



ENERGY STAR® Program Requirements For Commercial Ovens

Partner Commitments

Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR qualified products. The ENERGY STAR Partner must adhere to the following partner commitments:

Qualifying Products

1. Comply with current ENERGY STAR Eligibility Criteria, which define performance requirements and test procedures for commercial ovens. A list of eligible products and their corresponding Eligibility Criteria can be found at www.energystar.gov/specifications.
2. **Prior to associating the ENERGY STAR name or mark with any product**, obtain written certification of ENERGY STAR qualification from a Certification Body recognized by EPA for commercial ovens. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform commercial oven testing. A list of EPA-recognized laboratories and Certification Bodies can be found at www.energystar.gov/testingandverification.

Using the ENERGY STAR Name and Marks

3. Comply with current ENERGY STAR Identity Guidelines, which define how the ENERGY STAR name and marks may be used. Partner is responsible for adhering to these guidelines and ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance. The ENERGY STAR Identity Guidelines are available at www.energystar.gov/logouse.
4. Use the ENERGY STAR name and marks only in association with qualified products. Partner may not refer to itself as an ENERGY STAR Partner unless at least one product is qualified and offered for sale in the U.S. and/or ENERGY STAR partner countries.
5. Provide clear and consistent labeling of ENERGY STAR certified commercial ovens.
 - 5.1. The ENERGY STAR mark must be clearly displayed on the top/front of the product (on product labels and/or as a permanent mark), in product literature (i.e., user manuals, spec sheets, etc.) and on the manufacturer's Internet site where information about ENERGY STAR certified models is displayed.
 - 5.2. It is also recommended that the mark appear on the product packaging.

Verifying Ongoing Product Qualification

6. Participate in third-party verification testing through a Certification Body recognized by EPA for commercial ovens, providing full cooperation and timely responses. EPA may also, at its discretion, conduct tests on products that are referred to as ENERGY STAR certified. These products may be obtained on the open market, or voluntarily supplied by Partner at the government's request.

Providing Information to EPA

7. Provide unit shipment data or other market indicators to EPA annually to assist with creation of ENERGY STAR market penetration estimates, as follows:

- 7.1. Partner must submit the total number of ENERGY STAR certified commercial ovens shipped in the calendar year or an equivalent measurement as agreed to in advance by EPA and Partner. Partner shall exclude shipments to organizations that rebrand and resell the shipments (unaffiliated private labelers).
- 7.2. Partner must provide unit shipment data segmented by meaningful product characteristics (e.g., type, capacity, presence of additional functions) as prescribed by EPA.
- 7.3. Partner must submit unit shipment data for each calendar year to EPA or an EPA-authorized third party, preferably in electronic format, no later than March 1 of the following year.

Submitted unit shipment data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner.

8. Report to EPA any attempts by recognized laboratories or Certification Bodies to influence testing or certification results or to engage in discriminatory practices.
9. Notify EPA of a change in the designated responsible party or contacts within 30 days using the My ENERGY STAR Account tool (MESA) available at www.energystar.gov/mesa.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures, and should keep EPA informed on the progress of these efforts:

- Provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.
- Consider energy efficiency improvements in company facilities and pursue benchmarking buildings through the ENERGY STAR Buildings program.
- Purchase ENERGY STAR qualified products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR qualified product information to employees for use when purchasing products for their homes.
- Feature the ENERGY STAR mark(s) on Partner website and other promotional materials. If information concerning ENERGY STAR is provided on the Partner website as specified by the ENERGY STAR Web Linking Policy (available in the Partner Resources section of the ENERGY STAR website), EPA may provide links where appropriate to the Partner website.
- Ensure the power management feature is enabled on all ENERGY STAR qualified displays and computers in use in company facilities, particularly upon installation and after service is performed.
- Provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR qualified products.
- Provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, and communicate Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR website, etc. The plan may be as simple as providing a list of planned activities or milestones of which Partner would like EPA to be aware. For example, activities may include: (1) increasing the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrating the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) providing information to users (via the website and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products; and (4) building awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event.

