DEPARTMENT OF ENERGY

10 CFR Part 430

[Docket No. EERE–2012–BT–TP–0013]

RIN 1904–AC71

Energy Conservation Program: Test Procedures for Cooking Products

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

ACTION: Supplemental notice of proposed rulemaking.

SUMMARY: On December 3, 2014, the U.S. Department of Energy (DOE) issued a supplemental notice of proposed rulemaking (SNOPR) to revise its test procedures for cooking products. As part of the December 2014 test procedure SNOPR, DOE proposed a change to the test equipment that would allow for measuring the energy efficiency of induction cooking tops. DOE also proposed methods to test non-circular electric surface units, electric surface units with flexible concentric cooking zones, full-surface induction cooking tops, and gas burners with high input rates. In this SNOPR, to address issues raised by interested parties regarding the ability of the previous cooking top proposals to adequately measure energy use during a representative average use cycle, DOE proposes to amend its test procedure for all conventional electric cooking tops to incorporate by reference the relevant selections from European standard EN 60350–2:2013 ''Household electric cooking appliances Part 2: Hobs—Methods for measuring performance'' (EN 60350–2:2013). DOE also revises its proposals for testing non-circular electric surface units, electric surface units with flexible concentric cooking zones, and full-surface induction cooking tops based on EN 60350–2:2013. Furthermore, DOE proposes to extend the test methods in EN 60350–2:2013 to measure the energy consumption of gas cooking tops by correlating test equipment diameter to burner input rate, including input rates that exceed 14,000 British thermal units per hour (Btu/h). DOE also proposes to modify the calculations of conventional cooking top annual energy consumption and integrated annual energy consumption to account for the proposed water-heating test method. DOE proposes to incorporate by reference test structures from American National Standards Institute (ANSI) Z21.1–2016 ''Household cooking gas appliances'' to standardize the installation conditions under which cooking tops are tested. DOE also proposes minor technical clarifications to the gas heating value correction and other grammatical changes to the regulatory text in appendix I that do not alter the substance of the existing test methods. With regard to conventional ovens, DOE proposes to repeal the regulatory provisions establishing the test procedure for conventional ovens under the Energy Policy and Conservation Act (EPCA). DOE has determined that the conventional oven test procedure may not accurately represent consumer use as it favors conventional ovens with low thermal mass and does not capture cooking performance-related benefits due to increased thermal mass of the oven cavity.

DATES: DOE will accept comments, data, and information regarding this SNOPR no later than September 21, 2016. See section V, ''Public Participation,'' for details.

Any comments submitted must identify the SNOPR for Test Procedures for Cooking Products, and provide docket number EE–2012–BT–TP–0013 and/or regulatory information number (RIN) number 1904–AC71. 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: Induction-Cooking-Prod-2012-TP-0013@ee.doe.gov.* Include the docket number and/or RIN in the subject line of the message. Submit electronic comments in WordPerfect, Microsoft Word, PDF, or ASCII file format, and avoid the use of special characters or any form of encryption.

3. *Postal Mail:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE–5B, 1000 Independence Avenue SW., Washington, DC, 20585–0121. Telephone: (202) 586–6636. 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:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza SW., 6th Floor, Washington, DC, 20024. Telephone: (202) 586–6636. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

For detailed instructions on submitting comments and additional information on the rulemaking process, see section V of this document (Public Participation).

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

A link to the docket Web page can be found at: *https://www.regulations.gov/#!docketDetail;D=EERE-2012-BT-TP-0013.* This Web page will contain a link to the docket for this notice on the *www.regulations.gov* site. The *www.regulations.gov* Web page will contain simple instructions on how to access all documents, including public comments, in the docket. See section VII for information on how to submit comments through regulations.gov.

FOR FURTHER INFORMATION CONTACT:

Ms. Ashley Armstrong, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE–2J, 1000 Independence Avenue SW., Washington, DC, 20585–0121. Telephone: (202) 586–6590. Email: *ashley.armstrong@ee.doe.gov.*

Ms. Celia Sher, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue SW., Washington, DC, 20585–0121. Telephone: (202) 202–287–6122. Email: *Celia.Sher@hq.doe.gov.*

For further information on how to submit a comment, review other public comments and the docket, or participate in the public meeting, contact the Appliance and Equipment Standards Program staff at (202) 586–6636 or by email: *Induction-Cooking-Prod-2012-TP-0013@ee.doe.gov.*

SUPPLEMENTARY INFORMATION: DOE intends to incorporate by reference certain sections of the following industry standards into 10 CFR part 430:

(1) ANSI Standard Z21.1–2016—''Household cooking gas appliances'' (ANSI Z21.1).

- Copies of ANSI Z21.1, can be obtained from ANSI, 25 W 43rd Street, 4th Floor, New York, NY, 10036, or by going to *http://webstore.ansi.org/default.aspx.*

(2) EN 60350–2:2013 ''Household electric cooking appliances Part 2: Hobs—Methods for measuring performance'' (EN 60350–2:2013).

- Copies of EN 60350–2:2013, a European standard approved by the European Committee for Electrotechnical Standardization (CENELEC), can be obtained from the

British Standards Institute (BSI Group), 389 Chiswick High Road, London, W4 4AL, United Kingdom, or by going to *http://shop.bsigroup.com/.*

See section IV.M for a further discussion of these standards.

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I. Authority and Background

Title III of the Energy Policy and Conservation Act of 1975 (42 U.S.C. 6291, *et seq.;* ''EPCA'' or, ''the Act'') sets forth a variety of provisions designed to improve energy efficiency. (All references to EPCA refer to the statute as amended through the Energy Efficiency Improvement Act of 2015, Public Law 114–11 (Apr. 30, 2015).) Part B of title III, which for editorial reasons was redesignated as Part A upon incorporation into the U.S. Code (42 U.S.C. 6291–6309, as codified), establishes the ''Energy Conservation Program for Consumer Products Other Than Automobiles.'' These include cooking products,[1] and specifically conventional cooking tops [2] and conventional ovens,[3] the primary subject of this document. (42 U.S.C. 6292(a)(10))

Under EPCA, the energy conservation program consists essentially of four parts: (1) Testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. The testing requirements consist of test procedures that manufacturers of covered products must use as the basis for (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA, and (2) making representations about the efficiency of those products. Similarly, DOE must use these test procedures to determine whether the products comply with any relevant standards promulgated under EPCA.

[1] DOE's regulations define ''cooking products'' as one of the following classes: Conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, microwave/conventional ranges and other cooking products. (10 CFR 430.2)

[2] Conventional cooking top means a class of kitchen ranges and ovens which is a household cooking appliance consisting of a horizontal surface containing one or more surface units which include either a gas flame or electric resistance heating. (10 CFR 430.2)

[3] Conventional oven means a class of kitchen ranges and ovens which is a household cooking appliance consisting of one or more compartments intended for the cooking or heating of food by means of either a gas flame or electric resistance heating. It does not include portable or countertop ovens which use electric resistance heating for the cooking or heating of food and are designed for an electrical supply of approximately 120 volts.(10 CFR 430.2)

A. General Test Procedure Rulemaking

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. EPCA provides in relevant part that any test procedures prescribed or amended under this section shall be reasonably designed to produce test results which measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

In addition, if DOE determines that a test procedure amendment is warranted, it must publish proposed test procedures and offer the public an opportunity to present oral and written comments on them. (42 U.S.C. 6293(b)(2)) Finally, in any rulemaking to amend a test procedure, DOE must determine to what extent, if any, the proposed test procedure would alter the measured energy efficiency of any covered product as determined under the existing test procedure. (42 U.S.C. 6293(e)(1))

B. Test Procedures for Cooking Products

DOE's test procedures for conventional cooking tops, conventional ovens, and microwave ovens are codified at appendix I to subpart B of 10 CFR part 430 (appendix I).

DOE established the test procedures in a final rule published in the **Federal Register** on May 10, 1978. 43 FR 20108, 20120–28. DOE revised its test procedures for cooking products to more accurately measure their efficiency and energy use, and published the revisions as a final rule in 1997. 62 FR 51976 (Oct. 3, 1997). These test procedure amendments included: (1) A reduction in the annual useful cooking energy; (2) a reduction in the number of self-cleaning oven cycles per year; and (3) incorporation of portions of International Electrotechnical Commission (IEC) Standard 705–1988, ''Methods for measuring the performance of microwave ovens for household and similar purposes,'' and Amendment 2–1993 for the testing of microwave ovens. *Id.* The test procedures for conventional cooking products establish provisions for determining estimated annual operating cost, cooking efficiency (defined as the ratio of cooking energy output to cooking energy input), and energy factor (defined as the ratio of annual useful cooking energy output to total annual energy input). 10 CFR 430.23(i); appendix I. These provisions for conventional cooking products are not

currently used for compliance with any energy conservation standards because the present standards are design requirements; in addition, there is no EnergyGuide [4] labeling program for cooking products.

DOE subsequently conducted a rulemaking to address standby and off mode energy consumption, as well as certain active mode testing provisions, for residential dishwashers, dehumidifiers, and conventional cooking products. DOE published a final rule on October 31, 2012 (77 FR 65942, hereinafter referred to as the October 2012 Final Rule), adopting standby and off mode provisions that satisfy the EPCA requirement that DOE include measures of standby mode and off mode power in its test procedures for residential products, if technically feasible. (42 U.S.C. 6295(gg)(2)(A))

C. The January 2013 TP NOPR

On January 30, 2013, DOE published a notice of proposed rulemaking (NOPR) (78 FR 6232, hereinafter referred to as the January 2013 TP NOPR) proposing amendments to appendix I that would allow for measuring the active mode energy consumption of induction cooking products (*i.e.,* conventional cooking tops equipped with induction heating technology for one or more surface units [5] on the cooking top). DOE proposed to incorporate induction cooking tops by amending the definition of ''conventional cooking top'' to include induction heating technology. Furthermore, DOE proposed to require for all cooking tops the use of test equipment compatible with induction technology. Specifically, DOE proposed to replace the solid aluminum test blocks currently specified in the test procedure for cooking tops with hybrid test blocks comprising two separate pieces: an aluminum body and a stainless steel base. In the January 2013 TP NOPR, DOE also proposed amendments to include a clarification that the test block size be determined using the smallest dimension of the electric surface unit. 78 FR 6232, 6234 (Jan. 30, 2013).

D. The December 2014 TP SNOPR

On December 3, 2014, DOE published an SNOPR (79 FR 71894, hereinafter referred to as the December 2014 TP SNOPR), modifying its proposal from the January 2013 TP NOPR to more accurately measure the energy efficiency of induction cooking tops. DOE proposed to add a layer of thermal grease between the stainless steel base and aluminum body of the hybrid test block to facilitate heat transfer between the two pieces. DOE also proposed additional test equipment for electric surface units with large diameters (both induction and electric resistance) and gas cooking top burners with high input rates. 79 FR 71894 (Dec. 3, 2014). In addition, DOE proposed methods to test non-circular electric surface units, electric surface units with flexible concentric cooking zones, and full-surface induction cooking tops. *Id.*

In the December 2014 TP SNOPR, DOE also proposed to incorporate methods for measuring conventional oven volume, clarify that the existing oven test block must be used to test all ovens regardless of input rate, and provide a method to measure the energy consumption and efficiency of conventional ovens equipped with an oven separator. 79 FR 71894 (Dec. 3, 2014). On July 3, 2015, DOE published a final rule addressing the test procedure amendments for conventional ovens only. (80 FR 37954, hereinafter referred to as the July 2015 Final Rule). In this SNOPR, DOE is continuing the rulemaking to consider additional methodology for testing conventional cooking tops. In addition, based on further review of public comments and data provided by manufacturers, DOE is proposing in this SNOPR to repeal the regulatory provisions establishing the test procedures of conventional ovens.

II. Summary of the Supplemental Notice of Proposed Rulemaking

DOE received comments on the energy conservation standards NOPR for conventional ovens (80 FR 33030) published on June 10, 2015 (the June 2015 STD NOPR) highlighting uncertainty about whether the unique features of commercial-style ovens were appropriately accounted for when measuring energy consumption using the existing conventional oven test procedure. After review of these comments, DOE determined that additional investigation is required to establish a representative test procedure for conventional ovens. DOE is proposing to repeal the provisions in the existing cooking products test procedure relating to conventional ovens.

For conventional cooking tops, based on review of the public comments received in response to the December 2014 TP SNOPR, and a series of manufacturer interviews conducted in February and March 2015 to discuss key concerns regarding the hybrid test block method proposed in the December 2014 TP SNOPR, DOE is withdrawing its proposal for testing conventional cooking tops with a hybrid test block. Instead, DOE proposes to modify its test procedure to incorporate by reference the relevant sections of EN 60350–2:2013 ''Household electric cooking appliances Part 2: Hobs—Methods for measuring performance'' [6] (EN 60350–2:2013), which uses a water-heating test method to measure the energy consumption of electric cooking tops. EN 60530–2:2013 specifies heating a water load to a certain temperature at the maximum energy input setting for a single surface unit, and then reducing the energy input to the surface unit to a lower setting for an extended simmering period. The test method specifies the quantity of water to be heated in a standardized test vessel whose size is based on the diameter of the surface unit under test. For each surface unit, the test energy consumption is measured and then divided by the mass of the water load used to test each surface unit to calculate the energy consumed per gram of water. The measurements of energy consumption per gram of water calculated for each surface unit are averaged, then normalized to a single water quantity to determine the total energy consumption of the cooking top. Based on DOE's further review of a report on round robin testing commissioned by the European Committee of Domestic Equipment Manufacturers (CECED) [7] using a draft version of EN 60350–2:2013 conducted in 2011, review of the public comments received in response to the December 2014 TP SNOPR, and a series of manufacturer interviews conducted in February 2015, as well as further evaluation of DOE's own test data, DOE determined that the test methods to measure surface unit energy consumption specified in EN 60350–2:2013 produce repeatable and reproducible test results. DOE also notes that the test vessels specified in EN 60350–2:2013 are compatible with all cooking top technologies. Additionally, the range of test vessel diameters specified in EN 60350–2:2013 covers the full range of surface unit diameters available on the U.S. market. Moreover, incorporating EN 60350–2:2013 by reference has the benefit of harmonization with international testing

[4] For more information on the EnergyGuide labeling program, see: *www.access.gpo.gov/nara/cfr/waisidx_00/16cfr305_00.html.*

[5] The term surface unit refers to burners for gas cooking tops, electric resistance heating elements for electric cooking tops, and inductive heating elements for induction cooking tops.

[6] Hob is the British English term for cooking top.

[7] Italian National Agency for New Technologies, Energy and Sustainable Economic Development—Technical Unit Energy Efficiency (ENEA–UTEE), ''CECED Round Robin Tests for Hobs and Microwave Ovens—Final Report for Hobs,'' July 2011.

methods. Although DOE is proposing to incorporate the EN 60350–2:2013 method to measure the energy consumption of the cooking top, DOE is proposing to modify the water quantity used to normalize the total energy consumption of the cooking top, in order to estimate a representative annual energy consumption for the U.S. market.

In the December 2014 TP SNOPR, DOE proposed test methods for non-circular electric cooking top surface units and full-surface induction cooking tops with ''cook anywhere'' functionality. 79 FR 71894, 71905 (Dec. 3, 2014). In this SNOPR, DOE proposes, instead, to adopt the test methods and specifications for non-circular surface units and full-surface induction cooking tops included in EN 60350–2:2013. However, for surface units with flexible concentric sizes (*i.e.,* units with multiple zones of the same shape but varying shortest dimensions), DOE continues to propose that the surface unit be tested at each unique size setting. DOE also further clarifies in this SNOPR that for all cooking tops, specialty surface units such as bridge zones, warming plates, grills, and griddles are not covered by the proposed appendix I.

Only electric cooking tops are covered by the methods specified in EN 60350–2:2013. DOE is proposing to extend the water-heating test method to gas cooking tops by correlating the burner input rate and test vessel diameters specified in EN 30–2–1:1998 *Domestic cooking appliances burning gas—Part 2–1: Rational use of energy—General* (EN 30–2–1) to the test vessel diameters and water loads already included in EN 60350–2:2013. The range of gas burner input rates covered by EN 30–2–1 includes burners exceeding 14,000 British thermal units per hour (Btu/h), and thus provides a method to test gas burners with high input rates.

Although EN 60350–2:2013 includes a method to determine the normalized per-cycle energy consumption of the cooking top, it does not include a method to determine total annual energy consumption. DOE is proposing in this SNOPR to include a calculation of the annual energy consumption and integrated annual energy consumption of conventional cooking tops using the cooking frequency determined in the 2009 DOE Energy Information Administration (EIA) Residential Energy Consumption Survey (RECS).[8] The EIA RECS collects energy-related data for occupied primary housing units in the United States. DOE also reviewed recent field energy use survey data presented in the 2010 California Residential Appliance Saturation Study (CA RASS) [9] and the Florida Solar Energy Center (FSEC) [10] to determine whether the proposed test method and cooking frequency based on RECS data produce an annual energy consumption representative of consumer use. Based on this CA RASS and FSEC field use data, and based on testing of a sample of products, DOE determined that the estimated annual active mode cooking top energy consumption using the proposed test method and cooking frequency based on RECS data does not adequately represent consumer use. As a result, DOE is proposing to normalize the cooking frequency to account for differences between the duration of a cooking event represented in the RECS data and DOE's proposed test load for measuring the energy consumption of the cooking top. DOE is proposing to use the resulting normalized number of cooking cycles per year multiplied by the normalized per-cycle energy consumption and the number of days in a year (365) to calculate annual active mode cooking energy consumption for the cooking top.

DOE also proposes to define the term ''combined cooking product'' as a cooking product that combines a conventional cooking product with other appliance functionality, which may or may not include another cooking product. Examples of such ''combined cooking products'' include conventional ranges, microwave/conventional cooking tops, microwave/conventional ovens, and microwave/conventional ranges. In this SNOPR, DOE is proposing to clarify that the active mode test procedures in appendix I apply to the conventional cooking top component of a combined cooking product. However, the combined low-power of these products can only be measured for the combined product and not the individual components. Thus, DOE is proposing a method to apportion the combined low-power mode energy consumption measured for the combined cooking product to the individual cooking top component of the combined cooking product using the ratio of component cooking hours per year to the total cooking hours per year of the combined cooking product.

