



Standard Specification for Induction Cooktops, Counter Top, Drop-in Mounted, or Floor Standing¹

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1. Scope

1.1 This specification covers cooktops which utilize induction as a means for cooking and warming food in commercial and institutional food service establishments. Included are tabletop units, drop-in units and floor standing equipment with integral induction hobs.

1.2 The values stated in inch-pound units are to be regarded as the standard. The SI values given in parentheses are provided for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- D3951 Practice for Commercial Packaging
- F1166 Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities
- F760 Specification for Food Service Equipment Manuals
- F1521 Test Methods for Performance of Range Tops

2.2 ANSI Standards:³

- NSF/ANSI 4 Commercial Cooking, Rethermalization, and Powered Hot Food Holding and Transport Equipment⁴
- ANSI/NFPA 70 National Electric Code⁵

¹ This specification is under the jurisdiction of ASTM Committee F26 on Food Service Equipment and is the direct responsibility of Subcommittee F26.02 on Cooking and Warming Equipment.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁴ Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140.

⁵ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269-9101.

ANSI/UL 197 Standard for Commercial Electric Cooking Appliances⁶

ANSI B1.1 Unified Inch Screw Threads (UN and UNR Thread Form)

ANSI Z1.4 Sampling Procedures and Tables for Inspection and Attributes⁷

ANSI Z83.11 Gas Food Service Equipment

ANSI Z97.1 Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

2.3 Other Standards:

IEC61000-4-2 Electromagnetic Compatibility (EMC)—Part 4-2: Testing and Measurement Techniques—Electrostatic Discharge Immunity Test⁸

FCC Part 18.305 and 18.307 Field Strength Limit and EMC Conduction Limit⁹

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *countertop unit*—an induction unit intended to be operated on a counter or table.

3.1.2 *drop-in unit*—an induction unit intended to be installed in a counter top or application specific cut-out.

3.1.3 *floor standing unit*—an induction unit intended to be operated standing on the floor.

3.1.4 *hob*—an individual heating or cooking zone, typically associated with an individual induction coil.

3.1.5 *hybrid unit*—an induction cooktop combined with another heating method.

3.1.6 *induction cooktop*—a commercial or institutional food cooking or warming device using magnetic induction as the

⁶ Available from Global Engineering Documents, 15 Inverness Wayeast, Englewood, Co 80112-5704.

⁷ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS OR Acquisition Streamlining and Standardization Information System (ASSIST) which is the official source of all documents listed in the DoD Index of Specifications and Standards. The ASSIST can be located at <http://dsp.dla.mil>.

⁸ Available from International Electrotechnical Commission (IEC), 3 rue de Varembe, Case postale 131, CH-1211, Geneva 20, Switzerland, <http://www.iec.ch>.

⁹ Available from Federal Communications Commission, <http://www.fcc.gov/css.html>.

heating energy source. In the context of this specification, this includes countertop, counter drop-in, and floor standing units.

3.1.7 *wok unit*—an induction cooking unit with a round bowl heating surface for heating woks.

4. Classification

4.1 *Type*:

- 4.1.1 *Type I*—Table or Counter top units
- 4.1.2 *Type II*—Drop-in units
- 4.1.3 *Type III*—Table or counter top wok unit
- 4.1.4 *Type IV*—Drop-in wok unit
- 4.1.5 *Type V*—Floor standing units

4.2 *Group*:

- 4.2.1 *Group A*—Induction only
- 4.2.2 *Group B*—Hybrid

4.3 *Style*:

- 4.3.1 *Single hob*
- 4.3.2 *Multihob*

4.4 *Class*:

- 4.4.1 *Class 1*—120 volts, 60 hertz, 1 phase
- 4.4.2 *Class 2*—208 volts, 60 hertz, 1 phase
- 4.4.3 *Class 3*—208 volts, 60 hertz, 3 phase
- 4.4.4 *Class 4*—240 volts, 60 hertz, 1 phase
- 4.4.5 *Class 5*—208–240 volts, 50 hertz, 1 phase
- 4.4.6 *Class 6*—208–240 volts, 60 hertz, 1 phase
- 4.4.7 *Class 7*—480 volts, 60 hertz, 3 phase
- 4.4.8 *Class 8*—230 volts, 50 hertz, 1 phase
- 4.4.9 *Class 9*—240 volts, 50 hertz, 1 phase
- 4.4.10 *Class 10*—400 volts, 50 hertz, 3 phase
- 4.4.11 *Class 11*—415 volts, 50 hertz, 3 phase
- 4.4.12 *Class 12*—380 volts, 50 hertz, 3 phase

5. Ordering Information

5.1 Orders for Induction Cooktops under this specification shall specify:

- 5.1.1 ASTM specification number and date of issue,
- 5.1.2 Quantity to be furnished,
- 5.1.3 Type,
- 5.1.4 Group,
- 5.1.5 Style, and
- 5.1.6 Class.