- Join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. The SmartWay Transport Partnership works with freight carriers, shippers, and other stakeholders in the goods movement industry to reduce fuel consumption, greenhouse gases, and air pollution. For more information on SmartWay, visit www.epa.gov/smartway.
- Join EPA's Green Power Partnership. EPA's Green Power Partnership encourages organizations to buy green power as a way to reduce the environmental impacts associated with traditional fossil fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune 500 companies, small and medium businesses, government institutions as well as a growing number of colleges and universities. For more information on Green Power, visit www.epa.gov/greenpower.



ENERGY STAR® Program Requirements Product Specification for Commercial Ovens

Eligibility Criteria Version 2.2

Following is the **Version 2.2** product specification for ENERGY STAR certified commercial ovens. 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. Oven: A chamber designed for heating, roasting, or baking food by conduction, convection, radiation, and/or electromagnetic energy.¹

Oven Types

- B. Combination Oven: A device that combines the function of hot air convection (oven mode), saturated and superheated steam heating (steam mode), and combination convection/steam mode for moist heating, to perform steaming, baking, roasting, rethermalizing, and proofing of various food products. In general, the term combination oven is used to describe this type of equipment, which is self-contained.² The combination oven is also referred to as a combination oven/steamer, combi or combo.
- a. Half-Size Combination Oven: A combination oven capable of accommodating a single 12 x 20 x 2 ½-inch steam table pan per rack position, loaded from front-to-back or lengthwise.
- b. Full-Size Combination Oven: A combination oven capable of accommodating two 12 x 20 x 2 ½-inch steam table pans per rack position, loaded side by side, from front-to-back or lengthwise.
- c. 2/3-Size Combination Oven: A combination oven capable of accommodating a single 12 x 10 x 2 ½-inch steam table pan per rack position, loaded from front-to-back or lengthwise.
- C. Convection Oven: A general-purpose oven that cooks food by forcing hot dry air over the surface of the food product. The rapidly moving hot air strips away the layer of cooler air next to the food and enables the food to absorb the heat energy. For the purposes of this specification, convection ovens do not include ovens that have the ability to heat the cooking cavity with saturated or superheated steam. However, this oven type may have moisture injection capabilities (e.g., baking ovens and moisture-assist ovens). Ovens that include a *hold feature* are eligible under this specification as long as convection is the only method used to fully cook the food.
- a. Half-Size Convection Oven: A convection oven that is capable of accommodating half-size sheet pans measuring 18 x 13 x 1-inch.
- b. Full-Size Convection Oven: A convection oven that is capable of accommodating standard full-size sheet pans measuring 18 x 26 x 1-inch.
- D. Conventional or Standard Oven: An oven that cooks food primarily using the naturally occurring hot air currents to transfer heat over the surface of the food product without the use of a fan or blower. The burner or elements heat the air within the oven cavity as well as the cavity walls,

¹ NSF/ANSI 170-2014, *Glossary of Food Equipment Terminology*.

² ASTM Standard F-2861-10 *Standard Test Method for Enhanced Performance of Combination Oven in Various Modes*.

causing currents of hot air that transfer heat to the surface of the food. The hot air's buoyancy carries it upward through cooler air, which then slowly sinks to the bottom of the oven as it cools off.

