. Set-Back Mode (Off Mode): A feature that includes automatic temperature reduction after
134 periods of non-use. In addition, the feature may also incorporate the reduction or elimination of
135 energy consumption during periods of non-use.
136

137 **Note:** ASTM F1521-22 specifies standard cookware (material type and size) used for testing that is readily
138 available to ensure repeatable and reproduceable results from test-to-test and lab-to-lab. To ensure
139 consistent and comparable test results among laboratories as well as certification and verification testing,
140 the EPA continues to support use of a stainless-steel cooking container for commercial induction and
141 electric non-induction cooktops for the purposes of ENERGY STAR certification. The Agency
142 acknowledges that this approach is a departure from the ASTM F1521-22 Section 6.3.1, which specifies
143 steel or steel-plated nickel for commercial induction and aluminum for commercial non-induction cooktops.
144 The EPA supports and engages in the ASTM F26 committee process and encourages participants to work
145 through their process to specify a single cooking material for commercial electric cooktops.
146

147 The ASTM F1521-22 standard states the cookware in section 6.3: "Cooking Container, 13-in. (330-mm)
148 diameter, 20-qt (19-L), sauce pot with matching lid. The bottom of the pot shall be flat to within 0.0625 in.
149 (1.6 mm) over the diameter." For clarification, EPA added further additional guidance on where to measure
150 the diameter of the cookware in Section 1.O., which states: "The inside diameter (ID) shall be measured to
151 confirm the specified 13in diameter of the cookware." This inner diameter of the pot shall be measured
152 from parallel inner walls.
153

154 Stakeholders are encouraged to provide feedback on the proposed cooking container, the approach for
155 measuring the diameter of the cookware, including the referenced ASTM standard test method, and any
156 further information on other variables that may impact energy efficiency of the commercial electric cooktop.
157

158 **2) Scope:**

⁸ Modified ASTM F1521-22 *Standard Test Methods for Range Tops*. Amended Section 10.6.

⁹ Modified definition from ASTM F2834-10a (2017) *Standard Specification for Induction Cooktops, Counter Top, Drop-in Mounted, or Floor Standing*. Amended Definition 3.1.4.

- 159
160 A. Included Products: Products that meet the definition of a commercial electric cooktop are
161 eligible for ENERGY STAR certification, including commercial electric ranges.
162

163 Products shall be third-party certified to minimum food protection and sanitation requirements
164 under NSF/ANSI Standard 4, *Commercial Cooking, Rethermalization and Powered Hot Food*
165 *Holding and Transport Equipment*.
166

167 A commercial electric range may be certified if the commercial cooktop portion of the unit meets
168 the criteria set forth in this specification and the commercial electric oven portion is certified to the
169 ENERGY STAR Commercial Ovens specification version currently in effect.
170

- 171 B. Excluded Products: Conventional cooking tops, as defined by the U.S. Department of Energy
172 (DOE) at Title 10 Code of Federal Regulations (CFR) 430.2 are not eligible for ENERGY
173 STAR certification under this specification. Conventional cooking top means a category of
174 cooking products (as defined in 10 CFR 430.2) which is a household cooking appliance
175 consisting of a horizontal surface containing one or more surface units that utilize a gas flame,
176 electric resistance heating, or electric inductive heating. This includes any conventional
177 cooking top component of a combined cooking product. 10 CFR 430.2 Cooktops designed for
178 other non-commercial applications are not eligible for ENERGY STAR certification under this
179 specification. Gas ranges, gas ovens, or gas cooktops (i.e., gas hot tops and open top gas
180 burners); griddles or planchas; soup wells; woks; dedicated warming/holding equipment; and
181 other cooktop types that do not meet the criteria are ineligible for ENERGY STAR certification
182 under this specification.
183

184 **Note:** Added clarity in Section 2.A. to include commercial electric ranges as eligible products. A
185 commercial electric range may be certified if the commercial electric cooktop portion of the unit meets the
186 criteria set forth in this specification and the commercial electric oven portion is certified to the ENERGY
187 STAR Commercial Ovens specification version currently in effect. Otherwise, an electric range may not be
188 certified. Certification criteria for commercial electric ranges are summarized in Section 3.A. Table 2.
189

190 The standard test method (ASTM F1521-22) referenced in this specification evaluates the performance of
191 the cooktop only, regardless of if it is part of a multi-function unit. As such, eligible stand-alone commercial
192 cooktops shall certify under this specification and eligible independent commercial ovens shall continue to
193 be certified under the ENERGY STAR Commercial Ovens specification version currently in effect.
194

195
196 **3) Certification Criteria:**

- 197
198 A. Commercial Electric Cooktop Cooking (Boil)-Energy Efficiency Requirements:
199

Table 1: Energy Efficiency Requirements for Commercial Electric Cooktops

Individual Hob Performance*	
Cooking (Boil) Energy Efficiency, %	≥ 80%
* The ASTM F1521-22 test method indicates to start the test on the hob (or cooking unit/zone) closest to front and left (Section 10.4.2), then to repeat the test for each type of hob (or cooking unit/zone) on the range top (Section 10.4.11). The intent of the method is to test each hob individually. ENERGY STAR certification will rely on all individual hobs meeting the cooking (boil) energy efficiency level.	

