DEPARTMENT OF ENERGY

10 CFR Part 430

[Docket No. EERE–2010–BT–TP–0039]

RIN: 1904–AC27

Energy Conservation Program for Consumer Products: Test Procedures for Residential Dishwashers, Dehumidifiers, and Conventional Cooking Products (Standby Mode and Off Mode)

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

ACTION: Notice of proposed rulemaking and announcement of public meeting.

SUMMARY: In order to implement recent amendments to the Energy Policy and Conservation Act of 1975 (EPCA), the U.S. Department of Energy (DOE) proposes to amend its test procedures for residential dishwashers, dehumidifiers, and conventional cooking products (which include cooktops, ovens, and ranges) to provide for measurement of standby mode and off mode energy use by these products. The proposed amendments would incorporate into the DOE test procedures relevant provisions from the International Electrotechnical Commission's (IEC) Standard 62301, "Household electrical appliances—Measurement of standby power," First Edition 2005–06 (IEC Standard 62301 (First Edition)). DOE also proposes to adopt definitions of various modes of operation based on the relevant provisions from the IEC Standard 62301 "Household electrical appliances—Measurement of standby power," Second Edition Final Draft International Standard (IEC Standard 62301 (FDIS)). In addition, DOE proposes to adopt language to clarify application of these test procedure provisions for measuring standby mode and off mode power consumption in dishwashers, dehumidifiers, and conventional cooking products. Furthermore, the proposed amendments would add new calculations to determine annual energy consumption associated with the standby mode and off mode measured power. Finally, the amendments would modify existing energy consumption equations to integrate standby mode and off mode energy consumption into the calculation of overall annual energy consumption and annual operating cost of those products which already have definitions for such measures (dishwashers and conventional cooking products). DOE is also announcing a public meeting to discuss and receive comments on the issues presented in this notice.

DATES: *Meeting:* DOE will hold a public meeting on Friday, December 17, 2010, from 9 a.m. to 4 p.m., in Washington, DC. DOE must receive requests to speak at the public meeting before 4 p.m., Friday, December 3, 2010. DOE must receive a signed original and an electronic copy of statements to be given at the public meeting before 4 p.m., Friday, December 10, 2010.

Comments: DOE will accept comments, data, and information regarding the notice of proposed rulemaking (NOPR) before and after the public meeting, but no later than February 15, 2011. For details, see section V, "Public Participation," of this NOPR.

ADDRESSES: The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 8E–089, 1000 Independence Avenue, SW., Washington, DC 20585–0121. To attend the public meeting, please notify Ms. Brenda Edwards at (202) 586–2945. (Please note that foreign nationals visiting DOE Headquarters are subject to advance security screening procedures. Any foreign national wishing to participate in the meeting should advise DOE as soon as possible by contacting Ms. Edwards to initiate the necessary procedures.)

Any comments submitted must identify the NOPR on Test Procedures for Residential Dishwashers, Dehumidifiers, and Conventional Cooking Products, and provide the docket number EERE–2010–BT–TP–0039 and/or Regulatory Information Number (RIN) 1904–AC27. Comments may be submitted using any of the following methods:

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

2. *E-mail: Res-DW-Dehumid-CookingProd-2010-TP-0039@ee.doe.gov*. Include docket number EERE–2010–BT–TP–0039 and/or RIN 1904–AC27 in the subject line of the message.

3. *Postal Mail:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Please submit one signed paper original.

4. *Hand Delivery/Courier:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC 20024. Telephone: (202) 586–2945. Please submit one signed paper original.

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

Docket: For access to the docket to read background documents or comments received, visit the U.S. Department of Energy, Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC 20024, (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Please call Ms. Brenda Edwards at the above telephone number for additional information about visiting the Resource Room.

FOR FURTHER INFORMATION CONTACT: Mr. Wesley Anderson, Jr., U.S. Department of Energy, Energy Efficiency and Renewable Energy, Building Technologies Program, EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 586–7335. E-mail: *Wes.Anderson@ee.doe.gov*.

Mr. Eric Stas, U.S. Department of Energy, Office of the General Counsel, GC–71, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 586–9507. E-mail: *Eric.Stas@hq.doe.gov*.

For information on how to submit or review public comments and on how to participate in the public meeting, contact Ms. Brenda Edwards, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 586–2945. E-mail: *Brenda.Edwards@ee.doe.gov*.

SUPPLEMENTARY INFORMATION:

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I. Background and Authority

Title III, Part B of the Energy Policy and Conservation Act of 1975 (EPCA), Public Law 94–163 (42 U.S.C. 6291–6309, as codified), established the "Energy Conservation Program for Consumer Products Other Than Automobiles," a program covering most major household appliances, including residential dishwashers, conventional cooking products, and dehumidifiers,[1] the subjects of today's notice.[2] (42 U.S.C. 6292(a)(6) and (10); 6295(cc)) Under the Act,[3] this program consists essentially of three parts: (1) Testing; (2) labeling; and (3) Federal energy conservation standards.

Manufacturers of covered products must use DOE test procedures, prescribed under EPCA, to certify that their products comply with the energy conservation standards adopted under EPCA and to represent the energy consumption or energy efficiency of their products. (42 U.S.C. 6293(c); 42 U.S.C. 6295(s)) DOE must also use DOE test procedures in any enforcement action to determine whether covered products comply with these energy conservation standards. (42 U.S.C. 6295(s)) Criteria and procedures for DOE's adoption and amendment of such test procedures, as set forth in EPCA, require that test procedures 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. Test procedures must also not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

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)) 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)) If DOE determines that the amended test procedure would alter the measured efficiency of a covered product, DOE must amend the applicable energy conservation standard accordingly. (42 U.S.C. 6293(e)(2))

Dishwashers

DOE's test procedure for dishwashers is found in the Code of Federal Regulations (CFR) at 10 CFR part 430, subpart B, appendix C. DOE originally established its test procedure for dishwashers in 1977. 42 FR 39964 (August 8, 1977). Since that time, the dishwasher test procedure has undergone a number of amendments, as discussed below. In 1983, DOE amended the test procedure to revise the representative average-use cycles to more accurately reflect consumer use and to address dishwashers that use 120 °F inlet water. 48 FR 9202 (March 3, 1983). DOE amended the test procedure again in 1984 to redefine the term "water heating dishwasher." 49 FR 46533 (Nov. 27, 1984). In 1987, DOE amended the test procedure to address models that use 50 °F inlet water. 52 FR 47549 (Dec. 15, 1987). In 2001, DOE revised the test procedure's testing specifications to improve testing repeatability, changed the definitions of "compact dishwasher" and "standard dishwasher," and reduced the average number of use cycles per year from 322 to 264. 66 FR 65091, 65095–97 (Dec. 18, 2001). In 2003, DOE again revised the test procedure to more accurately measure dishwasher efficiency, energy use, and water use. The 2003 dishwasher test procedure amendments included the following revisions: (1) The addition of a method to rate the efficiency of soil-sensing products; (2) the addition of a method to measure standby power; and (3) a reduction in the average-use cycles per year from 264 to 215. 68 FR 51887, 51899–903 (August 29, 2003). The current version of the test procedure includes provisions for determining estimated annual energy use (EAEU), estimated annual operating cost (EAOC), energy factor (EF) expressed in cycles per kilowatt-hour (kWh), and water consumption expressed in gallons per cycle. (10 CFR 430.23(c))

The National Appliance Energy Conservation Act of 1987 (NAECA), Public Law 100–12, amended EPCA to establish prescriptive standards for dishwashers, requiring that dishwashers manufactured on or after January 1, 1988, be equipped with an option to dry without heat. (42 U.S.C. 6295(g)(1)) These EPCA amendments also mandated that DOE must conduct two rounds of rulemaking to determine whether the energy conservation standards for dishwashers should be amended. (42 U.S.C. 6295(g)(4)) On May 14, 1991, DOE issued a final rule establishing the first set of performance standards for dishwashers. 56 FR 22250. The final rule required that dishwashers manufactured on or after May 14, 1994, must have a minimum EF of 0.46 cycles per kWh for standard size, and 0.62 cycles per kWh for compact size. *Id.* at 22279; 10 CFR 430.32(f)(1).

The Energy Independence and Security Act of 2007[4] (EISA 2007) further amended EPCA, in relevant part by establishing the following energy conservation standards for residential dishwashers manufactured on or after January 1, 2010: (1) For standard size

[1] The term "conventional cooking products," as used in this notice, refers to residential electric and gas kitchen ovens, ranges, and cooktops (other than microwave ovens).

[2] For editorial reasons, upon codification in the U.S. Code, Part B was re-designated as Part A.

[3] All references to EPCA refer to the statute as amended, including through the Energy Independence and Security Act of 2007, Public Law 110–140.

[4] Public Law. 110–140 (enacted Dec. 19, 2007).

dishwashers, a maximum annual energy use of 355 kWh per year, and a maximum water consumption of 6.5 gallons per cycle; and (2) for compact dishwashers, a maximum annual energy use of 260 kWh per year, and a maximum water consumption of 4.5 gallons per cycle. (42 U.S.C. 6295(g)(10)(A); 10 CFR 430.32(f)(2)) The amendments also specify that not later than January 1, 2015, the Secretary shall publish a final rule determining whether to amend the standards for dishwashers manufactured on or after January 1, 2018. (42 U.S.C. 6295(g)(10)(B))

Dehumidifiers

The DOE test procedure for dehumidifiers is found at 10 CFR 430, subpart B, appendix X. The Energy Policy Act of 2005 (EPACT 2005), Public Law 109–58, amended EPCA to specify that the U.S. Environmental Protection Agency's (EPA) test criteria used under the ENERGY STAR® [5] program must serve as the basis for the test procedure for dehumidifiers. (EPACT 2005, section 135(b); 42 U.S.C. 6293(b)(13)) The ENERGY STAR test criteria require that American National Standards Institute (ANSI)/Association of Home Appliance Manufacturers (AHAM) Standard DH–1–2003, "Dehumidifiers," be used to measure energy use and that the Canadian Standards Association (CAN/CSA) standard CAN/CSA–C749–1994 (R2005), "Performance of Dehumidifiers," be used to calculate EF. DOE has adopted these test criteria, along with related definitions and tolerances, as its test procedure for dehumidifiers. 71 FR 71340, 71347, 71366–68 (Dec. 8, 2006). The DOE test procedure provides methods for determining the EF for dehumidifiers, which is expressed in liters (l) of water condensed per kWh.

Section 135(c)(4) of EPACT 2005 added dehumidifiers as products covered under EPCA and established standards effective for dehumidifiers manufactured on or after October 1, 2007. (42 U.S.C. 6295(cc)(1)) Section 311 of EISA 2007 further amended EPCA to revise the energy conservation standards for dehumidifiers, establishing the following minimum EFs based on product capacity for dehumidifiers manufactured on or after October 1, 2012:

TABLE I.1—OCTOBER 2012 DEHUMIDIFIER ENERGY CONSERVATION STANDARDS *

Product capacity (pints/day)	Minimum EF (liters/kWh)
Up to 35.00	1.35
35.01–45.00	1.50
45.01–54.00	1.60
54.01–75.00	1.70
75.00 or more	2.5

* (42 U.S.C. 6295(cc)(2)).

Conventional Cooking Products

DOE's test procedures for conventional ranges, cooktops, and ovens (including microwave ovens) are found at 10 CFR 430, subpart B, appendix I. DOE first established the test procedures included in appendix I in a final rule published in the **Federal Register** on May 10, 1978. 43 FR 20108, 20120–28. DOE revised its test procedure 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 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 procedure for conventional cooking products establishes provisions for determining EAOC, cooking efficiency (defined as the ratio of cooking energy output to cooking energy input), and EF (defined as the ratio of annual useful cooking energy output to total annual energy input). (10 CFR 430.23(i); 10 CFR part 430 subpart B, appendix I) These provisions for conventional cooking products are not currently used for compliance with any energy conservation standards (because those standards currently involve design requirements), nor is there an EnergyGuide [6] labeling program for cooking products.

DOE has initiated a separate test procedure rulemaking to address standby mode and off mode power consumption for microwave ovens. This rulemaking was initiated separately in response to comments from interested parties on the advance notice of proposed rulemaking (ANOPR) for an earlier rulemaking concerning energy conservation standards for dishwashers, dehumidifiers, cooking products, and commercial clothes washers published on November 15, 2007 (hereafter referred to as the November 2007 ANOPR) (72 FR 64432), prior to the enactment of EISA 2007. As discussed in the October 2008 test procedure NOPR, interested parties stated generally that DOE should amend the test procedures for all types of cooking products to allow for measurement of standby mode energy use in order to implement a standby power energy conservation standard. 73 FR 62034, 62043–44 (Oct. 17, 2008). However, DOE did not receive any specific data or inputs on standby power consumption in conventional cooking products. Also, at that time, interested parties did not submit any comments regarding DOE addressing new measures of standby mode and off mode energy use in the test procedures or energy conservation standards for the other products that were the subject of the November 2007 ANOPR (*i.e.,* dishwashers and dehumidifiers.) Because DOE agreed with the comments supporting new measures of standby mode and off mode energy use for microwave ovens and the potential for early adoption of an energy conservation standard for microwave ovens addressing standby mode and off mode energy consumption, DOE published a NOPR proposing amendments to just the microwave oven test procedure for standby mode and off mode in the **Federal Register** on October 17, 2008. 73 FR 62134. DOE subsequently published a supplemental notice of proposed rulemaking (SNOPR) in the **Federal Register** on this topic on July 22, 2010. 75 FR 42612. Consequently, DOE is proposing amendments to its cooking products test procedure for only conventional cooking products in today's NOPR.

As with dishwashers, NAECA amended EPCA to establish prescriptive standards for cooking products. The NAECA amendments required gas ranges and ovens with an electrical supply cord manufactured on or after January 1, 1990, not to be equipped with a constant-burning pilot light. (42 U.S.C. 6295(h)(1)) Subsequently, DOE published a final rule in the **Federal Register** on April 8, 2009, amending the energy conservation standard for cooking products to require for products manufactured on or after April 9, 2012, that gas cooking products without an electrical supply cord shall not be equipped with a constant burning pilot light. 74 FR 16040, 16094.

