Designation: F 1817 – 97

Standard Test Method for
Performance of Conveyor Ovens[1]

This standard is issued under the fixed designation F 1817; 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 covers an evaluation of the energy consumption and cooking performance of conveyor ovens. The food service operator can use this evaluation to select a conveyor oven and understand its energy consumption.

1.2 This test method is applicable to gas and electric conveyor ovens.

1.3 The conveyor oven can be evaluated with respect to the following (where applicable):

1.3.1 Energy input rate and thermostat calibration (see 10.2),

1.3.2 Preheat energy consumption and time (see 10.3),

1.3.3 Idle energy rate (see 10.4),

1.3.4 Pilot energy rate (if applicable) (see 10.5), and

1.3.5 Cooking energy efficiency and production capacity (see 10.6).

1.4 The values stated in inch-pound units are to be regarded as the 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASHRAE Documents:*

ASHRAE Handbook of Fundamentals, "Thermal and Related Properties of Food and Food Materials," Chapter 30, Table 1, 1989[2]

ASHRAE Guideline 2-1986 (RA90) Engineering Analysis of Experimental Data[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *conveyor oven*, *n*—an appliance that carries the food product on a moving conveyor into and through a heated chamber. The chamber may be heated by gas or electric forced convection, radiants, or quartz tubes. Top and bottom heat may be independently controlled.

3.1.2 *cooking energy efficiency*, *n*—quantity of energy imparted to the specified food product, expressed as a percentage of energy consumed by the conveyor oven during the cooking event.

3.1.3 *cooking energy rate*, *n*—average rate of energy consumption (Btu/h or kW) during the cooking energy efficiency tests. Refers to all loading scenarios (heavy, medium, light).

3.1.4 *energy input rate*, *n*—peak rate at which a conveyor oven consumes energy (Btu/h or kW).

3.1.5 *idle energy rate*, *n*—the conveyor oven's rate of energy consumption (kW or Btu/h), when empty, required to maintain its cavity temperature at the specified thermostat set point.

3.1.6 *oven cavity*, *n*—that portion of the conveyor oven in which food products are heated or cooked.

3.1.7 *pilot energy rate*, *n*—rate of energy consumption (Btu/h) by a conveyor oven's continuous pilot (if applicable).

3.1.8 *preheat energy*, *n*—amount of energy consumed (Btu or kWh), by the conveyor oven while preheating its cavity from ambient temperature to the specified thermostat set point.

3.1.9 *preheat time*, *n*—time (min.) required for the conveyor oven cavity to preheat from ambient temperature to the specified thermostat set point.

3.1.10 *production capacity*, *n*—maximum rate (lb/h) at which a conveyor oven can bring the specified food product to a specified "cooked" condition.

3.1.11 *production rate*, *n*—rate (lb/h) at which a conveyor oven brings the specified food product to a specified "cooked" condition. Does not necessarily refer to maximum rate. Production rate varies with the amount of food being cooked.

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

4. Summary of Test Method

4.1 Accuracy of the conveyor oven thermostat is checked at a setting of 475°F and the thermostat is adjusted as necessary.

4.2 Energy input rate is determined to confirm that the conveyor oven is operating within 5 % of the nameplate energy input rate. For gas conveyor oven, the pilot energy rate and the fan and control energy rates are also determined.

4.3 Preheat energy and time are determined.

4.4 Idle energy rate is determined at a thermostat setting of 475°F.

4.5 Cooking energy efficiency and production rate are determined during light-, and heavy-load cooking tests using pizza as a food product.

5. Significance and Use

5.1 The energy input rate test and thermostat calibration are used to confirm that the conveyor oven is operating properly prior to further testing and to insure that all test results are determined at the same temperature.

5.2 Preheat energy and time can be useful to food service operators to manage power demands and to know how quickly the conveyor oven can be ready for operation.

5.3 Idle energy rate and pilot energy rate can be used to estimate energy consumption during noncooking periods.

5.4 Cooking energy efficiency is a precise indicator of conveyor oven energy performance while cooking a typical food product under various loading conditions. If energy performance information is desired using a food product other than the specified test food, the test method could be adapted and applied. Energy performance information allows an end user to better understand the operating characteristics of a conveyor oven.

5.5 Production capacity information can help an end user to better understand the production capabilities of a conveyor oven as it is used to cook a typical food product and this could help in specifying the proper size and quantity of equipment. If production information is desired using a food product other than the specified test food, the test method could be adapted and applied.

