



Designation: F1317 – 98 (Reapproved 2019)

Standard Test Method for Calibration of Microwave Ovens¹

This standard is issued under the fixed designation F1317; 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 is applicable to microwave ovens designed for both home and commercial use. It was developed for use in the evaluation of volatile and nonvolatile components of microwave susceptor packages.

1.2 This test method was collaboratively evaluated with microwave ovens with nominal output ratings of 700 W.

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 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

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

F874 Test Method for Temperature Measurement and Profiling for Microwave Susceptors

F1308 Test Method for Quantitating Volatile Extractables in Microwave Susceptors Used for Food Products

F1349 Test Method for Nonvolatile Ultraviolet (UV) Absorbing Extractables from Microwave Susceptors

F1500 Test Method for Quantitating Non-UV-Absorbing Nonvolatile Extractables from Microwave Susceptors Utilizing Solvents as Food Simulants

F1519 Test Method for Qualitative Analysis of Volatile

Extractables in Microwave Susceptors Used to Heat Food Products

3. Apparatus and Reagents

3.1 *Microwave Oven*, as manufactured.

3.2 *Beakers*, 2 L. (Alternatively use a 2-L polystyrene foam container.)

3.3 *Thermometer*, readable to $\pm 0.5^\circ\text{C}$.

3.4 *Stopwatch*.

4. Procedure

4.1 Using the stopwatch, check the accuracy of the microwave oven timer. Timer should be accurate to within 2 %. If not, determine the settings necessary to ensure accuracy.

4.2 Fill a 2 L beaker with exactly 1000 mL of distilled water at 18 to 20°C. Record initial temperature of the water as T_1 .

4.3 Remove the thermometer and place the beaker in the center of the microwave oven. If the oven has been used recently, allow it to cool until it is at room temperature.

4.4 Microwave at full power for 2 min 3 s. The additional 3 s is to allow for the magnetron start up delay.

4.5 Immediately after the power cycle completion, immerse the thermometer in the water and vigorously stir. Measure the temperature of the water. Record this temperature as T_2 .

4.6 Repeat the measurements to obtain triplicate measurements of the temperature rise.

4.7 Once calibrated, this oven can be used for analytical test standards such as Test Methods **F874**, **F1308**, **F1349**, **F1500**, and **F1519**.

4.8 Recalibrate oven daily.

5. Calculation

5.1 Calculate the output, O , of the microwave oven in watts using the following formula:

$$O = 34.9(T_2 - T_1)$$

where:

T_1 = initial temperature of the water, °C, and
 T_2 = final temperature of the water, °C.

¹ This test method is under the jurisdiction of ASTM Committee F02 on Primary Barrier Packaging and is the direct responsibility of Subcommittee F02.15 on Chemical/Safety Properties.

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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.