Table 2: Energy Efficiency Requirements for Commercial Electric Ranges

Commercial Cooktop	Must meet energy efficiency requirements per Table 1 above.
Commercial Oven	Must be certified to the ENERGY STAR Commercial Ovens specification version currently in effect.

- 201
202 B. Significant Digits and Rounding:
203

- 204 a. All calculations shall be carried out with directly measured (unrounded) values. Only the final
205 result of a calculation shall be rounded.

- 206 b. Unless otherwise specified in this specification, compliance with certification criteria shall

207 be evaluated using exact values without any benefit from rounding.
208

- 209 c. Cooking (Boil) Energy Efficiency: Calculated values that are submitted for reporting on the
210 ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the
211 certification criteria.
212

213 **Note:** Commenters noted that the Draft 1 dataset included only induction technology in setting the
214 minimum energy efficiency threshold for this equipment category. Furthermore, there were deviations from
215 the ASTM F1521-22 *Standard Test Methods for Performance of Range Tops* that may have an impact on
216 the energy performance results; and, individual test runs were used as independent data points in the
217 analysis that stemmed from the same unit under test (UUT).
218

219 Though no changes were made to the certification criteria in Section 3.A., EPA did receive additional data
220 replacing the dataset used to generate the proposed level in Draft 1. EPA also modified the certification
221 requirements and approach to data analysis in response to stakeholder feedback.
222

223 *Certification Requirements*

224 One stakeholder expressed concern that the weighted average approach for ENERGY STAR certification
225 implied that less efficient equipment might certify. Some cooktop models exist with different operating
226 conditions on different hobs. An average hob efficiency could potentially result in an ENERGY STAR
227 certified product consisting of several hobs that may or may not all meet the minimum efficiency
228 performance threshold. Furthermore, as programs seek to incentivize electric cooktops in commercial
229 kitchens, a weighted average hob could result in an incentive being used towards the purchase of less
230 efficient equipment than intended. Given the above, EPA proposes that certification of electric cooktops be
231 based on each hob passing the cooking (boil) energy efficiency criterion (i.e., 80%). If any of the hobs on
232 the unit fail to meet the threshold, then the model can't earn ENERGY STAR certification. Stakeholders are
233 invited to comment on whether there are any sizes or types of hobs that are inherently unable to meet the
234 cooking (boil) energy efficiency criterion proposed in this draft specification.
235

236 *Additional Data – Induction Cooktops*

237 Since the publication of the ENERGY STAR Version 1.0 Commercial Electric Cooktop Draft 1, the Agency
238 received cooking(boil) energy efficiency and production capacity data from Southern California Edison
239 (SCE) based on the ASTM F1521-22 standard test method. The dataset used for Draft 1 is replaced with
240 this new dataset for Draft 2 in the data package accompanying the ENERGY STAR Version 1.0
241 Commercial Electric Cooktops Draft 2 publication. A characterization of the data (14 data points) used for
242 Draft 1 including deviations from the ASTM F1521-22 test method are provided in a note box below the
243 Certification Criteria section of the [Draft 1 product specification](#) with a notable change – the heat-up time
244 based on temperature rise from 75°F to 200°F and not 70°F to 200°F, as indicated. The recently supplied
245 data (31 data points) include single- and multi-hob induction cooktops tested with 20lbs water in a
246 stainless-steel aluminum clad pot. The deviations from the ASTM F1521-22 include the heat up time based
247 on temperature rise from 75°F to 200°F and some of the models operating outside the ±5% of the
248 nameplate energy input rate.
249

250 *Additional Data – Non-induction Cooktops*

251 Since the publication of the ENERGY STAR Version 1.0 Commercial Electric Cooktop Draft 1, the Agency
252 also received two additional cooking energy-efficiency data points from a stakeholder for hot plates (non-
253 induction cooktops) which were tested using a 20-qt aluminum cooking container. Though the test method
254 for these products was based on the ASTM F1521, a unique test protocol for them was provided. These
255 data are included as 'hot plates' in the Draft 2 Data Package and appear to perform well relative to the
256 induction models. However, the comparable performance may be due to unique testing and/or the
257 aluminum cookware used for this specific cooktop technology. Additional electric non-induction technology
258 testing based on ASTM F1521-22 with a stainless-steel cooking container is encouraged.
259