6. Apparatus

6.1 *Analytical Balance Scale*, for measuring weights up to 20 lb, with a resolution of 0.01 lb and an uncertainty of 0.01 lb.

6.2 *Barometer*, for measuring absolute atmospheric pressure, to be used for adjustment of measured natural gas volume to standard conditions. Shall have a resolution of 0.2 in. Hg and an uncertainty of 0.2 in. Hg.

6.3 *Canopy Exhaust Hood*, 4 ft in depth, wall-mounted with the lower edge of the hood 6 ft , 6 in. from the floor and with the capacity to operate at a nominal exhaust ventilation rate of 300 cfm per linear foot of active hood length. This hood shall extend a minimum of 6 in. past both sides and the front of the cooking appliance and shall not incorporate side curtains or partitions.

6.4 *Convection Drying Oven*, with temperature controlled at 220 ± 5°F, to be used to determine moisture content of pizza crust, pizza sauce and pizza cheese.

6.5 *Gas Meter*, for measuring the gas consumption of a conveyor oven, shall be a positive displacement type with a resolution of at least 0.01 ft^3 and a maximum uncertainty no greater than 1 % of the measured value for any demand greater than 2.2 ft^3/h. If the meter is used for measuring the gas consumed by the pilot lights, it shall have a resolution of at least 0.01 ft^3 and a maximum uncertainty no greater than 2 % of the measured value.

6.6 *Pressure Gage*, for monitoring natural gas pressure.

Shall have a range of zero to 10 in. H$_2$O, a resolution of 0.5 in. H$_2$O, and a maximum uncertainty of 1 % of the measured value.

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

6.8 *Temperature Sensor*, for measuring natural gas temperature in the range of 50 to 100°F with an uncertainty of ±1°F .

6.9 *Thermocouple*, fiberglass insulated, 24 gage, Type K thermocouple wire, connected at the exposed ends by tightly twisting or soldering the two wires together.

6.10 *Thermocouple Probe*, type K, micro needle, product probe with a response time from ambient to 200°F of less than 20 s.

6.11 *Watt-Hour Meter*, for measuring the electrical energy consumption of a conveyor oven, shall have a resolution of at least 10 Wh 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 Wh and a maximum uncertainty no greater than 10 %.

7. Reagents and Materials

7.1 *Pizza Crust* shall be a 12 in. diameter, prebaked or parbaked crust, weighing 0.9 ± 0.2 lb and having a moisture content of 36 ± 3 % by weight, based on a gravimetric moisture analysis. Refrigerate to 39 ± 1°F.

7.2 *Pizza Sauce* shall be a simple, tomato based sauce with a moisture content of 90 ± 2 % by weight, based on a gravimetric moisture analysis. Refrigerate to 39 ± 1°F.

7.3 *Pizza Cheese* shall be a part skim, low moisture, shredded mozzarella cheese with a moisture content of 50 ± 2 % by weight, based on a gravimetric moisture analysis. Refrigerate to 39 ± 1°F.

7.4 *Pizza* shall be comprised of a pizza crust, pizza sauce and pizza cheese according to the following: uniformly spread 0.25 lb of pizza sauce on top of a pizza crust to within 0.5 in. of the edge of the crust and cover the pizza sauce with 0.375 lb of pizza cheese.

7.5 Gravimetric moisture analysis shall be performed as follows: to determine moisture content, place a 1 lb sample of the test food on a dry, aluminum sheet pan and place the pan in a convection drying oven at a temperature of 220 ± 5°F for a period of 24 h. Weigh the sample before it is placed in the oven and after it is removed and determine the percent moisture content based on the percent weight loss of the sample. The sample must be thoroughly chopped (⅛ in. or smaller squares) and spread evenly over the surface of the sheet pan in order for all of the moisture to evaporate during drying and it is permissible to spread the sample on top of baking paper in order to protect the sheet pan and simplify clean-up.

NOTE 1—The moisture content of pizza crust, pizza sauce, and pizza cheese can be determined by a qualified chemistry lab using the AOAC Procedure 984.25 Moisture (Loss of Mass on Drying) in Frozen French Fried Potatoes.

8. Sampling, Test Units

8.1 *Conveyor Oven*—Select a representative production model for performance testing.

