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AnAmerican National Standard

Standard Test Method for Performance of Self-Contained Soft Serve and Shake Machines[1]

This standard is issued under the fixed designation F2795; 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 energy consumption and performance of soft serve ice cream and shake machines. The food service operator can use this test to evaluate and select an appropriate soft serve or shake machine and understand its energy consumption and production capabilities.

1.2 This test method applies to the following types of soft serve and shake machines: (any of which may or may not have a reservoir for liquid mix). Included in these test methods are conventional and heat-treatment freezers. The unit may include separate refrigeration systems for the frozen product and fresh mix and may be either air-cooled or water-cooled.

1.3 The soft serve/shake machines will be tested for the following (where applicable):

1.3.1 Maximum power input, or maximum current draw,
1.3.2 Initial freeze-down energy consumption and duration,
1.3.3 Heavy-use energy consumption,
1.3.4 Production capacity,
1.3.5 Overrun,
1.3.6 Impact performance,
1.3.7 Idle energy rate, and
1.3.8 Heat treat cycle energy consumption (if applicable).

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

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F1604 Specification for Freezers, Ice Cream, Soft Serve, Shake

2.2 *Code of Federal Regulations:*[3]

21 CFR 135.110 Ice cream and frozen custard

2.3 *NSF/ANSI Standard:*[4]

NSF/ANSI 6 Dispensing freezers

3. Terminology

3.1 *Definitions:*

3.1.1 *air cooled unit, n*—a unit which uses air passing over a main condenser in the freezer cylinder refrigeration system.

3.1.2 *combination unit, n*—a unit employing two main compressors and two main condensers with one or two condenser fan motors and two separate freezer doors (that is, one for soft serve and another for shake), designed to dispense shake and soft serve product in the same footprint.

3.1.3 *freeze-down energy, n*—amount of energy consumed (kWh) by the soft serve machine while cooling the product to a servable temperature.

3.1.4 *freeze-down time, n*—time required for the soft serve machine while cooling the product to a servable temperature.

3.1.5 *heat treat–cool phase, n*—portion of the heat treat cycle which involves cooling the product from ≥150°F (≥65°C) to ≤41°F (≤5°C) within a period of 120 min or less.

3.1.6 *heat treat–heat phase, n*—portion of the heat treat cycle which involves elevating product temperature from ≤41°F (5°C) to ≥150°F (66°C) within a period of 90 min.

3.1.7 *heat treat–hold phase, n*—portion of the heat treat cycle which involves holding the product above a ≥150°F (≥66°C) for a period of at least 30 min.

3.1.8 *heat-treatment freezers, n*—as defined in Specification F1604, operate as conventional freezers and heat all product to 150°F (66°C) minimum for at least 30 min daily to destroy undesirable microorganisms.

3.1.9 *ice cream or ice-cream (originally, iced cream), n*—a frozen dessert made from dairy products, such as milk and

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

[3] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

cream, combined with flavorings and sweeteners, such as sugar, and possible other ingredients. **(21 CFR 135.110)**

3.1.10 *idle energy rate, n*—the rate of energy consumed (kWh) by the soft serve or shake machine while holding or maintaining the product in a ready-to-serve state without dispensing product.

3.1.11 *interval, n*—length of time for one operator to draw a portion of product from a soft serve machine.

3.1.12 *mix, n*—a fluid that contains 4 to 6 % butterfat and is a vanilla flavor.

3.1.13 *overrun, n*—the increase in volume due to incorporation of air while freezing soft serve and shake products under agitation, calculated by this formula:

$$\text{Overrun} = \frac{(\text{Weight of liquid mix} - \text{Weight of frozen product})}{\text{Weight of frozen product}} \quad (1)$$

3.1.14 *product, n*—mix that is frozen under agitation to specific temperature without syrup that is ready to serve.

3.1.15 *shake, n*—a sweet, cold beverage which is made from milk, ice cream, and flavorings or sweeteners such as fruit syrup or chocolate sauce.

3.1.16 *spout adaptor, n*—a device which is attached to the freezer door spout to assist in the filling of sampling container.

