Management and Budget (OMB) and assigned OMB No. 0581–0178. No changes in those requirements as a result of this action are necessary. Should any changes become necessary, they would be submitted to OMB for approval.

This proposed rule would impose no additional reporting or recordkeeping requirements on either small or large California olive handlers. As with all Federal marketing order programs, reports and forms are periodically reviewed to reduce information requirements and duplication by industry and public sector agencies.

AMS is committed to complying with the E-Government Act, to promote the use of the Internet and other information technologies to provide increased opportunities for citizen access to Government information and services, and for other purposes.

USDA has not identified any relevant Federal rules that duplicate, overlap, or conflict with this rule.

A small business guide on complying with fruit, vegetable, and specialty crop marketing agreements and orders may be viewed at: *www.ams.usda.gov/MarketingOrdersSmallBusinessGuide.* Any questions about the compliance guide should be sent to Laurel May at the previously-mentioned address in the **FOR FURTHER INFORMATION CONTACT** section.

A 30-day comment period is provided to allow interested persons to respond to this proposed rule. Thirty days is deemed appropriate because: (1) The 2012 fiscal year began on January 1, 2012, and the marketing order requires that the rate of assessment for each fiscal year apply to all assessable olives handled during such fiscal year; (2) the Committee needs to have sufficient funds to pay its expenses which are incurred on a continuous basis; and (3) handlers are aware of this action which was unanimously recommended by the Committee at a public meeting and is similar to other assessment rate actions issued in past years.

List of Subjects in 7 CFR Part 932

Olives, Marketing agreements, Reporting and recordkeeping requirements.

For the reasons set forth in the preamble, 7 CFR part 932 is proposed to be amended as follows:

PART 932—OLIVES GROWN IN CALIFORNIA

1. The authority citation for 7 CFR part 932 continues to read as follows:

Authority: 7 U.S.C. 601–674.

2. Section 932.230 is revised to read as follows:

§ 932.230 Assessment rate.

On and after January 1, 2012, an assessment rate of $31.32 per ton is established for California olives.

Dated: May 30, 2012.

David R. Shipman,

Acting Administrator, Agricultural Marketing Service.

[FR Doc. 2012–13526 Filed 6–4–12; 8:45 am]

BILLING CODE 3410–02–P

DEPARTMENT OF ENERGY

10 CFR Part 430

[Docket No. EERE–2010–BT–TP–0023]

RIN 1904–AC26

Energy Conservation Program: Test Procedure for Microwave Ovens

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notice of data availability; request for comment.

SUMMARY: The U.S. Department of Energy (DOE) initiated a test procedure rulemaking to develop active mode testing methodologies for residential microwave ovens. DOE conducted testing to evaluate potential test procedure amendments to provide methods of measuring energy use for microwave ovens, including both microwave-only ovens and convection microwave cooking ovens. In today's notice, DOE presents the results from these testing investigations and requests comment and additional information on these results and potential amendments to the microwave oven test procedure.

DATES: DOE will accept comments, data, and information regarding this notice submitted no later than July 5, 2012.

ADDRESSES: Any comments submitted must identify the Notice of Data Availability for Microwave Ovens, and provide docket number EERE–2010–BT–TP–0023 and/or RIN 1904–AC26. Comments may be submitted using any of the following methods:

1. *Federal eRulemaking Portal: www.regulations.gov.* Follow the instructions for submitting comments.

2. *Email: MWO-2010-TP-0023@ee.doe.gov.* Include docket EERE–2010–BT–TP–0023 and/or RIN 1904–AC26 in the subject line of the message.

3. *Mail:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–2J, 1000 Independence Avenue SW., Washington, DC 20585–0121. If possible, please submit all items on a compact disc (CD), in which case it is not necessary to include printed copies.

4. *Hand Delivery/Courier:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza SW., Washington, DC 20024. Telephone: (202) 586–2945. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

Docket: The docket is available for review at *www.regulations.gov,* including **Federal Register** notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials. All documents in the docket are listed in the *www.regulations.gov* index. However, not all documents listed in the index may be publicly available, such as information that is exempt from public disclosure.

A link to the docket web page can be found at: *http://www.regulations.gov/#!docketDetail;dct=FR%252BPR%252BN%252BO%252BSR;rpp=10;po=0;D=EERE-2010-BT-TP-0023.* This Web page contains a link to the docket for this notice on the *www.regulations.gov* site. The *www.regulations.gov* Web page contains simple instructions on how to access all documents, including public comments, in the docket.

For further information on how to submit a comment or review other public comments and the docket, contact Ms. Brenda Edwards at (202) 586–2945 or email: *Brenda.Edwards@ee.doe.gov.*

FOR FURTHER INFORMATION CONTACT:

Mr. Wes Anderson, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE–2J, 1000 Independence Avenue SW., Washington, DC 20585–0121. Telephone: 202–586–7335. Email: *Wes.Anderson@ee.doe.gov.*

In the Office of the General Counsel, contact Mr. Ari Altman, U.S. Department of Energy, 1000 Independence Ave. SW., Room 6B–159, Washington, DC 20585. Telephone: 202–287–6307; Email: *Ari.Altman@hq.doe.gov.*

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Background

On July 22, 2010, DOE published in the **Federal Register** a final rule for the microwave oven test procedure rulemaking (July 2010 TP Repeal Final Rule), in which it repealed the regulatory provisions for establishing the cooking efficiency test procedure for microwave ovens under the Energy Policy and Conservation Act (EPCA). 75 FR 42579. In the July 2010 TP Repeal Final Rule, DOE determined that the existing microwave oven test procedure to measure the cooking efficiency, which was based on the International Electrotechnical Commission (IEC) Standard 705–1998 and Amendment 2–1993, ''Methods for Measuring the Performance of Microwave Ovens for Households and Similar Purposes'' (IEC Standard 705), did not produce representative and repeatable test results. DOE stated that it was unaware of any test procedures that had been developed that addressed the concerns with the microwave oven cooking efficiency test procedure. DOE was also unaware of any research or data on consumer usage indicating what a representative food load would be, or any data showing the repeatability of test results. 75 FR 42579, 42581. In addition, in comments received in response to a separate test procedure notice of proposed rulemaking (NOPR) published in the **Federal Register** on October 17, 2008, which addressed provisions for measuring standby mode and off mode energy use for microwave ovens (73 FR 62134), interested parties commented that pure water has relatively low specific resistivity, and actual food items that might be cooked in a microwave oven would have more salts and thus absorb microwave energy more efficiently than pure water. Interested parties stated that, as a result, testing with a water load would likely result in lower efficiency measurements than would be expected from using actual food products.

On July 22, 2010, DOE also published in the **Federal Register** a notice of public meeting to initiate a separate rulemaking process to consider new provisions for measuring microwave oven energy efficiency in active (cooking) mode. 75 FR 42611. DOE held the public meeting on September 16, 2010 to discuss and receive comments on several issues related to active mode test procedures for microwave ovens to consider in developing a new test procedure. DOE received no data or comments at or after the September 16, 2010 public meeting suggesting potential methodologies for test procedures for microwave oven active mode.

On October 24, 2011, DOE published a Request for Information (RFI) notice to announce that it has initiated a test procedure rulemaking to develop active mode testing methodologies for microwave ovens. 76 FR 65631. DOE specifically sought information, data, and comments regarding representative and repeatable methods for measuring the energy use of microwave ovens, in particular for the microwave-only and convection microwave cooking (*i.e.,* microwave plus convection and any other means of cooking) functions. In particular, DOE sought comment on the following: (1) The characteristics of food loads representative of consumer use, (2) the repeatability of energy use measurements using different food loads, and (3) consumer usage data on the hours of operation in active mode, standby mode, and off mode for the development of an integrated energy use metric. In response to the August 2011 RFI, DOE received comments from the Association of Home Appliance Manufacturers (AHAM) and Whirlpool Corporation (Whirlpool) on a number of these test procedure issues. These comments are summarized below.