9. Preparation of Apparatus

9.1 Install the appliance according to the manufacturer's

instructions under a canopy exhaust hood. Position the conveyor oven so that a minimum of 6 in. is maintained between the edge of the hood and the vertical plane of the front and sides of the appliance. In addition, both sides of the conveyor oven shall be a minimum of 3 ft from any side wall, side partition, or other operating appliance. The exhaust ventilation rate shall be 300 cfm per linear foot of active hood length. The associated heating or cooling system shall be capable of maintaining an ambient temperature of 75 ± 5°F within the testing environment when the exhaust ventilation system is operating.

NOTE 2—The ambient temperature requirements are designed to simulate real world kitchen temperatures and are meant to provide a reasonable guideline for the temperature requirements during testing. If a facility is not able to maintain the required temperatures, then it is reasonable to expect that the application of the procedure may deviate from the specified requirements (if it cannot be avoided) as long as those deviations are noted on the Results Reporting Sheets.

9.2 Connect the conveyor oven to a calibrated energy test meter. For gas installations, install a pressure regulator downstream from the meter to maintain a constant pressure of gas for all tests. Install instrumentation to record both the pressure and temperature of the gas supplied to the conveyor oven and the barometric pressure during each test so that the measured gas flow can be corrected to standard conditions. For electric installations, a voltage regulator may be required during tests if the voltage supply is not within ±2.5 % of the manufacturer's nameplate voltage.

9.3 For an electric conveyor oven, confirm (while the conveyor oven elements are energized) that the supply voltage is within ±2.5 % of the operating voltage specified by the manufacturer. Record the test voltage for each test.

NOTE 3—If an electric conveyor oven is rated for dual voltage (for example, 208/240 V), the conveyor oven shall be evaluated as two separate appliances in accordance with this test method.

9.4 For a gas conveyor oven, adjust (during maximum energy input) the gas supply pressure downstream from the appliance's pressure regulator to within ±2.5 % of the operating manifold pressure specified by the manufacturer. Make adjustments to the appliance following the manufacturer's recommendations for optimizing combustion.

10. Procedure

10.1 *General*:

10.1.1 For gas appliances, record the following for each test run:

10.1.1.1 Higher heating value,

10.1.1.2 Standard gas pressure and temperature used to correct measured gas volume to standard conditions,

10.1.1.3 Measured gas temperature,

10.1.1.4 Measured gas pressure,

10.1.1.5 Barometric pressure,

10.1.1.6 Energy input rate during or immediately prior to test (for example, during the preheat for that days testing), and

10.1.1.7 Ambient temperature.

NOTE 4—Using a calorimeter or gas chromatograph in accordance with accepted laboratory procedures is the preferred method for determining the higher heating value of gas supplied to the conveyor oven under test.

It is recommended that all testing be performed with gas having a higher heating value of 1000 to 1075 Btu/ft^3.

10.1.2 For gas conveyor ovens, add electric energy consumption to gas energy for all tests, with the exception of the energy input rate test (see 10.3).

10.1.3 For electric conveyor ovens, record the following for each test run:

10.1.3.1 Voltage while elements are energized,

10.1.3.2 Energy input rate during or immediately prior to test (for example, during the preheat for that days testing), and

10.1.3.3 Ambient temperature.

10.1.4 For each test run, confirm that the peak input rate is within ±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 conveyor oven.

10.2 *Energy Input Rate and Thermostat Calibration*:

10.2.1 Install a thermocouple 2 in. above the conveyor, at the center of the oven cavity (side to side and front to back).

10.2.2 Set the temperature control to 475°F and turn the conveyor oven on. Record the time and energy consumption from the time when the unit is turned on until the time when any of the burners or elements first cycle off.

10.2.3 Calculate and record the conveyor oven's energy input rate and compare the result to the rated nameplate input. For gas conveyor ovens, only the burner energy consumption is used to compare the calculated energy input rate with the rated gas input; any electrical energy use shall be calculated and recorded separately as the fan/control energy rate.

10.2.4 Allow the conveyor oven to idle for 60 min after the burners or elements commence cycling at the thermostat set point.

10.2.5 After the 60 min idle period, start monitoring the conveyor oven cavity temperature and record the average temperature over a 30 min period. If this recorded temperature is 475 ± 5°F, then the conveyor oven's thermostat is calibrated.

10.2.6 If the average temperature is not 475 ± 5°F, adjust the conveyor oven's temperature control following the manufacturer's instructions and repeat 10.2.5 until it is within this range. Record the corrections made to the controls during calibration.