DOE is also aware that the installation test conditions currently specified in appendix I are not clearly defined. Thus, DOE is proposing to incorporate by reference test structures from the ANSI standard Z21.1–2016—''Household cooking gas appliances'' (ANSI Z21.1) to standardize the conditions under which cooking tops are tested.

DOE also notes that section 2.9.4 of the existing test procedure in appendix I does not clearly state what temperature and pressure conditions should be used to correct the gas heating value. DOE is proposing to clarify that the measurement of the heating value of natural gas or propane specified in section 2.9.4 in appendix I be corrected to standard pressure and temperature conditions in accordance with the U.S. Bureau of Standards, circular C417, 1938.

Finally, DOE is proposing minor technical grammatical corrections to certain sections of appendix I that serve as clarifications and do not change the substance of the test method.

III. Discussion

A. Products Covered by This Test Procedure Rulemaking

As discussed in section I.A, DOE has the authority to amend test procedures for covered products. 42 U.S.C. 6292(a)(10) of EPCA covers kitchen ranges and ovens. In a final rule issued on September 8, 1998 (63 FR 48038), DOE amended its regulations to substitute the term ''kitchen ranges and ovens'' with ''cooking products''. DOE regulations currently define ''cooking products'' as consumer products that are used as the major household cooking appliances. They are designed to cook or heat different types of food by one or more of the following sources of heat: gas, electricity, or microwave energy. Each product may consist of a horizontal cooking top containing one or more surface units and/or one or more heating compartments. They must be one of the following classes: conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, microwave/conventional ranges and other cooking products.[11] (10 CFR 430.2)

[8] Available online at: *http://www.eia.gov/consumption/residential/data/2009/.*

[9] California Energy Commission. 2009 California Residential Appliance Saturation Study, October 2010. Prepared for the California Energy Commission by KEMA, Inc. Contract No. 200–2010–004. <*http://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-V2.PDF*>.

[10] FSEC 2010. Updated Miscellaneous Electricity Loads and Appliance Energy Usage Profiles for Use in Home Energy Ratings, the Building America Benchmark and Related Calculations. Published as FSEC–CR–1837–10, Florida Solar Energy Center, Cocoa, FL.

[11] As discussed in the January 2013 TP NOPR and December 2014 TP SNOPR, DOE proposed to amend the definition of ''conventional cooking top'' to include products that feature electric inductive heating surface units. 78 FR 6232, 6234–6235 (Jan.

Continued

In this SNOPR, DOE is addressing test procedures for conventional cooking tops and is proposing to repeal the test procedures for conventional ovens In addition, because DOE regulations currently continue to use the term ''kitchen ranges and ovens'' and other terms to describe the product that is the subject of this rulemaking, DOE proposes in this SNOPR to consistently refer to the product as ''cooking products'' in DOE's regulations codified at 10 CFR parts 429 and 430.

DOE notes that certain residential household cooking appliances combine a conventional cooking product component with other appliance functionality, which may or may not perform a cooking-related function. Examples of such ''combined cooking products'' include a conventional range, which combines a conventional cooking top and one or more conventional ovens; a microwave/conventional cooking top, which combines a microwave oven and a conventional cooking top; a microwave/conventional oven, which combines a microwave oven and a conventional oven; and a microwave/conventional range, which combines a microwave oven and a conventional oven in separate compartments and a conventional cooking top. Because combined cooking products may consist of multiple classes of cooking products, any potential conventional cooking top or oven energy conservation standard would apply to the individual components of the combined cooking product. Thus, the cooking top test procedures proposed in this SNOPR also apply to the individual conventional cooking top portion of a combined cooking product. Because combined cooking products are a kind of cooking product that combines a conventional cooking product with other appliance functionality and not a distinct product class, DOE is proposing to remove the definitions of the various kinds of combined cooking products that are currently included in 10 CFR 430.2, and then add a definition of ''combined cooking product'' to appendix I, as this definition would be related to the test of combined cooking products and is not a unique product class itself. DOE also notes that the definitions of conventional cooking top, conventional oven, microwave oven, and other cooking products refer to these products as classes of cooking products. Because these are more general product categories and not specific product classes, DOE is proposing to amend the definitions of conventional cooking top, conventional oven, microwave oven, and other cooking products in 10 CFR 430.2 to reflect this clarification.

In its product testing conducted in support of the December 2014 TP SNOPR, DOE observed that for combined cooking products, the annual combined low-power mode energy consumption can only be measured for the combined cooking product and not the individual components. In order to calculate the integrated annual energy consumption of the conventional cooking top component separately, DOE is proposing in this SNOPR to allocate a portion of the combined low-power mode energy consumption measured for the combined cooking product to the conventional cooking top component using the estimated annual cooking hours for the given components comprising the combined cooking product. Similarly for microwave ovens, in order to calculate the annual combined low-power mode energy consumption for the microwave oven component separately, DOE is proposing to allocate a portion of the combined low-power mode energy consumption measured for the combined cooking product to the microwave oven component, based on the estimated annual cooking hours for the given components comprising the combined cooking product. Section III.H provides a complete discussion of the derivation of integrated annual energy consumption for the individual components of a combined cooking product.

Gas Cooking Products With High Input Rates

In the December 2014 TP SNOPR, DOE proposed to amend the conventional cooking top test procedure in appendix I to measure the energy use of gas surface units with high input rates and noted that the current definition for ''conventional cooking top'' in 10 CFR 430.2 already covers conventional gas cooking products with higher input rates (including commercial-style gas cooking products), as these products are household cooking appliances with surface units or compartments intended for the cooking or heating of food by means of a gas flame. DOE considers a cooking top burner with a high input rate to be a burner rated greater than 14,000 Btu/h. 79 FR 71894, 71897 (Dec. 3, 2014).

Sub-Zero Group, Inc. (Sub-Zero) commented that cooking with larger cooking vessels and high performance burners requires increased grate-to-burner spacing to maximize air flow and improve burner combustion, which in turn impacts efficiency as measured by the test procedure. According to Sub-Zero, a ''one size fits all'' test procedure is inequitable and would place gas cooking tops with higher input rates at a market disadvantage. (Sub-Zero, TP No. 20 at p. 3) [12] Sub-Zero also commented that the proposed test procedure does not accurately measure the performance and efficiency of the larger, higher-output components and leads to misleading results. (Sub-Zero, TP No. 20 at pp. 2–3) Sub-Zero believes that due to the lack of data, test procedure complexities, and the limited potential for energy savings, DOE should exempt high-performance products (*i.e.,* commercial-style cooking tops) from standards until adequate further analysis is conducted such that these products can be accurately and fairly evaluated. (Sub-Zero, TP No. 20 at p. 3)

As discussed further in the following sections, and specifically in section III.F of this notice, DOE is proposing that the energy consumption of conventional gas cooking tops be measured using a range of test vessel diameters and water loads that are selected based on input rate of the burner, including those with burners having input rates greater than 14,000 Btu/h (including commercial-style gas cooking tops). The current definition for ''conventional cooking top'' in 10 CFR 430.2 already covers conventional gas cooking products with higher input rates, as these products are household cooking appliances with surface units or compartments intended for the cooking or heating of food by means of a gas flame.

B. Repeal of the Conventional Oven Test Procedure

The existing test procedure to measure the active mode annual energy consumption of conventional ovens in appendix I involves setting the oven controls to achieve an average internal cavity temperature that is 325 degrees Fahrenheit (°F) ± 5 °F higher than the room ambient air temperature and measuring the amount of energy required to raise the temperature of an aluminum block test load from room temperature to 234 °F above its initial temperature. The measured energy

30, 2013); 79 FR 71894, 71897 (Dec. 3, 2014). As DOE did not receive any additional comments on this proposal, DOE is maintaining these proposed modifications in this SNOPR.

[12] A notation in the form ''Sub-Zero, TP No. 20 at p. 3'' identifies a written comment (1) made by Sub-Zero on the Test Procedure for cooking products; (2) recorded in document number 20 that is filed in the docket of this cooking products test procedures rulemaking (Docket No. EERE–2012–BT–TP–0013) and available for review at *www.regulations.gov;* and (3) which appears on page 3 of document number 20.

consumption includes the energy input during the time the load is being heated plus the energy consumed during fan-only mode. In the July 2015 TP Final Rule, DOE did not modify the active mode test method but proposed to incorporate methods for measuring conventional oven volume according to an Association of Home Appliance Manufacturers (AHAM) procedure,[13] to clarify that the existing oven test block must be used to test all ovens regardless of input rate, and to measure the energy consumption and efficiency of conventional ovens equipped with an oven separator. 80 FR 37954.

As part of the concurrent energy conservation standards rulemaking analysis, DOE received comments regarding the representativeness of the active mode oven test procedure in appendix I for commercial-style cooking products. Sub-Zero commented that ''high performance'' (*i.e.,* commercial-style) ovens include the following design features that enhance cooking performance (professional quality baking, broiling, roasting, slow bake, proofing, and other functions) but negatively impact efficiency and are not accounted for in the existing test procedure:

- Heavier gauge materials which extend product life and enhance product quality, cooking functionality and durability;
- Configurations that allow for up to six-rack baking capability with full extension, heavy-gauge oven racks to support large loads and provide enhanced safety and ergonomic benefit;
- Full oven-height dual convection blowers to optimize cooking air flow;
- Hidden bake elements that enhance customer safety, cleanability and heat distribution for better cooking performance;
- Controls and software to maximize the long-term reliability of oven cavity porcelain when employing a hidden bake element; and
- Cooling fans for the electronic printed circuit boards that provide precise oven control and touch-screen user interface for cooking modes and other features. (Sub-Zero, STD No. 25 at pp. 3, 5–6) [14]

BSH also noted that commercial-style ovens include unique design features as identified by Sub-Zero, and listed the following additional design features associated with commercial-style products:

- Soft-close hinges to handle constant loading and unloading of the oven to eliminate the noise of slamming doors;
- A variety of modes and options not typically found in residential-style products (*e.g.,* rapid steam generator, additional convection heating element, high power combination modes such as convection broil and steam convection);
- Powerful heating elements to maintain set temperatures during sessions of loading and unloading food (*e.g.,* caterers and entertainers at large house parties); and
- Very large usable baking space, *e.g.,* two ovens in a 60-inch range that operate independently to provide more versatility in cooking with each cavity capable of cooking one to three racks of food. In addition, commercial-style ovens can accommodate commercial baking pans that are more than twice the size of standard residential baking pans. (BSH, STD No. 41 at p. 2)

BSH and Miele also commented that DOE should consider whether a different test procedure is needed that adequately measures commercial-style products' energy use and accounts for the enhanced cooking performance. (BSH, STD No. 41 at p. 3; Miele, STD No. 42 at pp. 1–2) Miele commented that the DOE test procedure does not adequately reflect the energy use of commercial-style products because it does not account for the effects of door openings and the energy required for thermal recovery. Miele noted that the added mass of commercial-style ovens provides the advantage of requiring less energy and time to recover from a door opening, which alters the quality of foods being cooked. (Miele, STD No. 42 at pp. 1–2)

Based on DOE's review of these comments and additional data provided by manufacturers, DOE determined that commercial-style ovens typically incorporate design features (*e.g.,* heavier-gauge cavity construction, high input rate burners, extension racks) that result in inherently lower efficiencies than for residential-style ovens with comparable cavity sizes, due to the greater thermal mass of the cavity and racks when measured using the test procedure adopted in the July 2015 TP Final Rule. Furthermore, DOE concludes that certain additional factors that are not currently addressed in the test procedure, such as the impact of door openings on thermal recovery, could, if included in the test procedure, alter the efficiencies of commercial-style ovens relative to the efficiencies of residential-style ovens. For these reasons, DOE is proposing to repeal the provisions in appendix I for measuring conventional oven integrated annual energy consumption (IAEC). In addition, because DOE is proposing to repeal the provisions for measuring conventional oven IAEC, DOE is also proposing to remove the reference to AHAM OV–1–2011 ''Procedures for the Determination and Expression of the Volume of Household Microwave and Conventional Ovens'' contained in 10 CFR 430.3.

C. Hybrid Test Block Method

DOE received a number of comments from interested parties on the cooking top active mode test procedure proposed in the December 2014 TP SNOPR. In February and March of 2015, DOE also conducted a series of interviews with manufacturers representing the majority of the U.S. market to discuss key issues with the proposed cooking top test procedure. The concerns of interviewed manufacturers were similar to those expressed in the written comments on the proposal, but were collected from a larger group of manufacturers. Overall, interested parties' major concerns with the hybrid test block method, as proposed, included the thermal grease specification, the fabrication of the hybrid test block, the proposed test block diameters, and the representativeness, repeatability, and reproducibility of the hybrid test block method. Given the feedback from interested parties, and for the reasons discussed in the following sections, DOE is no longer proposing to amend appendix I to require hybrid test blocks and is instead proposing to incorporate by reference the relevant sections of the water-heating test method for measuring the energy consumption of cooking tops in EN 60350–2:2013.

1. Thermal Grease

In the December 2014 TP SNOPR, DOE proposed that a layer of thermal grease should be applied evenly between the contacting surfaces of the stainless steel base and the aluminum body of the hybrid test block for all test block sizes. The amount of thermal grease applied to the test block depended on the test block diameter. DOE also proposed a minimum thermal conductivity for the grease and that the layer of thermal grease be periodically reapplied, as DOE observed that the grease would dry out after several tests. 79 FR 71894, 71906–71908 (Dec. 3, 2014).

[13] The test standard published by the AHAM titled, ''Procedures for the Determination and Expression of the Volume of Household Microwave and Conventional Ovens,'' Standard OV–1–2011.

[14] A notation in the form ''Sub-Zero, STD No. 25 at p. 3'' identifies a written comment (1) made by Sub-Zero on the Energy Conservation Standards for conventional ovens; (2) recorded in document number 25 that is filed in the docket of the cooking product energy conservation standards rulemaking (Docket No. EERE–2014–BT–STD–0005) and available for review at *www.regulations.gov;* and (3) which appears on page 3 of document number 25.

General Electric Appliances (GE) commented in response to the December 2014 TP SNOPR that it was not able to replicate the DOE test results using the proposed test methods. (GE, TP No. 17 at p. 2) Specifically, GE observed during its testing that the aluminum body slid off the stainless steel base, the thermal grease dried out, and the amount of grease between the blocks changed from one test to another. *Id.* During individual manufacturer interviews, multiple manufacturers also confirmed the block-sliding phenomenon and the issues with dried out grease. Additionally, AHAM, BSH Home Appliances Corporation (BSH), and GE noted that DOE did not specify an operating temperature range nor application thickness for the thermal grease, and also noted that the thermal conductivity and viscosity of the grease might change over time or after repeated use at high temperatures. (BSH, TP No. 16 at p. 11; GE, TP No. 17 at p. 2; AHAM, TP No. 18 at p. 3)

After further investigation into the properties of the thermal grease used during the testing conducted to support the December 2014 TP SNOPR, DOE agrees that further specifications would be necessary to ensure that the hybrid test block method is sufficiently repeatable and reproducible. DOE became aware, through discussions with a thermal grease supplier, that thermal grease formulations are not required to be rated according to a test standard. Additionally, although such a test standard exists, the grease supplier commented that the rating method is for a specific set of conditions and materials, and may not be reflective of all applications. Thus, different thermal greases with the same published characteristics may perform differently when used with the hybrid test blocks. DOE's research also suggests that effective thermal conductivity depends on how the thermal grease fills the microscopic crevices of the test block surface, meaning that the effective thermal conductivity of the grease could change from test block to test block depending on how the metal was machined. Some thermal greases also have temperature- and time-dependent stabilization periods which are not explicitly defined by the grease supplier, leading to further opportunities for variation in performance with each application. Depending on the allowable operating temperature range, some thermal greases may dry out more quickly than others, suggesting that simply specifying a maximum number of runs for a given application of grease is not sufficient. Moreover, DOE does not believe it is practical to specify and measure the thickness for the layer of applied grease. The required amount and thickness would vary both with the material properties of the grease as well as the technique used to apply the grease to the test block surface.

AHAM also commented that the hybrid test block, as proposed, is not yet appropriate for testing induction technologies because of the variability in the temperature gradient between its steel base and aluminum body with respect to different heating elements, which in turn affects the efficiency result. (AHAM, TP No. 18 at p. 3) BSH commented that by basing its analysis exclusively on only nine different appliances in the December 2014 TP SNOPR, DOE did not completely consider the diversity of induction technology. (BSH, TP No. 16 at p. 1) DOE notes that it initially proposed to add a layer of thermal grease to the hybrid test block to facilitate heat transfer between the base and body of the hybrid test block, specifically when used with induction cooking technology. If heat does not transfer from the stainless steel base to the aluminum body at a fast enough rate, the sensors and control algorithms designed to limit the surface temperature of the surface unit may turn off or limit power to the surface unit to prevent it from overheating and damaging the cooking top. Although adding thermal grease to the hybrid test block helped to minimize this issue for the cooking tops in DOE's test sample, during recent interviews, a few manufacturers noted that they use a lower temperature threshold and different control strategies to prevent overheating in induction heating elements. As a result, these manufacturers stated that they were unable to complete a test of an induction surface unit without the unit overheating.

For the reasons described in this preamble, DOE has determined that thermal grease cannot be specified without significant further study or further modification in the construction of the hybrid test block.

