Household Electric Ranges

AHAM ER-1-2017

ASSOCIATION OF HOME APPLIANCE MANUFACTURERS

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PREFACE

The Association of Home Appliance Manufacturers develops standards in accordance with AHAM's "Policy and Procedures Governing Technical Standards" which states:

> "AHAM Standards shall be in the best interest, mutually, of consumers who use appliances, the industries which provide and service appliances, and other interested parties. They shall relate to actual use conditions, be technically and scientifically sound."

Use or observance of AHAM standards is voluntary.

This standard contains

> Test procedures that may be applied to any brand or model of household electric range for measuring performance. Results of tests in accordance with this standard may be publicly stated.
>
> Recommended levels of performance which are considered important to include but which, necessarily, are recommendations only.

With regard to safety, AHAM recommends that all appliance products--both major and portable--manufactured or marketed in the United States be submitted to an appropriate independent laboratory for inspection and listing in conformance with the safety standards and procedures followed by such laboratories. The relevant standard for electric ranges is ANSI/UL 858, "Standard for Safety, Household Electric Ranges."

AHAM welcomes comments and suggestions regarding this standard. Any standard may be reviewed and improved as needed. Any interested party, at any time, may request a change in an AHAM standard. Such request should be addressed to AHAM's President, and should be accompanied by a statement of reason for the request and a suggested alternate proposal.

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1. PURPOSE

This standard establishes a uniform, repeatable procedure or standard method for evaluating the performance of household electric ranges as indicated in Section 2.

The standard methods provide a means to compare and evaluate different brands and models of household electric ranges regarding characteristics significant to product use.

The standard methods are not intended to inhibit improvement and innovation in product testing, design or performance.

2. SCOPE

This standard applies to household electric ranges: free-standing ranges equipped with surface units and one or more ovens; built-in combinations of surface units and one or more ovens; wall-mounted ovens with one or more ovens; built-in ovens with one or more ovens; and counter-mounted surface assemblies. Microwave oven performance is not included.

Hereinafter, the word "range" will apply to all the above types unless otherwise specified.

3. DEFINITIONS

3.1. Definitions of Operations Performed on Range Products

3.1.1. Oven Cooking

3.1.1.1. Baking. To cook food by a combination of radiated, convected and conducted heat.

3.1.1.2. Broiling. To cook food by exposure to radiant heat.

3.1.1.3. Roasting. To cook meat by a combination of radiated, convected and conducted heat with a minimum of moisture present.

3.1.2. Surface Cooking. To cook food by heat conducted through a cooking container (utensil).

3.1.2.1. Boiling. To cook food using water as a medium to assist in conducting heat.

3.1.2.2. Frying. To cook food using oil or fat as a medium to assist in conducting heat.

3.1.3. Oven Cleaning

3.1.3.1. Pyrolytic Self-Cleaning Oven. A cooking compartment that uses a process whereby the cooking soil is reduced to light ash during a separate high temperature cycle.

The remaining ash is removable with a damp cloth.

3.1.3.2. Continuous Cleaning Oven. Oven soil is gradually reduced to a presentably clean condition on porous porcelain enamel (3.5.1.2) during normal baking or roasting operations.

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3.2. Definitions of Range Products and Accessories

3.2.1. Range

3.2.1.1. Free-Standing Range. A floor supported assembly consisting of a cooking top and one or more ovens designed for installation without requiring supporting cabinetry or structure.

3.2.1.2. Drop-In Range. An assembly consisting of a cooking top and one or more ovens supported by horizontal surface cabinetry.

3.2.1.3. Built-In Range. An assembly consisting of a cooking top and one or more ovens intended primarily for installation in conjunction with other structures. This would include drop-in units.

3.2.2. Cooking Compartments

3.2.2.1. Oven. A compartment of a range or separate oven in which baking or broiling may be done.

3.2.2.2. Broiler Compartment. A separate section of the oven intended primarily for broiling.

3.2.2.3. Conventional Oven. A cooking compartment in which heat is utilized through radiation, convection and conducted unassisted by any other means.

3.2.2.4. Wall-Mounted Oven. An assembly consisting of one or more cooking compartments designed to be installed on a wall or cabinet.

3.2.2.5. Forced Convection Oven. A conventional oven in which a fan or other means is used to circulate the heated air within the cooking compartment.

3.2.2.6. Built-In Oven. An assembly consisting of one or more ovens for installation in a wall or cabinet.

3.2.3. Cooking Compartment Accessories

3.2.3.1. Drawer. A pull-out storage space.

3.2.3.2. Storage Compartment. A section of a range not directly heated, meant for storing utensils, dry foods, etc.

3.2.3.3. Warming Compartment. A section of a range intended to maintain serving temperatures of cooked foods.

3.2.3.4. Rack. A horizontal support in an oven, warming compartment, broiler or storage compartment.

3.2.3.5. Rack Stop. A device to prevent a rack from unintentionally being completely pulled off its support in a compartment.

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3.2.3.6. Broiler Grill or Rack. A device to support the food to be broiled and to provide drainage for drippings.

