



Standard Test Method for Performance of Hot Food Holding Cabinets¹

This standard is issued under the fixed designation F2140; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method evaluates the preheat energy consumption, idle energy consumption, and dynamic energy consumption of hot food holding cabinets. The food service operator can use this evaluation to select a hot food holding cabinet and understand its energy performance, temperature uniformity, and overall performance. A hot food holding cabinet is described as a commercial kitchen appliance that is used to hold hot food (usually no greater than 200°F) that has been cooked in a separate appliance at a specified temperature.

1.2 This test method is applicable to electric hot food holding cabinets.

1.3 The hot food holding cabinet can be evaluated with respect to the following (where applicable):

- 1.3.1 Energy input rate (10.2),
- 1.3.2 Temperature calibration (10.3),
- 1.3.3 Preheat energy consumption and time (10.4),
- 1.3.4 Energy consumption (idle energy rate) (10.5),
- 1.3.5 Dynamic Energy Consumption and Performance (10.6) (active humidified cabinets), and
- 1.3.6 Temperature uniformity (10.5 and 10.6).

1.4 The values stated in inch-pound units are to be regarded as standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASHRAE Document:²

ASHRAE Guideline 2—1986 (RA90) “Engineering Analysis of Experimental Data”

2.2 NSF Standard:³

NSF/ANSI 4 - 2009 Commercial Cooking, Rethermalization, and Powered Hot Food Holding and Transport Equipment

3. Terminology

3.1 Definitions:

3.1.1 *active humidified, adj*—a category of holding cabinet, drawer, cook and hold, merchandiser, or other appliance that creates additional vapor in the air (often increasing humidity), commonly with the use of a water reservoir or steam generation, which allows separate controllability for energy supplied to the air temperature and water reservoir.

3.1.2 *air temperature, n*—the dry bulb temperature of an appliance.

3.1.2.1 *Discussion*—Often used as the primary temperature control for holding cabinets, ovens, and other food service appliances.

3.1.3 *cook-and-hold appliance, n*—a multiple-mode appliance intended for cooking food that may be used to hold the temperature of the food that has been cooked in the same appliance.

3.1.4 *drawer warmer, n*—an appliance that consists of one or more heated drawers and that is designed to hold hot food that has been cooked in a separate appliance at a specified temperature.

3.1.5 *dynamic energy consumption rate, n*—the rate of energy consumed (kW) by an active humidified holding cabinet, while maintaining control of wet-bulb and dry-bulb temperatures during use with the door being opened and closed frequently and consistently with food service operations.

¹ This test method is under the jurisdiction of ASTM Committee F26 on Food Service Equipment and is the direct responsibility of Subcommittee F26.06 on Productivity and Energy Protocol.

Current edition approved Sept. 1, 2024. Published November 2024. Originally approved in 2001. Last previous edition approved in 2019 as F2140 – 11 (2019). DOI: 10.1520/F2140-24.

² Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, <http://www.ashrae.org>.

³ Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140, <http://www.nsf.org>.

3.1.6 *energy input rate, n*—peak rate at which a hot food holding cabinet consumes energy (kW), typically reflected during preheat.

3.1.7 *heated glass merchandising cabinets, n*—an appliance with a heated compartment that is designed to display and maintain the temperature of hot food that has been cooked in a separate appliance.

3.1.8 *heater cycle, n*—a complete sequence of the heat source energizing, de-energizing, and energizing during the idle test. Heater cycle applies to snap-action style controls. Proportional style controls may not exhibit clear energized/de-energized sequences.

3.1.9 *holding cavity, n*—that portion of the appliance in which food products are held.

3.1.10 *hot food holding cabinet, n*—a heated, fully-enclosed compartment, with one or more solid or transparent doors, that is designed to maintain the temperature of hot food that has been cooked in a separate appliance. Does not refer to heated glass merchandising cabinets, drawer warmers or cook-and-hold appliances.

3.1.11 *idle energy rate—dry, n*—the rate of energy consumed (kW) by the hot food holding cabinet while “idling” the holding cavity at the control set point without using the humidity generating device, if applicable.

3.1.12 *passive humidified, adj*—a category of holding cabinet, drawer, cook and hold, merchandiser, or other appliance that creates additional vapor in the air (often increasing humidity), commonly with the use of a water reservoir, but does not have separate control to increase or decrease the humidity levels.