- E. Conveyor Oven: An oven designed to carry food product on a moving belt into and through a heated chamber.
- F. Slow Cook-and-Hold Oven: An oven designed specifically for low-temperature (e.g., less than 300°F) cooking, followed by a holding period at a specified temperature.
- G. Deck Oven: An oven that cooks food product directly on the floor of a heated chamber. The bottom of each compartment is called a deck and heat is typically supplied by burners or elements located beneath the deck. The oven ceiling, floor, and walls are designed to absorb heat quickly and radiate that heat back slowly and evenly.
- H. Rack Oven: A high-capacity oven that offers the ability to produce steam internally and is fitted with a motor-driven mechanism for rotating multiple pans inserted into one or more removable or fixed pan racks within the oven cavity.
 - a. Mini Rack Oven: A stand-mounted rack oven designed with a load-in-place rack that cannot be removed. Mini rack ovens are capable of accommodating up to 10 standard full-size sheet pans measuring 18 x 26 x 1-inch.
 - b. Single Rack Oven: A floor-model rack oven that is able to accommodate one removable single rack of standard sheet pans measuring 18 x 26 x 1-inch.
 - c. Double Rack Oven: A floor-model rack oven that is able to accommodate two removable single racks of standard sheet pans measuring 18 x 26 x 1-inch, or one removable double-width rack.
 - d. Quadruple Rack Oven: A floor-model rack oven that is able to accommodate four removable single racks of standard sheet pans measuring 18 x 26 x 1-inch, or two removable double-width racks.
- I. Range Oven: An oven base for a commercial range top (i.e., burners, electric elements or hobs). Range ovens may use either standard or convection technologies to cook food.
- J. Rapid Cook Oven: An oven that utilizes one or more non-traditional heat transfer technologies to cook food product significantly faster than would be possible using conventional (e.g., convection, conduction, radiant) heat transfer technologies. Heat transfer technologies that may be employed include microwave, quartz halogen, and high-velocity or impingement convection.
- K. Rotisserie Oven: An oven fitted with a mechanism to move or turn food past a fixed heat source while the food is slowly being cooked on all sides.

Energy Efficiency Metrics

- L. Baking-Energy Efficiency: Quantity of energy imparted to the specified load, expressed as a percentage of energy consumed by the oven during the baking event.
- M. Cooking-Energy Efficiency: Quantity of energy imparted to the specified load, expressed as a percentage of energy consumed by the oven during the cooking event.
- N. Idle Energy Rate: The rate of oven energy consumption while it is maintaining or holding at a stabilized operating condition or temperature. Also called standby energy rate.
- O. Total Idle Energy Rate: The rate of oven energy consumption while it is maintaining or holding at a stabilized operating condition or temperature. Total idle energy rate includes gas and electric

energy (primary and auxiliary). Also called total standby energy rate.

Water Consumption

- P. Average Water Rates: The ratio of the average potable water used to the maximum number of steam table pans the oven can accept during heavy-load cooking in steam and convection modes; expressed as gallons per hour (GPH) per pan.
- Q. Average Condensate Temperature: The average temperature of the condensed steam and cooling water mixture exiting the combination oven and directed to the drain during heavy-load cooking in steam and convection modes.
- R. Maximum Condensate Temperature: The maximum temperature of the condensed steam and cooling water mixture exiting the combination oven and directed to the drain during heavy-load cooking in steam and convection modes.

Qualification Terms

- S. Product Family: Individual models offered within a product line based on the same engineering design, including pan capacity, fuel type, and method of steam generation, as applicable. Acceptable differences within a product family for purposes of certification include: controls, door-opening orientation, and any aesthetic additions that have no impact on oven energy consumption in any operating mode.
- T. Pan Capacity: The number of steam table pans the combination oven is able to accommodate as per the ASTM F-1495-05 standard specification.
- U. Single Rack: Single racks shall accommodate 15 full-size sheet pans measuring 18 x 26 x 1-inch, at a 4-inch spacing between rack positions. Single racks accommodate 1 full-size sheet pan per rack position.
- V. Double-Width Rack: Double racks shall accommodate 30 full-size sheet pans measuring 18 x 26 x 1-inch, at a 4-inch spacing between rack positions. Double racks accommodate 2 full-size sheet pan per rack position.
- W. Set-Back Idle Mode: A feature that includes automatic temperature reduction after extended periods of non-use. In addition, the feature may also incorporate the reduction or elimination of fan speed, lighting, and automated rack rotation during periods of non-use.