260 *Data Analysis*

261 As explained in the documentation for the Draft 1 specification, each cooktop model in the dataset was
262 tested three times and the average of the three test results was included as a fourth data point for each
263 model. Given that there is some small variation in a model's results from test run to test run, it is
264 reasonable to conduct multiple test runs to better understand the range of expected performance. The
265 average is also helpful to characterize expected performance. However, stakeholders questioned EPAs

266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318

utilization of the three test runs in addition to the average as independent data points for criteria-setting. The reason the Agency decided to count each run and the average of all three runs as different data points was to enhance the dataset used for determining the minimum efficiency level for certification. Considering each of the three runs resulted in relatively similar or same results, it provided more insight to the level of range that could be expected in performance. In other words, the individual runs were considered as sample representations of additional models not included in the dataset.

For clarity, EPA revised the Draft 2 Data Package in a manner consistent with how ASTM tests are conducted, utilizing only the average of three test runs from the latest commercial electric cooktops dataset.

C. Additional Reporting Requirements:

- a. Confirmation that commercial electric cooktop was certified to NSF/ANSI Standard 4 ahead of energy efficiency testing for the purposes of ENERGY STAR certification.
- b. The total number of hobs of the cooktop shall be reported.
- c. The maximum electrical energy input rate of each hob shall be confirmed and reported.
- d. The diameter(s) of the individual hobs shall be reported.
- e. Heat-up time (in minutes) shall be reported for each hob from ambient to production-ready temperature (70°F to 200°F).
- f. Production capacity (lbs. of water per hour) shall be reported.
- g. Simmer test results (water temperature in °F and energy consumption in kW) shall be reported.
- h. For induction cooktops, the sub-category of the unit (countertop, drop-in, and/or floor standing) shall be specified, if applicable.

Note: The Agency highlights the requirement for third-party testing to minimum food protection and sanitation requirements under NSF/ANSI Standard 4, *Commercial Cooking, Rethermalization, and Powered Hot Food Holding and Transport Equipment* for commercial electric cooktops prior to ENERGY STAR certification; and includes a reporting requirement confirming certification to NSF/ANSI 4 prior to energy efficiency testing.

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 electric cooktops, the following test method shall be used to determine ENERGY STAR certification.

Table 2: Test Method for ENERGY STAR Certification		
Cooktop Category	ENERGY STAR Requirement	Test Method Reference
Commercial Electric Cooktops	Cooking (Boil) Energy Efficiency	ASTM F1521-22 <i>Standard Test Methods for Performance of Range Tops.</i>

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. For electric cooktops with dual voltage, multiple voltage-versatility and for those that are

available in different voltage configurations, the cooktop shall be evaluated as separate appliances in accordance with ASTM F1521-22, see Section 9.0, Note 3¹⁰, and shall meet the minimum energy efficiency level in the least energy efficient voltage the unit is designed to operate.

Note: EPA does not have adequate data representation to determine if a higher or lower voltage is more or less energy consumptive and more or less energy efficient. As such, EPA includes a caveat in Section 4.C. that the commercial electric cooktop under test shall meet the minimum energy efficiency level in the least energy efficient voltage the unit is designed to operate for certification. Per ASTM F1521-22 Section 9.0 Note 3: "If an electric range top is rated for dual voltage (for example, 208/240), the range top should be evaluated as two separate appliances in accordance with these test methods."

Thus, for units with more than one possible operating voltage, EPA requests data on the efficiencies at each operating voltage, particularly how the energy efficiency measurements compare on each hob. If different efficiencies are measured at different voltages, the ENERGY STAR certification shall be based on the lower efficiency operating voltage. For manufacturers and labs, units with voltage versatility shall be tested in the worst-case scenario for energy efficiency, according to the manufacturer. Since the labs may be running the tests at multiple voltages (if applicable), then the worst results must pass.

Stakeholders are encouraged to provide feedback on the proposed test requirement, including the referenced ASTM standard test method, and approach to addressing multiple voltage configurations.

- 5) Effective Date:** This ENERGY STAR Commercial Electric Cooktops specification will become effective immediately following publication of the final Version 1.0 specification. To certify as 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 Q3 2023. Upon finalization, manufacturers will be able to immediately begin certifying products.

- 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.

¹⁰ ASTM F1521-22 Section 9.0, Note 3 states: "If an electric range top is rated for dual voltage (for example, 208/240), the range top should be evaluated as two separate appliances in accordance with these test methods"