[5] For more information on the ENERGY STAR program, *see: http://www.energystar.gov.*

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

Standby Mode and Off Mode

Section 310 of EISA 2007 amended EPCA to require DOE to amend the test procedures for covered products to address standby mode and off mode energy consumption. Specifically, the amendments also require DOE to integrate standby mode and off mode energy consumption into the overall energy efficiency, energy consumption, or other energy descriptor for that product unless the current test procedures already fully account for such consumption. If integration is technically infeasible, DOE must prescribe a separate standby mode and off mode energy use test procedure, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)) Any such amendment must consider the most current versions of IEC Standards 62301, "Household electrical appliances—Measurement of standby power," and IEC Standard 62087, "Methods of measurement for the power consumption of audio, video, and related equipment." *Id.* For residential dishwashers, dehumidifiers, and conventional cooking products (and microwave ovens), DOE must prescribe any such amendment to the test procedures by final rule no later than March 31, 2011. (42 U.S.C. 6295(gg)(2)(B)(vi)) Furthermore, EISA 2007 also amended EPCA to direct DOE to incorporate standby mode and off mode energy use into any final rule establishing or revising an energy conservation standard for a covered product adopted after July 1, 2010. If it is not feasible to incorporate standby mode and off mode into a single amended or new standard, then the statute requires DOE to prescribe a separate standard to address standby mode and off mode energy consumption. (42 U.S.C. 6295(gg)(3))

DOE notes that the IEC is in the process of developing a revised version of IEC Standard 62301, which was expected to be released by July 2009. This revision is expected to be significantly delayed until late 2010 at the earliest. In order to publish a final rule by March 31, 2011, DOE is proceeding with an amended test procedure based on the current version of IEC Standard 62301 (First Edition). However, DOE is also considering the updated mode of operation definitions in the latest draft version of IEC Standard 62301, IEC Standard 62301 (FDIS). Although not formally adopted, DOE is evaluating the substance of those definitions, which are expected to be included in the final revised IEC Standard 62301 (Second Edition).

DOE acknowledges that the current dishwasher test procedure already includes definitions and testing methods for measuring standby mode power consumption similar to the IEC Standard 62301 (First Edition) provisions, but it does not include definitions and testing methods for measuring multiple standby modes and off mode power consumption. However, in today's NOPR, for the reasons discussed in section III.B, DOE proposes amendments to the current dishwasher test procedure in order to fully account for standby mode and off mode power consumption. These amendments would take into consideration the most current versions of IEC Standards 62301 and 62087.

The current DOE dehumidifier test procedure does not address energy use when the product is in standby mode and off mode. For this reason, in today's NOPR, DOE is proposing amendments to its dehumidifier test procedure to provide for the measurement of standby mode and off mode energy consumption.

The current DOE conventional cooking products test procedure does not fully account for standby mode and off mode energy consumption. However, DOE notes that the test procedures, as currently drafted, do account for standby energy use in narrow cases. The DOE conventional cooking products test procedures include provisions for determining the annual energy consumption of a continuously-operating clock, as well as the standby energy use associated with a continuously-burning pilot light for gas cooking products. Otherwise, the test procedure does not address energy use in standby mode or off mode. For this reason, in today's NOPR, DOE proposes amendments to the conventional cooking products test procedures to fully account for standby mode and off mode power consumption.

II. Summary of the Proposal

In today's NOPR, DOE proposes to amend the test procedures for dishwashers, dehumidifiers, and conventional cooking products in order to:

(1) Provide a foundation for DOE to develop and implement standards that address use of standby mode and off mode power by these products; and

(2) Address the statutory requirement to expand test procedures to incorporate measures of standby mode and off mode power consumption.

In general, DOE proposes to incorporate by reference into the test procedures for these products specific provisions from IEC Standard 62301 (First Edition) regarding test conditions and test procedures for measuring standby mode and off mode power consumption, and to include language that would clarify the application of such provisions. DOE also proposes to incorporate into each test procedure the definitions of "active mode," "standby mode," and "off mode" that are based on the definitions for those terms provided in IEC Standard 62301 (FDIS). Further, DOE proposes to include in each test procedure additional language that would clarify the application of clauses from IEC Standard 62301 (First Edition) for measuring standby mode and off mode power consumption.[7]

As an initial matter, DOE had to analyze a number of product-specific modes in order to determine whether they should be characterized as active mode, standby mode, or off mode functions. As discussed in further detail below, this rulemaking is limited to addressing standby mode and off mode. Based upon the results of its analyses, DOE is proposing the following product-specific amendments to the applicable DOE test procedures. For dishwashers, DOE is proposing definitions for the following different standby modes: (1) A general "inactive" mode; and (2) a "cycle finished" mode. For dehumidifiers, DOE is proposing definitions for the following different standby modes: (1) a general "inactive" mode; (2) an "off-cycle" mode; and (3) a "bucket full/removed" mode. For conventional cooking products, DOE is also proposing definitions for the following different standby modes: (1) A general "inactive" mode; and (2) a "cycle finished" mode. For each product, energy use in each standby mode, as well as energy use in the off mode, would be separately tested under the appropriate procedure and incorporated into an integrated energy efficiency metric for that product.

The current DOE dishwasher test procedure already includes provisions for measuring standby power and includes it in the EAEU and EAOC calculations. However, as discussed earlier, DOE is proposing amendments to the dishwasher test procedure, pursuant to EPCA, to fully and more accurately account for standby mode and off mode power consumption based on provisions in IEC Standard 62301. As a result, DOE is proposing revisions to the EAEU and EAOC calculations to

[7] EISA 2007 directs DOE to also consider IEC Standard 62087 when amending its test procedure to include standby mode and off mode energy consumption. *See* 42 U.S.C. 6295(gg)(2)(A). However, IEC Standard 62087 addresses the methods of measuring the power consumption of audio, video, and related equipment. As explained subsequently in this notice, the narrow scope of this particular IEC standard reduces its relevance to today's proposal.

incorporate the revised measurements of standby mode and off mode power consumption into the combined metrics for dishwashers.

For dehumidifiers, DOE is proposing in today's NOPR to:

(1) Establish a new measure of energy use to calculate the annual standby mode and off mode energy use in dehumidifiers, based on the typical hours dehumidifiers spend in these modes; and

(2) Adopt a new measure of energy efficiency (integrated energy factor (IEF)) that includes energy used in standby, off, and active modes for dehumidifiers.

For conventional cooking products, the current DOE test procedure accounts for energy used by a constant clock display (if present), which is considered as part of standby mode under the proposed definition of "standby mode." The current test procedure also accounts for standby mode energy use of a continuously-burning pilot light for gas conventional cooking products.[8] However, DOE proposes in today's NOPR to amend the test procedure for conventional cooking products to fully account for all additional standby mode and off mode power consumption, as specified by provisions in IEC Standard 62301. DOE proposes in today's NOPR to: (1) Establish a new measure of energy use to calculate the annual standby mode and off mode energy consumption in conventional cooking products, and (2) adopt new measures of energy efficiency (IEF), annual energy consumption, and annual operating cost that include the energy used in all standby mode and off mode operations of conventional cooking products. In addition, DOE proposes additional clarifications to the testing methods for conventional cooking products to define the test duration for cases in which the measured power is not stable (*i.e.,* varies over a cycle). DOE acknowledges that the power consumption of conventional cooking product displays can vary based on the clock time being displayed, so today's proposal is drafted in a way to account for this fact, while still generating representative results.

The statute also has other provisions regarding the inclusion of standby mode and off mode energy use in any energy conservation standard which have bearing on the current test procedure rulemaking. EPCA provides that amendments to the test procedures to include standby mode and off mode energy consumption shall not be used to determine compliance with product standards established prior to the adoption of the amended test procedures. (42 U.S.C. 6295(gg)(2)(C)) However, EPCA requires that DOE must determine to what extent, if any, the proposed test procedure would alter the measured energy efficiency, measured energy use, or measured water use of any covered product as determined under the existing test procedure. (42 U.S.C. 6293(e)(1)) If DOE determines that the amended test procedure would alter the measured efficiency or measured energy use of a covered product, DOE must amend the applicable energy conservation standard during the rulemaking carried out with respect to the amended test procedure. In determining the amended energy conservation standard, the Secretary shall measure, pursuant to the amended test procedure, the energy efficiency, energy use, or water use of a representative sample of covered products that minimally comply with the existing standard. (42 U.S.C. 6293(e)(2)) Although DOE remains obligated under 42 U.S.C. 6293(e)(1) to conduct an analysis of the impact of the test procedure amendments, amendments to the existing energy conservation standards are not required, because the statute already explicitly provides that the test procedure amendments for standby mode and off mode shall not apply to the energy conservation standards currently in place. The following discussion assesses these anticipated impacts, as well as the pathway for regulated entities to continue to be able to ascertain, certify, and report compliance with the existing standards until such time as amended standards are established which comprehensively address standby mode and off mode energy consumption.

For dishwashers, the current energy conservation standards (10 CFR 430.32(f)) are based on EAEU, which includes a simplified measure of standby mode power consumption. Because today's proposed amendments would revise the calculations for EAEU and EAOC, both of which currently incorporate standby mode power, DOE investigated how the proposed amendments would affect the measured efficiency. As discussed in section III.G, DOE has tentatively determined that the proposed amendments in today's NOPR would not measurably alter the measured efficiency of dishwashers. In addition, the proposed amendments would clarify that the amended calculations for EAEU need not be performed to demonstrate compliance with the existing energy conservation standards until the compliance date of amended energy conservation standards for dishwashers which take into account standby mode and off mode energy use. The proposed amendments would also require that any representations as to standby mode and off mode energy use must use the amended calculations for EAEU and EAOC on or after a date 180 days after publication of the test procedure final rule. The amended test procedure, therefore, would still be able to be used by manufacturers to certify compliance of existing dishwashers with the current energy conservation standards.

The current Federal energy conservation standards for dehumidifiers (10 CFR 430.32(v)), which are based on EF, do not currently account for standby mode or off mode power consumption. DOE proposes to establish a new integrated efficiency metric (integrated annual energy use) to account for standby mode and off mode power consumption. For this reason, the proposed amended test procedure would not alter the existing energy efficiency descriptor and, therefore, would not affect a manufacturer's ability to demonstrate compliance with previously established standards for dehumidifiers.

As noted earlier, the current energy conservation standards for cooking products (10 CFR 430.32(j)) require only that gas cooking products with an electrical supply cord not be equipped with a constant-burning pilot light. The same requirement applies to gas cooking products without an electrical supply cord, beginning on April 9, 2012. There are currently no performance-based Federal energy conservation standards for conventional cooking products (including energy use in standby mode and off mode). Thus, given the design standard currently in place, the proposed test procedure amendments would not alter one's ability to comply with the existing energy conservation standard for cooking products.

These amended test procedures would become effective in terms of adoption into the CFR, 30 days after the test procedure final rule is published in the **Federal Register**. However, DOE is proposing added language to the regulations codified in the CFR that would state that any added procedures and calculations for standby mode and off mode energy consumption resulting from implementation of the relevant provisions of EISA 2007 need not be performed at this time to determine compliance with the current energy conservation standards. Subsequently, manufacturers would be required to use

[8] DOE notes that it published a final rule in the **Federal Register** on April 8, 2009, establishing standards that prohibit continuously-burning pilot lights for gas cooking products manufactured on or after April 9, 2012. 74 FR 16040, 16094.

the amended test procedures' standby mode and off mode provisions to demonstrate compliance with DOE's energy conservation standards on the mandatory compliance date of a final rule establishing amended energy conservation standards for dishwasher, dehumidifier, and conventional cooking products that address standby mode and off mode energy consumption, at which time the limiting statements in the DOE test procedures would be removed. Further clarification would also be provided that as of 180 days after publication of a test procedure final rule, any representations related to the standby mode and off mode energy consumption of these products must be based upon results generated under the applicable provision of these test procedures. (42 U.S.C. 6293(c)(2))

As noted above, pursuant to its statutory mandate under 42 U.S.C. 6295(gg)(2), DOE is only addressing issues related to standby mode and off mode energy use in the current test procedure rulemaking for residential dishwashers, dehumidifiers, and conventional cooking products. For issues that are determined to relate to active mode energy use for any of these products, DOE will consider such amendments in a future test procedure rulemaking under section 302 of EISA 2007. Specifically, under that provision, DOE is required to review test procedures for covered products not later than every 7 years and to determine whether the test procedures accurately and fully comply with the requirement that they produce test results which are representative and not unduly burdensome to conduct. (42 U.S.C. 6293(b)(1))

III. Discussion

A. Products Covered by the Proposed Test Procedure Amendments

Today's proposed amendments to the DOE test procedures cover dishwashers, which DOE defines as follows:

"*Dishwasher* means a cabinet-like appliance which with the aid of water and detergent, washes, rinses, and dries (when a drying process is included) dishware, glassware, eating utensils, and most cooking utensils by chemical, mechanical and/or electrical means and discharges to the plumbing drainage system." 10 CFR 430.2.

Today's proposed amendments to the DOE test procedures also cover dehumidifiers, which DOE defines as follows:

"*Dehumidifier* means a self-contained, electrically operated, and mechanically refrigerated encased assembly consisting of—

(1) A refrigerated surface (evaporator) that condenses moisture from the atmosphere;

(2) A refrigerating system, including an electric motor;

(3) An air-circulating fan; and

(4) Means for collecting or disposing of the condensate."

Id.

Today's proposed amendments to the DOE test procedures also cover cooking products, specifically conventional cooking products, which are defined as:

"*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. They must be one of the following classes: Conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, microwave/conventional ranges and other cooking products."

* * * * *

"*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."

"*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."

"*Conventional range* means a class of kitchen ranges and ovens which is a household cooking appliance consisting of a conventional cooking top and one or more conventional ovens."

Id.

DOE is not proposing any amendments to these definitions in today's notice.

B. Incorporation by Reference of IEC Standard 62301 (First Edition) for Measuring Standby Mode and Off Mode Power Consumption

As required by EPCA, as amended by EISA 2007, DOE considered the most current versions of IEC Standard 62301 and IEC Standard 62087 for measuring power consumption in standby mode and off mode when developing today's proposed amendments to the test procedures. (42 U.S.C. 6295(gg)(2)(A)) DOE notes that IEC Standard 62301 includes provisions for measuring standby power in electrical appliances, and, thus, is relevant to this rulemaking. DOE also reviewed IEC Standard 62087, which specifies methods of measuring the power consumption of TV receivers, video cassette recorders (VCRs), set top boxes, audio equipment, and multi-function equipment for consumer use. IEC Standard 62087 does not, however, include methods for measuring the power consumption of electrical appliances such as dishwashers, dehumidifiers, or conventional cooking products. Therefore, DOE has tentatively determined that IEC Standard 62087 is unsuitable to this rulemaking and has not included any of its provisions in today's proposed test procedure amendments.

DOE proposes to incorporate by reference into these test procedures specific clauses from IEC Standard 62301 (First Edition) for measuring standby mode and off mode power. Specifically, two clauses provide test conditions and test procedures for measuring the average standby mode and average off mode power consumption. Section 4 of IEC Standard 62301 (First Edition) specifies test room conditions, supply voltage waveform, and power measurement meter tolerances, thereby ensuring repeatable and precise measurements of standby mode and off mode power consumption. Section 5 of IEC Standard 62301 (First Edition), regarding test procedures, specifies methods for measuring power consumption when it is stable and unstable (*i.e.,* varies over a representative cycle).