3.1.17 *standby idle energy, n*—the rate of energy consumed (kWh) by the soft serve machine while holding or maintaining the product ≤41°F (≤5°C) without dispensing product. Also referred to as night mode in NSF/ANSI 6.

3.1.18 *test method, n*—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 test results.

3.1.19 *twin single spout freezer, n*—a machine employing either of the above configurations (Twin Twist machine "A" or "B") but with two single spout doors which can only dispense from one Freezer Cylinder.

3.1.20 *twin twist freezer "A", n*—a machine using two main compressors and two main condensers with one or two condenser fan motors and a freezer door (3 spout) which the center spout draws from both freezer cylinders.

3.1.21 *twin twist freezer "B", n*—a machine with single main compressor, single main condenser fan motor, with a freezer door (3 spout) which the center spout draws product from both freezer cylinders.

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

3.1.23 *water cooled unit, n*—a unit which uses water passing through a twin tube condenser in the freezer cylinder refrigeration system.

4. Summary of Test Method

4.1 This test method is designed to address machines which have self contained refrigeration system(s) for the main freezing cylinder(s) and may or may not contain a mix storage system as part of the unit.

4.2 Power input is determined to confirm that the soft serve machine is operating below maximum nameplate power rating.

4.3 The hopper and barrel are loaded with 35 ± 1°F (1.5 ± 0.5°C) mix. The time and energy required to freeze down the product to an acceptable serving condition is monitored (as defined in 10.2.2).

4.4 Minimum Dispensing Interval Determination (as defined in 10.3).

4.5 Heavy-Use Power Rating, Energy Consumption and Production Capacity Test (as defined in 10.4).

4.6 Impact Draw Test (as defined in 10.5).

4.7 Ready-to-Serve Idle Test (as defined in 10.6).

4.8 Standby (Night Mode) Idle Test (as defined in 10.7).

4.9 Heat Treat Cycle Energy Consumption Test (if applicable) (as defined in 10.8).

5. Significance and Use

5.1 The freeze-down energy consumption and duration can be used to determine time and energy required for a machine to be ready to serve when loaded with mix.

5.2 The minimum dispensing interval determination is used to determine the rate at which the product will be dispensed during the Heavy-Use Energy Consumption and Production Capacity Test (10.4).

5.3 Heavy-use energy consumption can be used by an operator to determine energy consumption during peak usage when selecting a soft-serve machine.

5.4 Production capacity can be used by an operator in selecting a soft-serve machine that meets their production requirements.

5.5 Impact draw is used to determine the peak rate at which servable quality product (as defined in 10.2.2) can be dispensed from a soft-serve machine.

5.6 Idle energy rate is a precise indicator of a soft serve machine's energy performance under a stabilized ready-to-serve operating condition. This information enables the food service operator to consider energy performance when selecting soft-serve equipment.

5.7 Stand-by (night mode) energy rate is a precise indicator of a soft-serve or shake machine's energy performance under a simulated overnight operating condition. This information enables the food service operator to consider energy performance when selecting soft-serve or shake equipment.

5.8 Heat Treat cycle energy consumption is a precise indicator of a soft serve or shake machine's energy performance when operated in a heat treatment cycle. This information can be used by an operator to consider the energy requirement of using a heat treat cycle, if applicable.

6. Apparatus

6.1 *Analytical Balance Scale,* for measuring weights up to 25 lb (11.33 kg), with a resolution of 0.01 lb (0.004 kg) and an uncertainty of 0.01 lb (0.004 kg).

6.2 *Stop Watch,* with at least 1-s resolution.

6.3 *Thermocouple Probe,* calibrated industry standard type T or type K thermocouples capable of immersion with a range of 0 to 250°F (–17.7 to 121°C) and an uncertainty of ±1°F (±0.6°C).

6.4 *Watt-Hour Meter,* for measuring the electrical energy consumption, 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 %.

6.5 *Spout Adapter,* to facilitate measuring product temperature and filling container during the test which is made from an Acetal (POM) material and has a ID surface finish of 32√ .