10.2.7 In accordance with 11.4, calculate and report the conveyor oven energy input rate, fan/control energy rate where applicable, and rated nameplate input.

10.3 *Preheat Energy Consumption and Time*:

10.3.1 Verify that the conveyor oven cavity temperature is 75 ± 5°F. Set the calibrated temperature control to 475°F and turn the conveyor oven on.

10.3.2 Record the time, temperature and energy consumption required to preheat the conveyor oven, from the time when the unit is turned on until the time when the conveyor oven cavity reaches a temperature of 465°F. Recording should occur at intervals of 5 seconds or less in order to accurately document the temperature rise of the oven cavity.

NOTE 5—Research at PG&E's Food Service Technology Center indicates that a conveyor oven is sufficiently preheated and ready to cook when the oven cavity temperature is within 10°F of the oven set point (that

is, 465°F when the thermostat is set to maintain 475°F).

10.3.3 In accordance with 11.5, calculate and report the preheat energy consumption and time and generate a preheat temperature-versus-time graph.

10.4 *Idle Energy Rate*:

10.4.1 Set the calibrated temperature control to 475°F and preheat the conveyor oven.

10.4.2 Allow the conveyor oven to idle for 60 min after the burners or elements commence cycling.

10.4.3 At the end of 60 min, begin recording the conveyor oven's idle energy consumption, at 475°F, for a minimum of 2 h. Record the length of the idle period.

10.4.4 In accordance with 11.6, calculate and report the conveyor oven's idle energy rate.

10.5 *Pilot Energy Rate*:

10.5.1 For a gas conveyor oven with a standing pilot, set the gas valve at the "pilot" position and set the conveyor oven's temperature control to the "off" position.

10.5.2 Light and adjust the pilot according to the manufacturer's instructions.

10.5.3 Monitor gas consumption for a minimum of 8 h of pilot operation.

10.5.4 In accordance with 11.7, calculate and report the pilot energy rate.

10.6 *Pizza Preparation*:

10.6.1 Measure the width of the oven conveyor and determine the nominal conveyor width by rounding down to the nearest 1 ft. For example, a conveyor that is 27 in. wide has a nominal width of 2 ft. The nominal width represents how many pizzas (12 in. diameter) can fit side-by-side on the conveyor. Measure the length of the oven cavity and determine the nominal cavity length by rounding down to the nearest 1 ft. For example, an oven cavity that is 42 in. long has a nominal cavity length of 3 ft. The nominal length, in conjunction with the nominal width, represents how many pizzas can fit completely within the oven cavity. For instance, an oven with a nominal conveyor width of 2 ft and a nominal cavity length of 3 ft can hold six pizzas at once. Note the nominal conveyor width and nominal cavity length of the oven under test.

10.6.2 Based on the nominal conveyor width and nominal cavity length of the oven, prepare enough pizzas (in accordance with Section 7) for a light load test and a heavy load test. Each test will consist of a minimum of three runs. Table 1 lists how many pizzas are required for each run of a light load test and Table 2 lists how many pizzas are required for each run of a heavy load test. Table 3 lists how many pizzas are required for a complete oven test; the three runs of a light load test plus the three runs of a heavy load test. Cover the pizzas with cellophane (to inhibit moisture loss), and then place in a

TABLE 1 Total Number of Pizzas Required for Each Run of a Light Load Test[A]

		Nominal Length, ft					
		1	2	3	4	5	6
Nominal	1	4	4	4	4	4	4
Width,	2	8	8	8	8	8	8
ft	3	12	12	12	12	12	12
	4	16	16	16	16	16	16

[A]Includes both the stabilization pizzas and the test pizzas.

TABLE 2 Total Number of Pizzas Required for Each Run of a Heavy Load Test[A]

		Nominal Length, ft					
		1	2	3	4	5	6
Nominal	1	4	8	12	16	20	24
Width,	2	8	16	24	32	40	48
ft	3	12	24	36	48	60	72
	4	16	32	48	64	80	96

[A]Includes both the stabilization pizzas and the test pizzas.

TABLE 3 Total Number of Pizzas Required for a Complete Oven Test[A]

		Nominal Length, ft					
		1	2	3	4	5	6
Nominal	1	24	36	48	60	72	84
Width,	2	48	72	96	120	144	168
ft	3	72	108	144	180	216	252
	4	96	144	192	240	288	336

[A]Includes both the stabilization pizzas and the test pizzas required for three runs of the light load test and three runs of the heavy load test.

refrigerator to chill until they stabilize at 39 ± 1°F. Do not test with pizzas that have been in the refrigerator more than 24 h.