Specifically, DOE proposes to incorporate by reference into the DOE test procedures for dishwashers, dehumidifiers, and conventional cooking products the following provisions from IEC Standard 62301 (First Edition):

TABLE I.2—PROVISIONS FROM IEC STANDARD 62301 (FIRST EDITION) PROPOSED TO BE INCORPORATED BY REFERENCE

Section	Paragraph
4. General conditions for measurements	4.2 Test room. 4.4 Supply voltage waveform. 4.5 Power measurement accuracy.
5. Measurements	5.1 General, Note 1. 5.2 Selection and preparation of appliance or equipment. 5.3 Procedure.

DOE notes that the current dishwasher test procedure already includes testing methods for measuring standby power consumption that are very similar to the provisions in IEC Standard 62301 (First Edition). However, DOE also notes that the current dishwasher test procedure does not contain provisions for measuring multiple standby modes or an off mode. EPCA, as amended by EISA 2007, requires DOE to amend its test procedures for all covered products to fully account for and incorporate standby mode and off mode energy consumption, and to consider the most current version of IEC Standard 62301 as it does so. (42 U.S.C. 6295(gg)(2)(A)) As discussed below, DOE proposes to amend the dishwasher test procedure to include new definitions of "standby mode," "off mode," and "active mode" based on the provisions in IEC Standard 62301 (FDIS). DOE also analyzed the current DOE dishwasher test procedure to determine if any other amendments would be necessary. The analysis has led DOE to tentatively conclude that the proposed clauses from IEC Standard 62301 (First Edition) presented earlier would clarify the dishwasher testing procedure, as well as produce representative and repeatable test results.

As discussed in Section I, the current DOE conventional cooking products test procedure does not fully account for standby mode and off mode energy consumption. The test procedure accounts only for the annual energy consumption of a continuously-operating clock, and the standby energy use associated with a continuously-burning pilot light for gas cooking products. Otherwise, this test procedure does not address energy use in standby mode or off mode. For this reason, DOE has tentatively concluded that adopting the clauses from IEC Standard 62301 (First Edition) as proposed would provide for a test procedure that would produce representative and repeatable test results that would fully account for standby mode and off mode energy consumption.

As also discussed in section I, the current DOE dehumidifier test procedure does not contain any provisions for measuring energy use in standby mode or off mode. DOE has tentatively concluded that adopting the clauses from IEC Standard 62301 (First Edition) as proposed would provide for a test procedure that would produce representative and repeatable test results that would fully account for the standby mode and off mode energy consumption of dehumidifiers.

DOE invites comment on whether IEC Standard 62301 (First Edition) can adequately measure standby mode and off mode power consumption for dishwashers, dehumidifiers, and conventional cooking products, and whether these specific provisions should be incorporated into the test procedures.

DOE is aware that the EPCA requirement to consider IEC Standard 62301 in developing amended test procedures to include standby mode and off mode power consumption results in a potential conflict between the EPCA and IEC Standard 62301 (FDIS) definitions of "standby mode." EPCA defines "standby mode" as the condition in which a product is connected to a main power source and offers one or more of the following user-oriented or protective functions: (1) To facilitate the activation or deactivation of other functions (including active mode) by remote switch (including remote control), internal sensor, or timer; and/or (2) to provide continuous functions, including information or status displays (including clocks) or sensor-based functions. (42 U.S.C. 6295(gg)(1)(A)(iii)) However, paragraph 3.1 of the IEC Standard 62301 (First Edition) defines "standby mode" as the "lowest power consumption mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when an appliance is connected to the main electricity supply and used in accordance with the manufacturer's instructions." Finally, DOE adopted a third definition prior to EISA 2007 for "standby mode" nearly identical to that of IEC Standard 62301 (First Edition) in the dishwasher test procedure, in which "standby mode" "means the lowest power consumption mode which cannot be switched off or influenced by the user and that may persist for an indefinite time when the dishwasher is connected to the main electricity supply and used in accordance with the manufacturer's instructions." (10 CFR part 430, subpart B, appendix C, section 1.14) However, DOE is free to resolve any such conflict, because EISA 2007 specifically grants authority to amend the statutory definitions of "active mode," "off mode," and "standby mode." (42 U.S.C. 6295(gg)(1)(B)) DOE notes that the statute requires consideration of the most current version of IEC Standard 62301, but it does not require its adoption if DOE determines that another definition(s) would be more appropriate.

Although 42 U.S.C. 6295(gg)(2)(A) requires that DOE consider the most current version of IEC Standard 62301, DOE notes that the IEC is developing an updated version of this standard, IEC Standard 62301 (Second Edition). This updated version of IEC Standard 62301 is expected to include definitions of "off mode," "network mode," and "disconnected mode," and it would also revise the current IEC Standard 62301 (First Edition) definition of "standby mode." However, the IEC anticipates that the final version of IEC Standard 62301 (Second Edition) will likely be published only in late 2010 at the earliest. Therefore, for this proposed rule, the second edition is not available for DOE's consideration or incorporation by reference. Thus, IEC Standard 62301 (First Edition) is the "current version" for purposes of 42 U.S.C. 6295(gg)(2)(A).

DOE is aware that there are significant differences between IEC Standard 62301 (First Edition) and IEC Standard 62301 (FDIS), which is the latest draft version of IEC Standard 62301 (Second Edition). For example, IEC Standard 62301 (FDIS) clarifies certain provisions, such as clarifying the definition of "standby mode" and "off mode" to allow for the measurement of multiple standby power modes.

DOE has reviewed IEC Standard 62301 (FDIS) and anticipates that, once finalized, it will ultimately define the

various modes differently than IEC Standard 62301 (First Edition). IEC Standard 62301 (FDIS) incorporates responses to comments from multiple national committees from member countries on several previous draft versions, and thus, DOE believes, it provides the best available mode definitions. Although the revised IEC Standard 62301 (Second Edition) has not yet been officially released, DOE has decided to consider the substance of the new operational mode definitions from the draft version IEC Standard 62301 (FDIS). DOE notes that the mode definitions in IEC Standard 62301 (FDIS) are substantively similar to those in the previous draft version (IEC Standard 62301 (CDV)), which were the subject of extensive comments from interested parties during recent DOE test procedure rulemakings addressing standby mode and off mode energy use in other products (*i.e.,* microwave ovens, clothes dryers, and room air conditioners). In those instances, interested parties indicated general support for adopting the mode definitions provided in IEC Standard 62301 (CDV). Due to the effective equivalence of the mode definitions in IEC Standard 62301 (CDV) and IEC Standard 62301 (FDIS), DOE believes the public comment support expressed for the mode definitions in IEC Standard 62301 (CDV) would extend to those in IEC Standard 62301 (FDIS).

DOE notes that other significant changes in the methodology were first introduced only at the IEC Standard 62301 (FDIS) stage. These changes have not been the subject of significant public comment from interested parties, nor has DOE had the opportunity to conduct a thorough analysis of those provisions. Consequently, the merits of these latest changes have not been fully vetted, as would demonstrate that they are preferable to the existing methodological provisions in the current version of the IEC standard. Thus, DOE is not able to determine whether the updated methodology represents the best available means to measure standby mode and off mode energy use, so DOE has tentatively decided to base the proposed test procedure amendments (other than the mode definitions previously discussed) on the provisions of IEC Standard 62301 (First Edition).

After considering the most current version of IEC Standard 62301 (*i.e.,* the First Edition) and the draft version of IEC Standard 62301 (*i.e.,* FDIS), DOE has tentatively concluded that the definitions of "standby mode," "off mode," and "active mode" provided in IEC Standard 62301 (FDIS) are the most useful, in that they expand upon the EPCA mode definitions and provide additional guidance as to which functions are associated with each mode. Therefore, DOE is proposing definitions of "standby mode," "off mode," and "active mode" based on the definitions provided in IEC Standard 62301 (FDIS). These definitions are discussed in detail immediately below in section III.C.

C. Determination and Classification of Operational Modes

As stated earlier, without further clarification, regulated parties' attempts to reconcile differences between the mode definitions specified by EPCA and IEC Standard 62301 (First Edition) could lead to multiple interpretations. Therefore, DOE is proposing regulatory definitions for these key terms in order to ensure consistent application of the test procedure provisions related to standby mode and off mode. This section first discusses these overarching definitional changes and then follows with a product-specific analysis of different operational modes in order to determine whether they are active mode, standby mode, or off mode functions. DOE's proposed approach is set forth below.

EPCA defines "active mode" as the condition in which an energy-using product:

(1) Is connected to a main power source;

(2) Has been activated; and

(3) Provides one or more main functions.

(42 U.S.C. 6295(gg)(1)(A)(i))

EPCA defines "standby mode" as the condition in which an energy-using product:

(1) Is connected to a main power source; and

(2) Offers one or more of the following user-oriented or protective functions:

(a) To facilitate the activation or deactivation of other functions (including active mode) by remote switch (including remote control), internal sensor, or timer;

(b) Continuous functions, including information or status displays (including clocks) or sensor-based functions.

(42 U.S.C. 6295(gg)(1)(A)(iii))

This definition of "standby mode" differs from the one provided in IEC Standard 62301 (First Edition) by permitting the inclusion of multiple standby modes.

EPCA defines "off mode" as the condition in which an energy-using product:

(1) Is connected to a main power source; and

(2) Is not providing any standby mode or active mode function.

(42 U.S.C. 6295(gg)(1)(A)(ii))

DOE recognizes that the EPCA definitions for "active mode," "standby mode," and "off mode" were developed to be broadly applicable for many energy-using products. For specific products with multiple functions, these broad definitions could lead to multiple interpretations. Therefore, DOE proposes to amend the test procedures to include definitions for these modes based on the definitions provided in IEC Standard 62301 (FDIS), with added provisions specific to dishwashers, dehumidifiers, and conventional cooking products. DOE's proposed approach is discussed below.

DOE proposes to define "active mode" for dishwashers, dehumidifiers, and conventional cooking products as the condition in which the energy-using product is connected to a mains power source, has been activated, and provides one or more main functions. DOE notes that section 3.8 of IEC Standard 62301 (Second Edition Committee Draft 2) (IEC Standard 62301 (CD2)) provides the additional clarification that "delay start mode is a one off user initiated short duration function that is associated with an active mode." The subsequent IEC Standard 62301 Committee Draft for Vote (IEC Standard 62301 (CDV)) removed this clarification based on a comment from a member committee on IEC Standard 62301 (CD2) that the clarification conflicted with the proposed definition of "standby mode," which would include "activation of * * * active mode by * * * timer." However, in its response to that comment, the IEC reiterated that delay start mode is a one-off function of limited duration, even though it took action to delete the clarification in IEC Standard 62301 (CDV).[9] DOE infers this to mean that delay start mode should, therefore, be considered part of active mode. However, DOE notes that IEC Standard 62301 (FDIS) classifies delay start as a secondary function and not part of active mode. DOE continues to believe, however, that because delay start is of limited duration and is uniquely associated with the initiation of a main function, it should be considered part of active mode. Additional discussion of delay start mode is provided later in this section.

DOE also proposes the following clarifications for the range of main

[9] Compilation of comments on 59/523/CD: IEC 62301 Ed 2.0 "Household electrical appliances—Measurement of standby power" (August 7, 2009) p. 6. IEC Standards are available online at *http://www.iec.ch.*

functions that would be classified as active mode for each product:

Dishwashers—"Active mode" means a mode in which the dishwasher is performing the main function of washing, rinsing, or drying (when a drying process is included) dishware, glassware, eating utensils, and most cooking utensils by chemical, mechanical and/or electrical means, or is involved in functions necessary for these main functions, such as admitting water into the dishwasher or pumping water out of the dishwasher.

Conventional Cooking Products—"Active mode" means a mode in which a conventional cooking top, conventional oven, or conventional range is performing the main function of cooking, heating, proofing, or holding the cooking load by means of either a gas flame or electric resistance heating.

Dehumidifiers—"Active mode" means a mode in which a dehumidifier is performing the main functions of removing moisture from ambient air by drawing moist air over a refrigerated coil using a fan, circulating air through activation of the fan without activation of the refrigeration system, or defrosting the refrigerant coil.

DOE proposes to define "standby mode" for dishwashers, dehumidifiers, and conventional cooking products as any mode in which the 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: [10]

- To facilitate the activation of other modes (including activation or deactivation of active mode) by remote switch (including remote control), internal sensor, or timer;
- Continuous functions, including information or status displays (including clocks) or sensor-based functions.

DOE proposes the additional clarification that a timer is a continuous clock function (which may or may not be associated with a display) that provides regular scheduled tasks (*e.g.,* switching) and that operates on a continuous basis. As noted in section III.B, this definition of "standby mode" is based on the definitions provided in IEC Standard 62301 (FDIS), and expands upon the EPCA mode definitions to provide additional clarifications as to which functions are associated with each mode.

As noted earlier, the current DOE dishwasher test procedure defines "standby mode" as the lowest power consumption mode that cannot be switched off or influenced by the user and that may persist for an indefinite time when the dishwasher is connected to the main electricity supply and used in accordance with manufacturer's instructions. That definition is comparable to the definition in IEC Standard 62301 (First Edition). DOE believes that the proposed "standby mode" definition based on IEC Standard 62301 (FDIS) is preferable in that it expands upon the definition in IEC Standard 62301 (First Edition) and provides additional guidance as to what functions are associated with standby mode. For this reason, DOE proposes in today's NOPR to amend the "standby mode" definition in the dishwasher test procedure based on the definition provided in IEC Standard 62301 (FDIS). Furthermore, DOE proposes to redesignate the current DOE definition as a "simplified standby mode" in order to allow manufacturers to continue to use the existing standby mode provisions to determine compliance with the current dishwasher energy conservation standards until such time as these standards are amended to address standby mode and off mode energy use.

DOE proposes to define "inactive mode" for dishwashers, dehumidifiers, and conventional cooking products as 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.

The following discussion analyzes various product-specific modes for dishwashers, dehumidifiers, and conventional cooking products to determine whether they would be properly characterized as active mode, standby mode, or off mode functions.

1. Dishwashers

DOE is aware of two additional relevant modes for dishwashers: (1) delay start mode; and (2) cycle finished mode. "Delay start mode" is defined as a mode in which activation of an active mode is facilitated by a timer. "Cycle finished mode" is defined as a mode that provides continuous status display following operation in active mode. As discussed earlier, because delay start mode is not a mode that may persist for an indefinite time, DOE believes that delay start mode would not be considered part of standby mode, but instead would be a form of active mode. DOE is not proposing amendments to the dishwasher test procedure to define "delay start mode" or to measure power consumption in this mode. DOE may consider amendments addressing delay start mode issues in a future dishwasher test procedure rulemaking conducted under the 7-year schedule requirements of the EISA 2007 amendments to EPCA. (42 U.S.C. 6293(b)(1))

Based on the proposed "standby mode" definition, cycle finished mode, a mode that provides a continuous status display and may persist for an indefinite time, would be considered as part of a standby mode. Therefore, DOE proposes in today's NOPR to define cycle finished mode for dishwashers as "a mode which provides continuous status display following operation in active mode." Proposed provisions to measure energy use in delay start mode and cycle finished mode are discussed in section III.E.1.

