Sunpentown, Model SR-1262F
Induction Cooktop Performance Test

Application of ASTM Standard
Test Method F 1521-96

FSTC Report 5011.99.77

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Acknowledgments

The establishment of a Food Service Technology Center reflects Pacific Gas and Electric Company's commitment to the food service industry. The goal of the research project is to provide Pacific Gas and Electric Company's customers with information to help them evaluate technically innovative food service equipment and systems and make informed equipment purchases regarding advanced technologies and energy sources. The project was the result of many people and departments working together within Pacific Gas and Electric Company and the support of the commercial equipment manufacturers who supplied appliances for testing.

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Contents

List of Figures and Tables

Figures

Tables

Executive Summary

This study documents the performance of the Sunpentown Mr. Induction 2.6 kW induction Cooktop, model SR-1262F, as determined by applying the American Society for Testing and Materials' (ASTM) *Standard Test Method for the Performance of Range Tops* (Designation F 1521 - 96). Range top performance is characterized by energy input rate, temperature response and uniformity, cooking energy efficiency, and production capacity.

The controls panel of the Sunpentown Mr. Induction consist of an push button switch for selecting either a "*temp*" or "*cook*" mode. The *temp* selector is for cooking by temperature, with a range of 120°F to 430°F. This allows the induction hob to modulate on the selected temperature. The *cook* function provides a constant amount of power. While in the *cook* mode, the operator can choose from a range of, low, medium, and high settings. Each of these modes are controlled by an analog dial, which also functions as an on/off switch.

Cooking energy efficiency is a measure of how much of the energy that an appliance consumes is actually delivered to the food product during the cooking process. Cooking energy efficiency is therefore defined by the following relationship:

$$\text{Cooking Energy Efficiency} = \frac{\text{Energy to Food}}{\text{Energy to Appliance}}$$

A summary of the test results is presented in Table ES-1.

Executive Summary

Table ES-1. Summary of Induction Cooktop Performance

Rated Energy Input Rate (kW)	2.60
Measured Energy Input Rate (kW)	2.51
Cooking Energy Efficiency (%)	86.3 ± 1.3*
Production Capacity (lb/h)	52.9 ± 0.8*
Average Temperature at Minimum Input (Temp Low)	117
Average Temperature at Minimum Input (Cook Low)	314
Average Temperature at Maximum Input (Temp High)	335
Average Temperature at Maximum Input (Cook High)	395

*This range indicates the experimental uncertainty in the test results based on a minimum of three test runs

The induction cooktop performed favorably, particularly with respect to the cooking energy efficiency and temperature response at the low setting. The unit's 86% cooking energy efficiency is one of the highest that has been measured at the FSTC. In addition, the Cooktop also performed remarkably well in the *temp* mode. The *temp* mode allows the cooktop to idle at the specified dial temperature. The unit maintained an average120°F, on the lowest setting reflecting the temperature indicated on the dial, thus placing the control of cooking delicate food products in the hands the chef.

This induction unit was also tested to determine how it performed (power draw) with various pan sizes, shapes, and types. Power draw is the percentage of the unit's rated input power that a pan will draw with the controls set to the maximum setting. During this analysis, the Cooktop performed effectively with pans greater than 6 inches, delivering more than 80% of its rated power. See Figure ES - 1.

Executive Summary

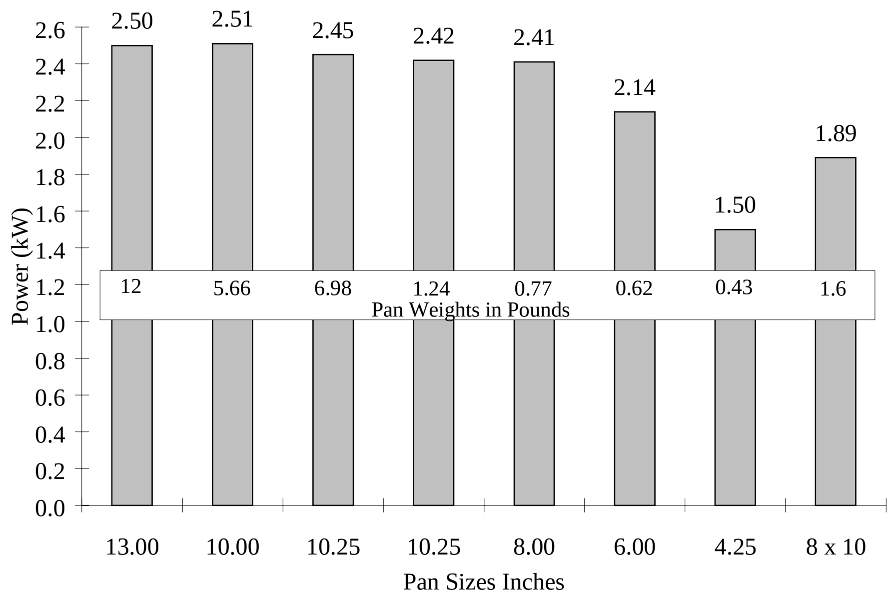

Figure ES - 1. Pan size vs. power drawn

Sunpentown has successfully implemented cooking controls that combine the best of electric cooking energy efficiencies, with the speed of gas, making this induction unit a fine choice for line cooking or delicate cooking.

