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High Efficiency Specifications for Commercial Convection Ovens

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Efficiency Requirements for Qualifying Products

Gas	
Full Size	
Cooking Energy Efficiency*	≥ 44%
Idle Energy Rate	≤ 13,000 Btu/h
Electric	
Half Size	
Cooking Energy Efficiency*	≥ 70%
Idle Energy Rate	≤ 1.0 kW
Full Size	
Cooking Energy Efficiency*	≥ 70%
Idle Energy Rate	≤ 1.6 kW

*Based on heavy load (potato) cooking test.

Definitions

A. Commercial Oven: A chamber designed for heating, roasting, or baking food by conduction, convection, radiation, and/or electromagnetic energy.

B. Product Family: Variations of one model offered within a single product line based on the same engineering design with differences limited to door options (e.g., solid, glass).

Oven Types

C. Combination Oven: An oven that combines the function of hot air convection (oven mode) and saturated/superheated steam heating (steam mode), or both (combi mode), to perform steaming, baking, roasting, rethermalizing, and proofing of various food products. Also referred to as a combination oven/steamer, combi or combo.

D. 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. Maximum water consumption within the oven cavity must not exceed 0.25 gallons/hour. 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.

- Full-Size Convection Oven: A convection oven that is able to accept a minimum of five standard full-size sheet pans measuring 18 x 26 x 1-inch.

- Half-Size Convection Oven: A convection oven that is able to accept a minimum of five sheet pans measuring 18 x 13 x 1-inch.

E. 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, 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.

F. Conveyor Oven: An oven designed to carry food product on a moving belt into and through a heated chamber.

G. 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.

H. 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.

I. Mini-Rack Oven: A rack oven that has the ability to produce steam internally and includes an internal rotating rack where pans are manually pushed into the racks. Mini-rack ovens typically hold 5 – 8 full-size sheet pans.

J. Rack (Roll-In) Oven: A high-capacity oven, with the ability to produce steam internally and fitted with a motor-driven mechanism for rotating multiple pans fitted into one or more pan racks within the cavity.

- Single Rack Oven: A rack oven that is able to hold one full rack of sheet pans of product at a time, based on nominal 4-inch spacing between pans.

- Double Rack Oven: A rack oven that is able to hold two single racks or one double-width rack, based on nominal 4-inch spacing between pans.

K. 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.

L. 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.

M. 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

N. Cooking Energy Efficiency: The ratio of energy absorbed by the food product to the total energy supplied to the oven during cooking.

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O. 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.

Qualifying Products

This specification applies only to convection ovens that: 1) meet the definition for commercial oven and convection oven as well as either full-size or half-size; 2) meet the performance criteria above; 3) have been installed in compliance with manufacturer instructions and meeting all applicable local, State, and Federal codes and standards; 4) are third-party certified to:

- NSF/ANSI Standard 4, *Commercial Cooking, Rethermalization and Powered Hot Food Holding and Transport Equipment*
- ANSI/UL 197, *Commercial Electrical Cooking Appliances* (electric ovens only)
- ANSI Z83.11, *Gas Food Service Equipment* (gas ovens only)

The following products are outside the scope of this specification and not eligible for qualification: ovens designed for residential or laboratory applications; hybrid ovens, such as those incorporating steam and/or microwave settings in addition to convection; other oven types, as defined in Section 1, including combination, conventional or standard, conveyor, slow cook-and-hold, deck, mini-rack, rack, range, rapid cook, and rotisserie ovens.

CEE plans to reference efficiency data from the ENERGY STAR or California energy efficiency program qualified product lists to develop qualified product lists. Manufacturers submitting to ENERGY STAR or California energy efficiency programs do not need to submit product information to CEE. CEE will consider accepting individual submissions from manufacturers who do not participate in the ENERGY STAR program or California energy efficiency programs, however, manufacturers who do not participate these programs are strongly encouraged to do so.

Test Methods and Reporting

When testing commercial convection ovens, the following test method shall be used to determine qualification:

- American Society for Testing and Materials (ASTM) Standard F1496-99 (Reapproved 2005). *Standard Test Method for the Performance of Convection Ovens.*
    - Cooking Energy Efficiency is based on heavy load (potato) cooking test.

Representative models shall be selected for testing per the following requirements:

- For qualification of a product family, the most energy consuming model within the product family shall serve as the representative model,

Significant Digits and Rounding: All calculations shall be carried out with actual measured or observed values. Only the final result of a calculation shall be rounded. Calculated results shall be rounded to the nearest significant digit as expressed in the corresponding specification limit. Unless otherwise specified, compliance with specification limits shall be evaluated using exact values without any benefit from rounding.

Future Specification Revisions

CEE reserves the right to revise the specification as appropriate.

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