2. Dehumidifiers

DOE is aware of three additional relevant modes for dehumidifiers: (1) Delay start mode; (2) off-cycle mode; and (3) bucket full/removed mode. The definition for "delay start mode" for dehumidifiers is the same as that for dishwashers. "Off-cycle mode" is defined as a mode in which a dehumidifier has cycled off its main function by humidistat or humidity sensor, does not have its fan or blower operating, and will reactivate the main function according to the humidistat or humidity sensor signal. "Bucket full/removed mode" is defined as a mode in which the dehumidifier has automatically powered off its main function by detecting when the water collection bucket is full or has been removed. For the same reasons discussed earlier for dishwashers, DOE believes that delay start mode would not be considered a standby mode, but instead would be a form of active mode. Therefore, DOE is not proposing amendments to define or to measure power consumption in "delay start mode." DOE may consider amendments addressing delay start mode issues in a future dehumidifier test procedure rulemaking conducted under the 7-year schedule requirements of the EISA 2007 amendments to EPCA. (42 U.S.C. 6293(b)(1))

DOE believes that off-cycle mode and bucket full/removed mode are modes that may persist for an indefinite time and, under the proposed definition, would be considered as part of standby mode. Therefore, DOE proposes amending its dehumidifier test procedure to include definitions of "off-

[10] The actual language for the "standby mode" definition in IEC Standard 62301 (FDIS) describes "* * * user oriented or protective functions which usually persist" rather than "* * * user oriented or protective functions which may persist for an indefinite time." DOE notes, however, that section 5.1 of IEC Standard 62301 (FDIS) states that "a mode is considered to be persistent where the power level is constant or where there are several power levels that occur in a regular sequence for an indefinite period of time." DOE believes that the proposed language, which was originally included in IEC Standard 62301 (CD2), encompasses the possible scenarios foreseen by section 5.1 of IEC Standard 62301 (FDIS) without unnecessary specificity.

cycle mode" and "bucket full/removed mode." Proposed provisions to measure energy use in delay start mode, off-cycle mode, and bucket full/removed mode are discussed in section III.E.2.

3. Conventional Cooking Products

DOE is aware of three additional relevant modes for conventional cooking products: (1) Delay start mode; (2) cycle finished mode; and (3) Sabbath mode. "Delay start mode" and "cycle finished mode" are defined as for dishwashers. "Sabbath mode" is defined as a mode in which the automatic shutoff is overridden to allow for warming of pre-cooked foods during such periods as the Jewish Sabbath. For the same reasons as discussed for dishwashers and dehumidifiers, DOE believes that delay start mode would not be considered a standby mode, but instead would be a form of active mode. Therefore, DOE is not proposing amendments to define or to measure power consumption in "delay start mode." In addition, DOE believes that the Sabbath mode function of warming food would also be considered part of the active mode. Therefore, DOE is not proposing amendments to define or to measure power consumption in "Sabbath mode." DOE may consider amendments addressing delay start mode and Sabbath mode issues in a future cooking products test procedure rulemaking conducted under the 7-year schedule requirements of the EISA 2007 amendments to EPCA. (42 U.S.C. 6293(b)(1))

DOE believes that cycle finished mode is a mode that may persist for an indefinite time and, under the proposed definition, would be considered as part of standby mode. Therefore, DOE proposes to amend its conventional cooking products test procedure to include a definition of "cycle finished mode." Proposed provisions to measure energy use in delay start mode and cycle finished mode are discussed in section III.E.3.

As discussed in section III.B, DOE proposes to amend the test procedures for residential dishwashers, dehumidifiers, and conventional cooking products to define "off mode" as a mode in which the product is connected to a mains power source and is not providing any active mode or standby mode function, and where the mode may persist for an indefinite time. An indicator that shows the user only that the product is in the off positions is included within the classification of off mode. As noted in section III.B, this definition of "off mode" is based on the definitions provided in IEC Standard 62301 (FDIS) and is useful in terms of expanding the scope of the EPCA mode definitions to clarify which functions are associated with off mode.

Under the proposed definitions, a dishwasher, dehumidifier, or conventional cooking product equipped with a mechanical on/off switch that can disconnect power to the display and/or control components would be considered as operating in the off mode when the switch is in the "off" position, provided that no other standby mode or active mode functions are energized. An energized light-emitting diode (LED) or other indication that shows the user only that the product is in the off position would be considered part of off mode under the proposed definition, again provided that no other standby mode or active mode functions are energized. However, if any energy is consumed by the appliance in the presence of a one-way remote control, the unit would be considered to be operating in standby mode because the remote control would be used to activate or deactivate other mode(s). Electrical leakage and any energy consumed for electrical noise reduction, which are not specifically categorized as standby power functions, would be indicative of off mode and would be measured by the proposed amended test procedures.

Section 3.7 of IEC Standard 62301 (FDIS) also defines "network mode" as a mode category that includes "any product modes where the energy using product is connected to a mains power source and at least one network function is activated (such as reactivation via network command or network integrity communication) but where the primary function is not active." Section 3.7 of IEC Standard 62301 (FDIS) also provides a note, stating that "[w]here a network function is provided but is not active and/or not connected to a network, then this mode is not applicable. A network function could become active intermittently according to a fixed schedule or in response to a network requirement. A 'network' in this context includes communication between two or more separately independently powered devices or products. A network does not include one or more controls which are dedicated to a single product. Network mode may include one or more standby functions."

DOE acknowledges that in the future, products that are the subject of this rulemaking could incorporate a network mode for either communication with technicians for repair and performance monitoring, or for interaction with the electric grid. At this time, however, DOE is unaware of any data that would enable it to determine appropriate testing procedures and mode definitions for incorporation into test procedures for network mode in dishwashers, dehumidifiers, and conventional cooking products. This makes it extremely difficult to consider evaluation of a networked unit, even in terms of categorizing it as a standby mode or off mode function. In particular, DOE is unaware of methods for appropriately configuring networks or methods for collecting data about the energy use of appropriately configured networks. DOE also has no information as to whether network connection speed or the number and type of network connections affect power consumption for these products. DOE also has no information as to whether wireless network devices in such products would have different levels of power consumption when a device is looking for a connection versus when the network connection is established. DOE is also unaware of how the energy consumption for dishwashers, dehumidifiers, and conventional cooking products in a network environment may be affected by their product design and user interaction, as well as network interaction. These effects would need to be measured both if the network function could become active intermittently according to a fixed schedule or in response to a network requirement. For these reasons, the amendments proposed in today's NOPR do not include provisions for testing network mode energy consumption in dishwashers, dehumidifiers, and conventional cooking products. Provisions for testing power consumption in network mode could be incorporated into the test procedure through future amendments once the appropriate data and testing methodologies become available. DOE welcomes comment on whether dishwashers, dehumidifiers, or conventional cooking products that incorporate a networking function are currently available, and whether definitions and testing procedures for a network mode should be incorporated into the DOE test procedures. DOE also requests comment on appropriate testing methodologies for measuring energy consumption in a network mode for dishwashers, dehumidifiers, and conventional cooking products, and data on the repeatability of those testing methodologies.

DOE also notes that section 3.9 of IEC Standard 62301 (FDIS) provides a definition for "disconnected mode," which is "the state where all connections to mains power sources of

the energy using product are removed or interrupted." IEC Standard 62301 (FDIS) also adds a note that common terms such as "unplugged" or "cut off from mains" also describe this mode and that this mode is not part of off mode, standby mode, or network mode. DOE believes that there would be no energy use in a disconnected mode and agrees that it would not be part of off mode, standby mode, or network mode. Therefore, DOE is not proposing a definition or testing method for disconnected mode in the test procedures for residential dishwashers, dehumidifiers, or conventional cooking products.

D. Specifications for the Test Methods and Measurements for Standby Mode and Off Mode Testing

DOE proposes amending its test procedures to include provisions for measuring the power consumption of dishwashers, dehumidifiers, and conventional cooking products in all standby and off modes. This section first discusses issues relevant to all three types of products subject to this rulemaking, and then, it subsequently addresses issues specific to each product type. As an initial matter, DOE would clarify the provisions it proposes to include in the test procedures to clarify the IEC Standard 62301 (First Edition) methods when used to measure standby mode and off mode energy use in dishwashers, dehumidifiers, and conventional cooking products. These proposed amendments also include provisions for measuring energy use in cycle finished mode for dishwashers, off-cycle mode and bucket full/removed mode for dehumidifiers, and cycle finished mode for conventional cooking products.

For all three products, DOE is proposing a test method based on the provisions from IEC Standard 62301 (First Edition). Paragraph 5.3.1 of IEC Standard 62301 (First Edition) specifies the following test method for products in which the power varies by not more than 5 percent from a maximum level during a period of 5 minutes: (1) Wait at least 5 minutes after selecting the mode to be measured for the product to stabilize; and (2) measure the power consumption at the end of an additional time period of not less than 5 minutes.

IEC Standard 62301 (First Edition), paragraph 5.3.2, contains provisions for measuring average power in cases where the power is not stable (*i.e.,* the measured power varies by more than 5 percent from a maximum level during a period of 5 minutes). Such instances can include, for example, a clock display whose power consumption varies as a function of the time displayed or internal electronic components which are cycled on and off regularly. In such cases, IEC Standard 62301 (First Edition) requires a measurement period of no less than 5 minutes, or, if there is an operating cycle (defined as a regular sequence of power states that occur over several minutes or hours), one or more complete cycles. DOE notes these provisions do not preclude manufacturers from testing products with a longer stabilization period, or a longer measurement period, as long as the power does not vary by more than 5 percent or the stabilization period represents one or more complete cycles. DOE expects results obtained under such conditions would be comparable to those obtained using the minimum allowable stabilization and measurement periods.

DOE is aware that residential dishwashers and conventional cooking products with displays may reduce power consumption by dimming after a period of user inactivity (known as "automatic power-down"). For products whose power consumption in inactive mode varies in this manner during testing, DOE proposes that the test be conducted after the power level has dropped to its lowest level, as discussed in IEC Standard 62301 (First Edition), section 5, paragraph 5.1, Note 1. DOE believes that products with automatic power-down spend more time in this low-power state than in the higher-power state. Thus, the energy consumption at the low-power level is most representative of inactive mode power range.

DOE is aware that IEC Standard 62301 (First Edition) does not provide guidance on how long to wait for the appliance to drop to the lower-power state. DOE tested 14 dishwashers, 13 dehumidifiers, and 41 conventional cooking products and observed that units with an automatic power-down feature persisted in the higher-power state for less than 10 minutes of user inactivity after the display has initially been energized. However, the test sample was small and may not be sufficiently representative. It is possible that some dishwashers, dehumidifiers, and conventional cooking products may remain in the higher-power state for the duration of a 5-minute stabilization period and subsequent 5-minute measurement period, and then drop to the lower-power state that is more representative of inactive mode. In contrast, IEC Standard 62301 (CDV) specifies for each testing method that the product shall be allowed to stabilize for at least 30 minutes prior to a measurement period of not less than 10 minutes. DOE believes this specification would allow sufficient time for all displays that automatically dim or power down after a period of user inactivity to reach the lower-power state prior to measurement. DOE believes that the IEC Standard 62301 (CDV) 30-minute stabilization and 10-minute measurement periods provide a clearer and more consistent testing procedure than the corresponding time periods specified in IEC Standard 62301 (First Edition). Those periods allow for representative measurements to be made among products that may have varying time periods before the power drops to a lower level more representative of standby mode, off mode, or cycle finished mode.

DOE notes that IEC Standard 62301 (FDIS) establishes an overall test period of not less than 15 minutes for products in which power consumption in the mode being tested is not cyclic. Data collected during the first third of the total period are discarded (and, thus, this time could be inferred to be a stabilization period), and data from the remaining two-thirds of the total period are used to determine whether the power is stable. If stability is not achieved, the total period is extended continuously until the stability criteria are achieved, to a maximum of 3 hours. Modes that are known to be non-cyclic and of varying power consumption shall follow this same procedure, but with a total test period not less than 60 minutes. If power consumption in a mode is cyclic, measurements must be conducted with an initial operation period (analogous to a stabilization period) of at least 10 minutes, and the average power measured over at least four complete cycles. The measurement period must be at least 20 minutes. After careful consideration, DOE has tentatively concluded that the specifications provided in IEC Standard 62301 (FDIS) would not produce power consumption measurements as accurate, repeatable, and enforceable as the specifications provided in IEC Standard 62301 (CDV). Therefore, DOE proposes to require that dishwashers, dehumidifiers, and conventional cooking products be allowed to stabilize for at least 30 minutes prior to a power measurement period of not less than 10 minutes. (For the reasons discussed in section III.D.3, DOE is proposing a choice between different methodologies for the specific case in which conventional cooking product energy use in standby mode varies as a function of the time displayed on a clock. In such case, DOE proposes to specify setting the clock to a particular start time at the

end of a 10-minute stabilization period, waiting another 10 minutes for the product again to stabilize, and then measuring standby power over a period of 10 minutes. Alternatively, DOE proposes that manufacturers, at their own discretion, may choose to measure standby power over a 12-hour period that captures all possible variations of power consumption as a function of the time displayed.) Although DOE did not observe any dehumidifiers with displays that automatically powered down, DOE is proposing the 30-minute stabilization and 10-minute power measurement periods for those products as well in order to account for currently available or future models that may have such a feature.

DOE's test procedures are developed to measure representative energy use for the typical consumer and cannot capture all possible consumer actions and appliance usage patterns that might increase energy use. For example, certain products featuring a display power-down may allow consumers to alter the display settings to increase the amount of time in the high-power state, or to make the high-power state permanent. However, DOE believes the typical consumer will not alter the standard or default settings. Therefore, DOE has not proposed additional provisions in today's NOPR to address the possibility of increased energy use as a result of consumers adjusting the display power-down settings or other features. DOE welcomes comment on the suitability of using the default settings in testing standby mode energy consumption. It also welcomes comment on any testing methodologies that can account for consumer actions that might increase energy use, and requests data on the repeatability of those testing methodologies.

The following sections describe the proposed test method that is specific to each of the three products that are the subject of this rulemaking.

1. Dishwashers

DOE proposes that test room ambient temperatures for standby mode and off mode testing be specified for all dishwashers according to section 4, paragraph 4.2 of IEC Standard 62301 (First Edition). The IEC standard specifies a temperature range of 73.4 ± 9 °F. The current DOE test procedure for dishwashers includes a test room ambient air temperature requirement of 75 ± 5 °F. The narrower range of allowable ambient temperature in the DOE test procedure helps ensure consistent and repeatable test results for active mode measurements in which heat losses could affect energy consumption, but energy use in standby mode or off mode are less affected by ambient temperature. Today's proposed test procedure would allow manufacturers of dishwashers to use the more stringent ambient temperature range in the current DOE test procedure if tests of active mode efficiency performance and standby mode and off mode power consumption are conducted simultaneously in the same room on multiple dishwashers. Alternatively, the proposed temperature specifications taken from IEC Standard 62301 (First Edition) would allow a manufacturer that opts to conduct standby mode and off mode testing separately from active mode testing more latitude in maintaining ambient conditions. DOE requests comment on the appropriateness of this proposed modified test room ambient temperature range.