FSTC Manager ______________________
Donald R. Fisher

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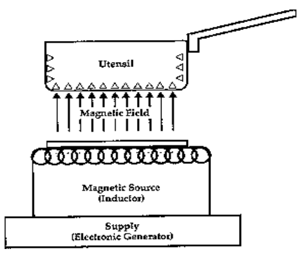
1 Introduction

Background



One of the benefits of induction cooking is that the heat can be evenly distributed to the cooking surface

The range top is one of the most widely used and versatile pieces of equipment in a commercial kitchen, and as range tops continue to evolve, commercial end users are beginning to demand more powerful and efficient equipment. An interesting development is the application of induction technology to electric range tops. One of the benefits of induction cooking is that the heat can be evenly distributed to the cooking surface, similar to a gas burner, without sacrificing the efficiency of electric resistance cooking. In addition, induction cooking reduces the heat added to the kitchen space, resulting in a cooler kitchen and greater comfort for the employees.

Although induction heating has been around for many years, its application to commercial cooking has been limited in North America. Several years ago, a major manufacturer marketed a 6-hob residential induction range, but the product line was discontinued about the same time that there was renewed interest in the commercial sector. Supported by electric utilities, a new generation of commercial-quality cooktops has been introduced in the U.S. and Canada. Currently, only single- or double-hob (element) units are being sold by the major players, although a Canadian company, is (or has been) building island-style suites with induction equipment. This island configuration, popular in Europe, is more likely to be found in product literature than actual kitchen. It is anticipated that a full-size range configuration (with 4 or 6 hobs) may be around the corner.

With support from the Electric Power Research Institute (EPRI), the Gas Research Institute (GRI), and the National Restaurant Association, Pacific Gas and Electric Company's Food Service Technology Center developed a uniform testing procedure to evaluate the performance of gas and electric cooktop.

Introduction

This test procedure was submitted to the American Society for Testing and Materials (ASTM), and it was accepted as a standard test method (Designation F 1521 - 94). This standard test method was revised in 1996 with a new designation of F 1521 - 96[1]. Pacific Gas and Electric Company's *Development and Application of a Uniform Testing Procedure for s* documents the developmental procedures and test results of several gas and electric range tops.[2] Other Pacific Gas and Electric Company reports document the results of applying the ASTM test method and discuss the scope of these revisions.[3,4,5,6] Two additional reports explore the performance of different induction cooktops.[7,8]

Application of the standard test method determines cooking energy efficiencies and production capacities that correlate with "real-world" performances, providing end users with valuable information for purchasing and operating range tops. In addition, a pan sensitivity test was applied. This test used a variety of pans with different attributes such as diameter, quality, and size. This test determined the versatility of the induction unit with various ferrous pans.

The glossary in Appendix A is provided so that the reader has a quick reference to the terms used in this report.

Objectives

The objective of this report is to examine the operation and performance of the Sunpentown Mr. Induction cooktop, model SR 1262F, under the controlled conditions of the ASTM standard test method. The scope of this testing is as follows:

1. Verify that the appliance is operating at the manufacturer's rated energy input.
2. Characterize the unit's minimum and maximum temperature rise and temperature uniformity.
3. Document the cooking energy efficiency at the maximum setting.

4. Determine the production capacity.
5. Characterize the units power draw at the maximum setting, using a variety of ferrous pans.

Appliance Description

The Sunpentown Mr. Induction 2.6 kW induction cooktop (see Figure 1-1) is a single cooking hob that causes heat to be generated directly in the magnetic material comprising the cooking container by means of an induced electro-magnetic field. The amount of heat generated in the cooking container is controlled by varying the strength of the magnetic field.

Figure 1-1. Sunpentown induction unit with testing pan

The controls panel consist of an push button switch for selecting either a "*temp*" or "*cook*" mode. The *temp* selector is for cooking by temperature, with a range of 120°F to 430°F. This allows the induction hob to modulate on the selected temperature. The *cook* function provides a constant amount of power. While in the *cook* mode, the operator can choose from a range of, low, medium, and high settings. Each of these modes are controlled by an analog dial, which also functions as an on/off switch.

The cooking surface is a smooth and continuous, ceramic glass plate, which allows for easy cleaning. Because the surface is not heated directly during operation, it remains relatively cool, gaining heat, only from the cooking container.

Appliance specifications are listed in Table 1-1, and the manufacturer's literature is in Appendix B.

Table 1-1. Appliance Specifications.

Manufacturer	Sunpentown
Model	SR 1262F
Generic Appliance Type	Electric Induction Cooktop
Rated Input	2.6 kW
Voltage	208 V, single phase
Dimensions	14.6" x 12.6" x 4.3"
Construction	Ceramic glass sealed flush with the stainless steel side panels, and control panel
Controls	A push-button switch for selecting either the *cook* or *temp* cooking modes, which is adjusted with an analog dial that also served as an on/off switch.

2 Methods

Setup and Instrumentation

FSTC researchers installed the induction cooktop on a tiled floor under a 4-foot deep canopy hood that was 6 feet, 6 inches above the floor. The hood operated at a nominal exhaust rate of 300 cfm per linear foot of hood. There was at least 6 inches of clearance between the vertical plane of the cooktop and the edge of the hood. All test apparatus were installed in accordance with the ASTM test method.[1]

Power and energy were measured with a calibrated watt/watt-hour transducer that generated an analog signal for instantaneous power and a pulse for every 10 Wh. The transducer and thermocouples were connected to an automated data acquisition unit that recorded data every 5 seconds. A voltage regulator was connected to the induction cook top to maintain a constant voltage for all tests. Figure 2-1 illustrates this setup.