3.1.13 *preheat energy, n*—amount of energy consumed by the hot food holding cabinet while preheating the cabinet from ambient room temperature ($75 \pm 2.5^\circ\text{F}$) to 150°F , with the control(s) set to a calibrated 150°F .

3.1.14 *preheat rate, n*—average rate ($^\circ\text{F}/\text{min}$) at which the hot food holding cabinet is heated from ambient temperature ($75 \pm 2.5^\circ\text{F}$) to 150°F , with the control(s) set to a calibrated 150°F .

3.1.15 *preheat time, n*—time required for the hot food holding cabinet to preheat from ambient room temperature ($75 \pm 2.5^\circ\text{F}$) to 150°F , with the control(s) set to a calibrated 150°F .

3.1.16 *thermal cycle, n*—a complete sequence of center-cabinet peak to low to peak temperatures during the idle test. The thermal cycle can be used in place of the thermal cycle for units with proportional controls.

3.1.17 *uncertainty, n*—measure of systematic and precision errors in specified instrumentation or measure of repeatability of a reported test result.

3.1.18 *water reservoir, n*—a humidity pan, evaporator, device, or similar water-holding vessel, which is filled with water, that is built into the cabinet.

4. Summary of Test Method

4.1 The hot food holding cabinet is connected to the appropriate metered energy source, and energy input rate is

determined to confirm that the appliance is operating within 5 % of the nameplate energy input rate.

4.2 The accuracy of the hot food holding cabinet’s temperature control is checked at 150°F and adjusted as necessary to within $\pm 5^\circ\text{F}$.

4.3 The amount of energy and time required to preheat the hot food holding cabinet to 150°F , based on a calibrated 150°F set point, is determined.

4.4 The rate of idle energy consumption is determined with the hot food holding cabinet set to maintain 150°F with no food load and no humidity generation.

4.5 The rate of dynamic energy consumption is determined with active humidified hot food holding cabinets, with energy into the water device and maintaining a minimum average dry-bulb temperature of $150 \pm 5^\circ\text{F}$ and a wet-bulb temperature of 135°F , but not to exceed 140°F .

NOTE 1—Dynamic door-opening events are common for high volume operators during busy meal periods.

4.6 The degree of temperature stratification at 150°F is determined.

5. Significance and Use

5.1 The energy input rate and thermostat calibration tests are used to confirm that the hot food holding cabinet is operating properly prior to further testing.

5.2 Preheat energy and time can be useful to food service operators to manage energy demands and to know how quickly the hot food holding cabinet can be ready for operation.

5.3 Energy consumption (idle energy rate-dry) can be used by the food service operator to estimate energy consumption using minimal food-safe holding conditions during non-peak periods.

5.4 Energy consumption (dynamic rate) can be used by the food service operator who use active humidified cabinets to estimate energy consumption during peak and off-peak periods.

5.5 The wet-bulb temperature evaluation can be used by operators to ensure food safety and food quality attributes are maintained during peak and off-peak periods and help them select a hot food holding cabinet that will meet their needs.

5.6 The temperature uniformity can be used by operators to evaluate the consistency of food safety and quality throughout the cabinet and choose a hot food cabinet that meets their needs.

6. Lab Apparatus

6.1 *Data Acquisition System*, for measuring energy and temperatures, capable of multiple channel displays updating at least every 2 s.

6.2 *Wet-Bulb Measuring Device*, with an accuracy of $\pm 2^\circ\text{F}$ during an operating temperature range of 60 to 180°F during the duration of the test. In-house designed wet-bulb measuring devices are permissible using a thermocouple (with $\pm 2^\circ\text{F}$ accuracy) and a fabric sleeve that is continuously wetted around the thermocouple, provided that it can perform to the standard listed above.

6.3 *Stop Watch*, with a 1-s resolution.

6.4 *Thermocouple(s)*, calibrated exposed junction industry standard type thermocouple probes, with a range of 0 to 250°F and an uncertainty of $\pm 1^\circ\text{F}$.

6.5 *Watt-Hour Meter*, for measuring the electrical energy consumption of a hot food holding cabinet, shall have a resolution of at least 10 W·h and a maximum uncertainty no greater than 1.5 % of the measured value for any demand greater than 100 W. For any demand less than 100 W, the meter shall have a resolution of at least 10 W·h and a maximum uncertainty no greater than 10 %.