Food Load Repeatability and Reproducibility. AHAM and Whirlpool commented that the repeatability (test-to-test within one laboratory) and reproducibility (lab-to-lab) must be considered in developing an active mode test procedure for microwave ovens. AHAM and Whirlpool are both unaware of any existing test procedures that have successfully incorporated actual food loads, noting that the European Committee for Electrotechnical Standardization (CENELEC) has conducted testing with different food loads, including real and artificial food as well as salt water, and concluded that food loads cannot meet CENELEC's requirements of repeatability and reproducibility. (AHAM, No. 11 at p. 2, Whirlpool, No. 10 at pp. 1, 3) According to Whirlpool, the most commonly microwaved foods are hot cereal, bacon, pre-made baked goods, and frozen vegetables. However, Whirlpool stated the following about the lack of reproducibility of various foods:

- The nature and behavior of fresh foods varies over the year and by geographical region;
- Prefabricated foods change formulation over time and without notice. Various items are routinely added to and removed from the market;
- The composition of meats such as chicken, beef, and pork vary from not only by region, but also within each meat category, for example in the amount of fat or the size of granulation. (Whirlpool, No. 10 at p. 3)

AHAM and Whirlpool also commented that the IEC evaluated gels, but they were abandoned due to poor repeatability and excessive preparation time. (AHAM, No. 11 at p. 2, Whirlpool, No. 10 at p. 3) Whirlpool added that IEC Standard 60705 Edition 4.0, 2010–04, ''Household microwave ovens—Methods for measuring performance,'' (IEC Standard 60705 Fourth Edition) contains food loads, but that those are used for performance testing only and are not reproducible as is stated in the test standard. (Whirlpool, No. 10 at p. 2)

Whirlpool stated that the final temperature of the load must be correlated to normal usage (*i.e.,* heating food to ''eating temperature''). AHAM and Whirlpool commented that a well-defined final temperature of food loads cannot be determined with sufficient accuracy to attain an acceptable level of repeatability. According to Whirlpool, infrared measurements will only detect surface temperature and thermocouples will just measure temperature in a few spots and as a result, cold/hot spots inside the food may not be found. (AHAM, No. 11 at p. 2, Whirlpool, No. 10 at pp. 2, 3)

Convection Microwave Ovens. Whirlpool noted that convection microwave ovens represent less than 4 percent of U.S. shipments and that qualitative data suggests that even when consumers own a convection microwave oven, the use of the convection microwave cooking function is very limited. Whirlpool commented that the European Commission established a mandate to define a test method for the microwave-only cooking function and that the convection microwave cooking function has not been on the agenda. However, Whirlpool noted that CENELEC tested convection microwave ovens but was unsuccessful at developing repeatable and reproducible test loads and testing procedures for the reasons discussed above. (Whirlpool, No. 10 at p. 1, 2)

Test Methods for DOE Test Procedure. Whirlpool commented that DOE should not attempt to develop a test procedure for both microwave-only and convection microwave ovens at this time because the challenge to develop just a microwave-only test procedure is significant. (Whirlpool, No. 10 at p. 1) AHAM commented that the issues associated with the test procedure are not unique to the United States because microwave ovens do not vary significantly across countries. AHAM noted that microwave ovens do not represent a large amount of energy consumption as compared to other products, and that DOE should not direct its limited resources to duplicate what another group has adequately done. (AHAM, No. 11 at p. 2)

AHAM and Whirlpool commented that if DOE proceeds with a test procedure, it should develop a test procedure for microwave-only ovens that is harmonized with IEC Standard 60705, which is currently being updated based on extensive testing. AHAM and Whirlpool noted that the draft revised IEC Standard 60705, which uses varying water loads (1000 grams (g), 350 g, and 275 g), was evaluated in a round robin testing program completed in July 2011 and the results verified that the testing procedures have acceptable repeatability and reproducibility. Whirlpool also commented that the three amounts of water defined in the test procedure give good correlation to ''normal usage'' and the water temperature rise of 50 degrees Celsius (°C) achieves eating temperature. (AHAM, No. 11 at p. 2, Whirlpool, No. 10 at pp. 3–4)

Based on DOE's determination to initiate a microwave oven active mode test procedure rulemaking and comments received on the October 2011 RFI discussed above, DOE conducted testing to evaluate potential amendments to its microwave oven test procedure to provide methods for measuring the active mode energy use for these products. The sections below present DOE's tests results and the analytical approaches that it is considering for potential amendments to the microwave oven test procedure to measure active mode energy use.

II. Discussion

A. Test Units

In order to evaluate potential amendments to the microwave oven test procedure, DOE selected a number of test units representative of products currently available on the U.S. market. DOE considered features such as installation configuration, cooking functions (*i.e.,* microwave cooking, convection microwave cooking), rated output power, and rated cavity volume. The test units and key features are presented below in Table 1. Unless otherwise noted, the test unit numbers presented in Table 1 correspond to the test units in the tables presenting test results in today's notice.

TABLE 1—MICROWAVE OVEN TEST UNITS AND FEATURES

Product type	Test unit	Rated microwave power output (*W*)	Rated cavity volume (*ft*^{3})
Microwave-Only, Countertop	1	700	0.7
	2	1200	2.0
	3	1000	1.5
	4	1200	1.2
	5	1200	1.5
Microwave-Only, Over-the-Range	6	1000	1.7
	7	950	1.5
	8	1000	2.0
	9	1200	2.0
	10	1100	2.0
Convection Microwave, Countertop	11	1000	1.2
	12	1100	1.5
	13	1000	1.0
	14	900	1.5
Convection Microwave, Over-the-Range	15	1050	1.7
	16	1100	1.8
	17	950	1.7
	18	950	1.7

B. Water Load Microwave-Only Testing

As discussed in section 0, DOE's previous active mode test procedure incorporated portions of IEC Standard 705. These test methods measured the amount of energy required to raise the temperature of 1 kilogram of water by 10 °C under controlled conditions. The ratio of usable output power over input power described the energy factor (EF), a measure of the cooking efficiency.[1] DOE noted that IEC is in the process of revising its current test standard for microwave ovens, IEC Standard 60705 Fourth Edition. In addition to the 10 °C temperature rise water load test from IEC Standard 705, the draft revised IEC Standard 60705 includes a new test method that continues to use water as the cooking load. The draft revised test method involves measuring the energy consumption required to heat water loads of 275 g, 350 g, and 1000 g, in 400 milliliter (ml), 900 ml, and 2000 ml borosilicate glass test containers, respectively, by 45–50 °C and 50–55 °C. The results from the two different temperature rise tests are used to linearly interpolate the energy consumption required to heat each load by 50 °C. The cooking cycle energy consumption for each water load size is then weighted based on consumer usage to calculate the weighted per-cycle cooking energy consumption. In addition to the cooking cycle energy consumption, the low power energy consumption while the microwave is cooling down after the completion of the cooking cycle is also measured for a 15-minute period. This energy consumption is then added to the cooking energy consumption to calculate an overall weighted per-cycle energy consumption. DOE recognizes that these draft revised IEC Standard 60705 testing methods may be subject to changes during the IEC review process, however DOE decided to consider this latest available draft revised test method for potential amendments to the DOE test procedure. Table 2 presents the key differences between IEC Standard 705 and the draft revised IEC Standard 60705.

[1] The previous DOE microwave oven test procedure also provided for the calculation of several other measures of energy consumption, including cooking efficiency and annual energy consumption.

TABLE 2—KEY DIFFERENCES BETWEEN IEC STANDARD 705 AND DRAFT REVISED IEC STANDARD 60705

Test condition	IEC standard 705	Draft revised IEC standard 60705
Test Load Type	Water	Water.
Test Load Size	1000 g	275 g, 375 g, 1000 g.
Test Container Size	2000 ml	400 ml, 900 ml, 2000 ml.
Temperature Requirements	Ambient Temp., T_0 = 20 ± 2 °C	Ambient Temp., T_0 = 23 ± 2 °C.
	Starting Water Temp., $T_1 = T_0 - (10 \pm 1$ °C)	Starting Water Temp., T_1 = 10 ± 0.5 °C.
	Final Water Temp., $T_2 = T_0 \pm 1$ °C	Final Water Temp., T_2 = 55–60 °C; 60–65 °C
Test Load Preparation	Prior to the test, water load and test container are not allowed to equilibrate.	Prior to the test, water load and test container are allowed to equilibrate.
Time Limit to Measure Final Temperature.	60 seconds	20 seconds.
Measurement Equipment Accuracy.	Mass ± 1 g	Mass ± 1 g.
	Watt-hour ± 1.5 percent	Watt-hour ± 1.0 percent.
	Temperature ± 0.25 °C over the range of 7–23 °C for all temperature measurements. Also specifies linearity of better than 1 percent.	Ambient temperature ± 1 Kelvin (K). Water temperature ± 1.5 K.
	Time ± 0.25 seconds	Time ± 1 seconds.
Number of Repeat Tests	Test is carried out three times unless the power output value resulting from second measurement is within 1.5 percent of the value obtained from the first measurement.	No additional repeat tests specified.
Cooling Down Energy Use Measured?	No	Yes.