5.2 The following options should be reviewed and if any are desired they should be included in the order:

- 5.2.1 When Federal/Military procurement(s) is involved, refer to the supplement pages.
- 5.2.2 Electrical power connection if applicable—power cord with plug or conduit connection and size.
- 5.2.3 When other than manufacturer’s standard, commercial, domestic packaging is required, specify packaging requirements.
- 5.2.4 When other than the manufacturer’s standard power input is required, specify the power input requirements.

6. Materials and Manufacture

6.1 *General*:

6.1.1 Induction cooktops shall conform to the applicable documents listed in 2.2.

6.1.2 Materials used shall be free from defects, which would affect the performance or maintainability of individual components, or of the overall assembly.

6.1.3 Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice.

6.1.4 Use of used or rebuilt products is not allowed under this specification.

6.2 *Hardware and Fittings*—Unless otherwise specified, all hardware and fittings shall be corrosion-resistant or suitably processed to resist corrosion in accordance with the manufacturer’s standard practice.

6.3 *Threaded Parts*—All threaded parts shall conform to ANSI B1.1.

7. Design and Construction

7.1 Induction cooktops may optionally include temperature control. If included, the temperature control shall have an accuracy of $\pm 10^{\circ}\text{F}$, measured at the bottom of the cooking/warming vessel. (See Section 10.)

7.2 Induction cooktops shall include a line current limiting capability.

7.3 Countertop induction cooktops shall be fixed or portable and provided with standard power plugs or hard wired as appropriate to the application.

7.4 Drop-in induction cooktops may optionally be supplied without a plug, with power wiring appropriate for direct power connection.

7.5 When specified, an induction cooktop shall include a replaceable fan air filter.

7.6 When specified, an induction cooktop shall include a cleanable fan air filter.

7.7 When specified, an induction cooktop shall have a power save/sleep mode.

7.8 *Safety Features*:

7.8.1 Induction cooktops shall include a “dry pan” feature, causing the unit to be shut off if an excessive unit top surface temperature of 316°C (600°F) is reached. (See Section 10.)

7.8.2 Induction cooktops shall include a minimum load determination capability to ensure that only intended objects/cookware will be heated. (See Section 10.)

7.8.3 Induction cooktops shall include internal safety measures to ensure unintended on-states may not occur.

7.8.4 Multi-hob induction cooktops shall include a clear (graphical) depiction of the association of controls with hobs.

7.8.5 Induction cooktops shall be ANSI Z97.1 compliant for any glass panels other than the cooking surface (such as user interface panels).

7.8.6 Induction cooktops shall be ANSI/UL 197 compliant.

8. Physical Properties

8.1 When specified, the user interface/controls shall resist the intrusion of water.

8.2 Induction cooktops shall be NSF/ANSI 4 compliant.

9. Performance Requirements

9.1 Induction cooktops shall be able to operate at their rated power:

9.1.1 Using a pan specified by the manufacturer, an induction cooktop shall be able to operate at its rated power $\pm 10\%$. (See Section 10.)

9.1.2 Using a pan specified by the manufacturer, an induction cooktop shall be able to operate at its rated power output continuously, except as limited by temperature controls or safety features.

9.2 Induction cooktops shall function properly at their rated voltage input $+5/-10\%$.

9.3 Induction cooktop efficiencies (power delivered to a cooking/warming load v.s. input power) shall be $>85\%$ at rated power. (See Section 10.)

9.4 Induction cooktops shall be IEC61000-4-2 ESD standards compliant for 10kV air and 8kV contact discharge.

9.5 Induction cooktops shall meet FCC part 18.305 and 18.307 radiated field strength emissions limit and EMC conducted emissions limit requirements.

10. Testing Methods

10.1 *Temperature Control Accuracy Test:*

10.1.1 This test is performed if the induction cooktop includes a temperature setting capability. The induction cooktop shall be connected to the specified power source. A thermocouple is applied to the bottom center of a suitable cooking vessel partially filled with water. The temperature is monitored as the unit is operated at each selectable operating temperature (or at 10°F intervals) until the temperature has stabilized. The measured temperature shall be within $\pm 10^\circ\text{F}$ of the set temperature.