Figure 2-1. Sunpentown, voltage regulator and computer

Methods

Cooktop temperature rise and uniformity were measured with K-type thermocouples, strain-gage-welded to a 12-inch steel plate. Water temperature was measured using a Fluke model 2180A resistance temperature device (RTD). The cooking container used for the cooking energy efficiency test was an All-Clad 12 qt., 10 ½ diameter, laminated stock pot (Figure 2-2). The inside layer is 18/10 stainless steel, the center core is pure aluminum, and the outside layer is magnetic stainless steel. The pan weighed 5.65 pounds, and the lid weighed 1.03 pounds. Each test load consisted of 20.0 pounds of water. All data were logged using Fluke Helios data logger and recorded on a PC. Voltage was maintained at 208 V with a Staco voltage regulator.

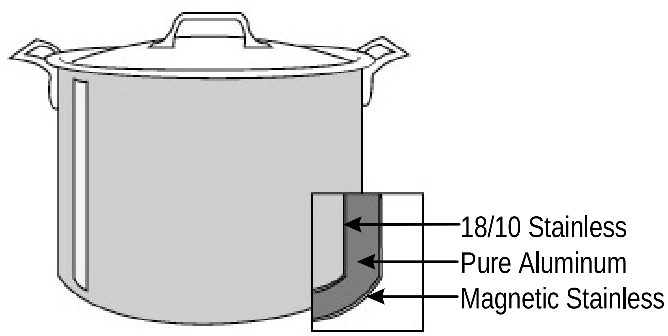


Figure 2-2.
All-Clad ™ stock pot

Measured Energy Input Rate

The induction cooktop was connected to a regulated 208 V, single phase power source and the energy input rate test was performed on the unit in accordance with the ASTM test method. The input rate is measured with the unit operating at full input in order to verify that the cooktop is operating properly, within ± 5.0% of the manufacturer's rated input.

Temperature Response

To determine the heat-up temperature response of a cooktop, FSTC researchers attached 17 thermocouples to a ¼ -inch-thick, 12-inch-diameter carbon steel plate, as detailed in section 10.4 of the ASTM test method (Figure 2-3). The cooktop was set to the minimum control setting and time, temperature, and energy were recorded over the next hour. After the plate was allowed to cool, the test was repeated at the highest setting.

Temperature uniformity of the cooktop was determined by recording the 17 individual temperatures on the plate surface at the end of each one-hour heat-up temperature response test. The temperature uniformity was then expressed as the standard deviation of these 17 temperature points and was reported along with the average of the temperatures at each location.

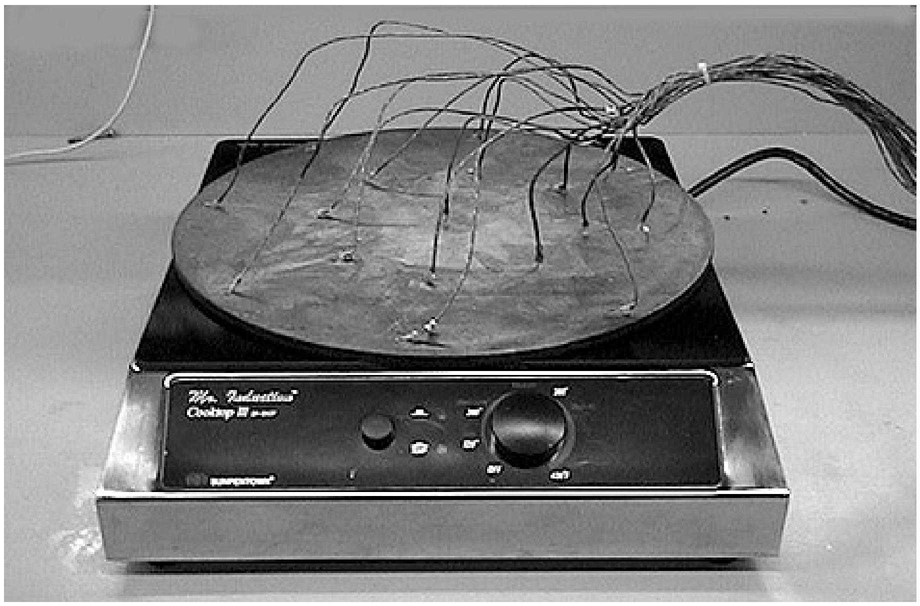


Figure 2-3.
Steel plate with 17 thermocouples

Cooking Tests

A range top can be used to cook food in several different manners, from sautéing, to simmering. However, it is often used to heat up qualities of food in stock pots. In keeping with that scenario, the cooking energy efficiency and production capacity test is based on the sensible heat gain (heat up) of water in a stock pot. The water was heated from 70°F to 200°F. A minimum of three cooking test were performed at full-input rate in accordance with the ASTM test method. This procedure ensured that the reported cooking energy efficiency and production capacity result had an experimental uncertainty of less than ± 10.0 %. The results from each test run were averaged, and the absolute uncertainty was calculated based on the standard deviation of the results.

3 Results

Energy Input Rate

Prior to testing, the energy input rate was measured and compared with the manufacturer's nameplate value. This procedure ensured that the induction cooktop was operating within its specified parameters. The energy input rate was 2.51 kW (a difference of 3.5% from the nameplate rating).

Temperature Response and Uniformity

The ASTM test method specifies that the cooktop be tested at the minimum and maximum control settings; however, the induction unit has two possible minimum and maximum settings, depending on the mode (*temp* or *cook*). FSTC researchers tested the units heat-up response for all four control settings. Results for the minimum and maximum settings are shown in Figure 3-1 and 3-2. The four curves generated by the temperature response test illustrated the function of each of the four control settings.

