



Standard Guide for Laboratory Requirements Necessary to Test Commercial Cooking and Warming Appliances to ASTM Test Methods¹

This standard is issued under the fixed designation F2875; 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 The scope of this guide includes the laboratory and organizational requirements to test commercial cooking and warming appliances (for example, griddles, fryers, ovens, steam cookers, and hot food holding cabinets) for preheat energy consumption and time, idle energy rate, cooking-energy efficiency, and production capacity, in accordance with the appropriate ASTM test methods under the jurisdiction of Committee F26, including the following:

Test Method	F1275
Test Method	F1361
Test Methods	F1484
Test Method	F1496
Test Methods	F1521
Test Method	F1605
Test Method	F1639
Test Method	F1695
Test Method	F1784
Test Method	F1785
Test Method	F1786
Test Method	F1787
Test Method	F1817
Test Method	F1964
Test Method	F1965
Test Method	F1991
Test Method	F2093
Test Method	F2140
Test Method	F2142
Test Method	F2144
Test Method	F2237
Test Method	F2238
Test Method	F2239
Test Method	F2380
Test Method	F2473

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate*

appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

1.4 *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 ASTM Standards:²

- F1275 Test Method for Performance of Griddles
- F1361 Test Method for Performance of Open Deep Fat Fryers
- F1484 Test Methods for Performance of Steam Cookers
- F1496 Test Method for Performance of Convection Ovens
- F1521 Test Methods for Performance of Range Tops
- F1605 Test Method for Performance of Double-Sided Griddles
- F1639 Test Method for Performance of Combination Ovens (Withdrawn 2012)³
- F1695 Test Method for Performance of Underfired Broilers
- F1784 Test Method for Performance of a Pasta Cooker
- F1785 Test Method for Performance of Steam Kettles
- F1786 Test Method for Performance of Braising Pans
- F1787 Test Method for Performance of Rotisserie Ovens
- F1817 Test Method for Performance of Conveyor Ovens
- F1964 Test Method for Performance of Pressure Fryers
- F1965 Test Method for Performance of Deck Ovens
- F1991 Test Method for Performance of Chinese (Wok) Ranges
- F2093 Test Method for Performance of Rack Ovens
- F2140 Test Method for Performance of Hot Food Holding Cabinets
- F2142 Test Method for Performance of Drawer Warmers
- F2144 Test Method for Performance of Large Open Vat Fryers

¹ This guide 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.

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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 The last approved version of this historical standard is referenced on www.astm.org.

F2237 Test Method for Performance of Upright Overfired Broilers

F2238 Test Method for Performance of Rapid Cook Ovens

F2239 Test Method for Performance of Conveyor Broilers

F2380 Test Method for Performance of Conveyor Toasters

F2473 Test Method for Performance of Water-Bath Rethermalizers

3. Terminology

3.1 Definitions:

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

3.1.2 *cooking energy rate, n*—average rate of energy consumption during the cooking-energy efficiency tests, Btu/h (kJ/h) or kW.

3.1.3 *energy input rate, n*—peak rate at which an appliance consumes energy, Btu/h (kJ/h) or kW.

3.1.4 *idle energy rate, n*—an appliance's rate of energy consumption while maintaining a ready-to-cook or hold state at a specified thermostat set point, Btu/h (kJ/h) or kW.

3.1.5 *pilot energy rate, n*—rate of energy consumption by an appliance's continuous pilot (if applicable), Btu/h (kJ/h).

3.1.6 *preheat energy, n*—amount of energy consumed by the appliance while warming the cooking or holding area from ambient temperature to the specified thermostat set point, Btu (kJ) or kWh.

3.1.7 *preheat time, n*—time required for the appliance to warm the cooking or holding area from ambient temperature to the specified thermostat set point, min.

3.1.8 *production capacity, n*—maximum rate at which an appliance can bring the specified food product to a specified "cooked" condition, lb/h (kg/h).

3.1.9 *production rate, n*—rate at which an appliance brings the specified food product to a specified "cooked" condition, lb/h (kg/h).

NOTE 1— Does not necessarily refer to maximum rate.

NOTE 2—Production rate varies with the amount of food being cooked.

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

4. Summary of Guide

4.1 Guide to outline requirements for laboratories to test to ASTM performance specifications for commercial cooking appliances that include the necessary organizational structure, facility, equipment, instrumentation, procedures, reporting and proficiency testing.

5. Significance and Use

5.1 This guide provides criteria for evaluating the capability of a laboratory to properly perform commercial cooking appliance energy consumption and cooking-energy efficiency evaluations, and to establish essential characteristics pertaining to the organization, personnel, facilities, and quality systems of the laboratory.

6. Organization of the Laboratory

6.1 The following information concerning the organization of the laboratory shall be provided by documentation:

6.1.1 A description of the organization including:

6.1.1.1 The complete legal name and address of the main office,

6.1.1.2 The names and positions of the principal officers and directors,

6.1.1.3 The laboratory's ownership, managerial structure, and principal members,

6.1.1.4 The functional description of the laboratory's organizational structure, operational departments, and support departments and services. This may be demonstrated in the form of charts that depict all the divisions, departments, sections, and units and their relationships,

6.1.1.5 All relevant organizational affiliates of the laboratory and the principal officers of affiliates and directors of the affiliates, where applicable,

6.1.1.6 External organizations and organizational components, and their functions, that are utilized for significant technical support services, and

6.1.1.7 A brief history of the laboratory including its relationship with its organizational component affiliations and other supporting information.