2. Dehumidifiers

DOE proposes that test room ambient temperatures for standby mode and off mode testing be specified for all dehumidifiers according to section 4, paragraph 4.2 of IEC Standard 62301 (First Edition). The IEC standard specifies a temperature range of 73.4 ± 9 °F. The current DOE test procedure for dehumidifiers references the ENERGY STAR test criteria for dehumidifiers. The ENERGY STAR test criteria are based on ANSI/AHAM Standard DH–1–2003, "Dehumidifiers," which specifies a test room ambient temperature of 80 ± 2 °F for testing. Today's proposed test procedure would allow manufacturers of dehumidifiers to conduct active mode efficiency performance testing and standby mode and off mode power consumption testing simultaneously in the same room on multiple dehumidifiers, as long as the temperature requirements for both tests are met. Alternatively, the proposed temperature specifications taken from IEC Standard 62301 (First Edition) would allow a manufacturer that opts to conduct standby mode and off mode testing separately from performance testing to use the ambient temperature requirement of 73.4 ± 9 °F. DOE requests comment on the appropriateness of this proposed modified test room ambient temperature range.

DOE also proposes additional clarifications to the power supply requirements for standby mode and off mode testing for dehumidifiers to require that the power supply frequency be the rated frequency ± 1 percent. The current DOE dehumidifier test procedure requires that the power supply for the active mode test have a supply voltage of 115/230 volts (V) ± 2 percent (depending on the voltage specified on the name plate), and be at the rated frequency (no allowable range is specified for the latter). DOE notes that section 4, paragraph 4.3 of IEC Standard 62301 (First Edition) states that when IEC Standard 62301 is referenced by an external standard, the test voltage and frequency defined by the external standard shall be used. When the test voltage and frequency are not defined by the external standard, IEC Standard 62301 (First Edition) requires that the supply voltage and frequency be 115 V ± 1 percent and 60 Hertz (Hz) ± 1 percent, respectively. Because the current DOE dehumidifier test procedure specifies that the rated frequency be used for testing but does not provide an allowable range, DOE proposes that the range of ± 1 percent specified by IEC Standard 62301 (First Edition) be used for standby mode and off mode testing. DOE requests comments on its proposed amendments related to frequency.

3. Conventional Cooking Products

DOE proposes that test room ambient temperatures for standby mode and off mode testing be specified for all conventional cooking products, including cooktops, ovens, and ranges, according to section 4, paragraph 4.2 of IEC Standard 62301 (First Edition). The IEC standard specifies a temperature range of 73.4 ± 9 °F. The current DOE test procedure for conventional cooking products includes a test room ambient air temperature specification of 77 ± 9 °F. This varies slightly from the range specified by IEC Standard 62301 of 73.4 ± 9 °F. DOE believes that the higher temperatures allowed for active mode energy testing could be representative of ambient temperatures during a cooking process, but that it would be appropriate to maintain lower allowable temperatures for standby mode and off mode power consumption measurements as to be more representative of ambient conditions during those operating modes. The proposed test procedure would allow manufacturers of conventional cooking products to measure active mode performance and standby and off mode power simultaneously in the same room on multiple units, provided that the room ambient temperature falls within the range allowed by both ambient temperature requirements (*i.e.,* any temperature between 68 and 82.4 °F). Alternatively, the proposed temperature specifications from IEC Standard 62301 (First Edition) would allow a manufacturer to conduct standby mode and off mode testing separately from

performance testing within an ambient temperature range of 73.4 ± 9 °F. DOE requests comment on the appropriateness of this proposed modified test room ambient temperature range.

DOE also proposes additional clarifications to the power supply requirements for standby mode and off mode testing for conventional cooking products to require that the power supply frequency be 60 Hz ± 1 percent. The current DOE conventional cooking products test procedure requires that the power supply for the active mode test be 240/120 V ± 2 percent or 208/120 ± 2 percent (for basic models rated only at that rating), but the test procedure does not specify any power supply frequency requirements. As discussed earlier for dehumidifiers, section 4, paragraph 4.3 of IEC Standard 62301 (First Edition) states that when the test voltage and frequency are not defined, the supply voltage and frequency shall be 115 V ± 1 percent and 60 Hz ± 1 percent, respectively. Because the current DOE conventional cooking products test procedure does not specify a power supply frequency, DOE proposes that the 60 Hz ± 1 percent specified by IEC Standard 62301 (First Edition) be used for standby mode and off mode testing. DOE requests comments on its proposed amendments related to frequency.

IEC Standard 62301 (First Edition) is written to provide some flexibility so that the test standard can be used to measure standby mode and off mode power for most household electrical appliances (including conventional cooking products). For that reason, it does not specify closely the test method for measuring the power consumption in cases in which the measured power is not stable. Section 5.3.2 of IEC Standard 62301 (First Edition) states that "[i]f the power varies over a cycle (*i.e.,* a regular sequence of power states that occur over several minutes or hours), the period selected to average power or accumulate energy shall be one or more complete cycles in order to get a representative average value." DOE investigated the possible regular sequences of power states for conventional cooking products in order to propose clarifying language to IEC Standard 62301 (First Edition) that would provide accurate and repeatable test measurements.

DOE's tests of standby power measurement in conventional cooking products indicate that a given unit or model with a clock display may use varying amounts of standby power depending on the clock time being displayed. DOE tested a small number (7) of conventional cooking products from its test sample to determine the amount of variation in power consumption that is possible due to variations in the clock time being displayed. More specifically, DOE tested the products with clock settings of 1:11 and 12:08, which represent the minimum and maximum amount of numerical display segments.[11] Table III.1 shows the test results for the products that showed significant variation in power consumption depending upon the clock's time display. According to DOE tests of conventional cooking products equipped with a 12-hour clock display, standby power use at different times during a 12-hour cycle could vary by as much as 44 percent.

TABLE III.1—CONVENTIONAL COOKING PRODUCT CLOCK TIME VARIATION STANDBY TESTING RESULTS

Product type	Test unit No.	Average power (W)		Percent variation (%)
		1:11 Clock time	12:08 Clock time	
Oven	1	1.06	1.44	26.4
Oven	2	1.05	1.5	30.0
Oven	3	1.25	1.60	21.7
Oven	4	1.06	1.44	26.4
Range	5	2.73	3.69	26.1
Range	6	0.65	1.15	43.8
Range	7	1.29	1.63	21.0

DOE believes that the lack of specificity in IEC Standard 62301 (First Edition) about the test period could produce test results obtained during one time period that are not comparable to those obtained using other time periods. Such results would not necessarily represent the standby power consumption of conventional cooking products during all hours associated with standby mode. In addition, different testing laboratories could take different approaches in selecting cycles for testing. To assess alternatives to the test cycle specified in IEC Standard 62301 (First Edition), DOE investigated alternative time periods and averaging methods for calculating representative standby power use, using data that DOE collected from microwave oven clock displays during its analyses for energy conservation standards for those products. DOE believes that those displays have cyclic variation in power consumption as a function of displayed time comparable to those in conventional cooking products.

For a typical microwave oven display with a 12-hour clock feature, DOE measured average standby power over the full 12-hour period. This measurement provides the most accurate and repeatable results. However, because a 12-hour test could substantially add to manufacturer test burden, DOE sought to identify other, more-abbreviated testing options, all the while keeping the 12-hour test in mind as an appropriate frame of reference in terms of generating representative results. DOE then evaluated a method using 18 different clock display times to produce an average standby power measurement representative of a 12-hour cycle. (This is referred to as the "18-point method.") This method was discussed in appendix 5B of the technical support document (TSD) for the November 2007 ANOPR. When this method is used, the standby power consumption and line voltage are measured as the clock is cycled through all the possible digit combinations (in terms of active elements).[12] A regression

[11] Each clock time was tested three times to confirm that the results were repeatable. The table shows the average power of the three tests.

[12] The term "active elements" refers to the number of display segments energized in a seven-segment clock display for a given time. Different digit combinations associated with different times displayed may have the same number of active elements.

analysis is then performed to quantify the effect of the number of lit elements (by digit) and voltage on power consumption. The results were integrated across the number of minutes that each active element combination was "on" through the course of the 12-hour test period. As noted in chapter 5 of the November 2007 ANOPR TSD, this methodology produced results for average standby power consumption that were within 1 to 2 percent of the 12-hour test results.

DOE also investigated whether a single 10-minute measurement period with a starting clock time of 3:33 would be a reasonable proxy for the 12-hour standby power measurement in the event that power consumption is not stable. DOE's analysis indicates that the proportion of time that each possible number of segments in a 7-segment LED display that are lit over the 10-minute time period from 3:33 to 3:42 is representative of the distribution of lit segments over a 12-hour period with an arbitrary starting time.[13] This suggests that the 10-minute test period starting at 3:33 would produce average standby power measurements comparable to average standby power measured over 12 hours. Table III.2 shows the average standby power measured for 11 units in DOE's microwave oven test sample using the 18-point and 10-minute methodologies as compared to the 12-hour test.

TABLE III.2—COMPARISON OF METHODOLOGIES FOR MEASURING STANDBY POWER IN COOKING PRODUCTS WITH CLOCK DISPLAYS

Test unit	Display type	12-Hour method	18-Point method		10-Minute method	
		Standby watts *	Standby watts*	Percent difference	Standby Watts*	Percent difference
1	LCD	1.567	1.552	−0.99	1.592	1.60
2	LCD	1.571	1.560	−0.70	1.554	−1.08
3	LCD	1.812	1.812	0.03	1.801	−0.61
4	LCD	1.490	1.475	−0.96	1.492	0.17
5	LCD	1.859	1.847	−0.60	1.874	0.84
6	LCD	3.788	3.798	0.26	3.818	0.81
7	LCD	3.641	3.642	0.04	3.606	−0.95
8	LED	1.802	1.796	−0.35	1.797	−0.32
9	LED	1.825	1.820	−0.25	1.816	−0.47
10	LED	3.185	3.177	−0.27	3.290	** 3.28
11	VFD	5.600	5.611	0.20	5.607	0.13

* Standby power measurements are scaled to normalize the supply power to 120.0 volts.
** For this test, the supply power was significantly different than 120.0 volts. Therefore, DOE believes the scaling of the measured standby power and, thus, the percentage differences from the 12-hour standby power measurements are not valid for this test unit.

Within DOE's limited test sample, the average standby power measured over the specified 10-minute test period agrees within ±2 percent of the average standby power measured over 12 hours. Therefore, DOE tentatively concludes that a 10-minute measurement period with a starting time of 3:33 would provide a valid measure of standby energy use for conventional cooking products, with power consumption varying according to the time displayed on the clock. DOE requests comment on the validity and comparability of the various tests examined, as well as which test(s) DOE should adopt for measuring standby mode and off mode energy use.

As a related matter, DOE is aware that certain clock displays enter a higher-power state when one manually sets the time, and then after a prescribed interval, the clock enters a lower-power state (*e.g.,* by dimming the display) that is representative of the power levels that would be associated with the display running without consumer interaction. Therefore, DOE has tentatively concluded that it would be appropriate to provide a second stabilization period after the clock display is set prior to the start of the measurement period. DOE testing of combination microwave ovens, which have similar clock displays as conventional cooking products, suggest that a second stabilization period of 10 minutes would be sufficient to ensure that the clock display has reached its more representative power state after setting the time. This approach would require setting the clock time to 3:23 in order to start the measurement period at 3:33 after the 10-minute second stabilization period. Therefore, DOE has tentatively decided to specify that, for conventional cooking products for which standby power consumption is not stable, the clock display shall be set at 3:23 at the conclusion of the stabilization period specified in section 5.3 of IEC Standard 62301 (First Edition), after which a second 10-minute stabilization period shall be provided, and the subsequent test period shall be 10 minutes. Alternatively, DOE believes that appropriate stabilization may be achieved by requiring only the 10-minute stabilization period after setting the clock time to 3:23. DOE seeks comment on whether this alternative method in which the clock time is set to 3:23 prior to a 10-minute stabilization period, followed by a 10-minute measurement period commencing at 3:33 would be appropriate.

DOE acknowledges, however, that both the 18-point and 10-minute approaches for accelerated standby testing do not exclude the possibility that a product could be programmed to alter its behavior during such a test in order to minimize measured standby power consumption. For example, a conventional cooking product could be programmed to dim or alter its display only during the display times associated with the 18 measurement points or between display times 3:33 and 3:42.

In light of the above, DOE is proposing to provide manufacturers of conventional cooking products the option to conduct either the full 12-hour test, the 10-minute test, or both (with the expectation that any test records will make clear which type of test(s) was (were) performed). If a manufacturer elects to perform both

[13] *See* "10-Minute vs. 12-Hour Analysis.pdf," included as entry No. 2 in the docket for this rulemaking.

tests on a unit, the manufacturer may only use the results from one of the tests (*i.e.,* the 12-hour test or the 10-minute test) as the test results for that unit. For purposes of enforcement testing, DOE reserves the right to use either test or both tests. Given that the 10-minute test, like the 12-hour test, is intended to represent standby mode and off mode energy use and based upon the research data discussed above, DOE proposes to clarify that the test results conducted under the two different tests must be within ± 2 percent of each other; otherwise, DOE will use the 12-hour test to determine compliance. DOE requests comment on its proposed approach requiring results under the 12-hour test and the 10-minute test to be within ± 2 percent of each other and welcomes data which would show that some other range is more appropriate.

DOE notes that the conventional cooking products test procedure is designed to provide an energy efficiency measurement consistent with representative average consumer use of these products, even if the test conditions and/or procedures may not themselves all be representative of average consumer use (*e.g.,* testing with a display of only 3:33 to 3:42). DOE's proposal reflects the statutory requirement, and the Department's longstanding view, that the overall objective of the test procedure is to measure the product's energy consumption during a representative average use cycle or period of use. 42 U.S.C. 6293(b)(3). Further, the test procedure requires specific conditions during testing that are designed to ensure repeatability while avoiding excessive testing burdens. Although certain test conditions specified in the test procedure may deviate from representative use, such deviations are carefully designed and circumscribed in order to attain an overall calculated measurement of the energy consumption during representative use. Thus, it is—and has always been—DOE's view that products should not be designed such that the energy consumption drops during test condition settings in ways that would bias the overall measurement, thereby making it unrepresentative of average consumer use. If a manufacturer incorporates a power-saving mode as part of the appliance's routine operation, DOE's test procedure would produce a representative measure of average consumer use if the unit powered down during the 10-minute test period for the same percentage of time that such powering down would be expected to occur during a typical 12-hour period, and, thus, such operation would be permissible. Although DOE believes that its proposed 10-minute test would be adequate for standby mode and off mode testing purposes, if it becomes aware of product design strategies which render the 10-minute test results unrepresentative, DOE reserves the right to perform a full 12-hour test in the context of enforcement testing. It has been the Department's long-held interpretation that the purpose of the test procedure is to measure representative use. Ultimately, if DOE identifies a broad pattern of behavior which has the effect of circumventing its test procedure provisions, the Department may consider reopening the conventional cooking products test procedure for further rulemaking.