2) Scope:

- A. Included Products: Products that meet the definitions of a Commercial Oven and Convection Oven, Combination Oven, or Rack Oven as specified herein are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.B. The following sub-types are eligible:
 - a. Full-size gas and half- and full-size electric convection ovens.
 - b. Half- and full-size gas combination ovens with a pan capacity ≥ 6 .
 - c. Half- and full-size electric combination ovens with a pan capacity ≥ 5 and ≤ 20 .
 - d. Single and double gas rack ovens.

To ensure only commercial ovens qualify under this specification, products shall be third-party certified to NSF/ANSI Standard 4, *Commercial Cooking, Rethermalization and Powered Hot Food Holding and Transport Equipment*.

- B. Excluded Products: This specification is intended for commercial food-grade ovens. Ovens designed for residential or laboratory applications cannot qualify for ENERGY STAR under this specification. The following oven types and sub-types are ineligible for ENERGY STAR:
- a. Half-size gas convection ovens.
 - b. 2/3-size combination ovens.
 - c. Dual-fuel heat source combination ovens.
 - d. Hybrid ovens not listed in Section 2.A, above, such as those incorporating microwave settings in addition to convection.
 - e. Conventional or standard ovens; conveyor; slow cook-and-hold; deck; range; rapid cook; and rotisserie.
 - f. Gas combination ovens with a pan capacity of < 6.
 - g. Electric combination ovens with a pan capacity < 5 and > 20.
 - h. Mini and quadruple gas rack ovens.
 - i. Electric rack ovens.

3) Qualification Criteria:

- A. Convection Oven Cooking-Energy Efficiency and Idle Energy Rate Requirements:

Table 1: Energy Efficiency Requirements for Convection Ovens		
Gas		
Oven Capacity	Idle Rate, Btu/h	Cooking-Energy Efficiency, %
Full-Size	≤ 12,000	≥ 46
Electric		
Oven Capacity	Idle Rate, kW	Cooking-Energy Efficiency, %
Half-Size	≤ 1.00	≥ 71
Full-Size	≤ 1.60	

- B. Combination Oven Cooking-Energy Efficiency and Idle Energy Rate Requirements:

Table 2: Energy Efficiency Requirements for Combination Ovens		
Gas		
Operation	Idle Rate, Btu/h	Cooking-Energy Efficiency, %
Steam Mode	≤ 200P+6,511	≥ 41
Convection Mode	≤ 150P+5,425	≥ 56
Electric		
Operation	Idle Rate, kW	Cooking-Energy Efficiency, %
Steam Mode	≤ 0.133P+0.6400	≥ 55
Convection Mode	≤ 0.080P+0.4989	≥ 76

Note: P = Pan capacity as defined in Section 1.S, above.

- C. Rack Oven Baking-Energy Efficiency and Idle Energy Rate Requirements:

Table 3: Energy Efficiency Requirements for Rack Ovens		
Gas		
Oven Size	Total Energy Idle Rate, Btu/h	Baking-Energy Efficiency, %
Single	≤ 25,000	≥ 48
Double	≤ 30,000	≥ 52

- D. Additional Idle Calculation Guidance: Compliance with the Convection Oven and Combination Oven idle rate requirements shall be based on gas energy only for purposes of qualifying gas models. When calculating the gas oven idle rates, electric energy consumed by auxiliary components shall not be taken into consideration. However, the electric energy consumption measured during idle tests shall be reported separately, as per Section 4.H.c.
- E. Additional Total Idle Calculation Guidance: Compliance with the Rack Oven total idle rate requirements shall be based on gas and electric energy for purposes of qualifying gas models. When calculating the gas rack oven total idle rates, electric energy consumed by auxiliary components shall be converted to Btu/h and added to the gas idle rate expressed in Btu/h. The electric energy consumption measured during idle tests shall also be reported separately as expressed in kW, as per Section 4.H.c.