7. Reagents and Materials

7.1 *Aluminum Sheet Pans*, measuring $18 \times 26 \times 1$ in. for the idle tests. (Pans measuring $13 \times 18 \times 1$ in. may be used for smaller units if the larger pans do not fit).

8. Sampling, Test Units

8.1 *Hot Food Holding Cabinet*—Select a representative production model for performance testing.

9. Preparation of Apparatus

9.1 Install the hot food holding cabinets according to the manufacturer's instructions in an appropriate space. All sides of the hot food holding cabinets shall be a minimum of 3 ft from any side wall, side partition, or other operating appliance. The associated heating or cooling system for the space shall be capable of maintaining an ambient temperature of $75 \pm 2.5^\circ\text{F}$ within the testing environment.

9.2 Connect the hot food holding cabinet to a calibrated energy test meter. A voltage regulator may be required during tests if the voltage supply is not within $\pm 2.5\%$ of the manufacturer's nameplate voltage.

9.3 Confirm (while the elements are energized) that the supply voltage is within $\pm 2.5\%$ of the operating voltage specified by the manufacturer. Record the test voltage for each test.

NOTE 2—It is the intent of the testing procedure herein to evaluate the performance of a hot food holding cabinet at its rated electric voltage. If an electric unit is rated dual voltage (that is, designed to operate at either 208 or 240 V with no change in components), the voltage selected by the manufacturer and/or tester shall be reported. If a hot food holding cabinet is designed to operate at two voltages without a change in the resistance of the heating elements, the performance of the unit (for example, preheat time) may differ at the two voltages.

9.4 Assure that the hot food holding cabinet's vent or vent accessory (if applicable) is maintained in the same open or closed position for the entirety of all tests conducted, except cabinets that automatically open/close a vent to maintain desired settings.

9.5 For the preheat test and the idle test, each tested cabinet will have a minimum of three thermocouples regardless of the physical size of the unit, as described in NSF/ANSI 4 - 2009:

Thermocouple #1: (when facing the front of the unit) 5.0 ± 0.25 in. (127 ± 6.0 mm) from the left interior wall, 5.0 ± 0.25 in. (127 ± 6.0 mm) down from the ceiling, and centered front-to-back.

Thermocouple #2: centered front-to-back, centered top-to-bottom, centered left-to-right.

Thermocouple #3: (when facing the unit) 5.0 ± 0.25 in. (127 ± 6.0 mm) from the right interior wall, 5.0 ± 0.25 in. (127 ± 6.0 mm) above the internal floor of the unit, and centered front-to-back.

9.5.1 If interior spatial constraints prohibit the placement of thermocouples as specified above, alternate locations shall be selected to comply with the intent of the standard.

NOTE 3—The intent is for the thermocouples to form a diagonal in the unit while being centered front to back. See example in Fig. 1.

NOTE 4—The thermocouple placement in 9.5 is in accordance with NSF/ANSI 4 - 2009.

9.5.2 For the dynamic energy consumption test, install a wet-bulb measuring device within 6 in. of thermocouple 2, which is located in the geometric center of the hot food holding cabinet.

9.6 The idle energy consumption test will use sheet pans. The equipment shall be tested with one tray at the top, middle, and bottom of the hot holding cabinet.