For over-the-range microwave ovens, DOE reviewed installation instructions for products available on the market. All products equipped with a venting fan offer two installation conditions for the venting fan: (1) Exhaust air to the outside and (2) recirculating air back into the room. DOE noted that for the majority of products, the default installation configuration for the venting fan was for air recirculation. As a result, DOE conducted testing with the venting fan installed in the air recirculation configuration and did not conduct testing using the exhaust configuration with additional requirements for venting.

DOE selected 15 microwave ovens in its test sample and conducted testing according to the draft revised IEC Standard 60705 to evaluate the repeatability of test results and the suitability for incorporating such methods into the DOE microwave oven test procedure.[2] For each test unit, DOE conducted two to three identical repeat tests. Table 3 through Table 5 present the cooking cycle energy consumption test results for each water load size. DOE noted that for the 275 g and 350 g water load sizes, the test-to-test variation expressed in terms of standard error ranged from roughly 0.1 percent to 2.5 percent, with averages of approximately 1.1 percent. For the 1000 g water load size, the test-to-test variation ranged from approximately 0.1 percent to 0.8 percent, with an average of 0.44 percent.

TABLE 3—DRAFT REVISED IEC STANDARD 60705 275 G WATER LOAD TEST RESULTS

Product type	Test unit	Cooking cycle energy use (*Wh*)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
Microwave-Only, Countertop	1	34.27	34.28	34.47	34.34	0.34
	2	36.13	36.76	36.58	36.49	0.88
	3	37.97	36.95	....	37.46	1.93
	4	33.03	32.05	....	32.54	2.12
	5	34.52	35.66	....	35.09	2.31
Microwave-Only, Over-the-Range	6	35.27	34.92	....	35.09	0.71
	7	35.18	36.00	....	35.59	1.63
	9	40.14	39.19	....	39.67	1.70
	10	33.96	34.63	34.54	34.38	1.05
Convection Microwave, Countertop	11	46.53	46.69	....	46.61	0.25
	12	45.50	46.14	45.94	45.86	0.70
	13	41.75	41.47	....	41.61	0.48
Convection Microwave, Over-the-Range	15	36.07	36.15	....	36.11	0.17
	16	38.29	37.41	38.86	38.18	1.91
	17	40.83	40.80	40.83	40.82	0.05
Average	....	....	....	....	37.99	1.08

[2] Although the draft revised IEC Standard 60705 specifies that the accuracy of ambient temperature and water temperature measurements to be ± 1 K and ± 1.5 K, respectively, testing conducted by DOE used thermocouples for temperature measurements with an accuracy of ± 0.2 °C, which meets the requirements of IEC Standard 705.

TABLE 4—DRAFT REVISED IEC STANDARD 60705 350 G WATER LOAD TEST RESULTS

Product type	Test unit	Cooking cycle energy use (*Wh*)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
Microwave-Only, Countertop	1	39.50	39.50	39.43	39.48	0.10
	2	42.81	42.87	41.26	42.31	2.16
	3	44.46	42.86	....	43.66	2.59
	4	39.65	39.29	....	39.47	0.65
	5	39.11	39.17	....	39.14	0.11
Microwave-Only, Over-the-Range	6	43.35	43.63	....	43.49	0.46
	7	42.74	43.76	....	43.25	1.68
	9	43.96	44.35	....	44.15	0.62
	10	40.25	39.64	40.60	40.16	1.20
Convection Microwave, Countertop	11	55.05	54.31	....	54.68	0.95
	12	53.85	52.36	53.07	53.10	1.41
	13	47.43	47.64	....	47.54	0.31
Convection Microwave, Over-the-Range	15	42.71	42.91	....	42.81	0.32
	16	45.21	43.89	45.19	44.77	1.69
	17	47.59	46.28	47.63	47.17	1.62
Average	....	....	....	....	44.34	1.06

TABLE 5—DRAFT REVISED IEC STANDARD 60705 1000 G WATER LOAD TEST RESULTS

Product type	Test unit	Cooking cycle energy use (*Wh*)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
Microwave-Only, Countertop	1	116.06	115.08	115.42	115.52	0.43
	2	106.02	105.48	105.38	105.63	0.33
	3	107.59	108.72	....	108.16	0.74
	4	104.93	104.8	....	104.86	0.09
	5	106.54	106.18	....	106.36	0.24
Microwave-Only, Over-the-Range	6	115.69	116.74	....	116.22	0.64
	7	113.91	114.53	....	114.22	0.38
	9	117.14	117.80	....	117.47	0.40
	10	107.44	107.85	107.04	107.44	0.38
Convection Microwave, Countertop	11	128.77	127.35	....	128.06	0.78
	12	131.95	130.17	130.5	130.87	0.72
	13	114.97	115.11	....	115.04	0.09
Convection Microwave, Over-the-Range	15	112.54	111.69	....	112.12	0.54
	16	120.83	120.18	119.56	120.19	0.53
	17	121.71	120.95	121.2	121.29	0.32
Average	....	....	....	....	114.90	0.44

Table 6 presents the calculated overall weighted average cooking cycle energy consumption results for each test unit. The following weighting factors provided in the draft revised IEC Standard 60705 are applied to the measured energy use for each test load size to calculate the weighted energy consumption: 1000 g = 2/11; 350 g = 6/11; 275 g = 3/11. DOE noted that values for the overall weighted average cooking cycle energy consumption ranged from approximately 50.4 Watt-hours (Wh) to 66.5 Wh (a 32.2 percent difference). DOE compared the range of values from testing according to the draft revised IEC Standard 60705 to the testing conducted for the most recent energy conservation standards rulemaking for microwave ovens. For that testing, DOE conducted testing on 32 microwave ovens and AHAM conducted tests on 21 separate microwave ovens according to the previous DOE microwave oven test procedure that was based on IEC Standard 705, with the results expressed in EF (i.e., the ratio of usable output power over input power). The DOE test units for the most recent energy conservation standards rulemaking testing are different from the test units tested for today's notice listed in Table 1. The results from this testing, presented in Table 7, showed a much smaller range in the efficiency metric, with EF values ranging from 54.8 percent to 61.8 percent (12.8 percent difference). Based on these results, DOE believes that the draft revised IEC Standard 60705 may provide the opportunity to better differentiate products available on the market based on efficiency and their associated design options for the purposes of energy conservation standards rulemakings.

TABLE 6—DRAFT REVISED IEC STANDARD 60705 OVERALL WEIGHTED ENERGY CONSUMPTION TEST RESULTS

Product type	Test unit	Overall weighted energy use (*Wh*)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
Microwave-Only, Countertop	1	51.99	51.82	51.90	51.90	0.17
	2	53.27	53.37	51.60	52.75	0.98
	3	54.41	53.46	....	53.93	1.25
	4	50.60	50.11	....	50.35	0.68
	5	50.51	50.79	....	50.65	0.39
Microwave-Only, Over-the-Range	6	55.11	55.36	....	55.23	0.32
	7	54.04	54.93	....	54.48	1.16
	9	57.31	57.38	....	57.34	0.09
	10	51.50	51.44	51.79	51.57	0.36
Convection Microwave, Countertop	11	66.85	66.24	....	66.54	0.65
	12	66.72	65.75	66.14	66.20	0.74
	13	58.47	58.54	....	58.51	0.08
Convection Microwave, Over-the-Range	15	54.58	54.55	....	54.57	0.03
	16	58.15	57.07	58.06	57.76	1.04
	17	59.89	59.03	59.82	59.58	0.80
Average	....	....	....	....	56.11	0.58

TABLE 7—DOE AND AHAM IEC STANDARD 705 TESTING RESULTS

DOE Testing		AHAM Testing	
Test unit [1]	EF (%)	Test unit [1]	EF (%)
1	57.5	33	57.6
2	58.0	34	61.1
3	55.9	35	58.9
4	59.6	36	57.4
5	59.5	37	60.7
6	58.4	38	61.8
7	57.6	39	55.2
8	57.3	40	59.1
9	60.2	41	57.2
10	56.9	42	57.8
11	59.4	43	58.7
12	59.2	44	61.4
13	59.0	45	56.4
14	60.8	46	61.4
15	58.9	47	57.3
16	60.6	48	55.7
17	57.2	49	54.8
18	59.2	50	55.8
19	58.2	51	59.1
20	60.4	52	56.8
21	61.2	53	58.1
22	56.9	....	....
23	59.4	....	....
24	58.7	....	....
25	61.3	....	....
26	58.0	....	....
27	61.5	....	....
28	60.4	....	....
29	59.7	....	....
30	57.6	....	....
31	58.5	....	....
32	58.0	....	....

Minimum Efficiency = 54.8%
Maximum Efficiency = 61.8%

[1] Test units listed in this table are different models than the models from DOE's latest testing.