2. Test Block Diameter and Composition

In addition to the two existing test block diameters specified in appendix I for the testing of conventional cooking tops, DOE proposed in the December 2014 TP SNOPR an additional test block diameter for electric surface units having a smallest dimension of 10 inches or greater and for gas surface units with input rates greater than or equal to 14,000 Btu/h. 79 FR 71894, 71904 (Dec. 3, 2014). DOE based its assessment on a review of the electric surface unit diameters and pan sizes available on the market, as well as investigative testing of the carbon monoxide emissions and measured efficiencies of various test block sizes on gas cooking tops with high-input rate burners. DOE tentatively concluded that, by adding only one larger additional test block diameter, the test procedure would appropriately capture cooking tops designed to be used with large cookware, without increasing the test burden for manufacturers. *Id.*

During manufacturer interviews, most manufacturers highlighted the need for DOE to specify larger test block sizes to test electric surface units having 12-inch and 13-inch diameters and gas surface units with high input rates. In written comments, BSH, GE, and AHAM asserted that the proposed test block sizes do not adequately reflect the surface unit sizes currently available on the market, given that some electric surface units exceed 11 inches in diameter. (BSH, TP No. 16 at p. 5; GE, TP No. 17 at p. 2; AHAM, TP No. 18 at p. 2) Sub-Zero also noted that there are a variety of large cooking zones on electric cooktops, induction cooktops, and gas burner systems that the proposed test block diameters would not adequately evaluate. Sub-Zero stated that these products would be disadvantaged if the test equipment does not match the size of the surface unit. (Sub-Zero, TP No. 20 at p. 3) Sub-Zero further stated that for gas burners, caps can be as large as 4 inches in diameter and when combined with gas burner designs that project the flame horizontally in order to evenly distribute heat to a cooking utensil with a large footprint, rather than focusing an intense flame towards the center, the surface contact of the burner will be greatly minimized if used with a small-diameter test block. (Sub-Zero, TP No. 20 at p. 3)

DOE notes that most user instruction manuals for conventional cooking tops, regardless of heating technology type, specify that pot or pan size should match the size of the surface unit. After reviewing public comments and information received during manufacturer interviews, and further review of the surface unit diameters available on the market, DOE acknowledges that it should consider additional test equipment diameters for the testing of conventional cooking tops. The test equipment should be reasonably matched to the diameter of the surface unit or the gas burner input rate. In section III.D of this notice, DOE describes the range of test vessel

diameters and water loads it is proposing to incorporate by reference from EN 60350–2:2013 as part of this SNOPR.

During the interviews conducted in February and March of 2015, multiple manufacturers commented that they had difficulty obtaining the proposed hybrid test block materials in the diameter and thickness proposed in the December 2014 TP SNOPR. GE also commented in response to the December 2014 TP SNOPR that the components of the proposed hybrid test block, especially for the stainless steel base, had not been proven to be easily procured in the required diameter and to the flatness tolerances specified by DOE, nor had the durability of this thickness been assessed. (GE, TP No. 17 at p. 2) Although DOE did not have difficulty procuring the proposed hybrid test block materials in the diameters and flatness tolerances specified, manufacturer comments regarding the difficulties of producing the test block factored into DOE's decision to consider alternative cooking top test methods discussed in the following sections.

Energy Innovations commented that the DOE test procedure test results as presented in the December 2014 TP SNOPR represent the heat transfer efficiency from the cooking top to the cooking utensil, rather than the cooking efficiency, and appear to be reasonable for determining the energy efficiency of cooking in a covered utensil without significant losses due to escaped steam. (Energy Innovations, TP No. 15 at pp. 9–10) Energy Innovations commented that much energy is wasted in generating steam, and thus the actual cooking efficiency is much lower than the heat transfer efficiency. (Energy Innovations, TP No. 15 at p. 9) Energy Innovations also commented that cooking with a covered utensil prevents steam from escaping the utensil and greatly reduces the amount of energy required to maintain a boiling state of the contents. (Energy Innovations, TP No. 15 at p. 5) However, Energy Innovations presented survey data in which 81 percent of respondents reported not using covered utensils most of the time, and 28 percent reported conducting most of their cooking without the cover at all. (Energy Innovations, TP No. 15 at p. 8) For this reason, Energy Innovations commented that DOE should develop a multiplicative factor representative of how consumers actually use cooking utensils to convert heat transfer efficiency to an estimate of the real-world energy efficiency. (Energy Innovations, TP No. 15 at pp. 9–10)

As discussed in section III.D of this notice, DOE is proposing in this SNOPR to incorporate by reference the water-heating test methods provided in EN 60350–2:2013. The proposed test method requires the use of test vessels with lids with holes to allow for evaporation of water to simulate the energy uptake of a food load during the simmering phase of the test. DOE welcomes comment on whether the proposed test method accurately reflects real-world use.

D. Water-Heating Test Method

The test method to measure the energy consumption of electric cooking tops provided in EN 60350–2:2013 is similar to the existing DOE test procedure for conventional cooking tops specified in appendix I in that it consists of two phases. The first phase of the EN 60350–2 test requires heating a test load to a calculated ''turndown temperature'' at the maximum energy input setting. During the second phase of the test, the energy input rate is reduced to a setting that will maintain the water temperature above 194 °F (a simmering temperature) but as close to 194 °F as possible without additional adjustment of the low-power setting. The test ends 20 minutes after the temperature first increases above 194 °F.

To determine the turndown temperature, EN 60350–2:2013 requires an initial test to determine the number of degrees that the temperature continues to rise after turning the unit off from the maximum energy input setting. For the test load, EN 60350–2:2013 specifies a quantity of water to be heated in a standardized test vessel. The test vessel consists of a thin-walled stainless steel cylinder attached to a flat, stainless steel 430 base plate. The test method also specifies an aluminum lid with vent holes and a small center hole to fix the thermocouple in the center of the pot. There are eight standardized cooking vessel diameters ranging from 4.7 inches to 13 inches, one of which is selected to test a given surface unit based on the diameter of the surface unit. The amount of water also varies with test vessel diameter. Table III.1 lists the full range of test vessel diameters, water loads, and the corresponding surface unit diameters as specified in EN 60350–2:2013 for electric cooking tops. EN 60350–2:2013 also classifies the specified test vessels into categories representing different cookware types.

TABLE III.1—EN 60350–2:2013 TEST VESSEL DIAMETER AND WATER LOAD

Test vessel diameter inches (mm)	Mass of the water load lbs (kg)	Corresponding surface unit diameter inches (mm)	Standard cookware category
4.72 (120)	1.43 (0.65)	3.93 ≤ x < 5.12 (100 ≤ x < 130)	A
5.91 (150)	2.27 (1.03)	5.12 ≤ x < 6.30 (130 ≤ x < 160)	
7.09 (180)	3.31 (1.50)	6.30 ≤ x < 7.48 (160 ≤ x < 190)	B
8.27 (210)	4.52 (2.05)	7.48 ≤ x < 8.66 (190 ≤ x < 220)	C
9.45 (240)	5.95 (2.70)	8.66 ≤ x < 9.84 (220 ≤ x < 250)	
10.63 (270)	7.54 (3.42)	9.84 ≤ x < 11.02 (250 ≤ x < 280)	D
11.81 (300)	9.35 (4.24)	11.02 ≤ x < 12.20 (280 ≤ x < 310)	
12.99 (330)	11.33 (5.14)	12.20 ≤ x < 12.99 (310 ≤ x ≤ 330)	

The number of test vessels needed to assess the energy consumption of the cooking top is based on the number of controls that can be independently but simultaneously operated on the cooking top. By assessing the number of independent controls and not just the marked surface units, the test procedure accounts for cooking tops with cooking zones that do not have limitative markings. Each independently controlled surface unit or area of a ''cooking zone'' is tested individually. The temperature of the water and the total input energy consumption is measured throughout the test. Total cooking top energy consumption is determined as the average of the energy consumed during each independent test divided by the mass of the water load used for the test. This average energy consumption in Watt-hours (Wh) is then normalized to a standard water load size (1,000 grams (g)) to determine the average per-cycle energy consumption of the cooking top. Normalizing to a single load size ensures that

manufacturers are not penalized for offering a variety of surface unit diameters to consumers.

For cooking tops with standard circular electric surface units, the test vessel with a diameter that best matches the surface unit diameter is selected. Different surface units on the cooking top could be tested with the same test vessel diameter. However, if the number of independent controls/surface units for the cooking top exceeds two, the selected test vessels must come from at least two cookware categories. This means that one or more of the surface units on the cooking top will be tested with the next best-fitting test vessel in another cookware category. By adding this requirement, EN 603050–2:2013 accounts for the variety of cookware that would be used on the cooking top and prevents the test procedure from penalizing cooking tops that have a range of surface unit sizes with a range of surface unit input rates.

For cooking tops without defined surface units, such as cooking tops with full-surface induction cooking zones, EN 60350–2:2013 specifies a method to select the appropriate test position for each test vessel based on a pattern starting from the geometric center of the cooking zone. Instead of requiring that test vessels be selected based on best fit, the test vessel diameters are explicitly defined, and vary with the number of controls, to capture how different cookware types may be used on the unmarked cooking surface.

1. Representativeness of the Water-Heating Test Method

To support its analysis in the January 2013 TP NOPR, DOE conducted water-heating tests using test loads and test methods derived from a draft amendment to the IEC Standard 60350–2 Edition 1.0 ''Household electric cooking appliances—Part 2: Hobs—Method for measuring performance'' (IEC 60350–2).[15] 78 FR 6232, 6239–6240 (Jan. 30, 2013). In the January 2013 TP NOPR, DOE acknowledged that water provides a heating medium that is more representative of actual consumer use because many foods cooked on a cooking top have a relatively high liquid content. However, DOE noted that a water heating test method could introduce additional sources of variability not present for metal block heating. *Id.*

In support of the December 2014 TP SNOPR, DOE performed further investigative testing using a modified version of the IEC 60350–2 water-heating test method. When compared to the hybrid test block method, DOE found the water-heating test method to be less repeatable and continued to propose the use of the hybrid test block. 79 FR 71894, 71900–71903 (Dec. 3, 2014).

In response to DOE's proposal to use the hybrid test block method as opposed to a water-heating test method, BSH commented that the proposed hybrid test block method did not include certain specifications necessary for test procedure reproducibility, such as test load sizing and positioning, and recommended that DOE consider the specifications in IEC Standard 60350–2. (BSH, No. 16 at p. 1) Additionally, interviewed manufacturers that produce and sell products in Europe uniformly supported the use of a water-heating test method and harmonization with IEC Standard 60350–2 for measuring the energy consumption of electric cooking tops. These manufacturers cited the benefits of adopting a test method similar to the IEC water-heating method as including: (1) Compatibility with all electric cooking top types, (2) additional test vessel diameters to account for the variety of surface unit sizes on the market, and (3) the test load's ability to represent a real-world cooking top load.

Pacific Gas and Electric Company (PG&E), Southern California Gas Company (SCGC), San Diego Gas and Electric (SDG&E), and Southern California Edison (SCE) (collectively, the California investor-owned utilities (IOUs)) also recommended that DOE require a water-heating test method to measure the cooking efficiency of conventional cooking tops. Specifically, the California IOUs requested that DOE align the cooking product test methods with existing industry test procedures, such as American Society for Testing and Materials (ASTM) standard F1521–12, ''Standard Test Methods for Performance of Range Tops'', and IEC Standard 60350–2. (California IOUs, TP No. 19 at p. 1) The California IOUs commented that aligning test procedures with existing industry test procedures will reduce the burden of new test materials and procedures on laboratories and manufacturers. (California IOUs, TP No. 19 at p. 2) According to the California IOUs, the differences in test procedure standard deviation between the hybrid test block and water-heating test method as presented in the December 2014 TP SNOPR did not sufficiently show that the hybrid test block method is more repeatable than a water-heating method. (California IOUs, TP No. 19 at p. 2) Additionally, the California IOUs believe cooking efficiencies derived using a water-heating test method are more representative of the actual cooking performance of cooking tops as opposed to a test procedure using hybrid test blocks, since many foods prepared on cooking tops have relatively high liquid content. (California IOUs, TP No. 19 at p. 1)

As discussed in section III.C of this notice, review of public comments and information received during manufacturer interviews led DOE to determine that the hybrid test block method, as proposed in the December 2014 TP SNOPR, may not be sufficiently repeatable and reproducible. Thus, as suggested by interested parties, DOE performed further evaluation of its own water-heating test data and reviewed additional studies on the repeatability and reproducibility of the water-heating test method to determine whether the water-heating test method specified in EN 60350–2:2013 should be considered.

In the December 2014 TP SNOPR, DOE found that the reproducibility of the water-heating test method, as determined by comparing the surface unit efficiency measured at two different test laboratories, was similar to that of the hybrid test block method. 79 FR 71894, 71901 (Dec. 3, 2014). DOE also evaluated the repeatability of the surface unit efficiency results by assessing the standard deviation of the measured surface unit efficiency for a selected number of tests. The average standard deviation for the proposed hybrid test method across all test surface unit types was 0.67 percent for the 9-inch test block and 1.17 percent for the 6.25-inch block. Conversely, the average standard deviation across all surface unit types for the water-heating method was 1.25 percent for the 9.5-inch test vessel and 2.21 percent for the 5.9-inch test vessel. 79 FR 71894, 71902 (Dec. 3, 2014).

Although the average standard deviations of the measured surface unit efficiency were slightly higher for the water-heating test method, DOE notes that it evaluated a modified version of the procedures in the draft amendment to IEC 60350–2 by using only the two test vessels that had diameters closest to the diameters specified for the existing test blocks in appendix I (6.25 inches and 9 inches). 79 FR 71894, 71900–71903 (Dec. 3, 2014). As part of this testing, DOE also used the ambient test

[15] On April 25, 2014, IEC made available the draft version of IEC Standard 60350–2 Edition 2.0 Committee Draft (IEC 60350–2 CD). DOE notes that the draft amendment to IEC 60350–2 on which testing for the January 2013 NOPR was based includes the same basic test method as the 2014 IEC 60350–2 CD. DOE also notes that the European standard EN 60350–2:2013 is based on the draft amendment to IEC 60350–2. DOE believes that the IEC procedure, once finalized, will retain the same basic test method as currently contained in EN 60350–2:2013.

conditions specified in appendix I to directly compare the repeatability of the water-heating and hybrid test block test methods. 79 FR 71894, 71902 (Dec. 3, 2014). DOE notes that ambient air pressure and temperature could significantly impact the amount of water that evaporates during the test and the temperature at which the water begins to boil. Appendix I allows a relatively large tolerance, ±9 °F, for ambient air temperature that may have contributed to increased test variability observed for the water-heating test method. Conversely, EN 60350–2:2013 specifies an ambient temperature tolerance of ±3.6 °F (2 °C) for the cooking top energy consumption test. EN 60350–2:2013 also specifies an absolute air pressure range of 0.901 to 1.05 atmospheres (atm).

For the testing conducted for the January 2013 TP NOPR and the December 2014 TP SNOPR, DOE also developed its own set of efficiency calculations for purposes of comparison with the hybrid test block method. In comments received during manufacturer interviews, manufacturers stated that it was inappropriate to calculate efficiency with a water-heating method because, despite including a measurement of the mass of the water before and after the test, it is unknown what precise quantity of water is lost to boiling as some water may condense on the underside of the lid and drop back into the test vessel. To address this issue, DOE reviewed the coefficients of variation for the measured surface unit energy consumption presented in the December 2014 TP SNOPR, which DOE originally evaluated only to assess the variability of energy consumption in relation to the cooking top efficiency calculation, and not the variation between the water-heating and hybrid test block test methods. 79 FR 71894, 71902–03 (Dec. 3, 2014). The average coefficient of variation for both the modified water-heating test method and the hybrid test block method was very similar (0.024 versus 0.025).

DOE is aware of round robin testing performed in 2011 by CECED to evaluate the repeatability and reproducibility of a draft version EN 60350–2:2013.[16] Three cooking top technologies were tested: Induction, smooth electric radiant, and electric solid plate, at 12 different test facilities. While solid plate cooking top technology is not available on the U.S. market, DOE anticipates that the results obtained for this technology type are most similar to those obtained for electric coil cooking tops because the electric resistance heating element is in direct contact with the cooking vessel. The test facilities conducting the round robin testing were divided into two groups, one group of manufacturer test labs and another group of independent test labs. Only a single surface unit, approximately 7 inches in diameter (180 mm), was measured for each cooking top.

DOE reviewed its test results from the December 2014 TP SNOPR and compared these to the measured surface unit energy consumption standard deviations observed during the 2011 CECED Round Robin Testing. Table III.2 presents repeatability results from the 2011 CECED Round Robin Testing for the average measured surface unit efficiency for each cooking top technology type. Table III.3 presents repeatability results from the December 2014 TP SNOPR for the average measured surface unit efficiency for selected cooking tops in the DOE test sample.

TABLE III.2—AVERAGE STANDARD DEVIATION OF THE MEASURED ENERGY CONSUMPTION—2011 CECED ROUND ROBIN TEST SAMPLE

	Induction	Radiant	Solid plate	Average
Draft IEC 60350–2 Water-heating Test Method: [a]				
Standard Deviation (*Wh*)	2.27	7.39	3.15	.....
Standard Deviation (*%*)	0.87%	2.69%	1.14%	1.57%

[a] DOE notes that the European standard EN 60350–2:2013 is derived from IEC 60350–2:2011 but includes the draft amendments to IEC 60350–2 specified in in the IEC document TC59X/217/DC. DOE believes that the draft IEC procedure, once finalized, will retain the same basic test method as contained in EN 60350–2:2013.

TABLE III.3—AVERAGE STANDARD DEVIATION OF THE MEASURED ENERGY CONSUMPTION—DOE TEST SAMPLE FROM THE DECEMBER 2014 TP SNOPR

	Induction 1	Induction 2	Radiant	Coil	Average
DOE Hybrid Test Block:					
Standard Deviation (*Wh*)	3.37	8.25	9.88	8.51	.....
Standard Deviation (*%*)	1.20%	2.32%	2.83%	2.98%	2.33%
DOE Modified Water-Heating Method:					
Standard Deviation (*Wh*)	12.31	8.08	5.91	8.93	.....
Standard Deviation (*%*)	3.04%	2.67%	1.28%	2.31%	2.33%

The average standard deviation for surface unit measured energy consumption, as determined by the 2011 CECED Round Robin Testing, is less than 3 percent for all cooking top technology types. Although DOE established in this preamble that the modified water-heating test results are not comparable to the results obtained for the 2011 CECED Round Robin Testing, DOE still notes that the average percent standard deviation for the surface units in the DOE test sample tested according to the modified water-heating test method shown in Table III.3, is higher than for the 2011 CECED Round Robin Testing shown in Table III.2. Additionally, the average percent standard deviation for the surface unit energy consumption measured using the hybrid test block method is equal to that of the modified water-heating test method when averaged for all cooking top technology types.