6.6 *Small Container,* a small container shall be a cup design and shall be 8 ± 0.5 oz (237 ± 15 mL) in capacity, with rigid sides. Thirty (30) cups will be required for tests which are listed in this standard.

6.7 *Medium Container,* a medium container shall be a cup design and shall be 16 ± 0.5 oz (475 ± 15 mL) in capacity, with rigid sides. Thirty (30) cups will be required for tests which are listed in this standard.

6.8 *Large Container,* a large container shall be a cup design and shall be 32 ± 0.5 oz (946 ± 15 mL) in capacity, with rigid sides. Thirty (30) cups will be required for tests which are listed in this standard.

7. Reagents and Materials

7.1 *Soft Serve Mix,* liquid mix shall consist of 4 to 6 % butterfat and have a vanilla flavor only. Mix can be stored either in hermetically sealed bags or in cartons and shall be refrigerated to 35 ± 1°F (1.5 ± 0.5°C) prior to all tests.

7.2 *Small Container,* for testing soft serve machines with less than 10 gal/h (37.8 L/h) capacity.

7.3 *Medium Container,* for testing soft serve machines with greater than 10 gal/h (37.8 L/h) capacity and shake machines rated ≤20 gal/h (≤75.7 L/h).

7.4 *Large Container,* for impact testing of shake machines rated more than 20 gal/h (75.7 L/h).

8. Sampling, Test Units

8.1 *Soft Serve or Shake Machine*—Select a representative production model for performance testing.

9. Preparation of Apparatus

9.1 Install the soft serve or shake machine so that there is 6 in. (15.24 cm) clearance maintained between a back wall and the back vertical plane of the soft serve machine. In addition, both sides of the soft serve machine shall be a minimum of 1 ft (91.44 cm) from any side wall, side partition, or other operating soft serve machine and a minimum of 3 ft (9.144 cm) clearance between the front vertical plane of the soft serve or shake machine and any wall or side partition. Walls can be portable or suspended from ceiling. If manufacturer's instructions require additional clearance between soft serve or shake machine and walls, then use manufacturer's clearance recommendations in place of clearances listed above. Record appliance placement relative to test room walls in results recording section. The associated heating or cooling system shall be capable of maintaining an ambient temperature of 86 ± 3°F (30 ± 2°C) (per NSF/ANSI 6) during energy tests within the testing environment. Machine to be installed in the temperature controlled room. Tests can start once all Thermocouple temperatures are within the temperature specified for the ambient conditions of the room.