DOE also noted that CENELEC conducted a round-robin testing program to evaluate the repeatability and reproducibility of the draft revised IEC Standard 60705. A total of 5 manufacturer test labs and 5 independent test labs in Europe conducted testing according to the draft revised IEC Standard 60705 on 4 microwave oven models. In terms of repeatability of the measured weighted cooking cycle energy consumption, the results showed that the test-to-test variation expressed as standard error within each laboratory was on average 0.56 percent. The lab-to-lab reproducibility of the measured weighted cooking cycle energy consumption showed a variation of 2.30 percent on average. CENELEC determined these to be acceptable levels of repeatability and reproducibility.

DOE also conducted testing to evaluate the testing methodology for measuring the low power energy consumption of the cooling down period. The draft revised IEC Standard 60705 requires that the cooking cycle test be run to achieve a 50 °C temperature rise. When the cooking cycle has finished, the load is removed from the microwave oven and the door is closed, at which point the cooling down energy consumption is measured for a period of 15 minutes. This test is conducted for each of the three test load sizes, and the weighted cooling down energy consumption is calculated using the same weighting factors used for the cooking cycle weighted energy consumption. The weighted cooling down energy consumption is then added to the weighted cooking cycle energy consumption to calculate the overall weighted energy consumption. For the 1000 g load size, DOE conducted two identical repeat tests. For the 275 g and 350 g load sizes, DOE conducted one test each. The results of this testing are presented below in Table 8.

TABLE 8—DRAFT REVISED IEC STANDARD 60705 COOLING DOWN ENERGY CONSUMPTION TEST RESULTS

Product type	Test unit	Cooling down energy use (*Wh*)			
		1000 g Test 1	1000 g Test 2	350 g Test	275 g Test
Microwave-Only, Countertop	1	0.00	0.00	0.00	0.00
	2	0.81	0.80	0.79	0.78
	3	0.23	....	0.23	0.25
	4	0.88	0.89	0.88	0.88
	5	0.39	0.39	0.40	0.39

TABLE 8—DRAFT REVISED IEC STANDARD 60705 COOLING DOWN ENERGY CONSUMPTION TEST RESULTS—Continued

Product type	Test unit	Cooling down energy use (*Wh*)			
		1000 g Test 1	1000 g Test 2	350 g Test	275 g Test
Microwave-Only, Over-the-Range	6	0.80	....	0.81	0.81
	7	0.41	0.41	0.43	0.41
	9	1.09	1.10	1.08	1.09
	10	0.72	0.78	0.77	0.72
Convection Microwave, Countertop	11	0.72	0.72	0.73	0.73
	12	0.92	0.89	0.89	1.07
	13	0.31	0.32	0.32	0.31
Convection Microwave, Over-the-Range	15	0.99	0.99	0.97	1.00
	16	1.08	1.07	1.07	1.07
	17	0.69	0.67	0.67	0.66

DOE observed minimal variation in the measured cooling down energy consumption from test to test and also between the different load sizes. DOE noted that for all of the units in its test sample, none contained a fan that operated at the end of the microwave-only cooking cycle to cool the appliance down. DOE also noted that when the door was closed after the load was removed at the end of the cooking cycle, the microwave ovens reverted back to the standby mode. Table 9 presents the average measured power for the cooling down mode as compared to the average measured standby mode power for each test unit.

TABLE 9—DRAFT REVISED IEC STANDARD 60705 COOLING DOWN MODE POWER

Product type	Test unit	Average cooling down power (*W*)			Average standby power (*W*)
		1000 g Tests	350 g Test	275 g Test	
Microwave-Only, Countertop	1	0.00	0.00	0.00	[1] 0.00
	2	3.24	3.15	3.10	3.18
	3	0.90	0.92	1.00	1.06
	4	3.55	3.54	3.54	3.52
	5	1.56	1.59	1.55	1.63
Microwave-Only, Over-the-Range	6	3.23	3.25	3.25	3.24
	7	1.64	1.72	1.64	1.71
	9	4.41	4.40	4.38	4.29
	10	3.00	3.11	2.90	3.16
Convection Microwave, Countertop	11	2.88	2.91	2.91	2.93
	12	3.66	3.58	4.29	3.54
	13	1.26	1.26	1.27	1.19
Convection Microwave, Over-the-Range	15	3.98	3.90	3.99	3.98
	16	4.29	4.30	4.29	4.32
	17	2.72	2.69	2.66	2.73

[1] Test unit 1 had electromechanical controls and operated in off mode, consuming 0 W. This unit was not capable of operating in standby mode.

The repeatability and reproducibility of the cooling down energy consumption measurement method from the draft revised IEC Standard 60705 was also evaluated as part of the CENELEC round-robin testing program. In terms of repeatability of the measured weighted cooling down energy consumption, the results showed that the test-to-test variation expressed as standard error within each laboratory was on average 0.24 percent. The lab-to-lab reproducibility of the measured weighted cooling down energy consumption showed a variation of 6.14 percent on average. CENELEC determined these to be acceptable levels of repeatability and reproducibility.

DOE may consider incorporating the draft revised IEC Standard 60705 test method into the DOE microwave oven test procedure for measuring the energy consumption of the microwave-only cooking function. As a result DOE is seeking comment on the following issues:

1. DOE seeks comment on the suitability of the testing methodologies provided in the draft revised IEC Standard 60705 for incorporation into the DOE microwave oven test procedure. In particular, DOE requests comment on the repeatability and reproducibility of the test results from both DOE and CENELEC testing. DOE also welcomes comment on whether the test procedure should require multiple test runs with the results averaged.

2. DOE requests comment on the accuracy requirements for measuring equipment specified in the draft revised IEC Standard 60705. In particular, DOE requests comment on the less stringent requirements for the accuracy of the temperature measurements as compared to IEC Standard 705.

3. DOE welcomes comment on the testing burden associated with testing according to the draft revised IEC Standard 60705. When providing comments, please quantify and describe the associated testing burdens.

4. DOE requests consumer usage data on the number of annual active mode cooking cycles and annual hours spent in active mode for microwave-only ovens.

5. DOE welcomes comment on the determination to conduct testing for over-the-range microwave ovens with

the airflow exhaust/recirculation fan installed in the default air recirculation configuration. DOE welcomes comment on whether there are any other installation conditions for over-the-range or built-in microwave ovens that it should consider for the DOE microwave oven test procedure.

C. Reheat Food Simulation Mixture Testing

DOE notes that water may not be representative of actual food loads cooked by consumers in microwave ovens. As a result, DOE conducted testing on 7 microwave ovens using the microwave-only cooking function to evaluate mixtures that would simulate food load that may be reheated in a microwave. The mixtures were composed of water and basic food ingredients (*i.e.,* fats, sugars, salt, fiber, proteins, etc.) with a total combined mass of 350 g. DOE selected the 350 g load size (using the 900 ml borosilicate glass container) based on the draft revised IEC Standard 60705 weighting factors for the load size with the highest frequency of use. DOE also conducted testing on an actual food load, chicken noodle soup, to serve as a comparison to the food simulations. The mixtures and food load were tested using the same basic testing methodology as the draft revised IEC Standard 60705 (*i.e.,* microwave-only cooking function, temperature rise from 10 °C to 60 °C). The measured cooking cycle energy consumption was then used to calculate the energy consumption required to heat one gram of the mixture by one degree Celsius, an effective heat capacity. For each test unit, three identical tests were conducted for each mixture to evaluate the repeatability of such a testing procedure.

The results from this testing, presented in Table 10 and Table 11, show a higher range and average test-to-test variation, expressed as a standard error, compared to the water-only load and compared to the results using the draft revised IEC Standard 60705 test method presented in 0.0. DOE also noted that the same brands were used for each ingredient in the mixtures. Therefore, additional variation in test results may be observed from lab to lab due to the use of different brands of the ingredients.

TABLE 10—FOOD SIMULATION MIXTURE TEST RESULTS—PART 1

Test unit	Water		Water + fat		Water + glucose		Water + fat + glucose	
	Average heat capacity (*J/g·°C*)	Test-to-test variation (%)	Average heat capacity (*J/g·°C*)	Test-to-test variation (%)	Average heat capacity (*J/g·°C*)	Test-to-test variation (%)	Average heat capacity (*J/g·°C*)	Test-to-test variation (%)
1	8.570	0.39	8.284	3.57	7.514	1.50	7.672	1.54
2	8.635	0.99	8.759	7.20	7.259	1.85	7.416	5.95
8	*	*	8.952	1.67	8.332	1.06	8.241	4.04
9	8.363	0.64	8.561	2.39	7.559	2.61	7.293	2.16
11	11.419	1.42	10.941	0.87	10.203	1.65	9.704	3.00
15	9.356	0.68	8.922	0.11	8.152	0.49	8.028	2.55
16	9.833	0.27	9.774	0.41	8.769	1.55	8.790	2.35
Average	9.363	0.73	9.170	2.32	8.255	1.53	8.163	3.08

* Not tested.