The dial control (rheostat power function), for the induction unit also serves as a on/off switch. It should be noted that the *temp* line in Figure 3-1 was achieved by the turning the dial to just passed the point where the switch "clicks on", rather than the 120° mark on the dial. When the controls were set to the 120°F mark on the dial, the plate temperature averaged 150°F.

Results

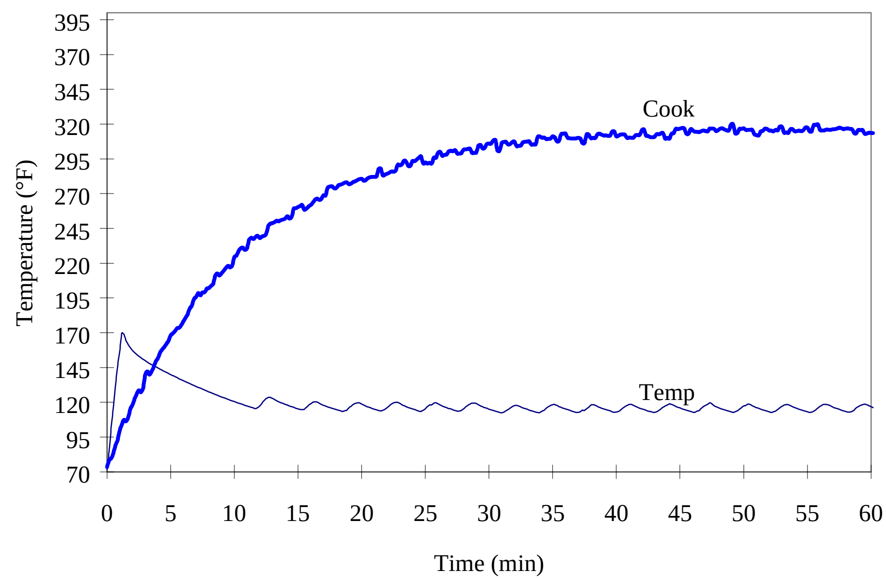


Figure 3-1.

Temperature response for "low" temp and cook settings

As a side test, a stock pot was filled with 6 quarts of water and placed on the cooktop with the controls set to 120°F. The cooktop was operated for three hours while the temperature of the water was monitored. During this period, the water temperature stabilized at 125°F, demonstrating the Sunpentown's accuracy and dial temperature control.

During the maximum control setting test in *cook* mode, the unit cut off when the surface reached 530°F (inner nine thermocouples). This high limit safety feature was designed to prevent the cooktop from exceeding an unsafe temperature.

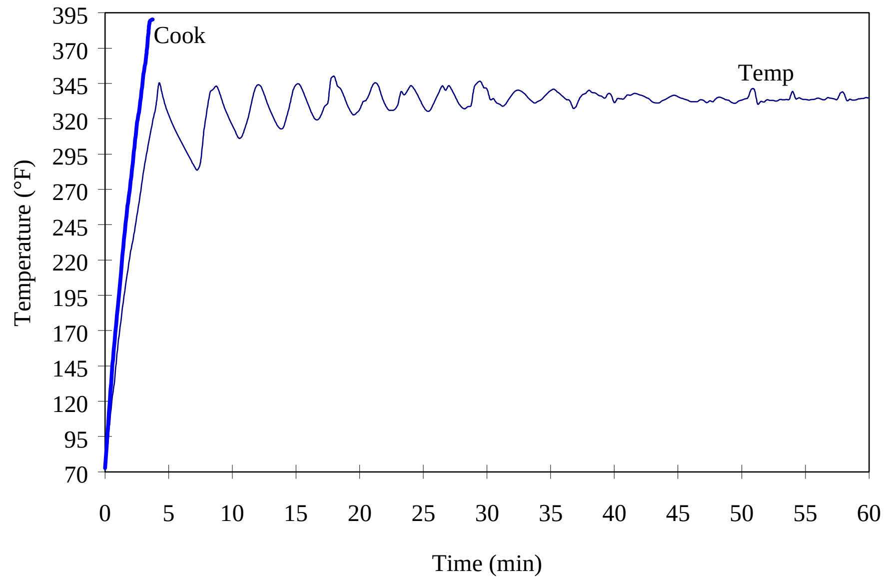


Figure 3-2.
Temperature response for "high" temp and cook settings

The *temp* settings modulate the power source to produce a steady, non-increasing temperature in the cooking container. This control feature is unique to the induction range. For example, on a non-thermostatic device such as an electric element or a gas burner, it is difficult to stabilize a cooking container because the container will continue to heat up until it reaches some equilibrium.

The temperature response at the maximum setting shows how quickly the unit can heat-up while the response at the minimum setting shows the lowest temperature that can be maintained on a cooktop. After five minutes at the maximum setting, the Sunpentown 2.6 kW induction unit had reached nearly 400°F, a standard gas open burner had reached 500°F, and a standard resistant element had reached 250°F. At the end of the one-hour test period on the minimum setting, the resistance-element was slightly over 300°F, the standard gas open burner was at 210°F, and the induction unit was at a temperature of 125°F.[2,3]

Results

The Figures 3-4 through 3-7 depict the final temperatures on the temperature response plate at the end of the one hour test. In the figures, the bottom of the plate would be at the front of the unit. Table 3-1 summarizes the results of the uniformity tests at the four settings.