3.2.3.7. Broiler Pan. A receptacle which fits underneath the broiler grill or rack to retain drippings.

3.2.3.8. Broil Stop. A device to hold the oven door partially open during broiling.

3.2.3.9. Oven Light. A lamp for illuminating the interior of the cooking compartment.

3.2.3.10. Latch. A device to hold a door in a closed position.

3.2.3.11. Rotisserie. A device for rotating food during cooking.

3.2.4. Surface Cooking

3.2.4.1. Cooking Top. A horizontal surface of the range (or separate surface) which includes the surface units or defined heating areas serving as surface units.

3.2.4.2. Counter-Mounted Surface Assembly. A cooking top intended for mounting in or on a horizontal supporting structure.

3.2.4.3. Surface Unit. A heating unit mounted in a cooking top on which utensils may be placed for cooking.

3.2.4.4. Surface Unit (Glass/ Ceramic). The heating source and associated heated area of a glasslike cooking top on which utensils are placed for cooking.

3.2.5. Surface Cooking Accessories

3.2.5.1. Griddle. A flat cooking surface designed for use on a cooking top; it may be built-in, portable, plug-in or separate.

3.2.5.2. Deep-Well Cooker. A structure containing a recessed heating unit and a utensil built into the range or counter-mounted surface assembly.

3.3. Test Definitions

3.3.1. Supply Circuit. The immediate source of electrical energy to which the range is connected.

3.3.2. Grounding

3.3.2.1. Grounding Jumper. An electrical conductor connecting the frame of the range to the neutral conductor of the supply circuit.

3.3.2.2. Grounding Lead. A circuit conductor that provides ground continuity.

3.3.3. Rated Watts Input. The power rating marked on the range nameplate and heating elements.

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3.3.4. Operating Voltage Limits. The limits of input voltage within which the range is intended to be used.

3.3.5. Preheat Time (Oven). The interval of time required for an unloaded oven to reach a specified oven temperature when set in accordance with the manufacturer's recommendations.

3.3.6. Heating Cycle. One complete operation of the thermostat or other controlling device from "on" to "on" or from "off" to "off", when the oven is operating at a steady internal temperature.

3.3.7. Oven Temperature Amplitude. The difference between the average of the maximum temperatures and the average of the minimum temperatures of three consecutive cycles taken after a steady internal temperature has been reached.

3.3.8. Average Internal Temperature. The mean of the maximum and minimum temperatures measured in any three consecutive cut-off/cut-on actions of the electric resistance heaters, excluding the initial cut-off/cut-on action.

3.3.9. Normal Non-Operating Temperature. The temperature of any area of an appliance to be tested that is within ± 5° of the temperature that the identical test area of the same basic model of the appliance would attain if it remained in the test room for 24 hours while not operating with all oven doors closed. All constantly energized components are to be functioning normally.

3.3.10. Oven Heat Loss. The thermal loss from a cooking compartment operated continuously at a given steady internal temperature.

3.3.11. Overall Volume. Measure overall volume per AHAM OV-1.

3.3.12. Usable Oven Space. Measure usable oven space per AHAM OV-1.

3.4. Definitions of Functional Components

3.4.1. Fan. A device used to move or cause flow of air.

3.4.2. Heating Element. A length of resistance material, connected between terminals, used to convert electrical energy to thermal energy.

3.4.3. Induction Element. An electric heating element where an alternating electric current flows thru the heating coils producing an oscillating magnetic field thereby inducing an electric current in the cookware and in turn heating the cookware.

3.4.4. Heating Unit. An assembly containing one or more resistive elements, electrical terminals or leads, electrical insulation, and a frame, casing or other suitable supporting means.

3.4.5. Indicator Light. A device to indicate circuit or feature function by the presence of a luminous signal.

3.4.6. Thermostat. A device activated by temperature changes, which controls the heat source to regulate the temperature of the medium with which it is associated.

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3.5. Materials Definitions

3.5.1. Porcelain Enamel. A substantially vitreous or glassy inorganic coating bonded to metal by fusion at a temperature above 800°F (425°C) approximately.

3.5.1.1. General Purpose Porcelain Enamel. A smooth, high gloss inorganic coating formulated for range application that has excellent hardness, color retention and a high resistance to rust, stains, and acids.

3.5.1.2. Continuous Cleaning Type Porcelain Enamel. A type of porcelain enamel or ceramic coating having a textured granular surface that is designed to provide for the continuous removal, during normal baking or roasting operations, of cooking soils deposited on the interior oven surface.

3.5.2. Glass/Ceramic. Heat resistant glasslike material comprising a cooking surface in whole or in part.

3.6. Miscellaneous Definitions

3.6.1. Shipping Container. The complete package in which the range is shipped.

3.6.2. Nameplate. A plate on which the electrical rated wattage and rated voltage and identification of the complete range product appears.

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4. VOLTAGES

The following is not intended to preclude ranges especially designed for other voltage systems.