NOTE 6—The test pizzas should not be stored in the refrigerator for long periods, more than 24 h, because the pizza crust may absorb excessive moisture from the sauce and evaporation may reduce the moisture content of the sauce, changing the thermal characteristics of the pizza. The 24-h period is a practical "time" specification that allows the preparation of test pizzas on day one, overnight chilling and stabilization and application of the procedure the following day.

NOTE 7—In order to easily handle and store the pizzas, it is recommended that the prepared pizzas be placed on full size (18 by 26 in.) sheet pans, two pizzas per pan. The entire pan can then be covered with food grade plastic wrap. When stacking multiple pans in the refrigerator, spacers are necessary between the pans in order to protect the pizzas from damage. Researchers at PG&E's Food Service Technology Center have found that sauce cups can be used as spacers.

NOTE 8—A minimum of three test runs is specified, however, more test runs may be necessary if the results do not meet the uncertainty criteria specified in Annex A1.

NOTE 9—Table 1, Table 2, and Table 3 are meant to help the tester prepare the right number of total pizzas needed to perform the cooking energy efficiency and production capacity (10.8) test procedure. As part of that procedure, the pizzas required for each run of a light load test and each run of a heavy load test are divided into two equal groups and referred to as "stabilization" pizzas and "test" pizzas. The quantities specified in Table 1, Table 2, and Table 3 include the total number of required pizzas, that is, "stabilization" plus "test".

10.6.3 Prepare a minimum of four additional pizzas for use in cook time determination. The actual number of pizzas needed for the cook time determination will vary with the number of trials needed to establish a cooking time that demonstrates a 195 ± 3°F final pizza temperature after cooking.

10.7 *Cook Time Determination*:

10.7.1 Set the calibrated temperature control to 475°F, preheat the conveyor oven and allow it to idle for 60 min. Estimate a cook time for pizza and set the conveyor in motion. The cook time is the time that it takes the entire pizza to pass completely through the oven cavity, starting from the point where the leading edge of the pizza enters the oven cavity until the point where the trailing edge of the pizza exits the oven

cavity. The cook time will be different from the conveyor speed, which is the time it takes for a single point on the conveyor to pass through the oven cavity. The oven controls will most likely be based on the conveyor speed.

10.7.2 Remove a pizza from the refrigerator and place the pizza directly on the conveyor (do not use a pizza screen or pan) so that the leading edge of the pizza is adjacent to the entrance to the oven cavity. Do not allow more than 1 min to elapse from the time a pizza is removed from the refrigerator until it is placed on the conveyor.

10.7.3 Allow the pizza to pass through the oven cavity and cook. As soon as the entire pizza has passed through the oven cavity, remove the pizza from the conveyor and place the pizza on an insulated, non-metallic surface such as corrugated cardboard. A standard cardboard pizza box is acceptable.

10.7.4 Determine the final temperature of the pizza by placing six thermocouple probes on the surface of the pizza. Locate the probes 3 in. from the center of the pizza and spaced equidistant from each other as shown in Fig. 1. The probes should penetrate the cheese and rest on the sauce-crust interface directly beneath the cheese. Allow no more than 10 s from the time the pizza is removed from the conveyor to the time the probes are placed on the pizza. Wait 30 s after the probes are

placed on the pizza, which allows time for the probes to stabilize, record the temperatures of all six probes and average them together. Leave the probes in place and record and average the temperatures again at 40 s, 50 s and 60 s. Fig. 2 details the timing of the temperature measurement. The final pizza temperature is the highest of these four averaged temperature readings. If the final pizza temperature is not 195 ± 3°F, adjust the cook time and repeat the cook time determination test as necessary to produce a 195 ± 3°F final temperature.

NOTE 10—It is recommended that the six thermocouple probes be attached to a simple, lightweight, rigid structure that will maintain the proper spacing and upright position of the probes and will therefore help maintain the consistency of the temperature readings. The following photograph shows a thermocouple structure that is made of Plexiglas and includes a simple handle for easy placement of the structure on the pizza. This structure can be gently set on top of the pizza during cooktime determination with just enough force to penetrate the cheese but not enough to push the probes beyond the sauce-crust interface. Because the sauce migrates into the crust during cooking, it is relatively easy to remain in the sauce-crust interface during temperature measurement.