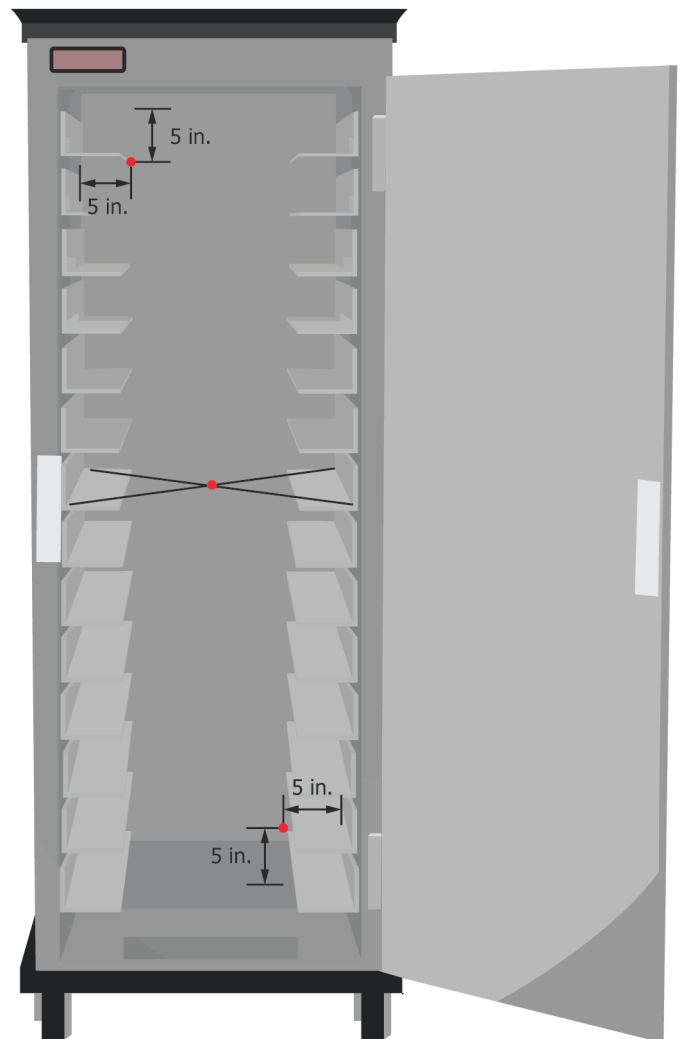


FIG. 1 Placement of Thermocouples

10. Procedure

10.1 General:

10.1.1 For the hot food holding cabinets, record the following for each test run:

10.1.1.1 Voltage while elements are energized,

10.1.1.2 Ambient temperature, and

10.1.1.3 Energy input rate during or immediately prior to each test run.

10.1.2 For each test run, confirm that the peak input rate is within $\pm 5\%$ of the rated nameplate input. If the difference is greater than 5% , terminate testing and contact the manufacturer. The manufacturer may make appropriate changes or adjustments to the hot food holding cabinet.

10.2 Energy Input Rate:

10.2.1 Set the air temperature controls to 150°F and turn on the hot food holding cabinet.

10.2.2 Start recording time and energy consumption when the elements are energized and stop recording when the heaters commence cycling (not when the hot food holding cabinet's ready light comes on). For units with proportional controls, record time and energy consumption while the heaters are operating at their peak input.

NOTE 5—A cabinet's ready light is an indication that the cabinet is up to temperature and not an indication of whether the elements are on or drawing power. It is the intent of this Energy Input Rate procedure to monitor the energy during a continuous period when the elements are energized.

10.2.3 Confirm that the measured input rate or power is within 5% of the rated nameplate input or power (it is the intent of the test procedure herein to evaluate the performance of a hot food holding cabinet at its rated energy input rate). If the difference between measured and rated input rate is greater than 5% , then contact the manufacturer. The manufacturer may make appropriate changes or adjustments to the test hot food holding cabinet or supply another hot food holding cabinet for testing.

10.3 Temperature Calibration:

10.3.1 Install a thermocouple at the geometric center of the hot food holding cabinet.

10.3.2 Set the controls to maintain a cabinet temperature of 150°F in the geometric center and turn the unit on. Stabilize for 60 min after the elements commence cycling at the thermostat set point.

NOTE 6—If the temperature dial does not have a temperature scale (for example, 70 to 200°F), but instead has a numbered setting dial (for example, 1 to 10) use a best guess estimate at what may be 150°F for the initial thermostat calibration setting and adjust as necessary thereafter.

10.3.3 Monitor and record the cavity temperature every 30 s for a minimum of 1 h. Average these recorded temperatures.

10.3.4 As required (as indicated by the average temperature), adjust the temperature control(s) to attain an actual holding cavity temperature of $150 \pm 5^{\circ}\text{F}$. Repeat 10.3.3 to confirm that the cavity temperature is $150 \pm 5^{\circ}\text{F}$.

10.3.5 To facilitate further testing, mark on the dial the exact position of the thermostat control(s) that corresponds to an average holding cavity temperature of $150 \pm 5^{\circ}\text{F}$. Record the final control setting.

10.4 Preheat Energy Consumption and Time:

NOTE 7—The preheat test should be conducted as the first appliance operation on the day of the test, starting with the holding cavity at room temperature ($75 \pm 2.5^{\circ}\text{F}$).