Table 3-1. Summary of Temperature Response and Uniformity. (All 17 Thermocouples).

Temperature Setting	Average Temperature	Standard Deviation
Temp Low	116.8°F	7.1
Cook Low	313.6°F	42.9
Temp High	334.7°F	47.7
Cook High*	394.9°F	150.2

* Note: The average high temperature results are after four minutes , at which point the high limit safety feature was activated.

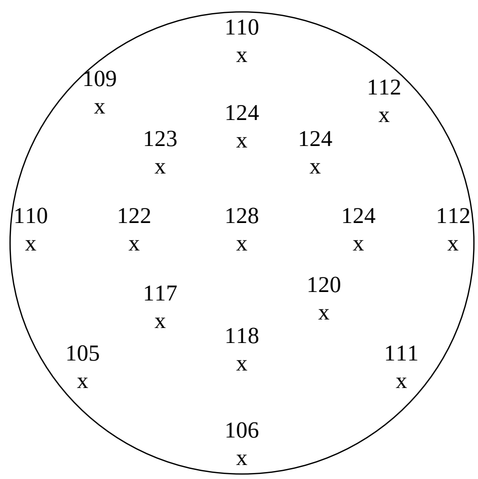


Figure 3-4.

Temperature uniformity for "temp" low setting

Results

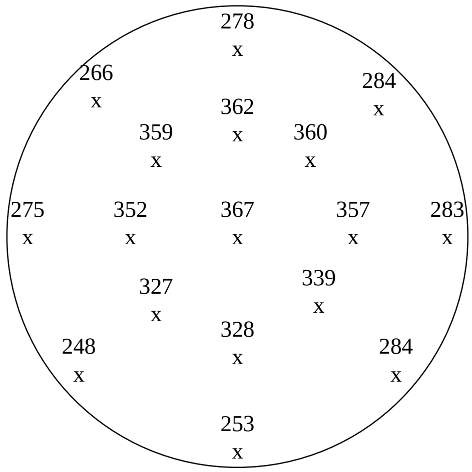


Figure 3-5.

Temperature uniformity for "cook" low setting

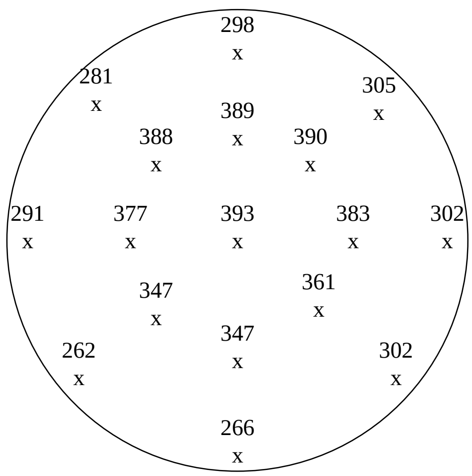


Figure 3-6.

Temperature uniformity for "temp" high setting

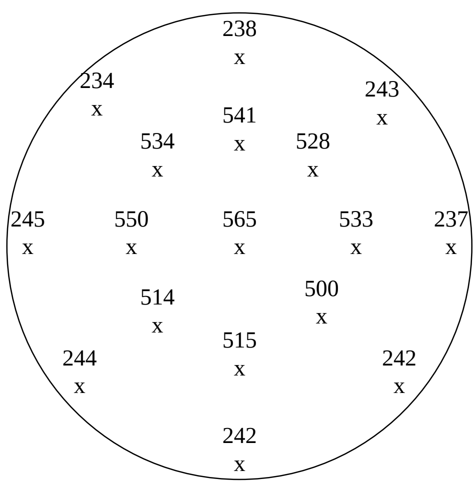


Figure 3-7.

Temperature uniformity for "cook" high setting

On the Sunpentown 2.6 kW induction unit, the 12-inch plate hung over the unit's square top by approximately ¼-inch on the sides, indicating that the unit is more suited to smaller pans. The induction unit has two rings on the glass ceramic top, the larger having a diameter of 9 ½ inches which was assumed to be the extent of the induction hob (energy source).

The testing plate consists of two circles of thermocouples (see Figure 2-3). The inner circle of thermocouples has a 6-inch diameter, and the outer circle has a 11 ½-inch diameter. Examining only the inner circle of thermocouples, the Sunpentown shows a very tight temperature response and uniformity as seen in Table 3-2. Therefore, using too large of a cooking container could diminish the uniform heating pattern; however, using a suitably sized pan can provide exceptional control and results.

Table 3-2. Summary of Temperature Response and Uniformity (Only the Inner Nine Thermocouples).

Temperature Setting	Average Temperature	Standard Deviation
Temp Low	122.8°F	3.2
Cook Low	350.6°F	15.0
Temp High	375.4°F	18.5
Cook High	531.7°F	19.9

Cooking Performance

The cooktop was used to heat 20 pounds of water from 70°F to 200°F. The cooking energy efficiency test was performed a minimum of three times in accordance the ASTM test method. Table 3-3 compares the induction cooktop results with a standard 2.0 kW resistance-element[2]. Cooking energy efficiency is defined as the ratio of the energy absorbed by the food product (water) and the energy consumed by the appliance:

$$\text{Cooking Energy Efficiency} = \frac{\text{Energy to Food}}{\text{Energy to Appliance}}$$

Table 3-3. Cooking Energy Efficiency and Production Capacity.