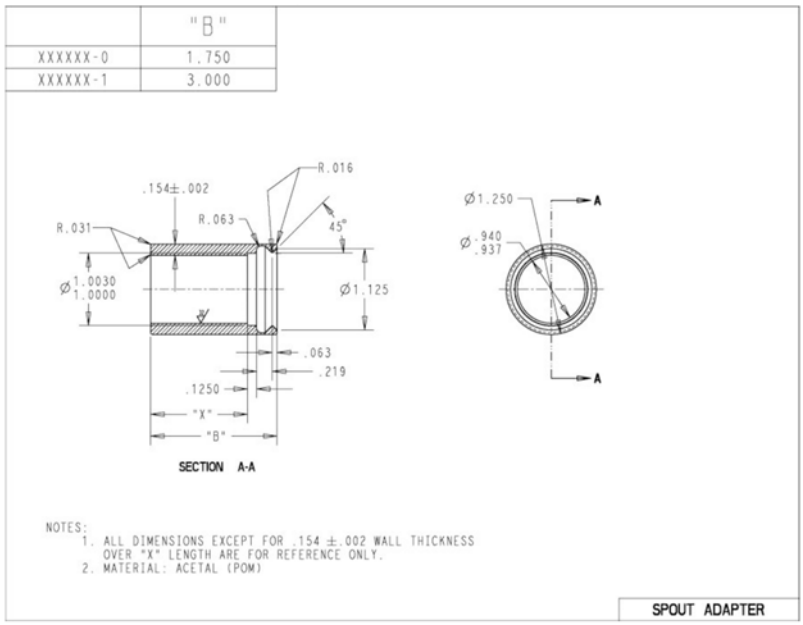

FIG. 1 Spout Adaptor Specification

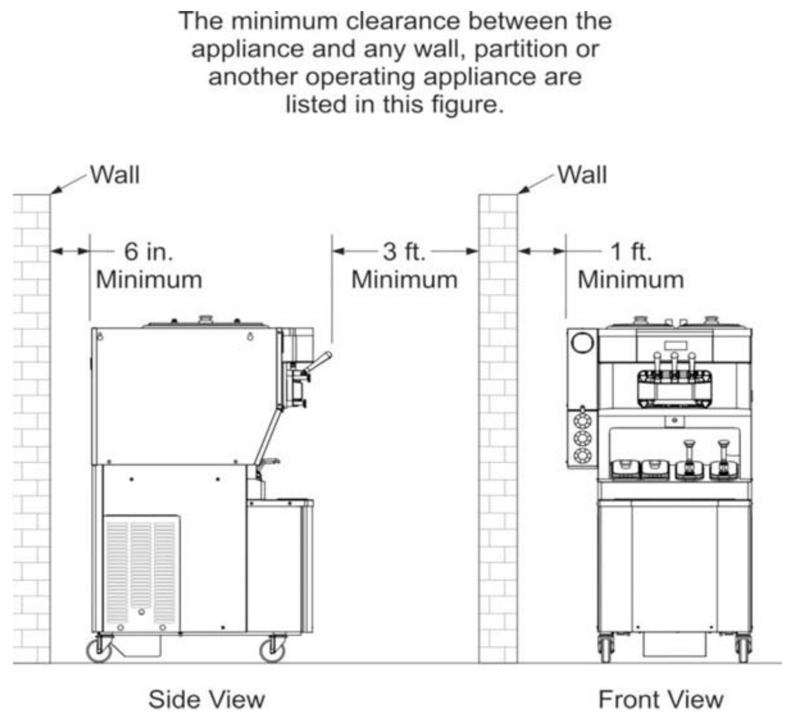

FIG. 2 Example of Appliance Placement

9.2 Connect the soft serve or shake machine to a Watt-Hour meter. 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 Confirm (while the soft serve or shake machine compressor(s) is 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 1—The purpose of the testing procedure is to evaluate the performance of a soft serve or shake machine at its rated electric voltage. If a soft serve or shake machine 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 or tester, or both, shall be recorded. The performance of a dual voltage soft serve or shake machine may differ at the two voltages.

9.4 To facilitate monitoring product temperature during testing, locate a thermocouple probe in the center of the hopper(s), 1 ± 0.1 in. (25 ± 2 mm) below the surface of the mix (per NSF/ANSI 6). For all draw tests, locate an additional thermocouple probe in the geometric center of the draw spout adapter(s). For all non-draw tests, locate an additional thermocouple probe in the product holding area of at least one of the dispenser heads (per NSF/ANSI 6).

9.5 For water cooled soft serve or shake machines, the supplied water for the main condensing system must be 70 ± 5°F (21 ± 3°C).

10. Procedure

10.1 *General:*

10.1.1 The following shall be obtained and recorded for each run of every test.

10.1.1.1 Voltage.

10.1.1.2 Average air temperature over the complete test period.

10.1.1.3 Average relative humidity over the complete test period.

10.1.1.4 Water consumed (where applicable for water cooled machines).

10.1.1.5 Average incoming water temperature over the complete test period (where applicable for water cooled machines).

10.1.1.6 Average exit water temperature over the complete test period (where applicable for water cooled machines).

10.1.1.7 Temperature of mix.

10.1.1.8 Temperature of dispensed product.

10.1.1.9 Weight of frozen product in the cup, when applicable.

10.1.2 For each test run, confirm that the maximum 10-s continuous amperage draw rate is not >110 % of the rated nameplate amperage. After 10 s, if the measured amperage is >110 % of the rated nameplate maximum amperage, terminate testing and contact the manufacturer. The manufacturer may make appropriate changes or adjustments to the soft serve or shake machine.