The 2011 CECED Round Robin Testing also included an evaluation of the reproducibility of test results. The

[16] Italian National Agency for New Technologies, Energy and Sustainable Economic Development—Technical Unit Energy Efficiency (ENEA–UTEE), ''CECED Round Robin Tests for Hobs and Microwave Ovens—Final Report for Hobs,'' July 2011.

report calculated reproducibility as the square root of the sum of the between-laboratory variance and the mean of the within-laboratory variances (taken over all laboratories). When considering all 12 test facilities, the average reproducibility of the measured total energy consumption was below 3 percent for each cooking top technology type, with an average of 2.75 percent.

Based on DOE's review of the test data discussed in this preamble, DOE preliminarily concludes that the EN 60350–2:2013 water-heating method proposed as a part of this SNOPR is sufficiently repeatable and reproducible.

2. Incorporating by Reference EN 60350–2:2013

In this SNOPR, DOE is proposing to incorporate by reference only certain sections of EN 60350–2:2013, as the full test procedure also includes test methods to measure heat distribution and other forms of cooking performance not related to the energy consumption of the cooking top. Specifically, DOE is proposing to incorporate Section 5, ''General conditions for the measurements,'' which outlines the test room and test equipment conditions; Section 6.2, ''Cooking zones per hob,'' which outlines how to determine the number of controls and the dimensions of the cooking zones; and Section 7.1, ''Energy consumption and heating up time,'' which outlines both the test methods and equipment required to measure cooking top energy consumption. However, DOE is proposing to omit Section 7.1.Z5, ''Procedure for measuring the heating up time,'' as it is not required to calculate the overall energy consumption of the cooking top and would increase manufacturer test burden. Additionally, DOE is proposing to omit Section 7.1.Z7, ''Evaluation and calculation,'' as DOE is proposing to normalize the measured cooking top energy consumption to a standard water load size of 2,853 g for both electric and gas cooking tops instead of the 1,000 g currently specified in EN 60350–2:2013, as discussed in section III.G. DOE is also proposing to incorporate by reference Annex ZA through Annex ZD, which provide further requirements for measuring the energy consumption, clarify test vessel construction, and provide examples for how to select the appropriate test vessels. DOE also proposes to include many of the definitions related to the measure of cooking top energy consumption specified in Section 3 of EN 60350–2:2013. However, due to differences in terminology between the United States and Europe, such as the use of the word hob for cooking top, DOE is proposing to explicitly define relevant terms from Section 3 of EN 60350–2:2013 in appendix I.

E. Multi-Ring and Non-Circular Surface Units

In the December 2014 TP SNOPR, DOE specified that for electric cooking tops, test equipment for non-circular surface units should be selected based on the surface unit's shortest dimension. 79 FR 71894, 71896 (Dec. 3, 2014). BSH and AHAM commented that using the smallest dimension of a noncircular electric surface unit is not always appropriate for determining the proper test equipment size because the induction market includes products that have different printings and shapes of cooking zones, and in cases where there is no clearly defined printing diameter, there is no suitable way to define the dimension of a surface unit. (BSH, TP No. 16 at p. 7; AHAM, TP No. 18 p. 2) BSH and AHAM also commented that specifying a position for test equipment on flexible induction units is important. According to these commenters, the positioning of the test equipment can have significant influence on the efficiency result. (BSH, TP No. 16 at p. 7; AHAM, TP No. 18 p. 2) BSH and AHAM further requested that DOE consider adopting the center position description from the draft IEC 60350–2 procedure for full surface induction units in order to make results more repeatable and reproducible. (BSH, TP No. 16 at p. 9; AHAM, TP No. 18 p. 3) GE also asked that DOE clearly define the placement of test equipment, prior to finalizing the SNOPR or any cooking top efficiency standard. (GE, TP No. 17 at p. 2)

As discussed in section III.C.1 of this notice, DOE is proposing to incorporate by reference specific provisions in EN 60350–2:2013. For cooking zones that include a circular and an elliptical or rectangular part, DOE is proposing, as per Section 7.Z1 in EN 60350–02:2013, that only the circular section be tested. Additionally, Section 7.1.Z4 and Annex ZA of EN 60350–2:2013, which would be incorporated by reference, define the center of elliptical and rectangular surface units by their geometric centers and provide the required test positions of test vessels on these kinds of surface units.

In the December 2014 TP SNOPR, DOE specified that for electric cooking tops, surface units with flexible concentric sizes (*i.e.,* units with multiple zones of the same shape but varying shortest dimensions) should be tested at each unique size setting. 79 FR 71894, 71896 (Dec. 3, 2014). Many smooth—electric radiant cooking tops have ''multi-ring'' elements that have multiple concentric heating elements for a single surface unit. When a single ring is energized, this corresponds to the smallest-diameter surface unit available. When two rings are energized, the diameter of the surface unit increases. This continues for as many concentric heating elements as are available for the surface unit. Multiple heating elements give the user flexibility to adjust the surface unit to fit a certain cookware size. Results from DOE testing presented in the December 2014 TP SNOPR showed a significant decrease in efficiency at the smaller-diameter settings as compared to the largest-diameter setting of a multi-ring surface unit. Because of the observed differences in efficiency, DOE proposed that each distinct diameter setting for a multi-ring surface unit be tested as a separate surface unit. For example, if the surface unit has three settings with outer diameters of 12, 9, and 6 inches, each setting would be tested separately with the appropriately sized test equipment, and the results would be factored into the overall energy consumption calculation as if they were individual surface units. 79 FR 71894, 71906 (Dec. 3, 2014).

GE and AHAM commented that DOE should not require measurement of the individual inner zones of multi-ring surface units with flexible concentric sizes, as doing so may lead to results that would not be indicative of actual product performance or be precise enough for standards-setting purposes. (GE, TP No. 17 at p. 2; AHAM, TP No. 18 p. 3) During manufacturer interviews, manufacturers stated that requiring that each setting be tested separately would increase the test burden. Furthermore, manufacturers noted that the ability to match the surface unit diameter to the pan size is an important consumer utility that might be penalized by the proposed test procedure. However, several manufacturers also independently confirmed that using the inner ring of a multi-ring burner is inherently less efficient because some of the generated heat will be lost to the portion of the heating element that is not energized.

According to EN 60350–2:2013, only the energy consumption of the largest diameter of a multi-ring surface unit is measured, unless an additional test vessel category is needed to meet the requirements of the test procedure, in which case one of the smaller-diameter settings of the surface unit that matches the next best-fitting test vessel diameter is tested. However, DOE is proposing to require each setting of the multi-ring

surface unit be tested independently. DOE notes that each setting could be used as an individual surface unit, and thus should factor into the calculated annual energy consumption of the cooking top. Each diameter setting of the multi-ring surface unit would be tested and included as a unique surface unit in the average energy consumption calculation for the cooking top. DOE welcomes consumer usage data demonstrating if and how these surface units are used differently than surface units without an adjustable diameter.

In the December 2014 TP SNOPR, DOE also discussed other non-circular cooking top elements such as bridge zones, warming plates, grills, and griddles that are not intended for use with a typical circular piece of cookware. Appropriate test blocks for these heating elements would depend on the intended function of each surface unit. DOE did not propose to require testing these surface units because the additional equipment necessary for the test method to be representative would place an unreasonable burden on test laboratories and manufacturers. Additionally, DOE stated that it expects use of these types of surface units to be much less frequent than the standard surface units used for circular pots and pans. 79 FR 71894, 71906 (Dec. 3, 2014).

GE commented that DOE should not require measuring the efficiency of warming plates, griddles, grills or other elements for which there is not an appropriately shaped and sized test block. (GE, TP No. 17 at p. 2) BSH and AHAM requested that DOE clarify whether the exclusion of bridge zones includes products with a bridge mode (which connects two surface units together as a single zone), and whether a flexible cooking area is considered a bridge mode. (BSH, TP No. 16 at p. 10; AHAM, TP No. 18 at p. 3) BSH and AHAM requested that roaster extensions also be excluded. (BSH, TP No. 16 at p. 10; AHAM, TP No. 18 at p. 3) After considering these comments, DOE is maintaining its proposal to exclude testing of bridge zones, warming plates, grills, and griddles in determining the energy consumption of a cooking top. DOE is also proposing to exclude roaster extensions from test. Furthermore, DOE is clarifying that it is not proposing to require testing of bridge modes that couple several surface units together for use as a warming plate or for use with a roasting pan, but is proposing to test the individual circular heating elements if they can be used independently of the bridge mode. DOE is also clarifying that a flexible cooking area, *i.e.,* a full-surface induction cooking zone, able to heat multiple items of cookware simultaneously, with independent control options for each piece of cookware, does not constitute a bridge mode.

In the December 2014 TP SNOPR, DOE specified that full-surface induction cooking tops with ''cook anywhere'' functionality should be tested with multiple test equipment diameters in the center of the usable cooking surface. 79 FR 71894 71905 (Dec. 3, 2014). These full-surface induction cooking tops have no clearly defined cooking zones. The location of the cookware is detected when it is placed on the surface, and multiple cookware can be independently controlled and used on the cooking top simultaneously. Annex ZA of EN 60350–2:2013, which DOE is proposing to incorporate by reference as discussed in section III.D of this notice, specifies that for a cooking area without limitative marking, *e.g.,* a full-surface induction zone, the number of controls is defined by the number of cookware items that can be used independently and simultaneously, and the number of controls determines the number of tests.

F. Extending EN 60350–2:2013 to Gas Cooking Tops

DOE notes that the test methods specified in the relevant sections of EN 60350–2:2013 were intended for use with only electric cooking tops. To extend this method to gas cooking tops, DOE reviewed another European water-heating test standard, EN 30–2–1:1998 *Domestic cooking appliances burning gas—Part 2–1: Rational use of energy—General,* which includes test methods specifically for gas cooking tops. EN 30–2–1 is similar to the electric cooking top water-heating test method in that it specifies a series of test vessels and water loads that are dependent on a nominal characteristic of the surface unit. EN 30–2–1 specifies the diameter of the test vessel and the mass of the water load based on the heat input of the gas burner being tested.

The methods of test in EN 60305–2:2013 and EN 30–2–1 differ slightly, so if DOE were to incorporate both by reference, the resulting measured energy consumption of gas and electric cooking tops would not be comparable. For example, EN 30–2–1 specifies an aluminum test vessel, without a lid, instead of a stainless steel vessel. Additionally, the procedure to determine the efficiency of a gas burner in EN 30–2–1 includes a heat-up phase at the maximum burner setting but does not capture energy consumed during a simmering phase. DOE is not aware of data showing that consumers cook food differently with gas cooking tops than with electric cooking tops. For these reasons, DOE is proposing to extend the test methods specified for electric cooking tops in EN 60350–2:2013 to gas cooking tops, but to specify test vessels and water loads based on the correlation between input rate of the burner and test vessel size in EN 30–2–1. Figure III.1 compares the test vessels in EN 30–2–1 to EN 603050–2.

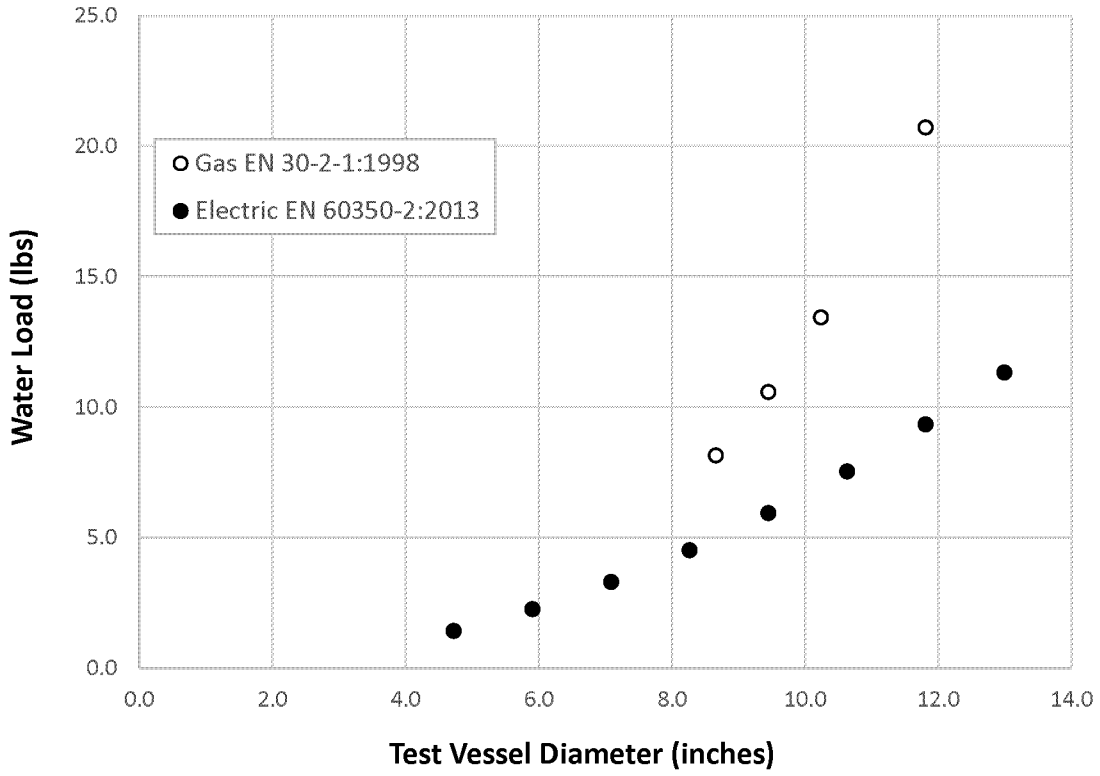

Figure III.1 Test Vessel Water Load versus Diameter as Specified in EN 30-2-1 and EN 60350-2:2013

DOE notes that for comparable test vessel diameters specified in the two test procedures, the water loads vary significantly. However, DOE is not aware of any data suggesting that a representative test load should be significantly different for gas cooking tops than for electric cooking tops. As a result, DOE is proposing to use the test vessel diameters and the corresponding water loads from EN 60350–2:2013 that most closely match the test vessel diameters specified in EN 30–2–1 to test conventional gas cooking tops. Proposing to use the same test vessels and water loads as specified for electric cooking tops, as well as the same general test method, reduces the burden on manufacturers by minimizing the amount of new test equipment required to be purchased. Table III.4 lists DOE's proposal for gas cooking top test vessel diameter and water load by nominal burner input rate.

TABLE III.4—PROPOSED TEST VESSEL DIAMETERS AND WATER LOADS FOR THE TEST OF CONVENTIONAL GAS COOKING TOPS

Nominal gas burner input rate		Test vessel diameter (inches (mm))	Mass of the water load (lbs (kg))
Minimum Btu/h (kW)	Maximum Btu/h (kW)		
3,958 (1.16)	5,596 (1.64)	8.27 (210)	4.52 (2.05)
5,630 (1.65)	6,756 (1.98)	9.45 (240)	5.95 (2.70)
6,790 (1.99)	8,053 (2.36)	10.63 (270)	7.54 (3.42)
8,087 (2.37)	14,331 (4.2)	10.63 (270)	7.54 (3.42)
>14,331 (4.2)	.....	11.81 (300)	11.33 (4.24)

Unlike electric cooking tops, DOE is not proposing to require a minimum number of cookware categories for the test of a gas cooking top. Given that the diameter of the gas flame cannot be adjusted when the burner is at its maximum setting, only the best fitting test vessel, as specified in Table III.4, would be used for the surface unit test. DOE is also proposing to maintain the gas test conditions and measurements currently specified in appendix I for the test of gas cooking tops because gas testing is not addressed in EN 60350–2:2013.

DOE seeks comment on its proposed test vessel diameters and water loads for the test of conventional gas cooking tops. DOE also seeks comment on whether a representative water load for gas cooking tops should differ significantly from those for electric cooking tops. DOE requests input on whether the range of gas burner input rates derived from European standard EN 30–2–1 appropriately captures the burner input rates available on the U.S. market.

G. Annual Energy Consumption

In section 4.2.2 of the existing test procedure in appendix I, the annual energy consumption for electric and gas cooking tops is specified as the ratio of the annual useful cooking energy output to the cooking efficiency measured with a test block. The cooking efficiency is the average of the surface unit efficiencies measured for the cooking top. The annual useful cooking energy output was determined during the initial development of the cooking products test procedure in 1978. It correlated cooking field data to results obtained using the aluminum test block method and the DOE test procedure. In subsequent analyses for cooking products energy conservation standards and updates to the test procedure, the annual useful cooking energy output was scaled to adjust for changes in consumer cooking habits.

In this SNOPR, DOE is proposing to incorporate by reference relevant sections of EN 60350–2:2013, which does not include a method to determine surface unit efficiency and thus, cooking top efficiency. DOE also noted in section III.D.1 of this notice the repeatability and reproducibility issues related to specifying an efficiency metric for the water-heating test method. As a result, DOE is proposing to include a method to calculate both annual energy consumption and integrated annual energy consumption using the average of the test energy consumption measured for each surface unit of the cooking top, normalized to a representative water load size.