	Sunpentown 2.6 kW	Electric Resistance 2.0 kW
Cooking Energy Efficiency		
Full-Energy Input Rate (%):	86.3	80.4
Uncertainty (%):	1.3	6.2
Production Capacity		
Full-Energy Input Rate (lb/h):	52.9	38.9

The induction unit exhibited a higher cooking energy efficiency than the standard electric unit. The individual unit's production rate was also proportionally higher, partially due to the additional 600 watts of available power. The cooking energy efficiency tests were repeated at other control settings (med-low, medium, med-high) to determine the relationship between settings and production rates. Figure 3-8 summarizes the results of these additional tests. Appendix C contains a synopsis of test data for each replicate of the cooking energy efficiency tests.

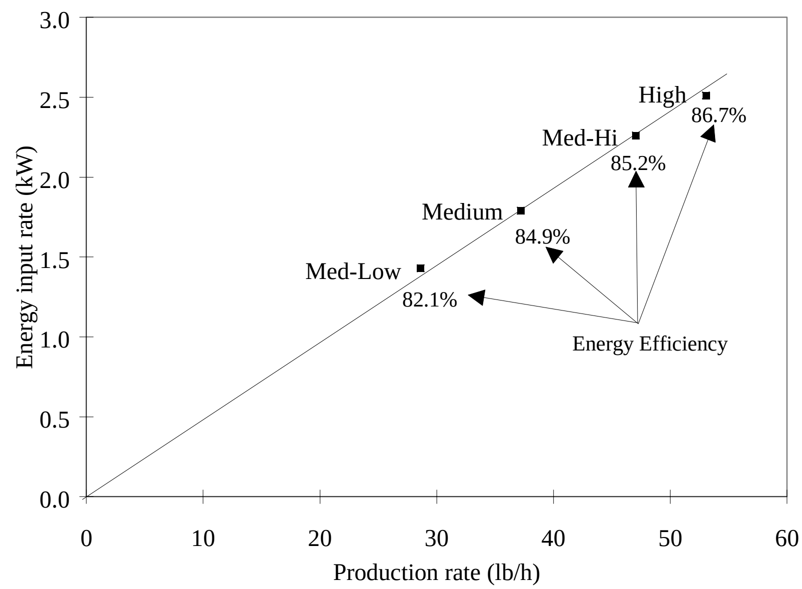


Figure 3-8. Productivity vs. input rate

Pan Size Sensitivity Testing

After applying the ASTM standard test method for range tops, an additional test was applied which examined the unit's performance under real world conditions. This test used various ferrous pans having different diameters, weights, shapes, and qualities. The purpose of this test was to determine if the induction unit is capable of delivering its full energy input rate power to all types and sizes of cooking containers. This is notable since induction technologies have been associated with the cost prohibitive "special" cooking containers. It should be noted, that this type of test is not as important to a higher powered units as it is to a smaller induction unit (i.e. 1.5 kW); however, this type of knowledge can be valuable to end-users.

The results are a measure of how much of the cooktop's rated input (kW) was drawn with each pan and what percentage of the induction unit's rated input was utilized. For the purpose of the testing, pan diameter was determined by the bottom contact surface. This was assumed to have the greatest impact on cooktop performance. While two of the pans were of the same diameter, each pan's attributes contrasted. The pans were constructed from materials such as cast iron, steel, stainless steel, and laminated alloys. A majority of the bottoms of the pans were level (uniform) and one pan had a machined plate attached to the bottom. One of the pans was noticeably warped and three of the pans had a raised outer ring on the bottom. A raised ring pan is described as a pan that has a thin or thick ring on the bottom that circles the outer edge of the pan. This particular design prevents a majority of the pan from coming in direct contact with the cooktop. Figure 3-9 displays all the pans tested with the induction unit.

Since many of the pans did not have any markings, or did not indicate material properties, the researchers wanted to add a “consumer subjectivity” to the pan in the description table/list. Table 3-4 is only subjective to the point that it gives the reader another perception about the pans. The quality of the pans were broken down into low, average and high. These ratings were based on what a consumer might perceive a pan to be. A “low” quality pan would be thin, very light weight and easily dented or warped. An “average” rating for a pan meant that it was well constructed, relatively thick and could with-stand everyday use. A “high” quality pan was very heavy, thick, and had the appearance of lasting a lifetime.

The testing involves filling the pans half-full with 70°F water (to ensure full power draw with no safety shutoffs during testing). Each pan was then placed on the test unit, power was recorded, then the next pan until each pan had been tested.

Results

Figure 3-9.

Pans used for the pan sensitivity test

Results

Figure 3-10 displays the results of the pan sensitivity test.

Table 3-4. Pan Specifications.

Pan	Diameter (inches)	Pan Materials	Percent of Rated Power	Pan Type	Shape	Bottom Contours	Perceived Quality
A	13	Stainless Steel	96%	Stock Pot	Round	Flat	High
B	10	Layered	97%	Stock Pot	Round	Flat	High
C	10 ¼	Cast Iron	94%	Skillet	Round	Raised Ring	High
D	10 ¼	Nonstick Steel	93%	Sauté	Round	Flat	Low
E	8	Enameled Steel	93%	Dutch Oven	Round	Raised Ring	Low
F	6	Nonstick Steel	82%	Sauté	Round	Flat	Low
G	4.25	Enameled Steel	58%	Sauce Pan	Round	Raised Ring	Low
H	8 x 10	Stainless Steel	73%	Chaffing Dish	Rectangle	Con-Cave	Average