10.2 *Freeze-Down Energy Consumption and Duration:*

NOTE 2—The freeze-down test should be conducted prior to soft serve or shake machine operation on the day of the test. It is the intent of this procedure to determine the energy and time it takes the soft serve or shake machine to freeze mix to a servable product.

10.2.1 Follow the manufacturer's recommended instructions for priming the soft serve or shake machine prior to the freeze down test. Subsequent testing and results are not valid if the manufacturer's operating instructions are not completed. Start with the unit in a room at 86 ± 3°F (30 ± 2°C), fill the

hopper and barrel with refrigerated mix (35 ± 1°F (1.5 ± 0.5°C)) to the manufacturer's recommended level. Use a thermocouple probe to monitor the average temperature of the mix as hopper is filled.

10.2.2 Record the temperature of the mix in the center of the hopper, 1 in. (25 mm) below the surface of the mix (per NSF/ANSI 6). Start the initial freezing process.

10.2.3 Confirm that the machine is ready to serve by dispensing one 8 oz (weight ounces) (0.226 kg) portion of product and measuring the temperature at the geometric center. For soft serve, the temperature of the dispensed product shall be 19 ± 2°F (–7 ± 1°C); for shakes, the temperature of the dispensed product shall be 26 ± 2°F (–3 ± 1°C). If the product temperature is above the threshold criteria, repeat 10.2.1-10.2.4, adding an additional main compressor cycle (on then off again). If the temperature of the product is under the specified limits stated above adjust the temperature or equipment settings and repeat 10.2.1 through 10.2.3. Note in test record that another compressor cycle was part of this test.

10.2.4 Record energy consumption, elapsed time and final hopper mix temperature when the motor(s) and main compressor(s) for freezing cylinder(s) has cycled off.

10.2.5 Freeze-down is judged complete when the main compressor(s) for freezing cylinder(s) has cycled off.

10.2.6 Record the time, and energy consumption for the machine to freeze down product to the appropriate serving temperature (for example, 19 ± 2°F (–7 ± 1°C) for soft serve and 26 ± 2°F (–3 ± 1°C) for shakes).

10.3 *Minimum Dispensing Interval Determination:*

NOTE 3—It is the intent of this procedure to determine the shortest interval between consecutive draws that still produces acceptable product. For machines meeting definition under section 3.1.20, drawing of product is to take place from either the left or right spout with opposite side running in ready to serve mode (do not alternate). For machines meeting definition under section 3.1.21, drawing of product is to take place alternating between the left and right spout (product not to be drawn from center spout).

10.3.1 Determine the appropriate container size (small, medium or large) for the minimum dispensing interval test:

10.3.1.1 For soft serve machines that are rated for less than 10 gal/h (38 L/h), use a small container.

10.3.1.2 For soft serve machines that are rated for greater than 10 gal/h (38 L/h), use a medium container.

10.3.1.3 For shake machines rated ≤20 gal/h (≤75/7 L/h), use a medium container.

10.3.1.4 For shake machines rated >20 gal/h (>75/7 L/h), use a large container.

10.3.2 Fill the hopper to the manufacturer's recommended level with refrigerated mix [35 ± 1°F (1.5 ± 0.5°C)] after the freeze-down cycle has completed. Then allow the machine to stabilize for 30 ± 2 min, in its ready to serve idle mode. If the main compressor is running at the end of the 30 ± 2 min, allow the main compressor to cycle off before starting the test.

10.3.3 If the machine has an adjustable draw handle, set the draw rate to the manufacturer's recommended setting. If the draw rate is not adjustable, record the draw rate. Confirm the draw rate as follows:

10.3.3.1 Tare the selected container on the scale. Dispense product continuously for 10 s into the selected container.

10.3.3.2 Divide the weight of the dispensed product by 10 and record this as the draw rate (oz/s or g/s).

10.3.3.3 Repeat steps 10.3.3.1 and 10.3.3.2 two more times and record the draw rate each time. Take the sum of the three tests and divide by three. Record this number as the average draw rate.