10.4.1 Assure that there are no sheet pans in the cabinet.

NOTE 8—The preheat test requires that no sheet pans are in the hot food holding cabinet.

10.4.2 Record oven cavity temperature and ambient temperature at the start of the test. The cavity temperature shall be $75 \pm 2.5^{\circ}\text{F}$ at the start of the test.

10.4.3 Turn the unit on with control(s) set to maintain 150°F at each thermocouple, as determined in 10.3.5.

10.4.4 Record the cavity temperature over a minimum of 5-s intervals during the course of preheat.

10.4.5 Record the energy and time to preheat the hot food holding cabinet. Preheat is judged complete when the temperature at the geometric center of the cabinet reaches 150°F , as indicated by the thermocouple.

10.5 Energy Consumption (Idle Energy Rate—Dry):

NOTE 9—The idle test may be conducted immediately following the preheat test (10.4). In addition, testing at Pacific Gas and Electric's Food Service Technology Center has determined that the ambient temperature during the idle energy consumption test can affect the energy usage; therefore, it is important to record the average ambient temperature during testing.

10.5.1 Preheat the air temperature of the hot food holding cabinet to 150°F . If testing a humidified cabinet, the cabinet is to be empty of water and any humidification settings are deactivated.

10.5.2 Place the sheet pans as determined in 9.6 into the predetermined positions and center front to back and side to side (if applicable).

10.5.3 Stabilize the hot food holding cabinet for a minimum of 2 h after the sheet pans have been inserted. Monitor the temperature of the center location during the 2-h stabilization period and not the average maximum and average minimum temperatures at the location. This is used to determine the thermal cycle for the unit.

10.5.4 After a minimum 2-h stabilization period, wait for the unit to reach the top of a thermal cycle (units with proportional controls) or the heater cycle off (units with snap-action controls), then immediately start monitoring elapsed time, cabinet temperature(s) and energy consumption.

10.5.5 The idle energy rate test shall be run for a minimum of 3 h and include a minimum of 10 complete thermal cycles or heater cycles. After the test period (either 3 h or 10 thermal/heater cycles, whichever is longer), end the test. If the test unit does not exhibit clear thermal cycles, then the test shall be run for 3 h.

NOTE 10—Models with proportional controls may not exhibit distinct heater cycles. The intent of the test is to accurately represent the average energy consumption of the holding cabinet needed to maintain food safety during off-peak operational periods while minimizing any error that may be introduced as a result of capturing partial thermal cycles.

10.5.6 Record the total elapsed time and energy consumption of the cabinet during the idle test.

NOTE 11—Idle energy consumption rate can be used to calculate

real-world energy usage with the door closed. It has been determined at Pacific Gas and Electric's Food Service Technology Center that the energy consumption of an empty hot food holding cabinet and a fully loaded (with food) cabinet are very similar.

10.6 Energy Consumption (Dynamic – Active Humidified Cabinets Only):

10.6.1 Fill the water reservoir with $70 \pm 2^\circ\text{F}$ ($\pm 1.1^\circ\text{C}$) water to the manufacturer's indicated maximum fill mark (if applicable) or to 90 % pan capacity.

10.6.2 Place the sheet pans, thermocouples, and wet-bulb measuring device, as determined in 9.5 and 9.6.

10.6.3 Preheat the cabinet with air temperature set to 150°F (65.5°C), as determined by 10.3.5. Activate energy to the water reservoir, most commonly by the humidity dial, to a setting that maintains a wet-bulb temperature of at least 135°F (57.2°C), but not to exceed 140°F (60°C). If the required wet-bulb temperature is unable to be reached, turn the controls for the air and humidity to the highest setting.

10.6.4 Stabilize the hot food holding cabinet for a minimum of 2 h after the air and wet-bulb temperatures have been reached (or adjusted up to the maximum level if applicable).

10.6.5 After a minimum 2-h stabilization period, wait for the unit to reach the top of a thermal cycle and the heater cycle off, then immediately start monitoring elapsed time, temperatures of each thermocouple, wet-bulb temperatures, and energy consumption.

10.6.6 Begin Door Opening Test Protocol by performing full-door openings for 10 s every 1 min, for a period of 60 min.

NOTE 12—A full door opening is defined as an opening of a minimum of 90° from the closed position. If the cabinet has multiple doors, the top door shall be used for the door-opening process. If cabinets have optional configurations (for example, pass-through flip-up doors, etc.), the standard configuration may be used for testing compliance purposes.