TABLE 11—FOOD SIMULATION MIXTURE TEST RESULTS—PART 2

Test unit	Pizza simulation		Chicken noodle soup simulation		Chicken noodle soup	
	Average heat capacity (*J/g·°C*)	Test-to-test variation (%)	Average heat capacity (*J/g·°C*)	Test-to-test variation (%)	Average heat capacity (*J/g·°C*)	Test-to-test variation (%)
1	6.975	2.42	8.618	1.09	8.941	2.01
2	6.486	1.24	8.811	3.77	9.210	1.26
8	7.715	1.93	8.952	0.69	9.754	2.67
9	6.453	0.61	8.406	0.73	8.995	3.29
11	9.036	0.90	11.108	0.81	11.662	1.39
15	7.164	1.28	8.909	0.56	9.236	1.04
16	7.715	1.15	9.624	0.88	10.012	1.43
Average	7.363	1.36	9.204	1.22	9.687	1.87

6. DOE welcomes comment on suitability of using food simulation mixtures for the microwave oven test procedure for microwave-only cooking. In particular, DOE requests comment on the repeatability and reproducibility of the food simulation mixture tests results presented in Table 10 and Table 11.

D. Convection Microwave Cooking Testing

As discussed above in section 0, according to Whirlpool, convection microwave ovens (*i.e.,* microwave ovens that incorporate convection features and any other means of cooking in a single compartment) represent less than 4 percent of U.S. shipments. Based on shipments data from *Appliance Magazine* showing 11.340 million microwave oven shipments in 2008,[3] convection microwave ovens represent approximately 450,000 annual shipments.

[3] ''U.S. Appliance Industry: Market Share, Life Expectancy & Replacement Market, and Saturation Levels.'' *Appliance Market Research Report, Appliance Magazine,* January 2010.

DOE's review of product literature indicated that convection microwave ovens can be operated using the microwave-only cooking function, convection-only cooking function, and convection microwave cooking function. DOE also noted based on a review of the cooking manuals and recipe books supplied with convection microwave ovens that a significant portion of the recipes included cooking procedures that used the convection microwave cooking function. As a result, DOE first investigated whether testing procedures could be developed to evaluate the convection microwave cooking function of convection microwave ovens. As discussed in section 0, AHAM and Whirlpool both noted a number of concerns with the repeatability and reproducibility of test results using actual food loads. DOE therefore decided to conduct limited testing to evaluate the repeatability of real food loads when heated using the convection microwave cooking function. DOE tested three different food loads: shortening, potatoes, and chicken. For each food load, the same brand of products was used for all tests to specifically evaluate repeatability of test results. DOE then conducted testing to assess food simulation cooking loads to determine whether such loads are representative of actual food loads and improve the repeatability of test results.

As part of this testing DOE noted that for the majority of microwave ovens in its test sample, the default program setting for convection microwave cooking allowed the user to set the overall cooking time and cycled between microwave-only cooking and convection-only cooking, where microwave-only cooking accounted for 30 percent of the cooking time and convection-only cooking accounted for the remaining 70 percent of total cooking time. DOE used this default convection microwave cooking program setting that used 30 percent microwave-only cooking and 70 percent convection-only cooking for testing. DOE also noted that for the majority of the convection microwave ovens in its test sample, the user is required to program the temperature setting for the convection portion of the convection microwave cooking cycle. Based on a review of the cooking manuals and recipe books supplied with convection microwave ovens, DOE noted that a majority of the recipes that used convection microwave cooking specified convection temperature settings between 300 degrees Fahrenheit (°F) and 375 °F. DOE also noted that its current test procedure for conventional ovens found in 10 Code of Federal Regulations (CFR) part 430, subpart B, appendix I specifies a convection temperature setting 325 ± 5 °F higher than the room ambient air temperature, which would result in a temperature setting close to 400 °F. However, based on DOE's survey of convection microwave ovens available on the market, not all products are equipped with a 400 °F temperature setting, but all convection microwave ovens DOE surveyed had a 375 °F setting. As a result, DOE selected a convection temperature setting of 375 °F for the convection microwave cooking function for its testing of convection microwave ovens.

For convection microwave cooking testing, DOE noted that the temperatures of the test loads had to be measured before and after the cooking cycle, as is done for IEC Standard 60705, due to safety concerns with arcing inside the microwave oven cavity from the metal thermocouples and the microwave energy. The following sections discuss these testing investigations to evaluate the convection microwave cooking function.

Food Load Testing

For shortening, DOE conducted limited testing on two convection microwave oven models. For each test, DOE prepared a 350 g load of shortening in the 900 ml borosilicate glass container with a starting load temperature of 10 ± 1 °C. DOE used three thermocouples to measure the average temperature of the load, with one thermocouple placed in the center of the load, and the other two placed approximately one inch from the edge of the container on either side. All of the thermocouples were placed at an equal distance from the top and bottom of the load. The shortening load was then heated using the default convection microwave cooking function to achieve a target average final temperature of 60 ± 5 °C. As for the reheat food simulation mixture testing, the measured cooking cycle energy consumption was then used to calculate the effective heat capacity. For each test unit, DOE conducted three identical tests to evaluate repeatability. DOE also conducted an additional set of testing with target average final temperatures of 70 ± 5 °C for one test unit and 80 ± 5 °C for the other test unit. DOE was unable to establish a target final average temperature range tighter than ± 5 °C due to the test-to-test variation in the final average temperature of the test load even when using the same cooking time. DOE noted that using tighter ranges such as ± 2 °C or ± 1 °C for this food load would require a significant number of retests to achieve the specified final average temperatures.

The test results for the shortening tests are presented below in Table 12. For the tests using an average final temperature of 60 ± 5 °C, the test-to-test variation ranged from 5.18 percent to 7.42 percent. DOE observed that the shortening, which was all solid at the starting temperature of 10 ± 1 °C, was only partly liquefied at the final temperature of approximately 60 °C, with the middle still being partly solid, and the outer portion being liquid. Unlike the tests using an average final temperature of 60 °C, DOE observed that the shortening was all liquid at the end of the cooking cycle for the 70 °C and 80 °C average final temperature tests. However, the test results for these tests continued to show significant test-to-test variation.

For all shortening tests, DOE noted that when it measured the final temperature of the load after the completion of the cooking cycle, the temperature continued to rise for 30–90 seconds before finally leveling off. DOE believes that this may be attributable to continued heat transfer from the hotter outer edges of the test container and/or food load after the completion of the cycle. DOE waited until the temperature leveled off and used that measurement for the calculation of the effective heat capacity. DOE recognizes that this may contribute to additional test-to-test variation depending on the time needed for the temperature of the load to stabilize for each test. DOE also noted that it had to conduct a number of additional retests in cases where the final temperature was not within the specified range. DOE recognizes that specifying a tighter final temperature range than ± 5 °C may represent a testing burden due to the difficulties of achieving a consistent final load temperature from test to test.

TABLE 12—FOOD LOAD TEST RESULTS: SHORTENING

Product type	Test unit	Target final avg. temp range of load (°C)	Test 1		Test 2		Test 3		Test-to-test variation (%)
			Avg. heat capacity (J/g·°C)	Avg. final temp (°C)	Avg. heat capacity (J/g·°C)	Avg. final temp (°C)	Avg. heat capacity (J/g·°C)	Avg. final temp (°C)	
Combination, Countertop	14	60 ± 5	44.290	57.3	39.977	58.3	42.843	56.1	5.18
		80 ± 5	33.115	83.7	35.924	79.1	31.932	75.9	6.09
Combination, Over-the-Range	17	60 ± 5	30.413	60.1	26.471	56.8	27.282	64.6	7.42
		70 ± 5	25.688	69.1	25.081	68.0	26.199	67.5	2.18

DOE next conducted testing to evaluate the repeatability of Russet Burbank potatoes as a test food load using the convection microwave cooking function. DOE selected potatoes as a test load based on a review of commonly found foods contained in the cooking manuals and recipe books supplied with convection microwave ovens. Based on discussions with a food scientist specializing in potato production and storage management as well as potato seed quality and performance, DOE specifically selected Russet Burbank potatoes based on their consistent water content. In addition, Russet potatoes were identified to be the most likely to be available year round and are grown with standardized approaches. For each test DOE selected 3 potatoes with similar weights, with no greater than an 80 g difference between the largest and smallest potato for a batch of 3 potatoes. The potatoes were then placed in an equidistant triangle pattern directly on the turntable dish at approximately 7 centimeters from the center of the dish. DOE noted that it was unable to keep a tight tolerance on the total combined mass due to the variability in size and shape of the potatoes. The temperature of each potato was measured using single thermocouples placed approximately at the center of each potato. The potato loads were heated from 10 ± 1 °C to about 60 ± 5 °C using the convection microwave cooking function. DOE selected the target final temperature of 60 °C based on a review of the cooking instructions for potatoes found in the cooking manuals and recipe books. As was done for the shortening tests, the measured cooking cycle energy consumption was then used to calculate the effective heat capacity. For each test unit, DOE conducted three identical tests to evaluate repeatability. DOE noted that Russet Burbank potatoes are grown in multiple geographical regions in North America, the majority of which are grown in Idaho and Canada. DOE decided to conduct testing to determine whether Russet Burbank potatoes grown in certain regions produce more repeatable test results. As a result, DOE tested batches of potatoes from the two areas where the majority of Russet Burbank potatoes are grown, Idaho and Canada.

