

High Efficiency Specifications for Commercial Convection Ovens

Effective Date 1/1/2015

Efficiency Requirements for Qualifying Products

Performance Tier	Tier 1	Tier 2
Electric, Half Size		
Cooking Energy Efficiency*	≥ 71%	≥ 75%
Idle Energy Rate	≤ 1.0 kW	≤ 0.9kW
Electric, Full Size		
Cooking Energy Efficiency*	≥ 71%	≥ 76%
Idle Energy Rate	≤ 1.60 kW	≤ 1.40 kW
Gas, Full Size		
Cooking Energy Efficiency*	≥ 46%	≥ 52%
Idle Energy Rate	≤ 12,000 Btu/h	≤ 10,000 Btu/h

*Based on heavy load (potato) cooking test.

Definitions

Commercial Oven A chamber designed for heating, roasting, or baking food by conduction, convection, radiation, or electromagnetic energy.¹

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, for example, 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.

- **Half size Convection Oven** A convection oven that is capable of accommodating half size sheet pans measuring 18 x 13 x 1-inch.
- **Full-size Convection Oven** A convection oven that is capable of accommodating standard full-size sheet pans measuring 18 x 26 x 1-inch.

¹ NSF 170-2010, Glossary of food equipment terminology.

Energy Efficiency Metrics

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

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.

Water Consumption

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.

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.

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

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 qualification include: controls, door opening orientation, and any aesthetic additions that have no impact on oven energy consumption in any operating mode.

Pan Capacity The number of steam table pans the combination oven is able to accommodate as per the ASTM F-1495-05 standard specification.

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 for electric ovens only
 - ANSI Z83.11, Gas Food Service Equipment for 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 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 will develop a qualifying products list by collecting third-party certified or verified performance data from other organizations rather than requiring manufacturers to submit performance data directly to CEE. All third-party certified or verified data sources will be cited on each qualifying products list published quarterly, including organization name and date. Manufacturers not participating in any third-party programs, such as ENERGY STAR® or similar programs are strongly encouraged to do so. If this is not an option, please contact CEE.

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 F1496-13, *Standard Test Method for the Performance of Convection Ovens*.

Cooking energy efficiency is based on heavy load (potato) cooking test.

Additional Idle Calculation Guidance Compliance with the Convection 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 total electric energy consumption measured during idle tests shall be reported separately.

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.

Cooking Energy Efficiency Calculated values shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

Idle Energy Rate Calculated values for gas convection oven idle shall be rounded to the nearest whole number. The calculated energy consumption values for electric convection ovens shall be rounded to 0.01 for idle rates.

Future Specification Revisions

CEE reserves the right to revise the specification.