Section 7.1.Z7.2 of EN 60350–2:2013 specifies that the energy consumption of the cooking top be normalized to 1,000 g of water. However, DOE notes that 1,000 g of water may not be representative of the average load used with cooking tops found in the U.S. market. According to the table of standardized test vessel diameters and water amounts listed in Table III.1, a load size of 1,000 g approximately corresponds to a test vessel diameter of 6 inches, which, according to the following analysis, is not the most representative test vessel diameter. To determine the representative load size for both electric and gas cooking tops, DOE first reviewed the surface unit diameters and input rates for cooking tops (including those incorporated into combined cooking products) available on the market. As discussed in section III.D, section 7.1.Z2 of EN 60350–2 includes methodology for selecting the test vessel diameter and a corresponding water load for each surface unit based on the number of surface units on the cooking top and the diameter of each surface unit. Using this methodology, DOE determined the test vessel diameters and water load sizes that would be required for the test of each cooking top model. Based on this analysis, DOE determined that the average water load size for both electric and gas cooking top models available on the market was 2,853 g. As a result, DOE is proposing to calculate the normalized cooking top energy consumption for electric products as

$$E_{CTE} = \frac{2853g}{n_{tv}} \times \sum_{tv=1}^{n_{tv}} \frac{E_{tv}}{m_{tv}}$$

and the normalized cooking top energy consumption for gas products as

$$E_{CTG} = \frac{2853g}{n_{tv}} \times \sum_{tv=1}^{n_{tv}} \frac{E_{tv}}{m_{tv}}$$

Where:

E_{CTE} is the energy consumption of an electric cooking top calculated per 2,853 g of water, in Wh;

E_{CTG} is the energy consumption of a gas cooking top calculated per 2,853 g of water, in Wh;

E_{tv} is the energy consumption measured for a given test vessel, tv, in Wh;

m_{tv} is the mass of water in the test vessel, in g; and,

n_{tv} is the number of test vessels used to test the complete cooking top.

To extrapolate the cooking top's normalized test energy consumption to an annual energy consumption, DOE considered cooking top usage data available through EIA RECS, which collects energy-related data for occupied primary housing units in the United States. The 2009 RECS collected data from 12,083 housing units representing almost 113.6 million households. RECS provides values for the frequency of household cooking events by product class as listed in Table III.5.

TABLE III.5—RECS 2009 AVERAGE MEALS PER DAY FOR CONVENTIONAL COOKING TOPS

Cooking top type	RECS average cooking frequency (meals per day)
Electric	1.21
Smooth Electric[a]	1.21
Gas	1.25

[a] Smooth Electric as listed here includes both smooth electric radiant and induction cooking tops.

However, RECS does not provide details about the cooking load (*e.g.,* load size or composition) nor the duration of the cooking event. As a result, DOE is proposing to normalize the number of cooking cycles to account for differences between the duration of a cooking event represented in the RECS data and DOE's proposed test load for measuring the energy consumption of the cooking top to calculate the annual energy consumption.

To evaluate the difference between field energy use and test energy consumption, DOE reviewed recent survey data of residential cooking presented in the 2010 CA RASS and the FSEC, from which DOE determined that the representative average annual energy consumption of conventional electric ranges is 287.5 kWh/year. In appendix 7A of the technical support document (TSD) for the conventional ovens energy conservation standards NOPR (80 FR 33030 (June 10, 2015)), DOE provides a methodology to disaggregate the range energy consumption into two portions—one allocated to the oven and the other portion allocated to the cooking top. This methodology assumes that the annual cooking energy consumption of a cooking top is a fraction of that of a standard oven, and that the ratio of annual useful cooktop energy output to standard oven useful energy output in a range has not changed over time. This methodology also assumes that this ratio for electric cooking products applies to gas cooking products as well. After applying these assumptions, the resulting field energy use estimates of the average annual energy consumption of an electric cooking top and gas cooking top were 114 kWh/yr and 858 kBtu/yr, respectively.

For comparison of the proposed test procedure to the field energy use estimates, DOE conducted testing on a select number of cooking tops, capturing all product classes and a range of cooking top features. DOE estimated the annual energy consumption of a conventional cooking top by multiplying the normalized test energy consumption of the cooking top by the cooking frequency in Table III.5 and the number of days in a year (365). The maximum annual energy consumption for electric cooking tops and gas cooking tops in the DOE test sample were 234.9 kWh/yr and 1,925 kBtu/yr respectively. The significant difference between the annual energy consumption determined using the proposed test procedure and the cooking frequency presented in Table III.5 compared to the field energy consumption data, presented in this preamble, confirms the need to adjust the number of cooking cycles per year used in the annual energy consumption calculation to account for differences between consumer use of the cooking top represented by the EIA RECS data

and the proposed water heating test method.

Using the average ratio between the maximum annual energy consumption measured in the DOE test sample and the estimated field energy use of both gas and electric cooking tops, DOE proposes to apply a normalization factor of 0.47 to the number of cycles per year such that,

$N_{CE} = 441.5 \times 0.47 = 207.5$ cooking cycles per year, the average number of cooking cycles per year normalized for duration of a cooking event estimated for electric cooking tops.

$N_{CG} = 456.3 \times 0.47 = 214.5$ cooking cycles per year, the average number of cooking cycles per year normalized for duration of a cooking event estimated for gas cooking tops.

DOE is proposing to calculate the annual energy consumption of a conventional cooking top by multiplying the normalized test energy consumption of the cooking top by the normalized cooking frequency and the number of days in a year (365). Integrated annual energy consumption for the cooking top would in turn be calculated by adding the annual conventional cooking top combined low-power mode energy consumption.

H. Calculation of Annual Energy Consumption of Combined Cooking Products

As discussed in section III.A, DOE notes that the test procedures proposed in this SNOPR apply to conventional cooking tops, including the individual cooking top component of a combined cooking product. However, DOE also notes that the annual combined low-power mode energy consumption can only be measured for the combined cooking product as a whole and not for the individual components. To determine the integrated annual energy consumption of the conventional cooking top component of a combined cooking product, DOE is proposing to allocate a portion of the combined low-power mode energy consumption for the combined cooking product to the conventional cooking top component based on the ratio of the annual cooking hours for the cooking top to the sum of the annual cooking hours for all components making up the combined cooking product. DOE is also proposing to use the same apportioning method to determine the annual low-power mode energy consumption for the microwave oven component of a combined cooking product.

For conventional cooking tops, DOE determined the annual cooking hours to be 213.1 hours based on the total inactive mode and off mode hours specified in the current version of appendix I, sections 4.2.2.1.2 and 4.2.2.2.2. For conventional ovens, DOE similarly determined the annual cooking hours to be 219.9 based on the total inactive mode and off mode hours specified in the current version of appendix I, section 4.1.2.3 using the annual hours already established for a conventional oven. For microwave ovens, DOE determined the number of annual cooking hours to be 44.9 hours based on consumer usage data presented in the February 4, 2013 NOPR proposing active mode test procedures for microwave ovens. 78 FR 7940, 7950.

Based on this, DOE is proposing to calculate the integrated annual energy consumption for the conventional cooking top component of a combined cooking product as the sum of the annual energy consumption and the portion of the combined cooking product's annual combined low-power mode energy consumption allocated to the cooking top component. Because appendix I currently contains test procedures for microwave ovens that measure only standby mode and off mode test energy consumption, DOE is including an annual combined low-power mode energy consumption calculation for the microwave oven component of a combined cooking product. As discussed in section III.G of this SNOPR, DOE is proposing to repeal the test procedures for conventional ovens. As a result, DOE is not proposing to incorporate methods to calculate the integrated annual energy consumption for the conventional oven component of a combined cooking product.

DOE also proposes to modify the requirements in 10 CFR 430.23 to align with the changes proposed for appendix I, clarifying test procedures for the measurement of energy consumption for combined cooking products.

I. Installation Test Conditions

DOE notes that section 2.1 of appendix I defines installation test conditions for some cooking products but does not explicitly describe the installation test conditions required for conventional cooking tops. The test conditions described for freestanding ''kitchen ranges'' specify that the product be installed with the back directly against, or as near as possible to, a vertical wall which extends at least 1 foot above and on either side of the appliance, and that a drop-in, built-in, or wall-mounted cooking product be installed in an enclosure in accordance with the manufacturer's instructions.

During interviews conducted in February and March 2015, manufacturers commented that the installation conditions described in the existing DOE test procedure are outdated. Specifically, manufacturers explained that certain conventional cooking tops, conventional ovens, and combined cooking products, such as conventional ranges, are designed to be used in a few different installation configurations. They stated that manufacturer installation guides may contain several sets of instructions, and the existing DOE test procedure does not sufficiently define which set should be selected for test. Manufacturers also commented that the installation configuration may impact the measured energy consumption. Because they are already required to test products according to ANSI Z21.1 for safety purposes, manufacturers suggested that DOE consider specifying the same test cabinetry in appendix I to minimize burden and ensure that all products are tested using a standardized cabinetry.

DOE agrees with manufacturers that a standardized test cabinetry should be specified for all cooking product types to ensure that test results are comparable across manufacturers and are repeatable and reproducible. For testing conventional cooking tops and combined components, DOE is proposing in this SNOPR to incorporate by reference the following test structures specified in ANSI Z21.1 sections 5.1 and 5.19:

- Figure 7, ''Test structure for built-in top surface cooking units and open top broiler units;''
- Figure 5, ''Test structure for floor-supported units not having elevated cooking sections;'' and
- Figure 6, ''Test structure for floor-supported units having elevated cooking sections.''

Although ANSI Z21.1 pertains to gas cooking appliances, DOE is proposing to require these test structures for both gas and electric conventional cooking products. ANSI Z21.1 definitions for the various installation configurations also differ slightly from those specified by DOE in the existing appendix I. According to ANSI Z21.1, a ''built-in unit'' is defined as a cooking appliance designed to be recessed into, placed upon, or attached to the construction of a building other than the floor, while a ''floor-supported'' unit is a cooking appliance for installation directly on the floor without requiring supporting cabinetry or structure. However, DOE notes that its definition for ''built-in'' in appendix I also applies to ''slide-in'' products that may be floor supported. In this SNOPR, DOE is proposing to further

clarify its definition of ''built-in'' to mean a product that is enclosed in surrounding cabinetry, walls, or other similar structures on at least three sides, and that can be supported by surrounding cabinetry (*e.g.,* drop-in cooking tops) or the floor (*e.g.,* slide-in conventional ranges). DOE is also proposing to revise its definition for freestanding cooking products to mean a product that is supported by the floor and is not designed to be enclosed by surrounding cabinetry, walls, or other similar structures.

In addition, DOE notes that in general, where the test procedure references manufacturer instructions used to determine the installation conditions for the unit under test, those instructions must be those normally shipped with product, or if only available online, the version of the instructions available online at the time of test. DOE recognizes that some manufacturer instructions may specify that the cooking product may be used in multiple installation conditions (*i.e.,* built-in and freestanding). DOE notes that because built-in products are installed in configurations with more surrounding cabinetry that may limit airflow and venting compared to freestanding products, products capable of built-in installation configurations may require additional features such as exhaust fans or added insulation to meet the same safety requirements (*e.g.,* surface temperature requirements specified in Table 12 of ANSI Z21.1) that impact energy use of the unit. As a result, DOE is proposing that if the manufacturer instructions specify that the cooking product may be used in multiple installation conditions, it should be installed according to the built-in configuration.

J. Technical Clarification to the Correction of the Gas Heating Value

DOE notes that section 2.9.4 in the existing test procedure appendix I specifies that the heating value of natural gas or propane must be corrected for local temperature and pressure conditions, but does not clearly state what conditions should be used for this correction. DOE notes that the test procedure for residential gas clothes dryers in 10 CFR 430 subpart B, appendix D2, specifies that the heating value should be corrected to standard temperature and pressure conditions in accordance with U.S. Bureau of Standards, circular C417, 1938. DOE notes other test procedures (*e.g.,* residential water heaters (10 CFR 430 subpart B, appendix E)) also specify that the temperature and pressure conditions should be corrected to standard temperature and pressure conditions. As a result, DOE is proposing to clarify that the measurement of the heating value of natural gas or propane specified in appendix I be corrected to standard pressure and temperature conditions in accordance with the U.S. Bureau of Standards, circular C417, 1938. This clarification ensures that the same correction methods are used by all operators of the test.

K. Grammatical Changes to Certain Sections of Appendix I

In an effort to clarify the text in certain sections of appendix I, DOE has provided minor grammatical corrections or modifications. DOE also notes that the watt meter requirements specified in 2.9.1.2 in the existing appendix I are no longer used in the test procedure. As a result, DOE is also proposing to remove this section. These minor proposed modifications do not change the substance of the test methods or descriptions provided in these sections.

L. Compliance With Other EPCA Requirements

EPCA requires that any new or amended test procedures for consumer products must be reasonably designed to produce test results which measure energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use, and must not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

DOE tentatively concludes that the amended test procedures proposed herein would produce test results that measure the energy consumption of conventional cooking tops during representative use, and that the test procedures would not be unduly burdensome to conduct.

While the test procedures proposed in this SNOPR differ from the method currently included in appendix I for testing cooking tops, the essential method of test which includes an initial temperature rise of the test load and a simmering phase, is performed in approximately the same amount of time as the existing test procedure in appendix I. The existing test equipment in appendix I would be replaced with the eight test vessels described in section 7.1.Z2 of EN 60350–2:2013. DOE estimates current testing represents a cost of roughly $700 per test for labor, with a one-time investment of $2,000 for test equipment ($1,000 for test blocks and $1,000 for instrumentation). The proposed reusable test vessels would represent an additional one-time expense of $5,000 for the test vessels. Although manufacturers would be required to purchase and construct the test structures described in section III.I of this notice, many manufacturers stated during interviews that because these test structures are already used for gas product compliance testing required in ANSI Z21.1, these structures are already available in-house. DOE also notes that the only additional instrumentation required would be an absolute pressure transducer to measure the ambient air pressure of the test room. DOE estimates the cost of this transducer to be $100 or less for a model compatible with typical existing data collection systems used by the manufacturer. The allowable range of room air pressure specified in EN 60350–2:2013 is wide enough that a pressurized test chamber would not be required. Air pressure at elevations less than 3000 feet above sea level falls within the range. DOE does not believe this additional cost represents an excessive burden for test laboratories or manufacturers given the significant investments necessary to manufacture, test and market consumer appliances. Given the similarities (in terms of the test equipment, test method, the time needed to perform the test, and the calculations necessary to determine IAEC, DOE asserts that the newly proposed amended test procedure for cooking tops would not be unreasonably burdensome to conduct as compared to the existing test procedure in appendix I.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

The Office of Management and Budget (OMB) has determined that test procedure rulemakings do not constitute ''significant regulatory actions'' under section 3(f) of Executive Order 12866, Regulatory Planning and Review, 58 FR 51735 (Oct. 4, 1993). Accordingly, this action was not subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) in OMB.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of an initial regulatory flexibility analysis (IFRA) for any rule that by law must be proposed for public comment and a final regulatory flexibility analysis for any such rule that an agency adopts as a final rule, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order

13272, ''Proper Consideration of Small Entities in Agency Rulemaking,'' 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's Web site: *http://energy.gov/gc/office-general-counsel.*

DOE reviewed this proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. The proposed rule would amend the test method for measuring the energy efficiency of conventional cooking tops, including methods applicable to induction cooking products and gas cooking tops with higher input rates.

The Small Business Administration (SBA) considers a business entity to be a small business, if, together with its affiliates, it employs less than a threshold number of workers or earns less than the average annual receipts specified in 13 CFR part 121. The threshold values set forth in these regulations use size standards and codes established by the North American Industry Classification System (NAICS) that are available at: *http://www.sba.gov/sites/default/files/files/Size_Standards_Table.pdf.* The threshold number for NAICS classification code 335221, titled ''Household Cooking Appliance Manufacturing,'' is 750 employees; this classification includes manufacturers of residential conventional cooking products.

Most of the manufacturers supplying conventional cooking products are large multinational corporations. DOE surveyed the AHAM member directory to identify manufacturers of residential conventional cooking tops. DOE then consulted publicly-available data, purchased company reports from vendors such as Dun and Bradstreet, and contacted manufacturers, where needed, to determine if they meet the SBA's definition of a ''small business manufacturing facility'' and have their manufacturing facilities located within the United States. Based on this analysis, DOE estimates that there are nine small businesses that manufacture conventional cooking products covered by the proposed test procedure amendments.

For the reasons stated in the preamble, DOE has tentatively concluded that the proposed rule would not have a significant impact on small manufacturers under the applicable provisions of the Regulatory Flexibility Act. The proposed rule would amend DOE's test procedures for cooking tops by incorporating testing provisions from EN 60350–2:2013 to address active mode energy consumption for all conventional cooking top technology types, including induction surface units and surface units with higher input rates. The amended test procedure would be used to develop and test compliance with any future energy conservation standards for cooking tops that may be established by DOE. The proposed test procedure amendments involve the measurement of active mode energy consumption through the use of a water-heating test method that requires different test equipment than is currently specified for conventional cooking tops. The test equipment consists of a set of eight stainless steel test vessels. DOE estimates the cost for this new equipment to be approximately $5,000–$10,000, depending on the number of sets the manufacturer wishes to procure. Additionally, DOE estimates a cost of approximately $33,450 for an average small manufacturer to test a full product line of induction surface units and surface units with high input rates not currently covered by the existing test procedure in appendix I. This estimate assumes $700 per test, as described in section III.L of this notice, with up to 48 total tests per manufacturer needed, assuming 11 models [17] with either four or six individual surface unit tests per cooking top model. This cost is small (0.21 percent) compared to the average annual revenue of the nine identified small businesses, which DOE estimates to be over $16 million.[18]

For combined cooking products, DOE is proposing to modify the calculation of the IAEC of a combined cooking product by apportioning the combined low-power mode energy consumption measured for the combined cooking product to each individual component making up the combined cooking product. These modifications require the same methodology, test equipment, and test facilities used to measure the combined low-power mode energy consumption of stand-alone cooking products and therefore would not result in any additional facility or testing costs.

The incorporation by reference of the test structures from ANSI Z21.1 to standardize the installation conditions used during the test of conventional cooking tops are not expected to significantly impact small manufacturers under the applicable provisions of the Regulatory Flexibility Act. DOE estimates a cost of $500 for an average small manufacturer to fabricate the test structures for the test of cooking tops and combined cooking products, which is negligible when compared to the average annual revenue of the nine identified small businesses. Additionally, small manufacturers of gas cooking appliances likely already use these test structures to perform safety testing according to ANSI Z21.1.