10.2 *Dry Pan Test:*

10.2.1 The induction cooktop shall be connected to the specified power source. Temperature at the top center of the unit cooking/warming surface shall be monitored with a thermocouple. The unit shall be operated with a dry pan load at full power and the temperature monitored. If the temperature reaches 316°C (600°F), the unit shall shut down and stop providing power to the load.

10.3 *Minimum Load Detection Test:*

10.3.1 The induction cooktop shall be connected to the specified power source. Place a low carbon sheet steel disc having a diameter of 50 mm and a thickness of 1.5 mm flat in the most unfavorable position in the cooking zone and operate the unit at a full power setting. The disc shall not be heated in excess of 35°C above the ambient starting temperature.

10.4 *Operating Power Test:*

10.4.1 The induction cooktop shall be connected to the specified power source, using a suitable calibrated power input measuring device. The cooktop shall be operated with a pan specified by the manufacturer at the maximum power setting. The measured power input, corrected for power factor, shall be within $\pm 10\%$ of the rated power.

10.5 *Induction Cooktop Efficiency Test:*

10.5.1 Induction cooktop efficiency shall be measured using Test Methods **F1521**, and shall be $>85\%$, power delivered to the load/input power. The test shall be performed in accordance with 10.2, "Energy Input Rate".

10.5.2 The test shall be performed using a 20 quart induction compatible stock pot. Examples are Polarware model 203, Vollrath model 77610, and Update International model SPS-20.

11. Product Marking

11.1 Each induction cooktop shall be provided with an identification plate or label in compliance with ANSI Z83.11 or ANSI/UL 197.

12. Packaging and Package Marking

12.1 The induction cooktop shall be packaged and packed in accordance with the manufacturer's standard commercial domestic packaging. The package shall be marked showing the name of the product, model number, serial number and manufacturer's name. When purchaser specified, packaging shall be in accordance with the requirements of Practice **D3951**.

13. Sampling and Quality Assurance

13.1 *Sampling*—When specified in the contract or purchase order, sampling for the inspection and tests contained in the main body of this specification shall be performed in accordance with ANSI Z1.4.

13.2 The induction cooktop ready for shipment shall be measured and inspected by the manufacturer for compliance with this specification.

14. Instruction Materials and Manuals

14.1 Each induction cooktop shall be furnished with an installation and operating instruction manual. Manual shall comply with Specification **F760**.

15. Keywords

15.1 burner; cooking device; drop-in cooktop; food service equipment; hob; induction; induction cooktop; warming device

SUPPLEMENTARY REQUIREMENTS

FEDERAL AND MILITARY PROCUREMENT

The supplemental requirements which follow apply to all Federal and Military procurements. Where provisions of this supplement conflict with the main body, this supplement shall prevail.

S1. Manual

S1.1 A manual complying with Specification F760 and Supplement shall be provided.

S2. First Article Inspection

S2.1 When required, the first article inspection shall be performed on one unit. The first article may be either a first production or a standard production item from the supplier's current inventory, provided the item meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

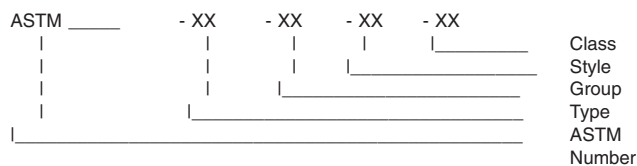
S3. Data Nameplate

S3.1 When required by purchaser, a nameplate shall contain the following:

- S3.1.1 National Stock Number (NSN).
- S3.1.2 Government-approved manual number.

S4. Part Identifying Number

S4.1 The following part identifying numbering procedure is for government purposes and does not constitute a requirement for the contractor. These classes are the same as those in Section 4. The Pins to be used for items acquired to this ASTM document are as follows:



S4.2 The above is an example of the PIN for an item in accordance with ASTM Standard F_____, type XX, style XX, class XX.

S5. Preservation, Packaging and Package Marking

S5.1 When other than normal commercial practice or conformance to Practice D3951 is desired, the preservation, packaging and package marking requirements shall be stated in the purchase order or contract.

S6. Human Factors Criteria

S6.1 Human factors engineering criteria principles and practices, as defined in Practice F1166, shall be used in the design of all induction cooktops.

S7. Manufacturer's Certification

S7.1 If the manufacturer has successfully furnished the same equipment on a previous contact within the past three years, further inspection will not be required. The manufacturer shall certify in writing that the equipment to be furnished is the same as that previously furnished and approved and that no major design changes have been made to the equipment.

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