The Russet Burbank potato testing results are presented below in Table 13 and Table 14. The results showed test-to-test variation for the calculated effective heat capacity ranging from 2.89 percent to 8.50 percent for both types of Russet Burbank potatoes. DOE noted that, in addition to the varying masses of each of the three test potatoes, the varying shape of each potato may also affect the time required to heat the center of each potato to the target final temperature. DOE also noted that it was difficult to achieve a consistent final average temperature from test to test due to the different masses and shapes of the potatoes. DOE observed, similar to the tests for shortening, that when it measured the final temperature of the load after the completion of the cooking cycle, the temperature continued to rise for 80–160 seconds in some cases before finally leveling off. DOE waited until the temperature leveled off and used that measurement for the calculation of the effective heat capacity. DOE recognizes that this may contribute to additional test-to-test variation depending on the time needed for the temperature of the load to stabilize for each test. As with the shortening tests, DOE noted that it had to conduct a number of additional retests in cases in which the final temperature was not within the specified range. DOE similarly recognizes that specifying a tighter final temperature range than ± 5 °C for potatoes may represent a testing burden due to the difficulties of achieving a consistent final load temperature from test to test.

DOE recognizes that in addition to issues with test-to-test repeatability, the lab-to-lab reproducibility will also be difficult to maintain if the potatoes are grown under different conditions, including climate and growing conditions (*i.e.,* soil conditions, watering frequency, harvesting time, etc.) that may vary throughout the growing seasons even within specific geographical regions.

TABLE 13—FOOD LOAD TEST RESULTS: IDAHO RUSSET POTATO

Product type	Test unit	Average heat capacity (J/g·°C)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
Convection Microwave, Countertop	12	29.541	32.359	31.366	31.089	4.60
	14	33.972	39.277	39.732	37.660	8.50
Average					34.375	6.55

TABLE 14—FOOD LOAD TEST RESULTS: CANADIAN RUSSET POTATO

Product type	Test unit	Average heat capacity (*J/g·°C*)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
Convection Microwave, Countertop	13	20.230	22.081	19.741	20.684	5.97
Convection Microwave, Over-the-Range	17	29.145	29.722	30.845	29.904	2.89
	18	29.155	27.766	27.300	28.074	3.44
Average					26.220	4.10

DOE also conducted testing with USDA grade A boneless chicken breasts using the same basic procedure described for the testing with potatoes, but with the different starting and final test load temperatures. DOE noted that chicken is generally stored frozen, and then allowed to thaw before cooking. To determine an appropriate starting temperature, DOE used the programmed defrost cycle settings for chicken on a microwave oven in its test sample and measured the temperature of the chicken breasts after the defrost cycle. The temperature of the thawed chicken after the defrost cycle ranged between 2 to 5 °C. However, at 2 °C, DOE noted that the chicken breast still had some localized frozen sections not found at 5 °C. Therefore, DOE used a starting temperature of 5 ± 1 °C. A target final temperature of 90 ± 5 °C was used based on review of cooking instructions for chicken found in cooking manuals and recipe books supplied with convection microwave ovens. For this testing, DOE selected 3 chicken breasts for each test with similar weights with no greater than a 170 g difference between the largest and smallest chicken breast. For each test unit, DOE conducted up to four identical tests to evaluate repeatability.

The results from testing, presented below in Table 15, showed test-to-test variation for the calculated effective heat capacity ranging from 1.09 percent to 12.57 percent, with an average of 7.20 percent. DOE noted that this variability may be due to the varying masses and shapes of each chicken breast. DOE also observed, similar to the tests for shortening and potatoes, that when it measured the final temperature of the load after the completion of the cooking cycle, the temperature continued to rise for 60–150 seconds in some cases before finally leveling off. DOE waited until the temperature leveled off and used that measurement for the calculation of the effective heat capacity. DOE recognizes that this may contribute to additional test-to-test variation depending on the time needed for the temperature of the load to stabilize for each test. As with the other food load tests, DOE noted that it had to conduct a number of additional retests in cases in which the final temperature was not within the specified range. DOE similarly recognizes that specifying a tighter final temperature range than ± 5 °C for chicken may represent a testing burden due to the difficulties of achieving a consistent final load temperature from test to test.

DOE recognizes that the following factors may contribute to variation from chicken to chicken, and thus test to test, as well as contribute to variation in reproducibility for chicken breasts from different suppliers:

- Individual chicken's diet;
- Individual chicken's physical activity;
- Genetics; and
- Methods of breeding and raising chickens from farm to farm

TABLE 15—FOOD LOAD TEST RESULTS: USDA GRADE A BONELESS CHICKEN BREAST

Product type	Test unit	Range of total masses (*g*)	Average heat capacity (*J/g·°C*)					Test-to-test variation—standard error (%)
			Test 1	Test 2	Test 3	Test 4	Average	
Convection Microwave, Countertop	12	700–781	37.449	37.533	36.867	([1])	37.283	0.97
	14	687–804	34.674	32.619	35.469		34.254	4.29
Convection Microwave, Over-the-Range	17	708–794	32.751	44.727	39.019	39.373	38.967	12.57
Average							36.835	5.95

[1] For test units 12 and 14, DOE conducted only 3 repeat tests.

7. DOE requests comment on the suitability of real food loads for incorporation into the DOE microwave oven test procedure for testing convection microwave ovens. DOE also welcomes comments specifically on the test methodologies (*i.e.,* load temperature measurement methods, starting and final temperatures, mass of test load) described in this section and the repeatability of test results using shortening, Russet Burbank potatoes, and USDA grade A boneless chicken breasts as well as the reproducibility of such food loads.

Food Load Simulation Testing

As part of the convection microwave cooking testing, DOE also evaluated loads that would simulate actual foods. As discussed in the October 2011 RFI, DOE noted that one consumer product review organization in the UK uses the solidifying powder TX–151, which when combined with water creates a gel, to simulate a food load (in their case lasagna).[4] DOE decided to conduct testing using the TX–151 solidifying powder to evaluate the repeatability of test results using the convection microwave cooking function. DOE prepared three different water-solidifying powder mixtures using ratios recommended by the manufacturer of TX–151 to create medium, medium-hard, and hard firmness gels, using ratios of powder to water of 1:10, 1:7,

[4] For more information, visit *http://www.which.co.uk/home-and-garden/kitchen/guides/how-we-test-microwaves/.*

and 1:5, respectively. DOE noted that when mixing each powder-to-water ratio, the temperature of the water and mixing speed/time directly influenced the mixture's homogeneity. As a result, DOE determined, based on experimentation, the water temperatures and mixing speeds/times for each powder-to-water ratio that produced the most homogenous mixtures. DOE also covered the mixtures and allowed them to set for two different lengths of time (2 hours and 6 hours) and at two different temperatures (20–25 °C and 7–10 °C) to evaluate whether setting time and temperature affected the consistency of the gel. DOE observed that the allowing the gels to set for 6 hours did not noticeably change the hardness or consistency as compared to the gels that were allowed to set for 2 hours. In addition, DOE observed in most cases a 0.1 g to 0.3 g loss in water prior to the cooking cycle for both the 2 hour and 6 hour setting times due to evaporation, and that the water loss was not noticeably higher for the 6 hour setting time. DOE noted that this was likely because the mixtures were covered while being allowed to set. Based on these observations, DOE selected the 2 hour setting time for testing. In addition, DOE noted that the two different setting temperatures did not result in a noticeably different hardness or consistency after a given setting time. As a result, DOE selected the 7–10 °C setting temperature so that the temperature of the test load at the start of the test cycle would be more representative of food load temperatures at the start of cooking.