DOE proposes to clarify in the conventional cooking products test procedure codified in 10 CFR 430.23(i)(17) that the energy test procedure is designed to provide a measurement consistent with representative average consumer use of the product, even if the test conditions and/or procedures may not themselves all be representative of average consumer use (*e.g.* specified display times). However, in a proposed rule on certification, compliance, and enforcement published in the **Federal Register** on September 16, 2010, DOE proposed that it would be a prohibited act to either fail to test a covered product in conformance with applicable test procedure requirements or to engage in "deliberate use of controls or features in a covered product or covered equipment to circumvent the requirements of a test procedure and produce test results that are unrepresentative of a product's energy or water consumption if measured pursuant to DOE's required test procedure." 75 FR 56796, 56825 (Sept. 16, 2010) (citing proposed amendments to 10 CFR 429.31(a)(2)). Examples of products exhibiting such behavior are those products that can exhibit operating parameters (*e.g.* display wattage) for any energy using component that are not predictably varying functions of operating conditions or control inputs—such as when a display is automatically dimmed when test conditions or test settings are reached. DOE believes that retention of the ability to conduct enforcement testing using the 12-hour test will deter product designs that would not be representative under the 10-minute test of the DOE test procedure.

DOE seeks comment on the proposed approach above to address products equipped with controls or other features that modify the operation of energy-using components during testing. DOE's proposed approach does not identify specific product characteristics that could render results generated under the test procedure unrepresentative when testing certain products (*e.g.* modification of operation based on display time). Rather, it clarifies the need to address any features that could potentially yield measurements unrepresentative of the product's energy consumption during a representative use cycle.

As discussed in section III.B, the current DOE conventional cooking products test procedure provides testing methods and calculations to account for energy use of a continuously-operating clock. The current test procedure requires that any electrical clock that uses energy continuously be disconnected, except for those that are an integral part of the timing or temperature-controlling circuit of the product. In cases where the continuously-operating clock is an integral part of the timing or temperature-control circuit and cannot be disconnected during the test, the test procedure requires that such clock energy use be subtracted from the oven, cooktop, or range test energy consumption. The test procedure also provides methods for measuring the power consumption of a clock, which is then multiplied by 8,760 hours (total hours per year) to determine the annual clock energy consumption. The annual clock energy consumption is included in the calculation of total annual energy consumption and EF.

DOE believes that the testing provisions for clock energy consumption currently in the cooking products test procedure are no longer necessary because DOE proposes to amend the conventional cooking products test procedure to fully account for standby mode and off mode energy consumption, which include clock energy consumption. DOE proposes to incorporate standby mode and off mode energy consumption into the total annual energy consumption and EF calculations. Therefore, DOE proposes to remove the provisions for clock energy consumption from the conventional cooking products test procedure and to replace them with the provisions for measuring all standby mode and off mode energy consumption. (*See* section III.E.)

E. Calculation of Energy Use Associated With Standby Mode and Off Mode

Measurements of power associated with standby mode and off mode for

dishwashers, dehumidifiers, and conventional cooking products are expressed in watts (W). The annual energy consumption in each of these modes is the product of the power consumption and the time spent in that particular mode per year. The following sections describe how the annual energy use associated with each operating mode is calculated for the products that are the subject of this rulemaking.

1. Dishwashers

Energy use for dishwashers is expressed in terms of average annual energy use and total energy used per dishwasher cycle. (10 CFR 430.23(c)) As discussed in section III.F, DOE has tentatively determined that it is technically feasible to incorporate measures of standby mode and off mode energy use into the overall energy use metric (*i.e.,* average annual energy use) as required by the EISA 2007 amendments to EPCA. (42 U.S.C. 6295(gg)(2)(A)) Therefore, DOE has examined standby mode and off mode energy consumption in terms of annual energy use, expressed in kWh per year.

In the current DOE dishwasher test procedure, the annual standby mode energy consumption is calculated by multiplying the average standby power use by the number of standby hours per year. The number of standby hours per year is equal to the number of total hours per year minus the product of the representative average dishwasher use of 215 cycles per year times the average wash cycle time. The average wash cycle time is derived from test measurements of the duration of the various cycles available on a dishwasher, such as normal, truncated normal, and sensor cycles. The average standby energy consumption is then added to the annual machine energy use (which includes any water heating within the dishwasher) and annual water energy use (energy used by the residence's water heater to heat the water prior to being supplied to the dishwasher during the cycle) to calculate the EAEU. DOE is proposing in today's NOPR that the active mode hours be determined using the approach specified in the current DOE dishwasher test procedure. That procedure uses test measurements of the duration of the various cycles available on a dishwasher to determine its average wash cycle time and then multiplies that average wash cycle time by 215 cycles per year. DOE proposes that the remaining non-active hours be distributed between the appropriate standby and off modes. DOE investigated the annual hours and energy consumption associated with each possible dishwasher operating mode, including inactive, delay start, cycle finished, off, and active modes, in order to propose methods for calculating the total annual energy use.

As part of the November 2007 ANOPR, DOE estimated the length of a dishwasher cycle to be one hour. 72 FR 64432, 64471 (Nov. 15, 2007). The DOE test procedure assumes 215 dishwasher cycles per year. (10 CFR part 430 subpart B, appendix C, section 5.6) Therefore, DOE estimates that 215 hours per year are dedicated to active mode.

Data regarding the amount of time dishwashers spend in the remaining non-active modes is very limited. A study conducted in Australia, "2005 Intrusive Residential Standby Survey Report," surveyed 120 households and provided information regarding delay start for dishwashers. The report stated that about 25 percent of dishwashers were found to have delay start capabilities. Twenty percent of those surveyed who had dishwashers with delay start capabilities indicated they used this function. The study also reported an average power consumption for delay start mode of 3.8 W.[14] DOE notes the study reported data on dishwashers installed in the households at the time of the survey. Thus, the data may not be representative of dishwashers currently on the market. Because this study provided only limited information on consumer usage patterns for a limited number of modes, DOE investigated other sources of consumer usage data for dishwashers regarding the amount of time dishwashers spend in each possible non-active mode.

One IEC report[15] surveyed dishwasher usage patterns in Germany, Italy, and the United Kingdom households. Dishwashers in these households averaged 213 cycles per year, which is close to the value specified by the current DOE dishwasher test procedure of 215 cycles per year. DOE believes the results of this survey are consistent with consumer behavior in the United States. DOE notes that the sample size of this survey was only 79 households. Regarding delay start, called "time delay function" in the survey, data showed 44 percent of dishwashers had a delay start function. Thirty-four percent of the respondents who owned a dishwasher with a delay start function used the function. Respondents who did use delay start used it for 16 percent of all cycles, with an average delay setting of 5.1 hours. If the results for delay start are applied to all dishwashers and cycles, the average delay start per cycle is just under 8 minutes, or 26 hours per year. For cycle finished mode, called "program end" in the survey, data from all households showed the average time after program end and before switching the machine off was 1.1 hours. If results for cycle finished mode are applied to all dishwashers and cycles, the average total cycle finished mode hours is 237 hours per year.

DOE is using data from this IEC survey in its estimates of the energy consumption associated with the different dishwasher modes. Of a total 8,760 hours per year,[16] the hours not associated with active, delay start, or cycle finished mode are allocated to off and inactive modes. To determine the approximate wattages associated with standby modes and off mode, DOE conducted internal testing on 14 dishwashers.[17] Average power levels in watts are multiplied by the estimated number of hours allocated per year to each mode to calculate the annual energy use for each mode. For example, the active mode power and annual energy use were calculated based on 215 cycles per year for a standard-size dishwasher with a minimum standard EF of 0.65. The typical average per-cycle energy use for such a dishwasher is calculated to be 1.54 kWh per cycle. The product of these inputs yields annual energy use in active mode of 331.1 kWh per year. In summary, Table III.3 presents the comparison of the average wattages and annual energy use associated with all dishwasher modes.

[14] "2005 Intrusive Residential Standby Survey Report," Energy Efficient Strategies (February 2006), p. 40.

[15] R. Stamminger, "Stand-by and other lower power modes on dishwashers," *IEC* Report No. 59A/122/INF (March 24, 2006).

[16] DOE used a value of 8760 total hours per year in all of its analyses in today's notice, based on 24 hours/day × 365 days/year. The current dishwasher test procedure includes a value of 8766 hours, which results from 24 hours/day × 365.25 days/year. Although the latter equation is more accurate, DOE has retained the value of 8760 in all its proposed test procedure amendments in today's notice, and notes that the two values vary by a negligible 0.07 percent.

[17] See "Standby and Off Mode Power Measurements," included as entry No. 3 in the docket for this rulemaking.

TABLE III.3—DOE ESTIMATE OF ANNUAL ENERGY USE OF DISHWASHER MODES

Mode	Hours	Typical power *(W)*	Annual energy use *(kWh)*
Active	215	1,540	331.10.
Delay Start	*26	1.91	0.05.
Cycle Finished	237	1.56	0.37.
Off and Inactive	**8,282	0 to 0.69	0 to 5.71.

*Based on IEC 59A/122/INF.
**(8,760 hours per year—215 active mode hours—26 delay start hours—237 cycle finished hours) = 8,282 hours.

As discussed in section III.C, DOE believes that delay start would not be considered part of standby mode, but instead, it would be an active mode. For the reasons discussed earlier, DOE is not proposing amendments to the dishwasher test procedure to define "delay start mode" or to measure power consumption in this mode. The comparison of annual energy consumption of different dishwasher modes presented in Table III.3 shows that energy use associated with delay start mode is relatively insignificant because of the small number of annual hours associated with this mode. In addition, the power levels in this mode are similar to those for off/inactive modes for dishwashers currently on the market. Therefore, DOE proposes to allocate delay start mode hours (which total 26 for this example case) to the inactive and off modes (which would then total 8,308 for this example case). DOE also proposes that 237 hours be associated with cycle finished mode for dishwashers capable of functioning in such a mode, as presented in Table III.3.

To determine the annual hours per mode for dishwashers for which not all standby modes are possible, DOE proposes to reallocate the hours for modes that are not part of the dishwasher's design. For example, if cycle finished mode is not part of a dishwasher's design, the off/inactive mode hours would be the total hours per year minus the active mode hours per year. If cycle finished mode is part of the design, the off/inactive mode hours would be the total hours per year minus the active mode hours per year minus the 237 cycle finished mode hours.

DOE believes that the proposed definition of "off mode" as applied to dishwashers refers to units with mechanical rather than electronic controls, or units with electronic controls combined with a mechanical switch, with which the user can de-energize the electronic controls. Reactivation of the dishwasher with a push-button sensor, touch sensor, or other similar device that consumes power is considered to be a standby mode feature under the proposed definition. The proposed definition states that standby mode facilitates the activation of other modes (including activation or deactivation of active mode) by remote switch (including remote control), internal sensor, or timer. DOE believes there are few dishwashers with electronic controls that have an additional mechanical on/off switch. Therefore, the combined inactive/off mode hours would most likely be allocated fully either to inactive or off mode, depending on the type of controls present on the dishwasher. DOE does not have market share information to determine how many dishwashers are currently shipped with electromechanical controls or the proportion of time spent in off mode for units equipped with a mechanical on/off switch. For dishwashers with electronic controls plus a mechanical on/off switch, DOE is proposing to allocate half of the non-active hours to inactive and half to off modes. DOE welcomes comment and additional information on this point, and on the proposed approach for calculating energy use for standby mode and off mode.

In conclusion, DOE proposes to determine dishwasher standby mode and off mode energy use by: (1) Calculating the product of wattage and allocated hours for all possible standby and off modes; (2) summing the results; and (3) dividing the sum by 1,000 to convert from watt-hours (Wh) to kWh. DOE invites comments on this proposed methodology and associated factors, including accuracy, allocation of annual hours, and test burden for manufacturers. DOE may also consider adoption in the final rule of the following alternative methodology based on comments received.

The comparison of annual energy use of different dishwasher product modes shows that cycle finished mode represents a relatively small number of hours per year at a low power consumption level. For dishwashers currently on the market, these levels are distinct from but comparable to those for off/inactive modes. Thus, DOE could adopt a test procedure for dishwashers that would specify that only hours spent in off and inactive modes would be considered when calculating energy use associated with standby mode and off mode. In that case, all of the non-active hours would be allocated to the inactive and off modes. DOE invites comment on whether such an alternative would be representative of the standby mode and off mode power consumption of dishwashers currently on the market.

2. Dehumidifiers

Energy use for dehumidifiers is expressed as EF, which is the ratio of liters of water removed from the air per kWh. As discussed in section III.F, DOE has determined it is technically feasible to incorporate measures of standby mode and off mode energy use into the overall energy use metric, and accordingly, DOE is making a proposal consistent with that determination, as required by the EISA 2007 amendments to EPCA. (42 U.S.C. 6295(gg)(2)(A)) Thus, DOE proposes that a dehumidifier's total annual energy use be estimated by combining standby mode and off mode energy consumption with active mode consumption based on the number of hours a dehumidifier spends in each mode.

In order to establish the number of hours per year a dehumidifier spends in different operating modes, DOE investigated studies of dehumidifier usage patterns. Table III.4 shows estimates of monthly dehumidifier usage obtained from a variety of sources, including a 1998 Arthur D. Little (ADL) report,[18] a 2005 Lawrence Berkeley National Laboratory (LBNL) report,[19] and estimates provided by ENERGY

[18] R. Zogg, and D. Alberino, "Electricity Consumption by Small End Uses in Residential Buildings," Arthur D. Little (August 20, 1998).

[19] M. McWhinney, *et al.,* "ENERGY STAR product specification development framework: using data and analysis to make program decisions." *Energy Policy,* 33 (2005) pp. 1613–25.

STAR[20] and AHAM in 2006[21] in consultation with manufacturers and others familiar with the product. Most of these estimates demonstrate heavy dehumidifier usage during the summer months and none between the months of November and March. DOE proposes to use AHAM's mid-level estimate of active mode hours for the purpose of this analysis. The AHAM data were developed based on manufacturer experience. DOE believes, therefore, that the data represent a reasonable assessment of the average usage patterns for dehumidifiers. As shown in Table III.4, AHAM's mid-level estimate of annual hourly operation is 1,095 active mode hours, while other estimates range from 875 to 4,320 active mode hours. For the purposes of this analysis, DOE proposes that 1,095 hours be associated with active mode.