10.3.4 Determine the product overrun as follows:

10.3.4.1 Draw product into the appropriate container so that the product overfills the rim and capacity. As the product fills the container, try to prevent forming air pockets. Lightly pack soft serve to ensure removal of air pockets. Skim off excess amount above rim with a straightedge and put the excess in the next container. Measure and record the weight of the dispensed product.

10.3.4.2 Calculate the overrun (refer to 3.1.13 for formula).

10.3.4.3 Repeat steps 10.3.4.1 and 10.3.4.2 two more times and record the average of the three overrun calculations noting the container size used.

10.3.5 Draw another three containers successively and wait for the unit to cycle off. Measure the temperature of the product in the geometric center of the third container to make sure it is at 19 ± 2°F (–7 ± 1°C) for soft serve product and 26 ± 2°F (–3 ± 1°C) for shake (without syrup) product.

10.3.6 Begin the dispensing interval test by filling individual containers to the rim. Maintain a 30-s interval between the beginnings of each draw. Monitor the temperature of the flow of soft serve or shake coming out of the draw spout and record the minimum temperature of the soft serve or shake in each cup and number of cups drawn.

10.3.7 If the dispensed product temperature exceeds the maximum serving temperature (21°F (–6°C) for soft serve or 28°F (–2°C) for shakes) for three consecutive draws, then stop testing and record the elapsed time, number of total draws and final temperature. Increase the interval between draws, as appropriate and repeat 10.3.1 through 10.3.7.

10.3.8 Systematically decrease the interval between successive draws (by 2 or 5-s increments) and repeat steps 10.3.1 through 10.3.7 until the unit fails to produce 30 acceptable draws (that is, drawn product temperature exceeds maximum serving temperature for three consecutive draws).

10.3.9 Note the shortest time interval that still produced 30 acceptable cups of product. This interval will be used in the heavy-use energy consumption and production capacity test.

10.4 *Heavy-Use Energy Consumption and Production Capacity Test:*

NOTE 4—It is the intent of this procedure to determine the energy consumption and production capacity of the soft serve or shake machine during heavy use.

NOTE 5—For machines meeting the definition under section 3.1.21, draw product alternating between the left and right spout (product not to be drawn from the center spout). For machines meeting the definition under section 3.1.20 and have two power sources, draw product from the side which has the highest rated amperage draw (refer to name plate/data label for machine ratings).

10.4.1 Conduct the Production Capacity Test a minimum of three times under the same conditions. Additional test runs may be necessary to obtain the required precision for the recorded test results.

10.4.2 Determine the appropriate container size (small, medium or large) for the minimum dispensing interval test:

10.4.2.1 For soft serve machines that are rated for less than 10 gal/h (38 L/h), use a small container.

10.4.2.2 For soft serve machines that are rated for greater than 10 gal/h (38 L/h), use a medium container.

10.4.2.3 For shake machines rated ≤20 gal/h (≤75/7 L/h), use a medium container.

10.4.2.4 For shake machines rated >20 gal/h (>75/7 L/h), use a large container.

10.4.3 Fill the hopper to the manufacturer's recommended level with refrigerated mix [35 ± 1°F (1.5 ± 0.5°C)] after the freeze-down cycle has completed. Allow the machine to stabilize for 30 ± 2 min or one complete main compressor cycle (whichever is longest) in its ready to serve idle mode. If the main compressor is running at the end of the 30 ± 2 min, allow the main compressor to cycle off before starting the test.

10.4.4 Draw three containers successively and wait for the unit to cycle off. Measure the temperature of the product in the geometric center of the third container to make sure it is at 19 ± 2°F (–7 ± 1°C) for soft serve product and 26 ± 2°F (–3 ± 1°C) for shake (without syrup) product.

10.4.5 Begin recording elapsed time and energy consumption as soon as the unit cycles off.

10.4.6 Draw product into the appropriate container so that the product overfills the rim and capacity. As the product fills the container, try to prevent forming air pockets. Lightly pack soft serve to ensure removal of air pockets. Skim off excess amount above rim with a straightedge and scrape the excess into the next cup. Measure and record the weight of the dispensed product in the full cup.

10.4.7 Repeat step 10.4.6 for 30 successive times using the interval between draws determined in 10.3. Measure and record the weight and temperature of each container of product.