DOE tested each convection microwave oven in its test sample using each of the three power-to-water ratio gels (*i.e.,* 1:10, 1:7, and 1:5) prepared as described above. For each test, DOE prepared 350 g of the gel mixtures in the 900 ml borosilicate glass containers. Similar to the method discussed above for shortening, DOE used three thermocouples to measure the temperature of the load, with one thermocouple placed in the center of the load, and the other two placed approximately one inch from the edge of the container on either side, and each thermocouple placed at an equal distance from the top and bottom of the load. The test loads were heated from 10 ± 1 °C until the center temperature was 60 ± 5 °C using the convection microwave cooking function. DOE chose to use a target final temperature for the center thermocouple probe because it noted that the temperatures of two outer thermocouple probes were much more variable and difficult to repeat. In addition, the temperature at the center of the food load is generally used to determine whether food is cooked completely. DOE noted that the target final temperature of 60 ± 5 °C resulted in an overall average final temperature of approximately 70 ± 5 °C for all three thermocouple probes in most cases.

The results from this testing are presented below in Table 16 through Table 18. For the 1:10 powder-to-water ratio gel, the test-to-test variation ranged from 1.89 percent to 5.89 percent, with an average of 4.02 percent. For the 1:7 and 1:5 powder-to-water ratio gel tests the range in test-to-test variation was greater than the 1:10 powder-to-water ratio gel tests. DOE noted that this may be due to the 1:10 powder-to-water ratio gel being the most homogenous mixture. DOE also observed that the outer edge on the surface of the gel was slightly evaporated at the completion of the cooking cycle. In particular, the gels with a powder-to-water ratio of 1:10 had more evaporation on the edges than the 1:7 and 1:5 ratio gels, which was likely due to the larger amount of water making up the 1:10 ratio gels.

DOE also observed, similar to the tests for real food loads, that when it measured the final temperature of the load after the completion of the cooking cycle, the temperature continued to rise for 30–90 seconds in most cases before finally leveling off. DOE waited until the temperature leveled off and used that measurement for the calculation of the effective heat capacity. DOE recognizes that this may contribute to additional test-to-test variation depending on the time needed for the temperature of the load to stabilize for each test. As with the real food load tests, DOE also noted that it had to conduct a number of additional retests in cases in which the final temperature was not within the specified range. DOE similarly recognizes that specifying a tighter final temperature range than ± 5 °C for the TX–151 gels may represent a testing burden due to the difficulties of achieving a consistent final load temperature from test to test.

TABLE 16—TX–151 1:10 RATIO GEL TESTS

Product type	Test unit	Average heat capacity (*J/g·°C*)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
Convection Microwave, Countertop	11	33.828	32.448	36.422	34.233	5.89
	12	43.748	40.932	39.665	41.448	5.04
	13	27.655	29.565	28.127	28.449	3.50
	14	54.402	51.997	53.212	53.203	2.26
Convection Microwave, Over-the-Range	15	31.301	32.376	29.910	31.196	3.96
	17	34.785	33.503	34.035	34.108	1.89
	18	49.865	45.797	44.999	46.887	5.57
Average					38.503	4.02

TABLE 17—TX–151 1:7 RATIO GEL TESTS

Product type	Test unit	Average heat capacity (*J/g·°C*)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
Convection Microwave, Countertop	11	34.378	34.588	32.836	33.934	2.82
	12	44.150	43.724	42.968	43.614	1.37
	13	28.102	28.068	28.381	28.183	0.61
	14	48.668	57.097	56.416	54.060	8.66
Convection Microwave, Over-the-Range	15	34.109	27.204	33.126	31.480	11.87

TABLE 17—TX–151 1:7 RATIO GEL TESTS—Continued

Product type	Test unit	Average heat capacity (*J/g·°C*)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
	17	34.850	34.699	34.307	34.618	0.81
	18	44.813	43.801	44.559	44.391	1.19
Average	....	....	....	....	38.612	3.90

TABLE 18—TX–151 1:5 RATIO GEL TESTS

Product type	Test unit	Average heat capacity (*J/g·°C*)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
Convection Microwave, Countertop	11	32.798	34.219	31.778	32.932	3.72
	12	45.869	45.375	44.995	45.413	0.97
	13	30.061	28.882	28.484	29.142	2.81
	14	55.433	59.854	48.900	54.729	10.07
Convection Microwave, Over-the-Range	15	27.940	33.899	32.653	31.497	9.98
	17	35.116	36.735	36.633	36.162	2.51
	18	54.040	46.450	47.023	49.171	8.60
Average	....	....	....	....	39.864	5.52

DOE may consider amendments to the microwave oven test procedure for measuring the convection microwave cooking function for convection microwave ovens. If DOE determines such test procedure amendments are warranted, it may consider developing an integrated metric that incorporates the convection microwave cooking function energy use along with other active mode and standby mode energy use. As a result, DOE would require consumer usage data on the number of annual convection microwave cooking cycles and annual hours spent in convection microwave cooking mode for convection microwave ovens. However, DOE is currently unaware of any such data. DOE is seeking comment on the following issues related to convection microwave cooking.

8. DOE requests comment on the suitability of the various powder-to-water ratio gels and testing methods (*i.e.,* load temperature measurement methods, starting and final temperatures, and mass of test load) described in this section for incorporation into the DOE microwave oven test procedure for testing convection microwave ovens. DOE also welcomes comments specifically on the repeatability of test results presented in this section as well as comments on the reproducibility of test measurements. In addition, DOE requests comment on the testing burden associated with these testing methods. When providing comments, please quantify and describe the associated testing burdens.

9. DOE requests comment on whether there are any other food load simulations and testing methods that it should consider for measuring the energy use of convection microwave ovens. In particular, DOE requests data and information on the repeatability of such loads and testing methods.

10. DOE requests consumer usage data on the number of annual active mode cycles and annual hours spent in microwave-only cooking mode and convection microwave cooking mode for convection microwave ovens.

E. Convection Microwave Oven Convection-Only Cooking Testing

As discussed above, DOE noted that convection microwave ovens can also be operated using the convection-only cooking function. DOE investigated whether a testing procedure could be developed to evaluate the convection-only cooking function of a convection microwave oven. DOE developed a testing method based on the DOE conventional cooking products test procedure for conventional ovens at 10 CFR part 430, subpart B, appendix I, to measure the energy consumption of the convection cooking function for convection microwave ovens. The DOE conventional oven test procedure involves setting the convection cooking cycle such that the temperature inside the oven is 325 ± 5 °F higher than the room ambient air temperature. An 8.5 ± 0.1 pound cylindrical aluminum test block is then heated from ambient room air temperature ± 4 °F until the test block temperature has increased 234 °F above its initial temperature. The temperature of the aluminum test block is measured using a single thermocouple placed at the center of the block in a 0.08 inch diameter hole 0.8 inches from the top of the block. Because this test uses only convection heating and is not subject to safety concerns with arcing from microwave energy, thermocouples can be used to measure the test load temperature inside the microwave oven cavity during the test cycle. The measured energy consumption is used to calculate the cooking efficiency and energy factor.

As discussed above, DOE noted that the convection temperature setting requirement of 325 ± 5 °F higher than the room ambient air temperature would result in a temperature setting close to 400 °F. Based on DOE's review of products currently available on the U.S. market, a number of convection microwave ovens did not have a 400 °F temperature setting, but all convection microwave ovens that DOE surveyed had a 375 °F temperature setting. As a result, DOE modified the test method to conduct this testing using a temperature control setting of 375 °F to heat the aluminum test block to 234 °F above its initial temperature. In addition, DOE also specified that the aluminum test block be placed on the metal cooking rack provided by the manufacturer. For each convection microwave oven, DOE conducted three identical tests to evaluate repeatability of results. The results from testing, presented in Table 19, showed test-to-test variation ranging from 0.68 percent to 2.11 percent, with an average of 1.30 percent.