TABLE III.4—ESTIMATES OF ACTIVE MODE OPERATING HOURS FOR DEHUMIDIFIERS

Source	Nov–Mar	Apr	May	June	July	Aug	Sep	Oct	Annual
AHAM-Low	0	0	70	210	245	245	70	35	875
AHAM-Mid	0	14	86	231	288	288	130	58	1,095
AHAM-High	0	37	110	256	329	329	183	73	1,315
ADL	0	0	180	360	360	360	180	180	1,620
ENERGY STAR	0	0	475	475	475	475	475	475	2,851
LBNL-High	1,800	360	360	360	360	360	360	360	4,320

DOE is aware that a dehumidifier may be unplugged for a certain percentage of time, and, therefore, will not be in either standby mode or off mode. DOE does not have data regarding the amount of time a typical dehumidifier is unplugged. However, in its comment on the framework document for the residential dishwasher, dehumidifier, cooking products, and commercial clothes washer energy conservation standards rulemaking, AHAM stated that dehumidifiers are normally used on a regional basis in basements during humid summer hours in northern climates. Reviewing the survey data presented in Table III.4, which show no active mode hours of operation for the months from November to March and minimal active mode hours in April, in the context of AHAM's comment has led DOE to tentatively conclude that dehumidifiers would likely be unplugged during the period from November to March and for half of April (5.5 months). Therefore, DOE estimates the time dehumidifiers spend unplugged as 3,984 hours.

Next, DOE investigated how the remaining 3,681 non-active hours (8,760 − 1,095—3,984) would be allocated to the other operating modes. DOE is not aware of any reliable consumer usage data on the number of hours per year dehumidifiers spend in delay start and bucket full/removed modes. In the absence of such data, DOE estimated the time spent in these modes in the manner described below.

To estimate a representative number of annual hours for bucket full/removed mode, DOE estimated the number of times a dehumidifier bucket would be expected to fill with water and the number of hours the bucket would be expected to remain full before being emptied. As discussed in the November 2007 ANOPR, DOE estimated that the predominant dehumidifier product class, which has 25.01–35 pints per day capacity and operates at the existing energy conservation standard level (EF of 1.35 liters per kWh), would have an annual energy use of about 480 kWh per year. 72 FR 64432, 64473 (Nov. 15, 2007). DOE estimates that such a dehumidifier would remove 648 liters of water from the air per year (480 kWh per year × 1.35 liters per kWh = 648 liters per year). Based on the units in DOE's test sample with a capacity between 25.01–35 pints per day, DOE estimates that the average condensate collection bucket size for this product class would be 18.7 pints, or 8.9 liters.[22] If it is assumed the typical consumer will run a dehumidifier until the bucket is full before emptying it, DOE estimates that dehumidifiers will reach bucket full/removed mode 73 times per year (648 liters of water removed from the air per year/8.9 liter bucket capacity = 73). Thus, the 1095 active mode hours divided by 73 bucket full mode events results in an estimate of 15 hours that the dehumidifier spends in active mode per bucket fill. DOE believes that consumers will not empty the collection bucket more than once per day, so the dehumidifier is likely to remain full an average of 9 hours per bucket-full event (24 hours per day − 15 hours per bucket fill = 9 hours). Based on these assumptions, DOE estimates the number of bucket full/removed annual hours to be 657 hours (73 bucket fills per year × 9 hours bucket remains full before being emptied and replaced).

To determine the number of annual hours associated with delay start mode, DOE surveyed dehumidifier models available on the market. DOE determined that about 19 percent of dehumidifiers have a delay start mode function and that the delay start function can be set for up to 24 hours. DOE estimates that the delay start function will only be used on 50 percent of these 19 percent of dehumidifiers that have the function. DOE also estimates that consumers that do use the delay start function will use it once a day for 10 percent of the 199 dehumidifying days per year. (The dehumidifying days are the 6.5 months of the year during which the dehumidifier may be operated in active mode, as shown in the AHAM's mid-level estimate in Table III.4.) DOE also estimates that consumers will use an average delay setting of 12 hours (which is half of the maximum delay start time available on dehumidifiers.) Based on these assumptions, DOE estimates that the average time a dehumidifier is operating in delay start mode per active mode day is 6.8 minutes, or 23 hours per year.

The estimates of annual hours and energy consumption associated with the active, delay start, and bucket full/removed modes are displayed in Table III.5. To determine the approximate wattages associated with standby modes and off mode, DOE conducted internal testing on 13 dehumidifiers.[23] Average power levels in watts are multiplied by

[20] U.S. Environmental Protection Agency and U.S. Department of Energy, ENERGY STAR, "Savings Calculator—Dehumidifiers (Assumptions) (2006) (Last accessed August 10, 2010). Available online at: *http://www.energystar.gov/index.cfm?c=dehumid.pr_dehumidifiers.*

[21] AHAM, *AHAM Data on Dehumidifiers for Efficiency Standards Rulemaking* (August 23, 2006) (Docket No. EE–2006–STD–0127, Comment Number 17).

[22] *See* "Dehumidifier Bucket Size.pdf," included as entry No. 4 in the docket for this rulemaking

[23] *See* "Standby and Off Mode Power Measurements," included as entry No. 3 in the docket for this rulemaking.

the estimated number of hours allocated per year to each mode to calculate the annual energy use for each mode. For the purpose of this analysis, DOE estimated that the remaining 3,001 annual hours (3,681 non-active mode hours − 23 delay start mode hours − 657 bucket/full removed mode hours = 3,001 hours) would be split between off-cycle mode, inactive mode, and off mode. The split between these three modes is discussed later in this section.

TABLE III.5—DOE ESTIMATE OF ANNUAL ENERGY USE OF DEHUMIDIFIER MODES

Mode	Hours	Typical power (*W*)	Annual energy use (*kWh*)
Active	1,095	493	540.
Delay Start *	23	1.54	0.04.
Bucket Full/Removed **	** 657	1.63	1.07.
Off-Cycle/Inactive/Off	3,001	0 to 1.04	0 to 3.12.

* 19 percent (percentage of dehumidifiers with delay start function) × 50 percent (percentage of machines for which the delay start function is used) × 10 percent (for consumers that use the delay start function, the percentage of dehumidifying days that a consumer will use this function per day) × 12 hours (average programmed duration of delay start period) × 199 days (number of dehumidifying days per year) = 23 hours.
** 73 (bucket fills per year) × 9 hours (hours the bucket remains full before being emptied and replaced) = 657 hours.

As discussed in section III.C, DOE believes that delay start mode would not be considered part of standby mode, but instead would be a form of active mode. Therefore, DOE is not proposing amendments to the dehumidifier test procedure to define "delay start mode" or to measure power consumption in this mode. The comparison of the annual energy consumption of different dehumidifier modes presented in Table III.5 shows that energy use associated with delay start mode is relatively insignificant because dehumidifiers spend only a small number of hours in this mode. In addition, the power levels in delay start mode are similar to those for off/inactive modes for dehumidifiers currently on the market. Therefore, DOE proposes to allocate delay start mode hours (which total 23 hours for this example case) to the off-cycle, inactive, and off modes (which would then total 3,024 hours in this example case).

To determine the annual hours per mode for dehumidifiers for which not all standby modes are possible, DOE estimated values by reallocating the hours associated with various standby modes that are not present using the ratios discussed previously. DOE's logic for this distribution of hours follows.

For example, if bucket full/removed mode is not possible for dehumidifiers with a continuous drain and no condensate collection bucket, off-cycle/inactive/off modes would equal 3,024 off-cycle/inactive/off mode hours + 657 bucket full/removed hours = 3,681 hours. DOE believes the proposed definition of "off mode" as applied to dehumidifiers is similar to that for dishwashers. Off mode, as applied to dehumidifiers, refers to units with mechanical rather than electronic controls, or units with electronic controls combined with a mechanical switch that the user can use to de-energize the electronic controls. DOE observed during testing that dehumidifiers with electronic controls require that a humidity level be set when the unit is powered on; if the room humidity level is above the level set, the unit begins operating in active mode. Therefore, DOE believes that when a dehumidifier with electronic controls is powered on, the majority of the non-active mode hours (*i.e.,* when the relative humidity level in the room is below the dehumidifier humidity set point) would be associated with off-cycle mode. If a dehumidifier is equipped with electronic controls and a push-button sensor to power on the controls, it operates in the inactive mode when the unit is not powered on. DOE believes that a dehumidifier with a remote control can be controlled whenever it is plugged in. Thus, these units do not have an off mode and instead operate in the inactive mode when the unit is not powered on, and operate in off-cycle or active mode when the unit is powered on. However, if a dehumidifier allows the user to switch off remote control operation, it would be capable of off, inactive, and off-cycle modes. DOE does not have consumer usage data on the distribution of annual mode hours for dehumidifiers among the different combinations of off-cycle, inactive, and off modes. DOE proposes that the annual hours be split evenly between the off-cycle, inactive, and off modes depending on which modes are present on the dehumidifier under test. Otherwise, for units which are capable of operating in only off-cycle, inactive, or off mode, DOE proposes that all of the hours be allocated to the appropriate mode. DOE welcomes any data available on this issue.

In summary, DOE proposes to amend the dehumidifier test procedure to determine energy use associated with standby mode and off mode by: (1) Calculating the products of wattage and allocated hours for all possible standby and off modes; (2) summing the results; and (3) dividing the sum by 1,000 to convert from Wh to kWh. DOE invites comments on this proposed methodology for dehumidifiers and associated factors, including accuracy, allocation of annual hours, and test burden. DOE may also consider adoption in the final rule of the following alternative methodology based on comments received.

The comparison of annual energy use of different dehumidifier modes shows that, for dehumidifiers currently on the market, power consumption levels in bucket full/removed mode are distinct from but comparable to those for off-cycle/inactive/off modes. Thus, DOE could adopt an approach for dehumidifiers limited to specifying the hours for only off-cycle, inactive, and off modes when calculating energy use associated with standby mode and off mode. In that case, all of the non-active hours (3,681 hours total), including bucket full/removed mode, would be allocated to the off-cycle, inactive, and off modes. DOE invites comment on whether this alternative would be representative of the standby mode and off mode power consumption of dehumidifiers currently on the market.

3. Conventional Cooking Products

Energy use for conventional cooking products is expressed as EF, which is the ratio of annual cooking energy output to the annual energy input. As discussed in section III.F, DOE has determined it is technically feasible to incorporate measures of standby mode and off mode energy use into the overall energy use metric, and accordingly, DOE is making a proposal consistent with that determination, as required by the EISA 2007 amendments to EPCA. (42 U.S.C. 6295(gg)(2)(A)) In order to incorporate standby mode and off mode power consumption into the overall energy consumption for conventional

cooking products, DOE analyzed data on the usage patterns and power consumption in these modes on an annual basis for each product class of conventional cooking products, as discussed below.

a. Conventional Ovens

DOE investigated the hours and energy consumption associated with each possible operating mode for conventional ovens, including inactive, Sabbath, delay start, cycle finished, off, and active modes.

DOE is unaware of reliable consumer usage data for the number of hours spent in active mode for conventional ovens. To estimate the number of annual active mode hours, DOE reviewed data from the Energy Information Administration (EIA)'s 2005 "Residential Energy Consumption Survey" (RECS).[24] RECS is a national sample survey of housing units that collects statistical information on the consumption of and expenditures for energy in housing units, along with data on energy-related characteristics of the housing units and occupants. RECS provides survey data on the frequency of conventional oven use per week. Based on its analysis of RECS data, DOE estimates that the number of active mode cooking cycles per year is 211. Assuming that a conventional oven active mode cycle is on average 1 hour long, DOE estimates that the number of active mode hours per year for a conventional oven is 211. DOE welcomes information and data on such average cycle times, as well as the number of annual conventional oven usage cycles. For the purposes of this analysis, DOE proposes that 211 hours be associated with active mode and the remaining 8,549 hours of the year be associated with the remaining possible modes, including inactive, delay start, cycle finished, Sabbath, and off mode. RECS also provides consumer usage data on how many conventional ovens are used per household. Based on its analysis of RECS data, DOE estimates that 1.04 conventional ovens are used per household.

Similarly, DOE is not aware of reliable consumer usage data for the number of hours conventional ovens spend in various non-active modes. DOE estimated the time associated with Sabbath mode in conventional ovens based on the percentage of Jewish households in the United States that observe kosher practices at home (the households most likely to use Sabbath mode), the number of annual work-free days, and the number of conventional ovens used per household. DOE believes this represents the population of consumers which uses Sabbath mode features in a conventional oven. DOE estimates the percentage of Jewish consumers observing kosher practices at home to be about 0.54 percent of the total U.S. population, based on data from a 2000–01 population survey by the United Jewish Communities,[25] which reported that 21 percent of 2.9 million Jewish households (which equals 609,000 households) in the United States keep a kosher home, compared to 112,386,298 total households in the United States as of 2008.[26] DOE also estimates 1,584 hours of annual work-free hours, which would comprise the weekly Sabbath and the annual non-working Jewish holidays.[27] Using these estimates as well as the number of ovens per household as determined earlier in this section, DOE estimates that 8.9 hours per year would be associated with Sabbath mode for conventional ovens. The calculation is: 0.54 percent (percent of U.S. households that observe kosher practices) × 1,584 hours (annual work-free hours per year) × 1.04 (conventional ovens per household) = 8.9 hours per year.

DOE also estimated the annual hours associated with delay start mode. DOE analyzed data from a DOE survey of ovens currently available on the market and estimated that 96 percent of conventional ovens are equipped with a delay start function. DOE notes that conventional ovens may offer a delay start function of up to 24 hours. However, DOE is unaware of any reliable usage data for the delay start function. In the absence of data, DOE has estimated that, given the prevalence of delay start-equipped ovens, approximately 50 percent of consumers will use this feature for at least some cooking cycles. DOE further estimates that consumers that use the delay start function will use it for 5 percent of cooking cycles and will program a 12-hour delay start period. (The 12-hour delay is half of the maximum delay start time available on conventional ovens, which is also approximately the time between preparation in the morning and initiating a cooking cycle in the evening.) Applying these estimates to all conventional ovens and cooking cycles (211 cycles per year as determined earlier), DOE estimates that the average time a conventional oven is operating in delay start mode per cycle is 17 minutes, or 61 hours per year.

To estimate the annual time associated with cycle finished mode, DOE assumed that conventional ovens on average remain in cycle finished mode for 5 minutes after every cycle. Calculations based on that assumptions result in an estimate of 18 annual hours associated with cycle finished mode.

The remaining 8,461.1 annual hours not associated with active, Sabbath, delay start, or cycle finished mode are allocated to off and inactive modes (8,760 annual hours − 211 active mode hours − 8.9 Sabbath mode hours − 61 delay start mode hours − 18 cycle finished mode hours). The hours for the relevant modes and estimates of power input and energy use for conventional ovens are summarized in Table III.6. The approximate wattages associated with each mode, other than active mode, were determined from internal testing conducted by DOE on 12 conventional ovens.[28] For active mode, the typical average power level is calculated by dividing the annual energy consumption of a baseline efficiency model electric self-cleaning oven (EF of 0.1099 and annual energy consumption of 171.0 kWh per year) by 211 active hours, which equals 810 W. Electric self-cleaning ovens were determined to be the predominant conventional electric oven product class as part of the November 2007 ANOPR. 72 FR 64432, 64474 (Nov. 15, 2007). Although the hours per mode presented in Table III.6 are estimates based on limited study data, DOE believes the energy patterns illustrated in this table are representative for most conventional ovens.