10.7.5 Record the determined cook time for use during the cooking energy efficiency and production capacity tests.

10.8 *Cooking Energy Efficiency and Production Capacity*:
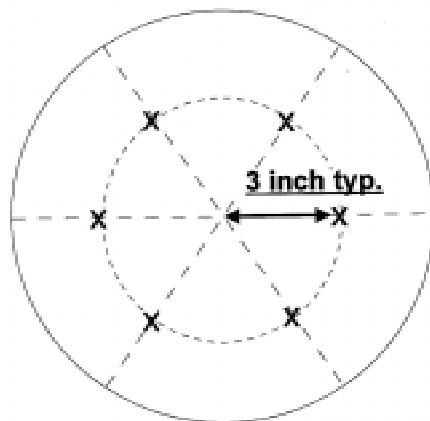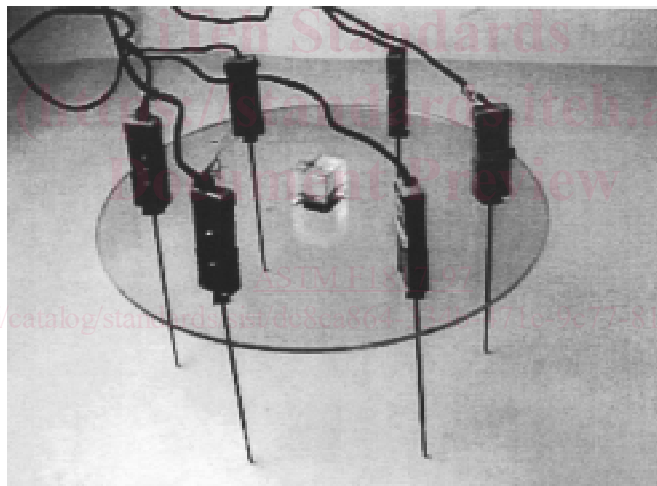
NOTE 1—The structure shown in the above photograph can be gently set on top of the pizza during cook-time determination with just enough force to penetrate the cheese but not enough to push the probes beyond the sauce-crust interface. Because the sauce migrates into the crust during cooking, it is relatively easy to remain in the sauce-crust interface during temperature measurement.

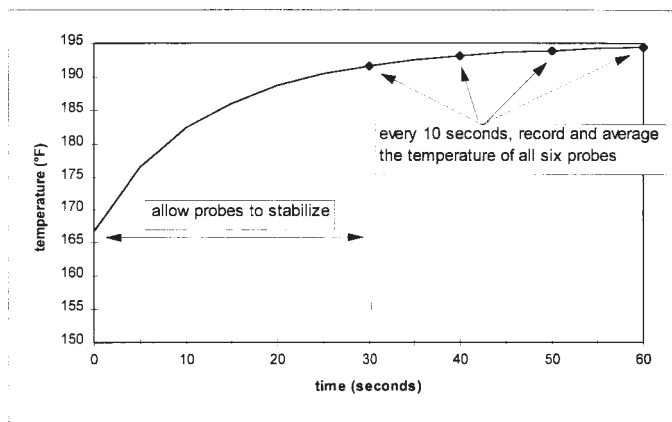FIG. 1 Location of Thermocouple Probes on Pizza Surface

FIG. 2 Timing of Temperature Measurement After Probes are Placed on Cooked Pizza

10.8.1 Set the calibrated temperature control to 475°F, preheat the conveyor oven and allow it to idle for 60 min. Set the conveyor speed to achieve the cook time for pizza determined in 10.7 and set the conveyor in motion.

10.8.2 The cooking energy efficiency and production capacity tests are to be run a minimum of three times. Additional test runs may be necessary to obtain the required precision for the reported test results (see Annex A1). The cooking energy efficiency tests shall be performed in the following sequence, starting with the light loads and progressing to the heavy loads:

10.8.3 Divide the total number of pizzas required for each test run (as detailed in Table 1 and Table 2) into two equal parts. The pizzas included in the first half of the test run are used to stabilize the oven and are referred to as the "stabilization" pizzas and the pizzas included in the second half of the test run are used for efficiency determination and are referred to as the "test" pizzas. For example, an oven with a one foot conveyor width and a two foot cavity length will require four pizzas for a light load - two stabilization pizzas and two test pizzas.