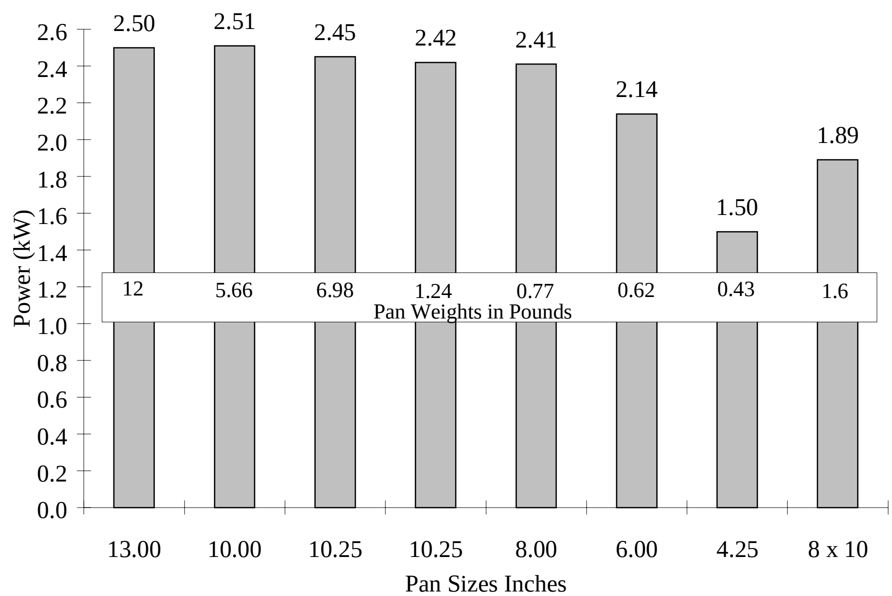


Figure 3-10. Pan size vs. power drawn

Results

The Sunpentown performed well during the pan sensitivity test, delivering at least 93% of its rated power to all the pans with a diameter greater than 8 inches regardless of the quality, weight, and pan material. Only the 4 ¼-inch round pan and the chaffing dish gave the unit any trouble drawing 58% and 73% respectively, of the unit's nameplate rating.

The stainless steel chaffing dish was slightly con-caved, however it drew 73% of the unit's rated power, thus demonstrating the Sunpentown's versatility.

It should be noted that the low power draw of the smallest pan tested presents a unique situation. It is believed that the amount of power delivered to any cooking container — be it gas, electric resistance, or induction — should be determined by the operator, not by the equipment's performance. However, delivering too much power can also be a problem with small pans. So the partial power drop for a small pan my be a good feature.

4 Conclusions

This 2.6 kW induction unit exhibited one of the highest energy efficiencies tested at the FSTC.

The Sunpentown Mr. Induction, model SR-1262F cooktop performed well under the rigorous conditions of the ASTM standard test method, particularly with respect to the energy efficiency tests. The unit exhibited one of the highest cooking energy efficiencies (86.3%) of any cooktop — gas or electric — tested at the Food Service Technology Center. More so, this Sunpentown cooktop performed favorably during the pan sensitivity testing delivering at least 93% of its rated power to all the pans with a diameter greater than 8 inches regardless of the quality, weight, or pan material.

Induction technology has eliminated the additional time and energy required during preheat (typical of other electric technologies) by directly heating the cooking container. Another characteristic of the cooktop that has potential energy savings occurs when the cooking container is removed. The unit automatically goes into a “stand-by” mode when the container is removed from the magnetic field, no longer consuming energy, and will remain in stand-by until the user reactivates the range by placing a pan on the unit. Many standard ranges will continue to consume energy until the user manually turns the power off.

The results show that the induction range exhibits the positive performance characteristics from both standard gas and electric rage tops. Sunpentown has incorporated the quick temperature response, usually associated with gas cooktop and maintained the higher efficiency attributed to electric range tops. The results of the Sunpentown 2.6 kW Mr. Induction cooktop reflects both speed and flexibility, exhibition the quick temperature response characteristics usually attributed to standard gas range tops, while allowing the user to operate at a lower temperature setting then either the gas or electric element. Sunpentown has successfully developed a cooktop that combine the best of electric cooking energy efficiencies, with the speed of gas.

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Appendixes

A Glossary

Cooking Energy (kWh or kBtu)

The total energy consumed by an appliance as it is used to cook a specified food product.

Cooking Energy Consumption Rate (kW or kBtu/h)

The average rate of energy consumption during the cooking period.

Cooking Energy Efficiency (%)

The quantity of energy input to the testing media; expressed as a percentage of the quantity of energy input to the appliance during the half- and full- energy input rate cooking energy efficiency tests.

Energy Input Rate (kW or kBtu/h)
Energy Consumption Rate
Energy Rate

The peak rate at which an appliance will consume energy, typically reflected during preheat.

Heating Value (Btu/ft^3)
Heating Content

The quantity of heat (energy) generated by the combustion of fuel. For natural gas, this quantity varies depending on the constituents of the gas.

Idle Energy Rate (kW or Btu/h)
Idle Energy Input Rate
Idle Rate

The rate of appliance energy consumption while it is "idling" or "holding" at a stabilized operating condition or temperature.

Glossary

Idle Temperature (°F, Setting)

The temperature of the cooking cavity/surface (selected by the appliance operator or specified for a controlled test) that is maintained by the appliance under an idle condition.

Measured Input Rate (kW or Btu/h)
Measured Energy Input Rate
Measured Peak Energy Input Rate

The maximum or peak rate at which an appliance consumes energy, typically reflected during appliance preheat (i.e., the period of operation when all burners or elements are "on").