4.1. Rated Voltage. The rated nameplate voltage of electric ranges intended for use on a single-phase, three-wire circuits is to be 120/240 or on two-phase or three-phase, four-wire, Y connected system is to be 208Y/120 volts.

4.2. Range of Operating Voltages. Appliance products are frequently subject to voltage fluctuations due to changes in the line loading, weather conditions or other uncontrollable causes. The limits of these fluctuations are specified in American National Standards Institute's (ANSI) C84.1-2011, Voltage Ratings for Electric Power Systems and Equipment (60 Hz). The utilization voltage (Range B) for 120/240 volt circuits which encompasses the maximum fluctuation normally encountered is from 104/208 to 127/254 and for 208Y/120 volt circuits from 180Y/104 to 220Y/127, according to ANSI C84.1-2011. It is not expected that ranges meet the recommended performance levels at any voltage other than rated voltage.

It is recommended, however, that relays, motors and timing devices satisfactorily initiate and maintain their design functions with this voltage range and not be injured by continuous operation.

NOTE: Since these voltage fluctuations can be expected to occur, good engineering practice would dictate that components (relays, motors and timing devices) not fail under these conditions.

5. GENERAL TEST CONDITIONS, EQUIPMENT AND INSTRUMENTATION

The test conditions, equipment and instrumentation which follow are to prevail for all tests included in this standard, where applicable.

5.1. Supply Circuit. Make the tests with the supply circuit for which the range is rated.

5.2. Test Circuit Voltage. When a test is to be conducted at rated voltage, the test circuit voltage is to be maintained within ± 2% of the rated voltage.

5.3. Electrical Measurements. All electrical measurements must be accurate to within ± 2%. In the case of a three-wire supply to the heating units, measure voltage and watts input to each side of the neutral.

5.3.1. Watt-Hour Meter. The watt-hour meter for measuring the electrical energy consumption of conventional ovens and cooking tops is to have a resolution of at least 1 watt-hour and a maximum error no greater than 1.5% of the measured value for any demand greater than 100 watt-hours.

5.3.2. Watt Meter. The watt meter is to have a resolution of at least 0.2 watt and a maximum error no greater than 5% of the measured value over the range of 0 to 10 watts.

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5.4. Temperature Measurements

5.4.1. Ambient Room Air Temperature. During the test, maintain an ambient room air temperature of 77 ± 9°F (25 ± 5°C) as measured at least 5 ft. (150 cm) and not more than 8 ft. (240 cm) from the nearest surface of the unit under test and approximately 3 ft. (90 cm) above the floor. Measure the temperature with a thermometer or temperature indicating system with an error no greater than ± 1°F (± 0.5°C) over the range of 65 - 90°F (18 - 32°C).

5.4.2. Temperature Indicating System for Measuring Test Block Temperature. The system is to have an error no greater than 2°F (1°C) when measuring specific temperatures over the range of 65 -330°F (18 - 166°C). It is also to have an error no greater than 2°F (1°C) when measuring any temperature difference up to 240°F (116°C) within the above range of temperatures.

5.4.3. Temperature Indicating System for Measuring Conventional Oven Temperature. The equipment for measuring the conventional oven temperature is to have an error no greater than ± 4°F (± 2°C) over the range of 65 - 500°F (18 -260°C).

5.4.4. Normal Non-Operating Temperature. All areas of the appliance are to attain the normal non-operating temperature as defined in 3.3.9 before any testing begins.

5.4.5. Air Circulation. Maintain air circulation in the room sufficient to secure reasonably uniform temperature distribution, but not to cause a significant effect on the unit under test.

5.5. Scale. The scale used for weighing the test blocks shall have a maximum error no greater than 1 oz. (28.3 g).

5.6. Installation. A free-standing appliance is to be installed with the back directly against, or as near as possible, to a vertical wall which extends at least 1 ft. (30 cm) above and on either side of the appliance. There are to be no side walls. A drop-in, built-in or wall-mounted appliance is to be installed in an enclosure in accordance with the manufacturer's instructions. These appliances are to be completely assembled with all handles, knobs, guards, and the like mounted in place. Any electrical resistance heater, baking racks and baffles are to be in place in accordance with the manufacturer's instructions; however, broiler pans are to be removed from the oven's baking compartment.

Disconnect the electrical clock that uses energy continuously unless it is required for operation of the range. Do not disconnect or modify the circuit to any other electrical devices or features.

5.7. Test Equipment

5.7.1. Test Block for Conventional Cooking Top Performance Tests (See Appendix A for Physical Dimensions of Small and Large Test Blocks). The test blocks are to be made of aluminum alloy No. 6061, with a specific heat of 0.23 Btu/lb.-°F and with any temper that will give a coefficient of thermal conductivity of 0.37 - 0.41 cal/cm °C sec. Each block is to have a hole at its top. The hole is to be 0.08 inch (2 mm) in diameter and 0.80 inch (20 mm) deep. The laboratory conducting the test may provide other means that will ensure that the thermocouple junction is installed at this same position and depth. (See 5.7.3.)

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