For these reasons, DOE tentatively concludes and certifies that the proposed rule would not have a significant economic impact on a substantial number of small entities. Accordingly, DOE has not prepared a regulatory flexibility analysis for this rulemaking. DOE will transmit the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the SBA for review under 5 U.S.C. 605(b).

C. Reduction Act of 1995

Manufacturers of conventional cooking products must certify to DOE that their products comply with any applicable energy conservation standards. In certifying compliance, manufacturers must test their products according to the DOE test procedures for conventional cooking products, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including conventional cooking products. (76 FR 12422 (March 7, 2011). The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (PRA). This requirement has been approved by OMB under OMB control number 1910–1400. DOE requested OMB approval of an extension of this information collection for three years, specifically including the collection of information proposed in the present rulemaking, and estimated that the annual number of burden hours under this extension is 30 hours per company. In response to DOE's request, OMB approved DOE's information collection requirements covered under OMB control number 1910–1400 through November 30, 2017. 80 FR 5099 (Jan. 30, 2015).

Notwithstanding any other provision of the law, no person is required to

[17] DOE considered different configurations of the same basic model (where surface units were placed in different positions on the cooking top) as unique models.

[18] Estimated average revenue is based on financial information provided for the small businesses in reports provided by Dun and Bradstreet.

respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

D. Review Under the National Environmental Policy Act of 1969

In this proposed rule, DOE proposes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for conventional cooking products. DOE has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, this proposed rule would amend the existing test procedures without affecting the amount, quality or distribution of energy usage, and, therefore, would not result in any environmental impacts. Thus, this rulemaking is covered by Categorical Exclusion A5 under 10 CFR part 1021, subpart D, which applies to any rulemaking that interprets or amends an existing rule without changing the environmental effect of that rule. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, ''Federalism,'' 64 FR 43255 (August 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE has examined this proposed rule and has determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, ''Civil Justice Reform,'' 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) Eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; (3) provide a clear legal standard for affected conduct rather than a general standard; and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) Clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, the proposed rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Public Law 104–4, sec. 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at *http://energy.gov/gc/office-general-counsel.* DOE examined this proposed rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of $100 million or more in any year, so these requirements do not apply.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This proposed rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, ''Governmental Actions and Interference with Constitutionally Protected Property Rights'' 53 FR 8859 (March 18, 1988), that this regulation would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

J. Review Under Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's

guidelines were published at 67 FR 62446 (Oct. 7, 2002). DOE has reviewed this proposed rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,'' 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any proposed significant energy action. A ''significant energy action'' is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that: (1) Is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

The proposed regulatory action to amend the test procedure for measuring the energy efficiency of conventional cooking tops is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under Section 32 of the Federal Energy Administration Act of 1974

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; FEAA) Section 32 essentially provides in relevant part that, where a proposed rule authorizes or requires use of commercial standards, the notice of proposed rulemaking must inform the public of the use and background of such standards. In addition, section 32(c) requires DOE to consult with the Attorney General and the Chairman of the Federal Trade Commission (FTC) concerning the impact of the commercial or industry standards on competition.

The proposed rule incorporates testing methods contained in certain sections of the following commercial standards: EN 60350–2:2013 ''Household electric cooking appliances Part 2: Hobs—Methods for measuring performance'', and ANSI Z21.1–2016 ''Household cooking gas appliances.'' While the proposed test procedure is not exclusively based on the provisions in these industry standards, many components of the test procedure have been proposed to be adopted without amendment. The Department has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA, (*i.e.*, that they were developed in a manner that fully provides for public participation, comment, and review). DOE will consult with the Attorney General and the Chairman of the FTC concerning the impact of these test procedures on competition, prior to prescribing a final rule.

M. Description of Materials Incorporated by Reference

In this SNOPR, DOE proposes to incorporate by reference certain sections of the test standard published by ANSI, titled ''Household cooking gas appliances,'' ANSI Z21.1–2016. ANSI Z21.1 is an industry accepted test procedure that provides a basic standard for safe operation of residential gas cooking appliances. The test procedure proposed in this SNOPR references various sections of ANSI Z21.1 that address test setup and describe the various installation test structures used to test combined cooking products and conventional cooking tops. ANSI Z21.1 is readily available on ANSI's Web site at *http://webstore.ansi.org/default.aspx.*

DOE also proposes to incorporate by reference certain sections of the test standard published by CENELEC, titled ''Household electric cooking appliances Part 2: Hobs—Methods for measuring performance,'' EN 60350–2:2013. EN 60350–2:2013 is an industry accepted European test procedure that measures cooking top energy consumption and performance. DOE has determined that EN 60350–2:2013, with the proposed clarifications discussed in sections III.E, III.F, and III.G, provides test methods for determining the annual energy use metrics and are applicable to all residential conventional cooking tops sold in the United States. The test procedure proposed in this SNOPR references various sections of EN 60350–2:2013 that address test setup, instrumentation, test conduct, and measurement procedure. EN 60350–2:2013 is readily available on the British Standards Institute's Web site at *http://shop.bsigroup.com/.*

V. Public Participation

A. Submission of Comments

DOE will accept comments, data, and information regarding this proposed rule no later than the date provided in the **DATES** section at the beginning of this proposed rule. Interested parties may submit comments using any of the methods described in the **ADDRESSES** section at the beginning of this notice.

Submitting comments via regulations.gov. The *regulations.gov* Web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to *regulations.gov* information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information (CBI)). Comments submitted through *regulations.gov* cannot be claimed as CBI. Comments received through the Web site will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through *regulations.gov* before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for

up to several weeks. Please keep the comment tracking number that *regulations.gov* provides after you have successfully uploaded your comment.

Submitting comments via email, hand delivery, or mail. Comments and documents submitted via email, hand delivery, or mail also will be posted to *regulations.gov*. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via mail or hand delivery, please provide all items on a CD, if feasible. It is not necessary to submit printed copies. No facsimiles (faxes) will be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, written in English and free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery two well-marked copies: One copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked non-confidential with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include: (1) A description of the items; (2) whether and why such items are customarily treated as confidential within the industry; (3) whether the information is generally known by or available from other sources; (4) whether the information has previously been made available to others without obligation concerning its confidentiality; (5) an explanation of the competitive injury to the submitting person which would result from public disclosure; (6) when such information might lose its confidential character due to the passage of time; and (7) why disclosure of the information would be contrary to the public interest.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

B. Issues on Which DOE Seeks Comment

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

1. Repeal of the Conventional Oven Test Procedure

DOE welcomes comment on its proposal to repeal the provisions in appendix I for measuring conventional oven IAEC. (See section III.B of this notice.)

2. Gas Burners With High Input Rates

DOE welcomes comment on what constitutes a representative test load for gas burners with high input rates. DOE is especially interested in consumer usage data demonstrating how consumers might use burners with high input rates differently than those with standard input rates. (See section III.A of this notice.)

3. Hybrid Test Blocks

DOE seeks comment on its decision to no longer propose the use of hybrid test blocks for the test of conventional cooking tops, given the outstanding issues associated with thermal grease and test block construction. (See section III.B of this notice.)

4. Representativeness of the Water-Heating Test Method for Electric Surface Units

DOE seeks comment on its proposal to incorporate by reference certain sections of EN 60350–2:2013 and specifically on whether the proposed test vessels and water loads are representative of actual consumer loads used with electric surface units. (See section III.D.1 of this notice.)

5. Non-Circular and Flexible Electric Surface Units

DOE invites comments on whether the specifications included in EN 60350–2:2013 are appropriate for determining the test vessel size and position for non-circular surface units and full-surface induction zones. DOE also invites comments on its proposal to test surface units with flexible concentric sizes at each unique size setting. DOE also welcomes comments on its proposal to not require testing of certain electric and gas cooking top surface units, such as bridge zones, warming plates, grills and griddles, in determining cooking top efficiency. (See section III.E of this notice.)

6. Representativeness of the Water-Heating Test Method for Gas Surface Units

DOE seeks comment on its proposal to extend the water-heating test method to gas cooking tops by correlating surface unit input rate to test vessel diameter and the mass of the water load. DOE also seeks comment on its proposed test vessel diameters and water loads for the test of conventional gas cooking tops and whether a representative water load for gas cooking tops should differ significantly from that of electric cooking tops. Additionally, DOE seeks input regarding whether the range of gas burner input rates derived from EN 30–2–1 appropriately captures the burner input rates available on the U.S. market. (See section III.F of this notice.)

7. Annual Energy Consumption Calculation

DOE seeks comment on its proposed method and calculation to determine the annual energy consumption and integrated annual energy consumption of conventional cooking tops. (See section III.G of this notice.)

8. Combined Cooking Products

DOE seeks comment on its proposed method and calculation to determine the integrated annual energy consumption for the conventional cooking top component of a combined cooking product and the combined annual low-power mode energy consumption for the microwave oven component of a combined cooking product. (See section III.H of this notice.)

9. Installation Test Conditions

DOE seeks comment on its proposal to incorporate by reference certain test structures from ANSI Z2.1 as required

installation test conditions for use with conventional cooking tops and combined cooking products. DOE seeks comment on its proposal to clarify the definitions for built-in and freestanding cooking products to appropriately reflect how these products are installed in the field. (See section III.I of this notice.)

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this proposed rule.

List of Subjects in 10 CFR Part 430

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Incorporation by reference, Intergovernmental relations, Small businesses.

Issued in Washington, DC, on August 5, 2016.

Kathleen B. Hogan,

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

For the reasons stated in the preamble, DOE is proposing to amend part 430 of chapter II of title 10, Code of Federal Regulations as set forth below:

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

■ 1. The authority citation for part 430 continues to read as follows:

Authority: 42 U.S.C. 6291–6309; 28 U.S.C. 2461 note.

■ 2. Section 430.2 is amended by:
■ a. Removing the definitions for ''Conventional range,'' ''Microwave/conventional cooking top,'' ''Microwave/conventional oven,'' and ''Microwave/conventional range;'' and
■ b. Revising the definitions for ''Conventional cooking top,'' ''Conventional oven'', ''Cooking products'', ''Microwave oven'', and ''Other cooking products''.

The revisions read as follows:

§ 430.2 Definitions.

* * * * *

Conventional cooking top means a category of cooking products which is a household cooking appliance consisting of a horizontal surface containing one or more surface units that utilize a gas flame, electric resistance heating, or electric inductive heating. This includes any conventional cooking top component of a combined cooking product.

* * * * *

Conventional oven means a category of cooking products which is a household cooking appliance consisting of one or more compartments intended for the cooking or heating of food by means of either a gas flame or electric resistance heating. It does not include portable or countertop ovens which use electric resistance heating for the cooking or heating of food and are designed for an electrical supply of approximately 120 volts. This includes any conventional oven(s) component of a combined cooking product.

Cooking products means consumer products that are used as the major household cooking appliances. They are designed to cook or heat different types of food by one or more of the following sources of heat: Gas, electricity, or microwave energy. Each product may consist of a horizontal cooking top containing one or more surface units and/or one or more heating compartments.

* * * * *

Microwave oven means a category of cooking products which is a household cooking appliance consisting of a compartment designed to cook or heat food by means of microwave energy, including microwave ovens with or without thermal elements designed for surface browning of food and convection microwave ovens. This includes any microwave oven(s) component of a combined cooking product.

* * * * *

Other cooking products means any category of cooking products other than conventional cooking tops, conventional ovens, and microwave ovens.

* * * * *

■ 3. Section 430.3 is amended:
■ a. By redesignating paragraphs (e)(16) through (e)(19) as paragraphs (e)(17) through (e)(20) and adding new paragraph (e)(16);
■ b. By removing paragraph (i)(7) and redesignating (i)(8) as (i)(7);
■ c. Redesignating paragraph (l) through (v) as paragraph (m) through (w), respectively; and
■ d. By adding new paragraph (l).

The revisions and additions read as follows:

§ 430.3 Materials incorporated by reference.

* * * * *

(e) * * *

(16) ANSI Z21.1–2016, (''ANSI Z21.1''), *Household cooking gas appliances,* (2016), IBR approved for appendix I to subpart B.

* * * * *

(l) *CENELEC.* European Committee for Electrotechnical Standardization, available from the HIS Standards Store, *https://www.ihs.com/products/cenelec-standards.html.*

(1) EN 60350–2:2013, (''EN 60350–2:2013''), *Household electric cooking appliances Part 2: Hobs—Methods for measuring performance,* (2013), IBR approved for appendix I to subpart B.

(2) [Reserved]

* * * * *

■ 4. Section 430.23 is amended by revising paragraph (i) to read as follows:

§ 430.23 Test procedures for the measurement of energy and water consumption.

* * * * *

(i) *Cooking products.* (1) Determine the integrated annual electrical energy consumption for conventional electric cooking tops, including any integrated annual electrical energy consumption for combined cooking products according to sections 4.1.2.1.2 and 4.2.2.1 of appendix I to this subpart. For conventional gas cooking tops, the integrated annual electrical energy consumption shall be equal to the sum of the conventional cooking top annual electrical energy consumption, $E_{CCE,}$ as defined in section 4.1.2.2.2 or 4.2.2.2, and the conventional cooking top annual combined low-power mode energy consumption, E_{CTSO}, as defined in section 4.1.2.2.3, or the annual combined low-power mode energy consumption for the conventional cooking top component of a combined cooking product, E_{CCTLP}, as defined in section 4.2.2.2 of appendix I to this subpart.

(2) Determine the annual gas energy consumption for conventional gas cooking tops according to section 4.1.2.2.1 of appendix I to this subpart.

(3) Determine the integrated annual energy consumption for conventional cooking tops according to sections 4.1.2.1.2, 4.1.2.2.2, 4.2.2.1, and 4.2.2.2, respectively, of appendix I to this subpart. Round the integrated annual energy consumption to one significant digit.

(4) The estimated annual operating cost corresponding to the energy consumption of a conventional cooking top, shall be the sum of the following products:

(i) The integrated annual electrical energy consumption for any electric energy usage, in kilowatt-hours (kWh) per year, as determined in accordance with paragraph (i)(1) of this section, times the representative average unit cost for electricity, in dollars per kWh, as provided pursuant to section 323(b)(2) of the Act; plus

(ii) The total annual gas energy consumption for any natural gas usage,

in British thermal units (Btu) per year, as determined in accordance with paragraph (i)(2) of this section, times the representative average unit cost for natural gas, in dollars per Btu, as provided pursuant to section 323(b)(2) of the Act; plus

(iii) The total annual gas energy consumption for any propane usage, in Btu per year, as determined in accordance with paragraph (i)(2) of this section, times the representative average unit cost for propane, in dollars per Btu, as provided pursuant to section 323(b)(2) of the Act.

(5) Determine the standby power for microwave ovens, excluding any microwave oven component of a combined cooking product, according to section 3.2.3 of appendix I to this subpart. Round standby power to the nearest 0.1 watt.

(6) For convertible cooking appliances, there shall be—

(i) An estimated annual operating cost and an integrated annual energy consumption which represent values for the operation of the appliance with natural gas; and

(ii) An estimated annual operating cost and an integrated annual energy consumption which represent values for the operation of the appliance with LP-gas.

(7) Determine the estimated annual operating cost for convertible cooking appliances that represents natural gas usage, as described in paragraph (i)(6)(i) of this section, according to paragraph (i)(4) of this section, using the total annual gas energy consumption for natural gas times the representative average unit cost for natural gas.

(8) Determine the estimated annual operating cost for convertible cooking appliances that represents LP-gas usage, as described in paragraph (i)(6)(ii) of this section, according to paragraph (i)(4) of this section, using the representative average unit cost for propane times the total annual energy consumption of the test gas, either propane or natural gas.

(9) Determine the integrated annual energy consumption for convertible cooking appliances that represents natural gas usage, as described in paragraph (i)(6)(i) of this section, according to paragraph (i)(3) of this section, when the appliance is tested with natural gas.

(10) Determine the integrated annual energy consumption for convertible cooking appliances that represents LP-gas usage, as described in paragraph (i)(6)(ii) of this section, according to paragraph (i)(3) of this section, when the appliance is tested with either natural gas or propane.

(11) Other useful measures of energy consumption for conventional cooking tops shall be the measures of energy consumption that the Secretary determines are likely to assist consumers in making purchasing decisions and that are derived from the application of appendix I to this subpart.

* * * * *

■ 7. Appendix I to subpart B of part 430 is revised to read as follows:

Appendix I to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Cooking Products

Note: Any representation related to active mode energy consumption of conventional cooking tops made after February 21, 2017 must be based upon results generated under this test procedure. Any representation related to standby and off mode power of conventional cooking tops, combined products, and microwave ovens must be based upon results generated under this test procedure.

Upon the compliance date(s) of any energy conservation standard(s) for cooking products, use of the applicable provisions of this test procedure to demonstrate compliance with the energy conservation standard will also be required.

1. Definitions

The following definitions apply to the test procedures in this appendix, including the test procedures incorporated by reference:

1.1 *Active mode* means a mode in which the product is connected to a mains power source, has been activated, and is performing the main function of producing heat by means of a gas flame, electric resistance heating, electric inductive heating, or microwave energy.

1.2 *ANSI Z21.1* means the test standard published by the American National Standards Institute titled, ''Household cooking gas appliances,'' Publication Z21.1 (2016) (incorporated by reference; see § 430.3).

1.3 *Built-in* means the product is enclosed in surrounding cabinetry, walls, or other similar structures on at least three sides, and can be supported by surrounding cabinetry or the floor.

1.4 *Combined cooking product* means a household cooking appliance that combines a cooking product with other appliance functionality, which may or may not include another cooking product. Combined cooking products include the following products: conventional range, microwave/conventional cooking top, microwave/conventional oven, and microwave/conventional range.

1.5 *Combined low-power mode* means the aggregate of available modes other than active mode, but including the delay start mode portion of active mode.

1.6 *Cooking area* is an area on a conventional cooking top surface heated by an inducted magnetic field where cookware is placed for heating, where more than one cookware item can be used simultaneously and controlled separately from other cookware placed on the cooking area, and that is either—

(1) An area where no clear limitative markings for cookware are visible on the surface of the cooking top; or

(2) An area with limitative markings.