10.6.7 After the Door Opening Test Protocol is complete, begin the Closed-Door Recovery Test Protocol by maintaining a closed door for 30 min.

10.6.8 Record the times, air thermocouple temperatures (3 sources) and wet-bulb temperatures (1 source) during Door Opening Test and Closed-Door Recovery Test Protocol.

10.6.9 Record the total elapsed time and total energy consumption during the Dynamic Test.

11. Calculation and Report

11.1 Test Hot Food Holding Cabinet:

11.1.1 Summarize the physical and operating characteristics of the hot food holding cabinet, including the interior dimensions of the hot food holding cabinet. If needed, describe other design or operating characteristics that may facilitate interpretation of the test results.

11.2 Apparatus and Procedure:

11.2.1 Confirm that the testing apparatus conformed to all of the specifications in Section 6. Describe any deviations from those specifications.

11.2.2 Report the voltage for each test.

11.3 Energy Input Rate:

11.3.1 Report the manufacturer's nameplate energy input rate in kW for the electric hot food holding cabinet.

11.3.2 For the hot food holding cabinets, calculate and report the measured energy input rate (kW) based on the energy consumed by the hot food holding cabinet during the period of peak energy input according to the following relationship:

$$q_{input} = \frac{E \times 60}{t} \quad (1)$$

where:

q_{input} = measured peak energy input rate, kW,
 E = energy consumed during period of peak energy input, kW·h, and
 t = period of peak energy input, min.

11.3.3 Calculate and report the percent difference between the manufacturer's nameplate energy input rate and the measured energy input rate.

11.4 Temperature Calibration:

11.4.1 For the as-received condition, report the holding cavity temperature (at the geometric center of the cabinet) that corresponds to the 150°F setting on the hot food cabinet's thermostat control.

11.4.2 Report any discrepancies greater than 5°F between the temperature indicated by the hot food cabinet's control and the 150°F hot food cabinet cavity temperature.

11.5 Preheat Energy and Time:

11.5.1 Report the preheat energy consumption (kWh) and preheat time (min).

11.5.2 Calculate and report the average preheat rate ($^\circ\text{F}/\text{min}$) based on the preheat period. Also report the starting temperature of the holding cavity.

11.5.3 Generate a graph showing the holding cavity temperature versus time based on the preheat period.

11.6 Energy Consumption (Idle Energy Rate):

11.6.1 Calculate and report the idle energy consumption rate dry (kW) based on:

$$q_{idle} = \frac{E \times 60}{t} \quad (2)$$

where:

q_{idle} = energy consumption (idle energy rate), kW,
 E = energy consumed during the test period, kW·h, and
 t = test period, min.

11.6.2 Report the number of thermocouples used in the idle energy consumption rate test. Also report the number of sheet pans used in the idle energy consumption rate test stratification.

11.6.3 Report the greatest temperature differences between the thermocouples during the idle energy consumption rate test.

11.7 Dynamic Energy Consumption and Performance:

11.7.1 Calculate and report the average air temperatures (center, top, and bottom) from each section of the dynamic testing protocols, detailing the range based on the columns of the chart in X1.1 (Fig. X1.4).

11.7.2 Calculate and report the greatest temperature differences between center, top, and bottom from each section of the dynamic testing protocols.

11.7.3 Calculate and report the average wet-bulb temperature during each section of the dynamic testing protocols.

11.7.4 Calculate and report the number of minutes that it took for the wet-bulb temperature to recover back to a minimum of 135°F during the 60-min Closed-Door Recovery period of the Dynamic test. If the unit did not recover within the 60 min process, detail DNR (did not recover) and the temperature it reached prior to the second Door Opening Protocol (for example, DNR - 131°F).

11.7.5 Calculate and report the Dynamic Energy Consumption Rate (kW) for the duration of the two-hour test based on:

$$q_{dynamic} = \frac{E \times 60}{t} \quad (3)$$

where:

$q_{dynamic}$ = energy consumption (dynamic energy rate), kW,
 E = energy consumed during the test period, kW·h,
 and
 t = test period, min.

12. Precision and Bias

12.1 Precision:

12.1.1 *Repeatability* (within laboratory, same operator and equipment).

12.1.1.1 The repeatability for each reported parameter is being determined.

12.1.2 *Reproducibility* (multiple laboratories).