10.4.8 Measure the overrun of every fifth container using the procedure in 10.3.5.

10.4.9 If the dispensed product temperature exceeds the maximum serving temperature (21°F (–6°C) for soft serve or 28°F (–2°C) for shakes) for three consecutive draws, the test is invalid and must be repeated. Adjust the interval between draws as appropriate and restart the testing procedure.

10.4.10 After 30 successive draws have been dispensed, record the total elapsed time, and energy consumption.

10.4.11 Record the time and energy consumption for the main compressor(s) for freezing cylinder(s) to cycle off after the last draw has been completed in step 10.4.10. This is the recovery time and energy.

10.4.12 Repeat the test two more times following steps 10.4.3-10.4.11.

10.5 *Impact Draw Test For Soft Serve or Shake:*

NOTE 6—It is the intent of this procedure to determine the shortest interval between successive draws and still produce acceptable product.

NOTE 7—For machines meeting the definition under section 3.1.21, draw product alternating between the left and right spout (product not to be drawn from the center spout).

10.5.1 Conduct the Impact Draw Test a minimum of three times for each serving size as specified in 10.5.7, 10.5.12, and 10.5.13 when testing a soft serve machine. For Shake equipment use a container as noted in section 7.3 and 7.4, and fill cup to the lip without overflowing.

10.5.2 Fill the hopper to the manufacturer's recommended level with refrigerated mix [35 ± 1°F (1.5 ± 0.5°C)]. Allow the machine to stabilize for 30 ± 2 min in its ready to serve idle mode. If the main compressor is running at the end of the 30 ± 2 min, allow the main compressor to cycle off before starting the test.

10.5.3 If the machine has an adjustable draw handle, set draw rate to manufacturer's recommended draw rate (oz/s) (g/s). If the draw rate is not adjustable, then record the draw rate. Confirm the draw rate as follows:

10.5.3.1 Tare the selected container on the scale. . Dispense product continuously for 10 s into the selected container.

10.5.3.2 Divide the weight of the dispensed product by 10 and record this as the draw rate (oz/s or g/s).

10.5.3.3 Repeat steps 10.5.3.1 and 10.5.3.2 two more times and record the draw rate each time. Take the sum of the three tests and divide by three. Record this number as the average draw rate (oz/s or g/s).

10.5.4 Determine the product overrun as follows:

10.5.4.1 Draw product into the appropriate container so that the product overfills the rim and capacity. As the product fills the container, try to prevent forming air pockets. Lightly pack soft serve to ensure removal of air pockets. Skim off excess amount above rim with a straightedge and discard the excess. Measure and record the weight of the dispensed product.

10.5.4.2 Calculate the overrun (Refer to 3.1.13 for formula).

10.5.4.3 Repeat steps 10.5.4.1 and 10.5.4.2 two more times and record the average of the three overrun calculations noting which container size used.

10.5.5 Draw three successive containers and wait for the unit to cycle off. Measure the temperature of the product in the geometric center. For soft serve, the temperature of the product shall be 19 ± 2°F (–7 ± 1°C); for shakes, the temperature of the product shall be 26 ± 2°F (–3 ± 1°C).

10.5.6 Begin recording elapsed time and energy consumption.

10.5.7 Use the large container to draw successive 12 ± 1 oz (weight oz) (340 ± 28 g) portions of soft serve, or fill the cup to the lip without overflowing for shakes, pausing 5 s between each draw, until the product temperature rises above the maximum serving temperature (21°F (–6°C) for soft serve or 28°F (–2°C) for shakes) for three consecutive draws. Measure and record the weight and temperature of each container of soft serve or shake.

10.5.8 Stop dispensing and record the total number of consecutive draws where the product remained under the maximum serving temperature.

10.5.9 Record the time and energy from immediately after the test to when the compressor cycles off. This is the recovery time and energy.

10.5.10 After the unit cycles off, perform an overrun test using the procedure in 10.5.4.

10.5.11 Repeat the Impact Draw Test two more times starting at step 10.5.2 through 10.5.10.