1.7 *Cooking zone* is a conventional cooking top surface that is either a single electric resistance heating element or multiple concentric sizes of electric resistance heating elements, an inductive heating element, or a gas surface unit that is defined by limitative markings on the surface of the cooking top and can be controlled independently of any other cooking area or cooking zone.

1.8 *Cooking top control* is a part of the conventional cooking top used to adjust the power and the temperature of the cooking zone or cooking area for one cookware item.

1.9 *Cycle finished mode* is a standby mode in which a conventional cooking top provides continuous status display following operation in active mode.

1.10 *Drop-in* means the product is supported by horizontal surface cabinetry.

1.11 *EN 60350–2:2013* means the CENELEC test standard titled, ''Household electric cooking appliances Part 2: Hobs—Methods for measuring performance,'' Publication 60350–2 (2013) (incorporated by reference; see § 430.3).

1.12 *Freestanding* means the product is supported by the floor and is not specified in the manufacturer's instructions as able to be installed such that it is enclosed by surrounding cabinetry, walls, or other similar structures.

1.13 *IEC 62301 (First Edition)* means the test standard published by the International Electrotechnical Commission, titled ''Household electrical appliances—Measurement of standby power,'' Publication 62301 (First Edition 2005–06) (incorporated by reference; see § 430.3).

1.14 *IEC 62301 (Second Edition)* means the test standard published by the International Electrotechnical Commission, titled ''Household electrical appliances—Measurement of standby power,'' Publication 62301 (Edition 2.0 2011–01) (incorporated by reference; see § 430.3).

1.15 *Inactive mode* means a standby mode that facilitates the activation of active mode by remote switch (including remote control), internal sensor, or timer, or that provides continuous status display.

1.16 *Maximum power setting* means the maximum possible power setting if only one cookware item is used on the cooking zone or cooking area of a conventional cooking top.

1.17 *Normal non-operating temperature* means a temperature of all areas of an appliance to be tested that is within 5 °F (2.8 °C) of the temperature that the identical areas of the same basic model of the appliance would attain if it remained in the test room for 24 hours while not operating with all oven doors closed.

1.18 *Off mode* means any mode in which a cooking product is connected to a mains power source and is not providing any active mode or standby function, and where the mode may persist for an indefinite time. An

indicator that only shows the user that the product is in the off position is included within the classification of an off mode.

1.19 *Standard cubic foot (or liter (L)) of gas* means that quantity of gas that occupies 1 cubic foot (or alternatively expressed in L) when saturated with water vapor at a temperature of 60 °F (15.6 °C) and a pressure of 30 inches of mercury (101.6 kPa) (density of mercury equals 13.595 grams per cubic centimeter).

1.20 *Standby mode* means any mode in which a cooking product is connected to a mains power source and offers one or more of the following user-oriented or protective functions which may persist for an indefinite time:

(1) Facilitation of the activation of other modes (including activation or deactivation of active mode) by remote switch (including remote control), internal sensor, or timer;

(2) Provision of continuous functions, including information or status displays (including clocks) or sensor-based functions. A timer is a continuous clock function (which may or may not be associated with a display) that allows for regularly scheduled tasks and that operates on a continuous basis.

1.21 *Thermocouple* means a device consisting of two dissimilar metals which are joined together and, with their associated wires, are used to measure temperature by means of electromotive force.

1.22 *Symbol usage.* The following identity relationships are provided to help clarify the symbology used throughout this procedure.

A—Number of Hours in a Year
C—Specific Heat
E—Energy Consumed
H—Heating Value of Gas
K—Conversion for Watt-hours to Kilowatt-hours or Btu to kBtu
Ke—3.412 Btu/Wh, Conversion for Watt-hours to Btu
M—Mass
n—Number of Units
P—Power
Q—Gas Flow Rate
T—Temperature
t—Time
V—Volume of Gas Consumed

2. Test Conditions

2.1 *Installation.* Install a freestanding combined cooking product with the back directly against, or as near as possible to, a vertical wall which extends at least 1 foot above the appliance and 1 foot beyond both sides of the appliance, and with no side walls. Install a drop-in or built-in cooking top in the test enclosure specified in Figure 7 of ANSI Z21.1 (incorporated by reference; see § 430.3) according to the manufacturer's instructions. Install a built-in combined cooking product other than a microwave oven/conventional oven in the test enclosure specified in Figure 5 or 6 of ANSI Z21.1 in accordance with the manufacturer's instructions. If the manufacturer's instructions specify that the cooking product may be used in multiple installation conditions, install the appliance according to the built-in configuration. Completely assemble the product with all handles, knobs, guards, and similar components mounted in place. Position any electric resistance heaters, gas burners, and baffles in accordance with the manufacturer's instructions.

2.1.1 *Conventional electric cooking tops.* Connect these products to an electrical supply circuit with voltage as specified in section 2.2.1 of this appendix with a watt-hour meter installed in the circuit. The watt-hour meter shall be as described in section 2.8.1.1 of this appendix. For standby mode and off mode testing, install these products in accordance with Section 5, Paragraph 5.2 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3), disregarding the provisions regarding batteries and the determination, classification, and testing of relevant modes.

2.1.2 *Conventional gas cooking tops.* Connect these products to a gas supply line with a gas meter installed between the supply line and the appliance being tested, according to manufacturer's specifications. The gas meter shall be as described in section 2.8.2 of this appendix. Connect conventional gas cooking tops with electrical ignition devices or other electrical components to an electrical supply circuit of nameplate voltage with a watt-hour meter installed in the circuit. The watt-hour meter shall be as described in section 2.8.1.1 of this appendix. For standby mode and off mode testing, install these products in accordance with Section 5, Paragraph 5.2 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3), disregarding the provisions regarding batteries and the determination, classification, and testing of relevant modes.

2.1.3 *Microwave ovens, excluding any microwave oven component of a combined cooking product.* Install the microwave oven in accordance with the manufacturer's instructions and connect to an electrical supply circuit with voltage as specified in section 2.2.1 of this appendix. Install the microwave oven also in accordance with Section 5, Paragraph 5.2 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3), disregarding the provisions regarding batteries and the determination, classification, and testing of relevant modes. A watt meter shall be installed in the circuit and shall be as described in section 2.8.1.2 of this appendix.

2.1.4 *Combined cooking products standby mode and off mode.* For standby mode and off mode testing of combined cooking products, install these products in accordance with Section 5, Paragraph 5.2 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3), disregarding the provisions regarding batteries and the determination, classification, and testing of relevant modes.

2.2 *Energy supply.*

2.2.1 *Electrical supply.*

2.2.1.1 *Voltage.* For the test of conventional cooking tops, maintain the electrical supply requirements specified in Section 5.2 of EN 60350–2:2013 (incorporated by reference; see § 430.3). For microwave oven testing, maintain the electrical supply to the unit at 240/120 volts ±1 percent. For combined cooking product standby mode and off mode measurements, maintain the electrical supply to the unit at 240/120 volts ±1 percent. Maintain the electrical supply frequency for all products at 60 hertz ±1 percent.

2.2.1.1 *Gas burner adjustments.* Test conventional gas cooking tops with all of the gas burners adjusted in accordance with the installation or operation instructions provided by the manufacturer. In every case, adjust the burner with sufficient air flow to prevent a yellow flame or a flame with yellow tips.

2.2.2.2 *Natural gas.* For testing convertible cooking appliances or appliances which are designed to operate using only natural gas, maintain the natural gas pressure immediately ahead of all controls of the unit under test at 7 to 10 inches of water column (1743.6 to 2490.8 Pa). The regulator outlet pressure shall equal the manufacturer's recommendation. The natural gas supplied should have a heating value of approximately 1,025 Btu per standard cubic foot (38.2 kJ/L). The actual gross heating value, H_n, in Btu per standard cubic foot (kJ/L), for the natural gas to be used in the test shall be obtained either from measurements made by the manufacturer conducting the test using equipment that meets the requirements described in section 2.8.4 of this appendix or by the use of bottled natural gas whose gross heating value is certified to be at least as accurate a value that meets the requirements in section 2.8.4 of this appendix.

2.2.2.3 *Propane.* For testing convertible cooking appliances with propane or for testing appliances which are designed to operate using only LP-gas, maintain the propane pressure immediately ahead of all controls of the unit under test at 11 to 13 inches of water column (2740 to 3238 Pa). The regulator outlet pressure shall equal the manufacturer's recommendation. The propane supplied should have a heating value of approximately 2,500 Btu per standard cubic foot (93.2 kJ/L). Obtain the actual gross heating value, H_p, in Btu per standard cubic foot (kJ/L), for the propane to be used in the test either from measurements made by the manufacturer conducting the test using equipment that meets the requirements described in section 2.8.4 of this appendix, or by the use of bottled propane whose gross heating value is certified to be at least as accurate a value that meets the requirements described in section 2.8.4 of this appendix.

2.2.2.4 *Test gas.* Test a basic model of a convertible cooking appliance with natural gas or propane. Test with natural gas any basic model of a conventional cooking top that is designed to operate using only natural gas as the energy source. Test with propane gas any basic model of a conventional cooking top which is designed to operate using only LP gas as the gas energy source.

2.3 *Air circulation.* Maintain air circulation in the room sufficient to secure a reasonably uniform temperature distribution, but do not cause a direct draft on the unit under test.

2.5 *Ambient room test conditions*

2.5.1 *Active mode ambient room air temperature.* During the active mode test for conventional cooking tops, maintain the ambient room air temperature and pressure specified in Section 5.1 of EN 60350–2:2013 (incorporated by reference; see § 430.3).

2.5.2 *Standby mode and off mode ambient temperature.* For standby mode and off mode testing, maintain room ambient air temperature conditions as specified in Section 4, Paragraph 4.2 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3).

2.6 *Normal non-operating temperature.* All areas of the appliance to be tested must attain the normal non-operating temperature, as defined in section 1.17 of this appendix, before any testing begins. Measure the applicable normal non-operating temperature using the equipment specified in sections 2.8.3.1 and 2.8.3.2 of this appendix.

2.7 *Conventional cooking top test vessels*

2.7.1 *Conventional electric cooking top test vessels.* The test vessels and water amounts required for the test of conventional electric cooking tops must meet the requirements specified in Section 7.1.Z2 of EN 60350–2:2013 (incorporated by reference; see § 430.3).

2.7.2 *Conventional gas cooking top test vessels.* The test vessels for conventional gas cooking tops must be constructed according to Section 7.1.Z2 of EN 60350–2:2013 (incorporated by reference; see § 430.3). Use the following test vessel diameters and water amounts to test gas cooking zones having the burner input rates as specified:

Nominal gas burner input rate		Test vessel diameter inches (mm)	Mass of the water load lbs (kg)
Minimum Btu/h (kW)	Maximum Btu/h (kW)		
3,958 (1.16)	5,596 (1.64)	8.27 (210)	4.52 (2.05)
5,630 (1.65)	6,756 (1.98)	9.45 (240)	5.95 (2.70)
6,790 (1.99)	8,053 (2.36)	10.63 (270)	7.54 (3.42)
8,087 (2.37)	14,331 (4.2)	10.63 (270)	7.54 (3.42)
>14,331 (4.2)		11.81 (300)	11.33 (4.24)

2.8 *Instrumentation.* Perform all test measurements using the following instruments, as appropriate:

2.8.1 *Electrical Measurements.*

2.8.1.1 *Watt-hour meter.* The watt-hour meter for measuring the electrical energy consumption of conventional cooking tops must have a resolution as specified in Table Z1 of Section 5.3 of EN 60350–2:2013 (incorporated by reference; see § 430.3). The watt-hour meter for measuring the electrical energy consumption of microwave ovens must have a resolution of 0.1 watt-hour (0.36 kJ) or less and a maximum error no greater than 1.5 percent of the measured value.

2.8.1.2 *Standby mode and off mode watt meter.* The watt meter used to measure standby mode and off mode power must meet the requirements specified in Section 4, Paragraph 4.4 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3). For microwave oven standby mode and off mode testing, if the power measuring instrument used for testing is unable to measure and record the crest factor, power factor, or maximum current ratio during the test measurement period, measure the crest factor, power factor, and maximum current ratio immediately before and after the test measurement period to determine whether these characteristics meet the requirements specified in Section 4, Paragraph 4.4 of IEC 62301 (Second Edition).

2.8.2 *Gas Measurements.*

2.8.2.1 *Positive displacement meters.* The gas meter to be used for measuring the gas consumed by the gas burners of the conventional cooking top must have a resolution of 0.01 cubic foot (0.28 L) or less and a maximum error no greater than 1 percent of the measured valued for any demand greater than 2.2 cubic feet per hour (62.3 L/h).

2.8.3 *Temperature measurement equipment.*

2.8.3.1 *Room temperature indicating system.* For the test of microwave ovens, the room temperature indicating system must have an error no greater than ±1 °F (±0.6 °C) over the range 65° to 90 °F (18 °C to 32 °C). For conventional cooking tops, the room temperature indicating system must be as specified in Table Z1 of Section 5.3 of EN 60350–2:2013 (incorporated by reference; see § 430.3).

2.8.3.2 *Temperature indicator system for measuring surface temperatures.* Measure the temperature of any surface of a conventional cooking top by means of a thermocouple in firm contact with the surface. The temperature indicating system must have an error no greater than ±1 °F (±0.6 °C) over the range 65° to 90 °F (18 °C to 32 °C).

2.8.3.3 *Water temperature indicating system.* For the test of conventional cooking tops, the test vessel water temperature indicating system must be as specified in Table Z1 of Section 5.3 of EN 60350–2:2013 (incorporated by reference; see § 430.3).

2.8.3.4 *Room air pressure indicating system.* For the test of conventional cooking tops, the room air pressure indicating system must be as specified in Table Z1 of Section 5.3 of EN 60350–2:2013 (incorporated by reference; see § 430.3).

2.8.4 *Heating Value.* Measure the heating value of the natural gas or propane with an instrument and associated readout device that has a maximum error no greater than ±0.5% of the measured value and a resolution of ±0.2% or less of the full scale reading of the indicator instrument. Correct the heating value of natural gas or propane to standard pressure and temperature conditions in accordance with U.S. Bureau of Standards, circular C417, 1938.

2.8.5 *Scale.* The scale used to measure the mass of the water amount must be as specified in Table Z1 of Section 5.3 of EN 60350–2:2013 (incorporated by reference; see § 430.3).

3. Test Methods and Measurements

3.1. *Test methods.*

3.1.1 *Conventional cooking top.* Establish the test conditions set forth in section 2, *Test Conditions,* of this appendix. Turn off the gas flow to the conventional oven(s), if so equipped. The temperature of the conventional cooking top must be its normal non-operating temperature as defined in section 1.17 and described in section 2.6 of this appendix. For conventional electric cooking tops, select the test vessel and test position according to Sections 6.2.Z1, 7.1.Z2, 7.1.Z3, 7.1.Z4, and Annex ZA of EN 60350–2:2013 (incorporated by reference; see § 430.3). For conventional gas cooking tops, select the appropriate test vessel from the test vessels specified in section 2.7.2 of this appendix based on the burner input rate. Use the test methods set forth in Section 7.1.Z6 of EN 60350–2:2013 to measure the energy consumption of electric and gas cooking zones and electric cooking areas. Do not test specialty cooking zones that are for use only with non-circular cookware, such as bridge zones, warming plates, grills, and griddles.

3.1.1.1 *Conventional cooking top standby mode and off mode power except for any conventional cooking top component of a combined cooking product.* Establish the standby mode and off mode testing conditions set forth in section 2, *Test Conditions,* of this appendix. For conventional cooktops that take some time to enter a stable state from a higher power state as discussed in Section 5, Paragraph 5.1, Note 1 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3), allow sufficient time for the conventional cooking top to reach the lower power state before proceeding with the test measurement. Follow the test procedure as specified in Section 5, Paragraph 5.3.2 of IEC 62301 (Second Edition) for testing in each possible mode as described in sections 3.1.1.1.1 and 3.1.1.1.2 of this appendix. For units in which power varies as a function of displayed time in standby mode, set the clock time to 3:23 at the end of the stabilization period specified in Section 5, Paragraph 5.3 of IEC 62301 (First Edition), and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301 (First Edition), but with a single test period of 10 minutes +0/−2 sec after an additional stabilization period until the clock time reaches 3:33.

3.1.1.1.1 If the conventional cooking top has an inactive mode, as defined in section 1.15 of this appendix, measure and record the average inactive mode power of the conventional cooking top, P_{IA}, in watts.

3.1.1.1.2 If the conventional cooking top has an off mode, as defined in section 1.18

of this appendix, measure and record the average off mode power of the conventional cooking top, P_{OM}, in watts.

3.1.2 *Combined cooking product standby mode and off mode power.* Establish the standby mode and off mode testing conditions set forth in section 2, *Test Conditions,* of this appendix. For combined cooking products that take some time to enter a stable state from a higher power state as discussed in Section 5, Paragraph 5.1, Note 1 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3), allow sufficient time for the combined cooking product to reach the lower power state before proceeding with the test measurement. Follow the test procedure as specified in Section 5, Paragraph 5.3.2 of IEC 62301 (Second Edition) for testing in each possible mode as described in sections 3.1.2.1 and 3.1.2.2 of this appendix. For units in which power varies as a function of displayed time in standby mode, set the clock time to 3:23 at the end of the stabilization period specified in Section 5, Paragraph 5.3 of IEC 62301 (First Edition), and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301 (First Edition), but with a single test period of 10 minutes +0/−2 sec after an additional stabilization period until the clock time reaches 3:33.

3.1.2.1 If the combined cooking product has an inactive mode, as defined in section 1.15 of this appendix, measure and record the average inactive mode power of the combined cooking product, P_{IA}, in watts.

3.1.2.2 If the combined cooking product has an off mode, as defined in section 1.18 of this appendix, measure and record the average off mode power of the combined cooking product, P_{OM}, in watts.