Pilot Energy Rate (kBtu/h)
Pilot Energy Consumption Rate

The rate of energy consumption by the standing or constant pilot while the appliance is not being operated (i.e., when the thermostats or control knobs have been turned off by the food service operator).

Preheat Energy (kWh or Btu)
Preheat Energy Consumption

The total amount of energy consumed by an appliance during the preheat period.

Preheat Rate (°F/min)

The rate at which the cook zone heats during a preheat.

Preheat Time (minute)
Preheat Period

The time required for an appliance to "preheat" from the ambient room temperature (75 ± 5°F) to a specified (and calibrated) operating temperature or thermostat set point.

Production Capacity (lb/h)

The maximum production rate of an appliance while cooking a specified test product in accordance with the heavy-load cooking test.

Glossary

Production Rate (lb/h)
Productivity

The average rate at which an appliance brings a specified food product to a specified "cooked" condition.

Range Top

A device for cooking food by direct or indirect heat transfer from one or more cooking units to one or more cooking containers.

Rated Energy Input Rate (kW, W or Btu/h, Btu/h)
Input Rating (ANSI definition)
Nameplate Energy Input Rate
Rated Input

The maximum or peak rate at which an appliance consumes energy as rated by the manufacturer and specified on the nameplate.

Test Method

A definitive procedure for the identification, measurement, and evaluation of one or more qualities, characteristics, or properties of a material, product, system, or service that produces a test result.

Temperature Response

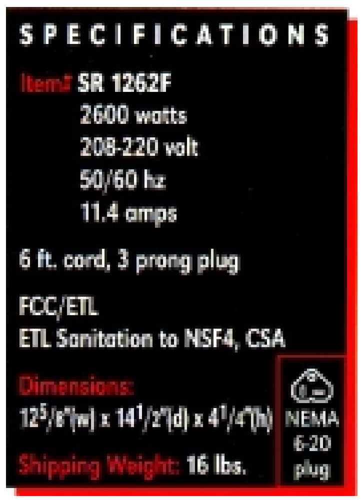
The temperature rise measure on the surface of a steel plate during the test period in accordance with the heat-up temperature response test.

Temperature Uniformity

The comparison of individual temperatures measured on the surface of a steel plate at the end of the test period in accordance with the heat-up temperature-response test.

B Appliance Specifications

Appendix B includes the product literature for the Sunpentown Mr. Induction range top.



C Results Reporting Sheets

Test Results - Data Sheet for Range Top STM

date: 09.09.99
company: Sunpentown
fuel: Electric
model: SR-1262F
notes: 2.6 kW Induction Range Top

energy input rate:

	kW		nameplate	% diff
unit	2.51	unit	2.6	3.5

17 temperatures on plate at end of 1 hour of operation at minimum control setting:
"temp" low setting

	°F		°F		°F
1	128.3	7	123.7	13	105.9
2	124.1	8	124.6	14	110.1
3	120.9	9	124.6	15	109.0
4	118.6	10	112.8	16	110.9
5	117.8	11	111.9	17	112.8
6	122.6	12	106.5	*input rate:*	0.096 kW

average plate temperature (average of 17 temperatures): 116.8 °F

17 temperatures on plate at end of 1 hour of operation at minimum control setting:
"cook" low setting

	°F		°F		°F
1	367.4	7	359.3	13	248.2
2	357.9	8	362.2	14	275.9
3	39.3	9	360.8	15	266.8
4	328.0	10	283.5	16	278.5
5	327.6	11	284.4	17	284.6
6	352.9	12	253.7	*input rate:*	0.507 kW

average plate temperature (average of 17 temperatures): 295.9 °F

C Results Reporting Sheets

17 temperatures on plate at end of 1 hour of operation at maximum control setting:
"cook" high setting*

	°F		°F		°F
1	565.7	7	534.9	13	244.7
2	533.3	8	541.3	14	245.2
3	500.0	9	528.9	15	234.0
4	515.6	10	237.2	16	238.1
5	514.7	11	242.6	17	243.5
6	550.5	12	242.4	*input rate:*	2.48 kW

average plate temperature (average of 17 temperatures): 394.9 °F

*(note: This temperature setting terminates after a high temperature safety-cut off point is activated.)

company: Sunpentown
fuel: Electric

page: 2
model: SR-1262F
notes: 2.6 kW Induction Range Top

17 temperatures on plate at end of 1 hour of operation at maximum control setting:
"temp" high setting

	°F		°F		°F
1	393.1	7	388.4	13	262.7
2	383.9	8	389.7	14	291.4
3	361.7	9	390.0	15	281.4
4	347.4	10	302.6	16	298.1
5	347.0	11	302.2	17	305.7
6	377.7	12	266.5	*input rate:*	0.590 kW

average plate temperature (average of 17 temperatures): 334.7 °F

production rate:

full-energy input rate

	lb/h
test 1	53.0
test 2	53.1
test 3	52.5
production rate	52.9

run	1	2	3	average
pot wt	6.6	6.6	6.6	
H2O wt	20.0	20.0	20.0	
delta t	130.5	130.0	130.0	
time	22.6	22.5	22.8	
lb/h	53.0	53.1	52.5	52.9
% uncertainty				1.5
Wh	949.0	944.9	953.4	
avg kW	2.5	2.5	2.5	
sens pot	189.4	188.7	188.7	
sens H2O	2610.0	2600.0	2600.0	
eff w/pot	86.7	86.5	85.7	86.3
% uncertainty				1.5