Example: Consider a double-sized gas rack oven with a gas idle energy rate of 30,000 Btu/h; and the electric idle energy rate of 1.5 kW. First convert the 1.5 kW electric idle energy rate to Btu/h by multiplying the 1.5 kW by 3,412.142. Then add the result to the 30,000 Btu/h gas idle rate.

$$1 \text{ kW} = 3,412.142 \text{ Btu/h}$$

$$\text{Electric idle energy rate, converted to Btu/h: } 1.5 \text{ kW} \times 3,412.142 \text{ Btu/h} = 5,118.213 \text{ Btu/h}$$

$$\text{Total idle energy rate: } 30,000 \text{ Btu/h} + 5,118.213 \text{ Btu/h} = 35,118.213 \text{ Btu/h}$$

- F. Significant Digits and Rounding:
- a. All calculations shall be carried out with directly measured (unrounded) values. Only the final result of a calculation shall be rounded.
 - b. Unless otherwise specified in this specification, compliance with specification limits shall be evaluated using exact values without any benefit from rounding.
 - c. Cooking and Baking-Energy Efficiency: Calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.
 - d. Idle Energy Rate: Calculated values for gas convection, combination, and rack oven idle rates that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest whole number. The calculated energy consumption values for electric convection and combination ovens shall be rounded to 0.01 for idle rates.

4) Test Requirements:

- A. Representative models shall be selected for testing per the following requirements:
- a. For qualification 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 qualification 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 ovens, the following test methods shall be used to determine ENERGY STAR qualification.

Table 4: Test Methods for ENERGY STAR Qualification		
Oven Category	ENERGY STAR Requirement	Test Method Reference
Convection Ovens	Cooking-Energy Efficiency, Idle Energy Rate, and Production Capacity	ASTM F1496-13, <i>Standard Test Method for Performance of Convection Ovens</i>
Combination Ovens	Cooking-Energy Efficiency, Idle Energy Rate, Production Capacity, and Water Consumption	ASTM F2861-14, <i>Standard Test Method for Enhanced Performance of Combination Oven in Various Modes</i>
Rack Ovens	Baking-Energy Efficiency, Total Idle Energy Rate, and Production Capacity	ASTM F2093-11, <i>Standard Test Method for Performance of Rack Ovens</i>

- C. For ovens with variable Btu/h or kW input, each available input shall be tested and reported individually. Ovens need to meet the idle energy rate or total idle energy rate, and cooking- or baking-energy efficiency requirements presented in Table 1, Table 2, or Table 3, of this specification at each input setting.
- D. For electric ovens with multiple voltage-versatility and those that are available in different voltage configurations, the representative oven shall be tested at the most energy consumptive voltage according to the manufacturer.
- E. If the representative combination oven model under test is designed to hold 18 x 26-inch sheet pans, manufacturer-supplied wire racks shall be positioned in the oven to accommodate 12 x 20 x 2¹/₂-inch steam table pans.
- F. Combination ovens with roll-in, removable racks shall have the racks positioned in place during steam mode and convection mode idle tests.
- G. For the steam mode idle and cooking-energy efficiency tests, the combination oven shall be manually set to operate at a nominal temperature of 212°F.
- H. Additional Reporting Requirements:
 - a. The average water consumption rates, the average condensate drain temperatures, and the maximum condensate drain temperatures shall be reported for all combination ovens. If the oven does not require condensate cooling water during convection mode operation, then it shall be reported as “0”.
 - b. The production capacity for all convection oven, combination oven, and rack oven cooking or baking-energy efficiency tests shall be reported.
 - c. The electric energy idle rate for gas convection, combination, and rack oven idle rate tests shall be reported.
 - d. Rack ovens that include energy saving feature(s) and that meet the minimum requirement of the set-back idle mode definition in Section 1.W. shall be reported.

5) Effective Date: This ENERGY STAR Commercial Oven specification shall take effect immediately. 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 qualification is not automatically granted for the life of a product model.