3.1.3 *Microwave oven.*

3.1.3.1 *Microwave oven test standby mode and off mode power except for any microwave oven component of a combined cooking product.* Establish the testing conditions set forth in section 2, *Test Conditions,* of this appendix. For microwave ovens that drop from a higher power state to a lower power state as discussed in Section 5, Paragraph 5.1, Note 1 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3), allow sufficient time for the microwave oven to reach the lower power state before proceeding with the test measurement. Follow the test procedure as specified in Section 5, Paragraph 5.3.2 of IEC 62301 (Second Edition). For units in which power varies as a function of displayed time in standby mode, set the clock time to 3:23 and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301 (First Edition), but with a single test period of 10 minutes +0/−2 sec after an additional stabilization period until the clock time reaches 3:33. If a microwave oven is capable of operation in either standby mode or off mode, as defined in sections 1.20 and 1.18 of this appendix, respectively, or both, test the microwave oven in each mode in which it can operate.

3.2 *Test measurements.*

3.2.1 *Conventional cooking top test energy consumption.*

3.2.1.1 *Conventional cooking area or cooking zone energy consumption.,* Measure the energy consumption for each electric cooking zone and cooking area, in watt-hours (kJ) of electricity according to section 7.1.Z6.3 of EN 60350–2:2013 (incorporated by reference; see § 430.3). For electric cooking zones with multiple concentric sizes, each concentric size is treated as a separate cooking zone. Each unique size must be tested individually with the appropriate test vessel size based on the dimensions of each concentric cooking zone as measured in section 6.2.Z2 of EN 60350–2:2013. For the gas surface unit under test, measure the volume of gas consumption, V_{CT}, in standard cubic feet (L) of gas and any electrical energy, E_{IC}, consumed by an ignition device of a gas heating element or other electrical components required for the operation of the conventional gas cooking top in watt-hours (kJ).

3.2.1.2 *Conventional cooking top standby mode and off mode power except for any conventional cooking top component of a combined cooking product.* Make measurements as specified in section 3.1.1.1 of this appendix. If the conventional cooking top is capable of operating in inactive mode, as defined in section 1.15 of this appendix, measure the average inactive mode power of the conventional cooking top, $P_{IA,}$ in watts as specified in section 3.1.1.1.1 of this appendix. If the conventional cooking top is capable of operating in off mode, as defined in section 1.18 of this appendix, measure the average off mode power of the conventional cooking top, P_{OM}, in watts as specified in section 3.1.1.1.2 of this appendix.

3.2.2 *Combined cooking product standby mode and off mode power.* Make measurements as specified in section 3.1.2 of this appendix. If the combined cooking product is capable of operating in inactive mode, as defined in section 1.15 of this appendix, measure the average inactive mode power of the combined cooking product, $P_{IA,}$ in watts as specified in section 3.1.2.1 of this appendix. If the combined cooking product is capable of operating in off mode, as defined in section 1.18 of this appendix, measure the average off mode power of the combined cooking product, P_{OM}, in watts as specified in section 3.1.2.2 of this appendix.

3.2.3 *Microwave oven standby mode and off mode power except for any microwave oven component of a combined cooking product.* Make measurements as specified in Section 5, Paragraph 5.3 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3). If the microwave oven is capable of operating in standby mode, as defined in section 1.20 of this appendix, measure the average standby mode power of the microwave oven, P_{SB}, in watts as specified in section 3.1.3.1 of this appendix. If the microwave oven is capable of operating in off mode, as defined in section 1.18 of this appendix, measure the average off mode power of the microwave oven, P_{OM}, as specified in section 3.1.3.1.

3.3 *Recorded values.*

3.3.1 Record the test room temperature, T_R, at the start and end of each conventional cooktop or combined cooking product test, as determined in section 2.5 of this appendix.

3.3.2 Record the relative air pressure at the start of the test and at the end of the test in hectopascals (hPa).

3.3.3 For conventional cooking tops and combined cooking products, record the standby mode and off mode test measurements P_{IA} and P_{OM}, if applicable.

3.3.4 For each test of an electric cooking area or cooking zone, record the values listed in 7.1.Z6.3 in EN 60350–2:2013 (incorporated by reference; see § 430.3) and the total test electric energy consumption, E_{TV}.

3.3.5 For each test of a conventional gas surface unit, record the gas volume consumption, V_{CT}; the time until the power setting is reduced, t_c; the time when the simmering period starts, t_{90}; the initial temperature of the water; the water temperature when the setting is reduced, T_c; the water temperature at the end of the test, T_s; and the electrical energy for ignition of the burners, E_{IC}.

3.3.6 Record the heating value, H_n, as determined in section 2.2.2.2 of this appendix for the natural gas supply.

3.3.7 Record the heating value, H_p, as determined in section 2.2.2.3 of this appendix for the propane supply.

3.3.8 For microwave ovens except for any microwave oven component of a combined cooking product, record the average standby mode power, P_{SB}, for the microwave oven standby mode, as determined in section 3.2.3 of this appendix for a microwave oven capable of operating in standby mode. Record the average off mode power, P_{OM}, for the microwave oven off mode power test, as determined in section 3.2.3 of this appendix for a microwave oven capable of operating in off mode.

4. Calculation of Derived Results From Test Measurements

4.1 *Conventional cooking top.*

4.1.1 *Conventional cooking top energy consumption.*

4.1.1.1 *Energy consumption for electric cooking tops.* Calculate the energy consumption of a conventional electric cooking top, E_{CTE}, in Watt-hours (kJ), using the following equation:

$$E_{CTE} = \frac{2853g}{n_{tv}} \times \sum_{tv=1}^{n_{tv}} \frac{E_{tv}}{m_{tv}}$$

Where:

n_{tv} = the total number of tests conducted for the conventional electric cooking top

E_{tv} = the energy consumption measured for each test with a given test vessel, tv, in Wh

m_{tv} is the mass of water used for the test, in g.

4.1.1.2 Gas *energy consumption for conventional gas cooking tops.* Calculate the energy consumption of the conventional gas cooking top, E_{CTG}, in Btus (kJ) using the following equation:

$$E_{CTG} = \frac{2853g}{n_{tv}} \times \sum_{tv=1}^{n_{tv}} \frac{E_{tvg}}{m_{tv}}$$

Where:

n_{tv} = the total number of tests conducted for the conventional gas cooking top
m_{tv} = the mass of the water used to test a given cooking zone or area
E_{tvg} = ($V_{CT} \times H$), the gas energy consumption measured for each test with a given test vessel, tv, in Btu (kJ)

Where:

V_{CT} = total gas consumption in standard cubic feet (L) for the gas surface unit test as measured in section 3.2.1.1 of this appendix.
H = either H_n or H_p, the heating value of the gas used in the test as specified in sections 2.2.2.2 and 2.2.2.3 of this appendix, expressed in Btus per standard cubic foot (kJ/L) of gas.

4.1.1.3 *Electrical energy consumption for conventional gas cooking tops.* Calculate the energy consumption of the conventional gas cooking top, E_{CTGE}, in Watt-hours (kJ) using the following equation:

$$E_{CTGE} = \frac{2853g}{n_{tv}} \times \sum_{tv=1}^{n_{tv}} \frac{E_{IC}}{m_{tv}}$$

Where:

n_{tv} = the total number of tests conducted for the conventional gas cooking top
m_{tv} = the mass of the water used to test a given cooking zone or area
E_{IC} = the electrical energy consumed in watt-hours (kJ) by a gas surface unit as measured in section 3.2.1.1 of this appendix.

4.1.2 *Conventional cooking top annual energy consumption.*

4.1.2.1 *Conventional electric cooking top.*

4.1.2.1.1 *Annual energy consumption of a conventional electric cooking top.* Calculate the annual energy consumption of a conventional electric cooking top, E_{CA}, in kilowatt-hours (kJ) per year, defined as:

$E_{CA} = E_{CTE} \times K \times N_{CE}$

Where:

K = 0.001 kWh/Wh conversion factor for watt-hours to kilowatt-hours.
N_{CE} = 207.5 cooking cycles per year, the average number of cooking cycles per year normalized for duration of a cooking event estimated for conventional electric cooking tops.
E_{CTE} = energy consumption of the conventional electric cooking top as defined in section 4.1.1.1 of this appendix.

4.1.2.1.2 *Integrated annual energy consumption of a conventional electric cooking top.* Calculate the integrated annual electrical energy consumption, E_{IAEC}, of a conventional electric cooking top, except for any conventional electric cooking top component of a combined cooking product, in kilowatt-hours (kJ) per year, defined as:

$E_{IAEC} = E_{CA} + E_{CTLP}$

Where:

E_{CA} = the annual energy consumption of the conventional electric cooking top as defined in section 4.1.2.1.1 of this appendix.

E_{CTLP} = conventional cooking top annual combined low-power mode energy consumption = $[(P_{IA} \times S_{IA}) + (P_{OM} \times S_{OM})] \times K$,

Where:

P_{IA} = conventional cooking top inactive mode power, in watts, as measured in section 3.1.1.1.1 of this appendix.
P_{OM} = conventional cooking top off mode power, in watts, as measured in section 3.1.1.1.2 of this appendix.
If the conventional cooking top has both inactive mode and off mode annual hours, S_{IA} and S_{OM} both equal 4273.4;
If the conventional cooking top has an inactive mode but no off mode, the inactive mode annual hours, S_{IA}, is equal to 8546.9, and the off mode annual hours, S_{OM}, is equal to 0;
If the conventional cooking top has an off mode but no inactive mode, S_{IA} is equal to 0, and S_{OM} is equal to 8546.9;
K = 0.001 kWh/Wh conversion factor for watt-hours to kilowatt-hours.

4.1.2.2 *Conventional gas cooking top*

4.1.2.2.1 *Annual gas energy consumption of a conventional gas cooking top.* Calculate the annual gas energy consumption, E_{CCG}, in kBtus (kJ) per year for a conventional gas cooking top, defined as:

$E_{CCG} = E_{CTG} \times K \times N_{CG}$

Where:

N_{CG} = 214.5 cooking cycles per year, the average number of cooking cycles per year normalized for duration of a cooking event estimated for conventional gas cooking tops.
E_{CTG} = gas energy consumption of the conventional gas cooking top as defined in section 4.1.1.2 of this appendix.
K = 0.001 conversion factor for Btu to kBtu.

4.1.2.2.2 *Annual electrical energy consumption of a conventional gas cooking top.* Calculate the annual electrical energy consumption, E_{CCE}, in kilowatt-hours (kJ) per year for a conventional gas cooking top, defined as:

$E_{CCE} = E_{CTGE} \times K \times N_{CG}$

Where:

N_{CG} = 214.5 cooking cycles per year, the average number of cooking cycles per year normalized for duration of a cooking event estimated for conventional gas cooking tops.
E_{CTGE} = secondary electrical energy consumption of the conventional gas cooking top as defined in section 4.1.1.3 of this appendix.
K = 0.001 conversion factor for Wh to kWh.

4.1.2.2.3 *Integrated annual energy consumption of a conventional gas cooking top.* Calculate the integrated annual energy consumption, E_{IAEC}, of a conventional gas cooking top, except for any conventional gas cooking top component of a combined cooking product, in kBtus (kJ) per year, defined as:

$E_{IAEC} = E_{CC} + (E_{CTSO} \times K_e)$

Where:

$E_{CC} = E_{CCG} + (E_{CCE} \times K_e)$ the total annual energy consumption of a conventional gas cooking top

Where:

E_{CCG} = the primary annual energy consumption of a conventional gas cooking top as determined in section 4.1.2.2.1 of this appendix.
E_{CCE} = the secondary annual energy consumption of a conventional gas cooking top as determined in section 4.1.2.2.2 of this appendix.
K_e = 3.412 Btu/Wh (3.6 kJ/Wh), conversion factor of watt-hours to Btus.

E_{CTSO} = conventional cooking top annual combined low-power mode energy consumption = $[(P_{IA} \times S_{IA}) + (P_{OM} \times S_{OM})] \times K$,

Where:

P_{IA} = conventional cooking top inactive mode power, in watts, as measured in section 3.1.1.1.1 of this appendix.
P_{OM} = conventional cooking top off mode power, in watts, as measured in section 3.1.1.1.2 of this appendix.
If the conventional cooking top has both inactive mode and off mode annual hours, S_{IA} and S_{OM} both equal 4273.4;
If the conventional cooking top has an inactive mode but no off mode, the inactive mode annual hours, S_{IA}, is equal to 8546.9, and the off mode annual hours, S_{OM}, is equal to 0;
If the conventional cooking top has an off mode but no inactive mode, S_{IA} is equal to 0, and S_{OM} is equal to 8546.9;
K = 0.001 kWh/Wh conversion factor for watt-hours to kilowatt-hours.

4.2 *Combined cooking products.*

4.2.1 *Combined cooking product annual combined low-power mode energy consumption.* Calculate the combined cooking product annual combined low-power mode energy consumption, E_{CCLP}, defined as:

$E_{CCLP} = [(P_{IA} \times S_{IA})] + [(P_{OM} \times S_{OM})] \times K$,

Where:

P_{IA} = combined cooking product inactive mode power, in watts, as measured in section 3.1.2.1 of this appendix.
P_{OM} = combined cooking product off mode power, in watts, as measured in section 3.1.2.2 of this appendix.
S_{TOT} equals the total number of inactive mode and off mode hours per year, 8,329.2;
If the combined cooking product has both inactive mode and off mode, S_{IA} and S_{OM} both equal $S_{TOT}/2$;
If the combined cooking product has an inactive mode but no off mode, the

inactive mode annual hours, S_{IA}, is equal to S_{TOT}, and the off mode annual hours, S_{OM}, is equal to 0;

If the combined cooking product has an off mode but no inactive mode, S_{IA} is equal to 0, and S_{OM} is equal to S_{TOT};

K = 0.001 kWh/Wh conversion factor for watt-hours to kilowatt-hours.

4.2.2 *Integrated annual energy consumption of any conventional cooking top component of a combined cooking product.*

4.2.2.1 *Integrated annual energy consumption of any conventional electric cooking top component of a combined cooking product.* Calculate the integrated annual energy consumption of a conventional electric cooking top component of a combined cooking product, E_{IAEC}, in kilowatt-hours (kJ) per year and defined as:

$E_{IAEC} = E_{CA} + E_{CCTLP}$

Where,

E_{CA} = the annual energy consumption of the conventional electric cooking top as defined in section 4.1.2.1.1 of this appendix.

E_{CCTLP} = annual combined low-power mode energy consumption for the conventional cooking top component of a combined cooking product, in kWh (kJ) per year, calculated as:

$$E_{CCTLP} = E_{CCLP} \times \frac{H_{CT}}{H_T}$$

Where:

E_{CCLP} = combined cooking product annual combined low-power mode energy consumption, determined in section 4.2.1 of this appendix.

H_{CT} = 213.1 hours per year, the average number of cooking hours per year for a conventional cooking top.

$H_T = H_{OV} + H_{CT} + H_{MWO}$

Where:

H_{OV} = average number of cooking hours per year for a conventional oven, which is equal to 219.9 hours per year. If the combined cooking product does not include a conventional oven, then H_{OV} = 0.

H_{MWO} = average number of cooking hours per year for a microwave oven, which is equal to 44.9 hours per year. If the combined cooking product does not include a microwave oven, then H_{MWO} = 0.

4.2.2.2 *Integrated annual energy consumption of any conventional gas cooking top component of a combined cooking product.* Calculate the integrated annual energy consumption of a conventional gas cooking top component of a combined cooking product, E_{IAEC}, in kBtus (kJ) per year and defined as:

$E_{IAEC} = E_{CC} + E_{CCTLP} \times K_e)$

Where,

$E_{CC} = E_{CCG} + E_{CCE}$, the total annual energy consumption of a conventional gas cooking top,

Where:

E_{CCG} = the annual gas energy consumption of a conventional gas cooking top as determined in section 4.1.2.2.1 of this appendix.

E_{CCE} = the annual electrical energy consumption of a conventional gas cooking top as determined in section 4.1.2.2.2 of this appendix.

K_e = 3.412 kBtu/kWh (3,600 kJ/kWh), conversion factor for kilowatt-hours to kBtus.

E_{CCTLP} = annual combined low-power mode energy consumption for the conventional cooking top component of a combined cooking product, in kWh (kJ) per year, calculated as:

$$E_{CCTLP} = E_{CCLP} \times \frac{H_{CT}}{H_T}$$

Where:

E_{CCLP} = combined cooking product annual combined low-power mode energy consumption, determined in section 4.2.1 of this appendix.

H_{CT} = 213.1 hours per year, the average number of cooking hours per year for a conventional cooking top.

$H_T = H_{OV} + H_{CT} + H_{MWO}$

Where:

H_{OV} = average number of cooking hours per year for a conventional oven, which is equal to 219.9 hours per year. If the combined cooking product does not include a conventional oven, then H_{OV} = 0.

H_{MWO} = average number of cooking hours per year for a microwave oven, which is equal to 44.9 hours per year. If the combined cooking product does not include a microwave oven, then H_{MWO} = 0.

4.2.3 *Annual combined low-power mode energy consumption for any microwave oven component of a combined cooking product.* Calculate the annual combined low-power mode energy consumption of a microwave oven component of a combined cooking product, E_{CMWOLP}, in kWh (kJ) per year, and defined as:

$$E_{CMWOLP} = E_{CCLP} \times \frac{H_{MWO}}{H_T}$$

Where:

E_{CCLP} = combined cooking product annual combined low-power mode energy consumption, determined in section 4.2.1 of this appendix.

H_{MWO} = 44.9 hours per year, the average number of cooking hours per year for a microwave oven.

$H_T = H_{OV} + H_{CT} + H_{MWO}$

Where:

H_{OV} = average number of cooking hours per year for a conventional oven, which is equal to 219.9 hours per year. If the combined cooking product does not include a conventional oven, then H_{OV} = 0.

H_{CT} = average number of cooking hours per year for a conventional cooking top, which is equal to 213.1 hours per year. If the combined cooking product does not include a conventional cooking top, then H_{CT} = 0.

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