TABLE 19—CONVECTION-ONLY COOKING TEST RESULTS

Product type	Test unit	Cooking efficiency (%)				Test-to-test variation—standard error (%)
		Test 1	Test 2	Test 3	Average	
Convection Microwave, Countertop	11	7.37	7.24	7.07	7.23	2.11
	12	12.48	12.53	12.25	12.42	1.19
	13	8.29	8.49	8.32	8.37	1.28
	14	10.12	10.06	10.31	10.16	1.32
Convection Microwave, Over-the-Range	15	6.62	6.49	6.43	6.51	1.51
	17	11.19	11.05	11.08	11.11	0.68
	18	7.60	7.66	7.51	7.59	1.00
Average					9.06	1.30

If DOE determines that actual and simulation food loads do not produce repeatable results using the convection microwave cooking function, DOE may consider developing a test procedure using a single metric that accounts for the energy use of the different cooking functions (*i.e.,* microwave-only, convection-only, and convection microwave cooking) using the microwave-only cooking test method and the convection-only cooking test method. As discussed above, DOE noted that the convection microwave cooking cycle for microwave ovens in DOE's test sample consisted of cycling between microwave-only cooking for 30 percent of the time and convection-only cooking for the remaining 70 percent of the time. DOE may use this mix of microwave and convection cooking to apportion the energy use measured using the individual test procedures for microwave-only and convection-only cooking to calculate the per-cycle energy use for a convection microwave cooking cycle. However, DOE is not aware of consumer usage data regarding representative cooking cycle lengths, number of annual cooking cycles, or annual usage hours for each of the cooking functions for convection microwave ovens.

11. DOE requests comment on the suitability of incorporating the convection-only cooking method presented above into the DOE test procedure for convection microwave ovens. DOE also requests comment on the potential approach of using the microwave-only and convection-only cooking tests to calculate the energy use for the convection microwave cooking function. DOE seeks comment on the repeatability of the convection microwave oven convection-only cooking function test results presented in this section. DOE welcomes additional data and inputs on the repeatability and reproducibility of this convection-only cooking test method.

12. DOE requests comment on the testing burden associated with these testing methods. When providing comments, please quantify and describe the associated testing burdens.

13. DOE seeks comment on the temperature setting of 375 °F and target final temperature of 234 °F above the initial test block temperature and whether such settings would be appropriate for the DOE test procedure for convection microwave ovens.

14. DOE seeks consumer usage data on the representative cooking cycle lengths, number of annual cooking cycles, and annual usage hours for each of the cooking functions for convection microwave ovens (*i.e.,* microwave-only, convection-only, and convection microwave cooking). DOE also welcomes comment on whether a split of 30 percent microwave and 70 percent convection would be appropriate for apportioning energy use for the convection microwave cooking function.

F. Cooling Down Energy Use

As discussed above in section 0.0, DOE noted that for all of the units in its test sample, none contained a fan that operated at the end of the microwave-only cooking cycle to cool the appliance down. However, DOE noted that a number of the convection microwave ovens in its sample had a fan that operated after the completion of the convection microwave cooking cycle and convection-only cooking cycle in order to cool the microwave oven. DOE observed during testing that the cooling down power ranged from approximately 19 watts (W) to 63 W. Table 20 shows the measured cooling down energy consumption and amount of time the cooling fan ran after the completion of the convection-only cooking cycle for the convection microwave ovens in DOE's test sample that operated a cooling fan after the cooking cycle. These measurements showed that the convection microwave ovens in DOE's test sample that operated a cooling fan after the completion of the cooking cycle consumed between 1.0 Wh and 7.2 Wh. DOE also noted that the amount of time that the cooling fan operated varied from product to product, and also from test to test.

TABLE 20—CONVECTION-ONLY COOLING DOWN ENERGY USE

Product type	Test unit	Test 1		Test 2		Test 3	
		Cool down energy use (*Wh*)	Cool down duration (*min*)	Cool down energy use (*Wh*)	Cool down duration (*min*)	Cool down energy use (*Wh*)	Cool down duration (*min*)
Convection Microwave, Countertop	11						
	12	1.2	3.22	1.1	2.95	1.0	2.80
	13						
	14	1.2	3.68	1.3	3.83	1.1	3.48
Convection Microwave, Over-the-Range	15						

TABLE 20—CONVECTION-ONLY COOLING DOWN ENERGY USE—Continued

Product type	Test unit	Test 1		Test 2		Test 3	
		Cool down energy use (*Wh*)	Cool down duration (*min*)	Cool down energy use (*Wh*)	Cool down duration (*min*)	Cool down energy use (*Wh*)	Cool down duration (*min*)
	17	6.7	6.52	6.6	6.28	7.2	6.90
	18	2.5	3.13	2.6	3.25	2.6	3.27

Note: Test units for which no values are listed indicate that no cooling fan ran after the completion of the combination or convection-only cooking cycles.

DOE may consider test procedure amendments to include the cooling fan energy consumption as part of the energy efficiency metric for convection microwave ovens. If DOE determines that such amendments are appropriate, it may also consider adjustments to the annual standby mode hours to account for the additional time that the product operates the cooling fan at the end of the cooking cycle. The total annual cooling fan hours would be calculated by multiplying the amount of time that the cooling fan operates per cycle by the number of total annual convection microwave cooking and convection-only cooking cycles. These hours would then be subtracted from the total number of standby mode hours. However, DOE is unaware of consumer usage data regarding the total annual convection microwave and convection-only cooking cycles for convection microwave ovens.

15. DOE welcomes comment on whether the cooling fan energy consumption should be included in the efficiency metric for convection microwave ovens.

G. Additional Issues on Which DOE Seeks Comment

DOE may consider amendments to the microwave oven test procedure for both microwave-only and convection microwave ovens based on the testing discussed in the sections above. In addition to the specific issues for each testing method on which DOE is seeking comment, DOE is seeking comment on the following:

16. DOE welcomes general comments about the potential testing methodologies to measure microwave oven active mode energy use presented in this notice. DOE also welcomes comment on any alternative testing methodologies appropriate for inclusion in the DOE microwave oven test procedure. DOE requests data on the repeatability and reproducibility of such testing methods. DOE also welcomes additional data on the repeatability and reproducibility of testing results using the test methods presented in this notice.

The purpose of this NODA is to solicit feedback from industry, manufacturers, academia, consumer groups, efficiency advocates, government agencies, and other stakeholders on issues related to the DOE microwave oven test procedure. DOE is specifically interested in information and additional data on the potential amendments to the microwave oven test procedure for measuring active mode energy use presented in today's notice. Respondents are advised that DOE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this NODA. Responses to this NODA do not bind DOE to any further actions related to this topic.

Issued in Washington, DC, on May 29, 2012.

Kathleen B. Hogan,

Deputy Assistant Secretary for Energy, Energy Efficiency and Renewable Energy.

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BUREAU OF CONSUMER FINANCIAL PROTECTION

12 CFR Part 1026

[Docket No. CFPB–2012–0022]

RIN 3170–AA17

Truth in Lending (Regulation Z)

AGENCY: Bureau of Consumer Financial Protection.

ACTION: Notice of reopening of comment period and request for comment.

SUMMARY: The Bureau of Consumer Financial Protection (Bureau) is reopening the comment period for the proposed rule published by the Board of Governors of the Federal Reserve System (Board) in the **Federal Register** on May 11, 2011 (76 FR 27390). On May 11, 2011, the Board published for notice and comment a proposed rule amending Regulation Z (Truth in Lending) to implement amendments to the Truth in Lending Act (TILA) made by the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act). The proposed rule addressed new ability-to-repay requirements that generally will apply to consumer credit transactions secured by a dwelling and the definition of a ''qualified mortgage.'' Among other consumer financial protection laws, the Dodd-Frank Act transferred the Board's rulemaking authority for TILA to the Bureau as of July 21, 2011. The original comment period to the proposed rule closed on July 22, 2011. The Bureau is reopening the comment period until July 9, 2012 to seek comment specifically on certain new data and information submitted during or obtained after the close of the original comment period.

DATES: Comments must be received on or before July 9, 2012.

ADDRESSES: You may submit comments, identified by *Docket No. CFPB–2012–0022* or *RIN 3170–AA17,* by any of the following methods:

- *Electronic: http://www.regulations.gov.* Follow the instructions for submitting comments.
- *Mail:* Monica Jackson, Office of the Executive Secretary, Bureau of Consumer Financial Protection, 1700 G Street NW., Washington, DC 20552.
- *Hand Delivery/Courier in Lieu of Mail:* Monica Jackson, Office of the Executive Secretary, Bureau of Consumer Financial Protection, 1700 G Street NW., Washington, DC 20552.

All submissions must include the agency name and docket number or Regulatory Information Number (RIN) for this rulemaking. In general, all comments received will be posted without change to *http://www.regulations.gov.* In addition, comments will be available for public inspection and copying at 1700 G Street NW., Washington, DC 20552, on official business days between the hours of 10 a.m. and 5 p.m. Eastern Time. You can make an appointment to inspect the documents by telephoning (202) 435–7275.

All comments, including attachments and other supporting materials, will become part of the record and subject to