NOTE 11—During each test run, the pizzas are divided into two groups, stabilization pizzas and test pizzas. The stabilization pizzas will go into the oven first and are included to ensure that the oven is operating under steady state conditions. The stabilization pizzas are not a part of the energy equation and do not impact the energy efficiency. When the test pizzas go into the oven the tester begins recording the time and energy and the energy efficiency is based on these numbers. The classifications of "stabilization" and "test" within the test run are there to help differentiate between these two phases of the test.

10.8.4 Divide the stabilization pizzas and test pizzas into rows, with the number of pizzas in each row being equal to the nominal conveyor width. For example, a full load test of an oven with a 2 ft conveyor width and a 3 ft cavity length will require 24 pizzas that is divided into two groups of 12 pizzas, each group is six rows long and each row is two pizzas wide.

10.8.5 Remove the first row of pizza from the refrigerator. Place the pizza(s) directly on the conveyor (do not use a pizza screen or pan) so that the leading edge of the pizza(s) is adjacent to the entrance to the oven cavity. For a light load, place the second row of pizza on the conveyor as soon as the first row of pizza has passed completely through the oven cavity and continue this loading pattern for subsequent rows.

For a heavy load, place the second row of pizza on the conveyor as soon as the first row of pizza has passed completely into the oven cavity (that is, the leading edge of the second row will be immediately adjacent to the trailing edge of the first row) and continue this loading pattern for subsequent rows. Do not allow more than 1 min to elapse from the time a pizza is removed from the refrigerator until it is placed on the conveyor. The example in Fig. 3 details the light and heavy loading scenarios for an oven with a 2 ft conveyor width and a 3 ft cavity length.

10.8.6 As soon as the first row of test pizzas, the second half of the test run, is removed from the refrigerator, weigh each uncooked pizza and record the weight before placing the row of pizza on the conveyor. Be sure the test pizzas are removed from the refrigerator, weighed and placed on the conveyor within the 1 min time allotted.

10.8.7 Start monitoring time and energy immediately upon placing the first row of test pizzas on the conveyor. Continue to weigh each test pizza as it is removed from the refrigerator and record the weights. Allow the pizza(s) to pass through the oven cavity and cook.

10.8.8 As soon as each row of test pizza has passed completely through the oven cavity, immediately remove the pizza(s) from the conveyor and determine the final pizza temperature (as detailed in the cook time determination) of one pizza from each row. Remove any cheese that may stick to the thermocouple probes during temperature measurement and place the cheese back on the pizza. Weigh each cooked test pizza and record the weight.
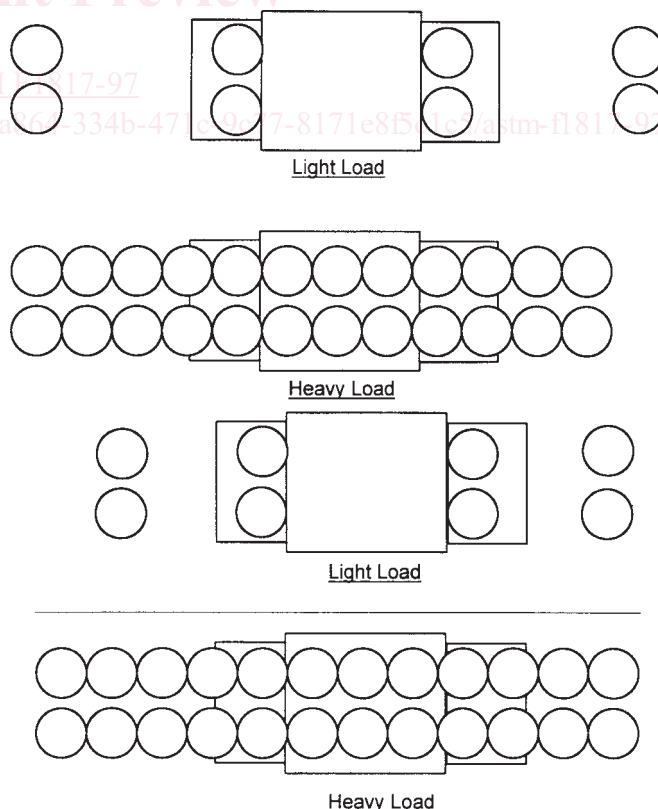

FIG. 3 Example of Light and Heavy Loading Scenarios for an Oven With a 2 ft Conveyor Width and a 3 ft Cavity Length

6