6.1.2 A general description of the type of users of the laboratory's services.

6.1.3 A listing of the relevant technical services offered.

6.2 Independence:

6.2.1 If the testing laboratory is part of an organization performing activities other than testing or calibration, or both, the laboratory shall define the responsibilities of key personnel in the organization that have an involvement or influence on the testing, equipment purchase, test data, reports, and calibration activities, or combination thereof, of the laboratory in order to identify potential conflicts of interest.

6.2.2 When a laboratory is part of a larger organization, the organizational arrangements shall be such that departments having conflicting interests, such as design engineering, production, commercial marketing, or finance do not adversely influence the laboratory's compliance with the requirements of this guide.

6.2.3 If the laboratory wishes to be recognized as a third-party laboratory, it shall demonstrate that it is impartial and that it and its personnel are free from any undue commercial and financial pressures and job performance evaluations that might influence their technical judgment. The third-party testing or calibration laboratory shall not engage in any activities that may endanger trust in its independence of judgment and integrity in relation to its testing or calibration activities.

7. Responsibilities and Duties

7.1 An appliance testing laboratory's capabilities shall include, but not be limited to, the following (where applicable): preheat energy consumption and time, idle energy rate, cooking-energy efficiency, and production capacity, as defined in the appropriate ASTM test methods.

7.2 It is the responsibility of the laboratory to ensure the following:

7.2.1 It performs only examinations for which it is adequately equipped and staffed,

7.2.2 Its employees perform only examinations for which they are adequately qualified,

7.2.3 Its equipment is calibrated and its personnel are qualified, and

7.2.4 All equipment, equipment calibrations, and personnel qualifications are properly maintained in accordance with this guide.

7.3 The following duties are those usually performed by the laboratory:

7.3.1 Performance of all testing in accordance with the specified ASTM test methods, and

7.3.2 Preparation of formal reports of all the results of the testing defined in 7.3.1. The laboratory shall be prepared to substantiate examination results when required.

7.4 The laboratory shall maintain a records retention policy that is compatible with its mission.

8. Personnel

8.1 The laboratory shall document and maintain a record of the following:

8.1.1 Written outline or chart defining operational personnel positions and their lines of responsibility and authority,

8.1.2 Job description for each professional, scientific, supervisory, and technical position category, documenting the required education, training, or experience, or a combination thereof.

8.1.3 Records or resumes that document the qualifications, work experience, and training history of each person in a position described in 8.1.2.

8.1.4 The laboratory shall make available a description of its means of ensuring the continued competence of its personnel to perform commercial cooking appliance testing, including the maintenance of written records to document the results.

9. Personnel Qualification

9.1 Commercial cooking appliance testing personnel, including contracted personnel, shall be qualified with a minimum of two years post-secondary education or equivalent work experience, be proficient in data acquisition and recording of energy measurement, water measurement, and temperature systems, and be able to operate data acquisition hardware and related software.

9.2 *LEVEL I*—Qualified to perform specific calibrations, specific examinations and specific evaluations (with specific written instructions).

9.3 *LEVEL II*—Qualified to set-up and calibrate equipment and to interpret and evaluate results with respect to codes, standards, and specifications. Shall be able to prepare written instructions and be qualified to provide on-the-job training, guidance to trainees, and to report examination results.

9.4 *LEVEL III*—Capable and responsible for establishing techniques, interpreting codes, and designating the test method and technique to be used. Capable of training Level I and II

personnel. Shall have a practical background in the technology and be familiar with other commonly used methods.

10. Procedures Manual

10.1 The laboratory shall prepare a written or electronic procedures manual for the type of work for which the laboratory is contracted. Additional requirements or clarifications are contained in 10.2 through 10.6. The Procedures Manual shall be of sufficient detail to provide complete guidance on its use to the laboratory personnel.

NOTE 3—The procedures manual may include multiple volumes for each type of work conducted by the testing laboratory.

10.1.1 The laboratory management shall designate a person or persons within the laboratory who shall have responsibility for maintaining the laboratory's quality system. This person or persons shall have direct access to top management. This person or persons shall ensure that an internal audit is conducted at least once every year to verify that the quality system is functioning properly as documented in the Procedures Manual.

10.1.2 The laboratory shall maintain a record of changes to the Procedures Manual.

10.2 *Operational Procedures*—This section shall contain the information necessary to control the various activities necessary for testing appliances. Items covered shall include receiving and preparing samples, identification and marking, test procedures and specifications to be used, reports, and return of samples.

10.3 *Personnel Qualification*—This section shall contain the requirements and procedures for training, as outlined in Section 9.1.

10.4 *Equipment Maintenance and Calibration*—All test equipment shall be calibrated and traceable to the National Institute of Standards and Technology (NIST) or equivalent. This section shall contain all of the following:

10.4.1 *Inventory Listing*—All available equipment shall be listed with the following information noted:

10.4.1.1 Name of the manufacturer,

10.4.1.2 Equipment model and serial number,

10.4.1.3 Characteristics subject to calibration,

10.4.1.4 Range of operation and range of calibration,

10.4.1.5 Reference to recognized standardization procedures acceptable to the authority, if applicable,

10.4.1.6 Frequency of calibration,

10.4.1.7 Allowable tolerances or maximum sensitivity, and

10.4.1.8 Source of verification,

10.4.2 *Calibration*—Each instrument, when calibration is required, shall have either a calibration sticker affixed or record of certification on file, containing the following:

10.4.2.1 Instrument calibrated,

10.4.2.2 Serial number,

10.4.2.3 Calibration date,

10.4.2.4 Calibration next due date, and

10.4.2.5 Name of individual who performed last calibration.

If calibration is not required, a sticker stating “no calibration is necessary” shall be affixed, or a record shall be on file to this effect.