12.1.2.1 The interlaboratory precision of the procedure in this test method for measuring each reported parameter is being determined.

12.2 *Bias*—No statement can be made concerning the bias of the procedures in this test method because there are no accepted reference values for the parameters reported.

13. Keywords

13.1 active humidified; hot food holding cabinet; idle energy consumption; passive humidified; preheat time and energy consumption



APPENDIX

(Nonmandatory Information)

X1. RESULTS REPORTING SHEETS

X1.1

Manufacturer _____
Model _____
Date _____
Test Reference Number (optional) _____

Section 11.1 Test Hot Food Holding Cabinet

Description of operational characteristics:

Section 11.2 Apparatus

_____ Check if testing apparatus conformed to specifications in Section 6.

Deviations:

Section 11.3 Energy Input Rate

Test Voltage (V) _____
Measured (kW) _____
Rated (kW) _____
Percent Difference between Measured and Rated (%) _____

*Section 11.4 Thermostat Calibration***As-Received:**

Temperature Control Setting (°F) 150
Cavity Temperature (°F) _____

As-Adjusted:

Temperature Control Setting (°F) _____
Cavity Temperature (°F) _____

Section 11.5 Preheat Energy and Time

Test Voltage (V) _____
Starting Temperature (°F) _____
Energy Consumption (kW h) _____
Duration (min) _____
Preheat rate (°F/min) _____

FIG. X1.1 Results Reporting Sheet

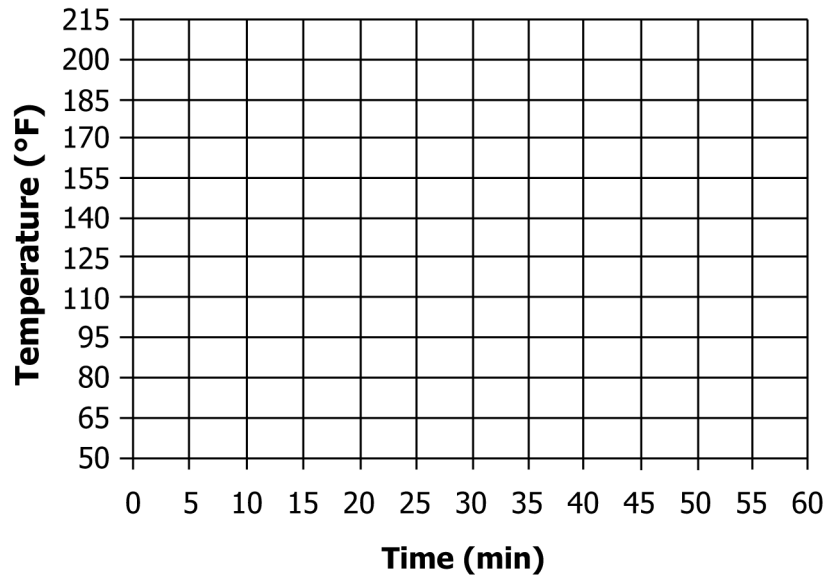


FIG. X1.2 Preheat Curve

Section 11.6 Energy Consumption (Idle Energy Rate)

	Idle Energy Consumption	
Test Voltage (V)		
Energy Consumption @ 150°F (kW)		
Ambient Temperature for Energy Consumption Test (°F)		
Number of Thermocouples		
Number of Sheet Pans		
Average Temperature at Top of Cabinet (°F)		
Average Temperature at Center of Cabinet (°F)		
Average Temperature at Bottom of Cabinet (°F)		
Additional Average Temperatures (°F)		
Maximum Temperature Difference (°F)		

Fig. X1.3 Idle Energy Results Table

Section 11.7 Dynamic Energy Consumption and Performance

	Starting Data	60-min Door Opening Protocol	30-min Closed-Door Recovery Protocol	1.5 h Test Duration
Average Air Temperature at Center of Cabinet (°F)				
Average Air Temperature at Top of Cabinet (°F)				
Average Air Temperature at Bottom of Cabinet (°F)				
Maximum Temperature Difference of Cabinet (°F)				
Average Wet Bulb Temperature (°F)				
Wet-Bulb Recovery Time (minutes)	N/A	N/A		N/A
Energy Consumption (kW)	N/A	N/A	N/A	

Fig. X1.4 Dynamic Testing Results Table

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