[24] U.S. Department of Energy-Energy Information Administration, "Residential Energy Consumption Survey," 2005 Public Use Data Files (2005). Available online at: *http://www.eia.doe.gov/emeu/recs/*. It is noted that EIA's 2005 RECS is the latest available version of this survey.

[25] United Jewish Communities, "The National Jewish Population Survey 2000–01—Strength, Challenge and Diversity in the American Jewish Population," (Sept. 2003) (Last accessed August 10, 2010). Available online at: *http://www.jewishfederations.org/local_includes/downloads/4606.pdf*.

[26] U.S. Census Bureau. "2006 American Community Survey 3–Year Estimates. S1101. Households and Families" (2006) (Last accessed August 10, 2010). Information available online at: *http://factfinder.census.gov/servlet/STTable?_bm=y&-qr_name=ACS_2008_3YR_G00_S1101&-geo_id=01000US&-ds_name=ACS_2008_3YR_G00_&-_lang=en&-format=&-CONTEXT=st*.

[27] These Jewish holidays included Rosh Hashanah, Yom Kippur, Sukkot, Shemini Atzeret, Simchat Torah, Shavu'ot, and Passover.

[28] *See* "Standby and Off Mode Power Measurements, pdf," included as entry No. 3 in the docket for this rulemaking.

TABLE III.6—ESTIMATE OF ANNUAL ENERGY USE OF CONVENTIONAL OVEN MODES

Mode	Hours	Typical power *(W)*	Annual energy use *(kWh)*
Active	211	810	171.0.
Sabbath	*8.9	7.59	.068.
Delay Start	**61	5.35	0.33.
Cycle Finished	†18	1.75	0.032.
Off/Inactive	8,461.1	0 to 3.80	0 to 32.15.

*1,584 (yearly work-free hours) × 1.04 (conventional ovens per household) × 0.54 percent (percent of U.S. households that observe kosher practices) = 8.9 hours.

**96 percent (percentage of conventional ovens with delay start function) × 50 percent (percentage of machines for which the delay start function is used) × 5 percent (for consumers that use the delay start function, the percentage of cycles that the consumer would use this function) × 12 hours (average programmed duration of delay start period) × 211 (annual cooking cycles) = 61 hours.

†211 (annual cycles) × 5 minutes (estimated cycle finished minutes per cycle) = 18 hours.

As discussed in section III.C, DOE believes delay start mode would not be considered part of standby mode, but instead, it would be a form of active mode. Therefore, DOE is not proposing amendments to the conventional oven test procedure to define delay start mode or to measure power consumption in this mode. The comparison of annual energy consumption of different conventional oven modes shows that energy use associated with delay start mode is relatively insignificant because only a small number of hours are associated with this mode. In addition, the power levels in this mode are similar to those for off/inactive modes for conventional ovens currently on the market. For this reason, DOE proposes to allocate delay start mode hours (which total 61 hours for this example case) to the inactive and off modes (which would then total 8,522.1 hours in this example case.)

As also discussed in section III.C, DOE believes that Sabbath mode would be considered part of the active mode. Therefore, DOE is not proposing amendments to the conventional cooking products test procedure to define "Sabbath mode" or to measure power consumption in this mode. However, the comparison of annual energy consumption shows that energy use associated with Sabbath mode is insignificant because only a small number of hours are associated with this mode. DOE proposes to allocate the Sabbath mode hours (which total 8.9 hours for this example case) to the active mode (which would then total 219.9 hours in this example case.)

To determine the annual hours per mode for conventional ovens for which not all standby modes are possible, DOE estimated values based upon reallocating the hours for modes that are not present using the ratios discussed previously. If cycle finished mode, which is assumed to be a fixed value of 18 hours per year, is not present, the off/inactive mode hours would be 8,760 total hours − 219.9 active mode hours = 8,540.1 hours. If cycle finished mode is possible, the off/inactive mode hours would be 8,760 total hours − 219.9 active mode hours − 18 cycle finished hours = 8,522.1 hours.

DOE believes the proposed definition of "off mode" as applied to conventional ovens refers to units with mechanical rather than electronic controls, or units with electronic controls combined with a mechanical switch, with which the user can de-energize the electronic controls. Reactivating a conventional oven with a push-button sensor, touch sensor, or other similar device that consumes power is considered to be a standby mode feature under the proposed definitions. DOE believes there are few conventional ovens with electronic controls that have an additional mechanical off switch. Therefore, the combined inactive/off mode hours would most likely be allocated fully either to inactive or off mode, depending on the type of controls present on the conventional oven. DOE does not have market share information to determine how many conventional ovens are currently shipped with electromechanical controls. For conventional ovens with electronic controls plus a mechanical off switch, DOE proposes to allocate half of the non-active hours to inactive and half to off modes. DOE welcomes comment and additional information on this point, and on the proposed approach for calculating energy use for standby mode and off mode, including the decision to allocate all non-active mode hours to off and inactive modes.

In summary, DOE proposes to determine conventional oven energy use associated with standby mode and off mode by: (1) Calculating the product of wattage and allocated hours for all possible standby and off modes; (2) summing the results; and (3) dividing the sum by 1,000 to convert from Wh to kWh. DOE invites comments on this proposed methodology and associated factors, including accuracy, allocation of annual hours, and test burden. DOE may also consider adoption in the final rule of the following alternative methodology based on comments received.

The comparison of annual energy use of different conventional oven product modes shows that cycle finished mode represents a relatively small number of hours at a low power consumption level. For conventional ovens currently on the market, these levels are distinct from but comparable to those for off/inactive mode. Thus, DOE could adopt an approach that would be limited to specifying the hours for only off/inactive mode when calculating energy use associated with standby and inactive/off modes. In that case, all of the non-active hours (8,540.1 hours total) would be allocated to the inactive/off mode. DOE invites comment on whether such an alternative would be representative of the standby mode and off mode power consumption of conventional ovens currently on the market.

b. Conventional Cooktops

DOE investigated the hours and energy consumption associated with each possible operating mode for conventional cooktops, including inactive, Sabbath, off, and active modes. DOE did not observe any models capable of delay start mode or cycle finished mode, and, therefore DOE did not consider these modes for the purpose of this analysis.

DOE notes that RECS only provides usage data for conventional ovens and does not provide usage data for conventional cooktops. As discussed earlier, DOE estimated based on the 2005 RECS that there are 211 active mode cooking cycles per year for conventional ovens, resulting in 211 active mode hours per year, and that the

balance of the year (8,549 hours) is the established number of hours associated with Sabbath, cycle finished, and off/inactive modes. DOE believes that conventional cooktops would have similar active mode usage patterns as conventional ovens. Therefore, DOE is proposing to use the same 211 active mode cycles per year and annual active mode hours for conventional cooktops, so the remaining 8,549 hours of the year would be associated with standby mode and off mode. DOE welcomes information and data on such average cycle times, as well as annual conventional cooktop usage. DOE also notes that RECS does not provide usage data on how many conventional cooktops are used per household. As a result, DOE is proposing to estimate that the average household uses one conventional cooktop.

DOE is not aware of reliable consumer usage data for hours spent in different standby and off modes in conventional cooktops. As was done for conventional ovens, DOE estimated the time associated with Sabbath mode in conventional cooktops based on the percentage of Jewish households in the United States that observe kosher practices at home (the households most likely to use Sabbath mode), the number of annual work-free days, and the number of conventional cooktops used per household. As it did for conventional ovens, DOE estimates that about 0.54 percent of U.S. households keep kosher homes and that there are approximately 1,584 annual work-free hours (*i.e.,* the weekly Sabbath and the annual Jewish holidays). Applying these estimates to the number of cooktops per household as estimated earlier in this section, and estimating that, based on the relatively few cooktop models certified as Sabbath-compliant [29] and the greater availability of ovens with a dedicated Sabbath mode that DOE estimates would be used in place of cooktops on the Sabbath at least 75 percent of the time, DOE estimates that 2.1 hours per year would be associated with Sabbath mode for conventional cooktops. The calculation is as follows: 0.54 percent (percent of U.S. households that observe kosher practices) × 1,584 hours (annual work-free hours per year) × 1 (conventional cooktops per household) × 25 percent (percent of times that cooktops would be used on the Sabbath in place of or in addition to using an oven) = 2.1 hours per year.

The remaining 8,546.9 annual hours not associated with active or Sabbath mode are allocated to off and inactive modes (8,760 annual hours − 211 active mode hours − 2.1 Sabbath mode hours). The hours for the relevant modes and estimates of power input and energy are summarized in Table III.7. The approximate wattage associated with off/inactive mode was determined from internal testing conducted by DOE on eight conventional cooktops.[30] For active mode, the typical average power level is calculated by dividing the annual energy consumption of a baseline efficiency model electric smooth cooktop (EF of 0.742 and annual energy consumption of 128.2 kWh per year) by 211 active hours which equals 608 W. Electric smooth cooktops were determined to be the predominant conventional electric cooktop product class as part of the November 2007 ANOPR. (*See* the ANOPR national impacts analysis (NIA) spreadsheet tool for cooktops and ovens on DOE's Web site at: *http://www1.eere.energy.gov/buildings/appliance_standards/residential/cooking_products_anopr_tools.html*). For Sabbath mode, in which the cooktop burners or heating elements must not be turned on, off, or adjusted during the Sabbath period, DOE estimates that the burners will be set at no more than 25 percent of the heating input associated with active mode, due to safety considerations during such long-duration use. Although the hours per mode presented in this table are estimates based on limited study data, DOE believes that energy patterns illustrated in this table are representative for most conventional cooktops, because Sabbath mode hours would be a small percentage of annual hours and the off/inactive power levels are based on DOE test measurements.

TABLE III.7—ESTIMATE OF ANNUAL ENERGY USE OF CONVENTIONAL COOKTOP MODES

Mode	Hours	Typical power *(W)*	Annual energy use *(kWh)*
Active	211	608	128.2.
Sabbath	*2.1	152**	0.33.
Off/Inactive	8,546.9	0 to 3.13	0 to 26.73.

*1,584 (yearly work-free hours) × 1 (conventional cooktops per household) × 0.54 percent (percent of U.S. households that observe kosher practices) × 25 percent (percent of times that cooktops would be used on the Sabbath in place of or in addition to using an oven) = 2.1 hours.
**608 W (power in active mode) × 25 percent (percent of heating input that would be used during the Sabbath).

For the same reasons as discussed for conventional ovens, DOE believes that Sabbath mode would be considered part of the active mode. Therefore, DOE is not proposing amendments to the conventional cooktop test procedure to define "Sabbath mode" or to measure power consumption. However, the comparison of annual energy consumption shows that energy use associated with Sabbath mode is insignificant, because only a small number of hours are associated with this mode. DOE instead proposes to allocate the Sabbath mode hours (which total 2.1 hours for this example case) to the active mode (which would total 213.2 hours in this example case).

As with conventional ovens, DOE believes there are few conventional cooktops with electronic controls that have an additional mechanical off switch. Therefore, DOE proposes that the combined inactive/off mode hours would likely be allocated fully either to inactive or off mode, depending on the type of controls present on the conventional cooktop. For conventional cooktops for which both inactive mode and off mode are present, DOE proposes to allocate half of the non-active hours each to inactive and off modes. DOE welcomes comment and additional information on the proposed approach for calculating energy use for standby and off modes, including the decision to allocate all non-active mode hours to off and inactive modes.

In summary, DOE proposes to determine conventional cooktop energy use associated with standby mode and off mode by: (1) Calculating the product

[29] For information on requirements for Sabbath-compliant cooktops and a list of cooktops certified as Sabbath-compliant, please visit: *http://www.star-k.com/cons-appl.htm.*

[30] *See* "Standby and Off Mode Power Measurements.pdf," included as entry No. 3 in the docket for this rulemaking.

of wattage and allocated hours for all possible standby and off modes; (2) summing the results; and (3) dividing the sum by 1,000 to convert from Wh to kWh. DOE invites comments on this proposed methodology and associated factors, including accuracy, allocation of annual hours, and test burden.

c. Conventional Ranges

DOE investigated the hours and energy consumption associated with each possible operating mode for conventional ovens, including inactive, Sabbath, delay start, cycle finished, off, and active mode.

DOE notes that RECS only provides usage data for conventional ovens and does not provide usage data for conventional ranges. As discussed previously, DOE estimated based on the 2005 RECS that there are 211 active mode cooking cycles per year for conventional ovens, resulting in 211 active mode hours per year. DOE also estimated that a conventional cooktop is in the active mode for 211 hours per year. DOE believes that the annual hours that a conventional range would be in active mode would be the sum of the annual active mode hours for conventional ovens and cooktops, which equals 422 hours. Since a range is essentially a combination of an oven and a cooktop, DOE's rationale is to combine the average values for these two components individually. Therefore, for conventional ranges, DOE proposes to associate 422 hours with active mode, and the remaining 8,338 hours of the year with the other non-active modes. DOE welcomes information and data on such average cycle times, as well as annual conventional range usage. RECS does provide consumer usage data on how many conventional ranges are used per household. Based on its analysis of the 2005 RECS data, DOE estimates that 1.03 conventional ranges are used per household.

DOE is not aware of reliable consumer usage data for hours spent in different standby and off modes for conventional ranges. DOE estimated the time associated with Sabbath mode in conventional ranges based on the percentage of Jewish households in the United States that observe kosher practices at home (the households expected to use Sabbath mode), the number of annual work-free days, and the number of conventional ranges used per household. DOE believes this represents the population of consumers which uses Sabbath mode features in a conventional range. As was determined earlier for conventional ovens, DOE estimates that about 0.54 percent of U.S. households keep kosher homes. As was estimated for conventional ovens, DOE estimates 1,584 annual work-free hours (*i.e.,* the weekly Sabbath and the annual Jewish holidays). Applying these estimates to the number of ranges per household, as estimated earlier in this section, DOE estimates that 8.8 hours per year would be associated with Sabbath mode for conventional ranges. The calculation is as follows: 0.54 percent (percent of U.S. households that observe kosher practices) × 1,584 hours (annual work-free hours per year) × 1.03 (conventional ranges per household) = 8.8 hours per year.

DOE analyzed a DOE survey of ranges currently available on the market and estimated that 79 percent of conventional ranges are equipped with a delay start function.[31] DOE notes that conventional ranges available on the market may offer a delay start function of up to 24 hours. As it did for conventional ovens, DOE estimates this function will be used on only 50 percent of conventional ranges so equipped. DOE also estimates that consumers who use the delay start function will use it for 5 percent of the cooking cycles associated with the oven portion of the range and set it for a 12-hour delay start period. (The 12-hour period is half of the maximum delay start time available on conventional ranges.) Applying these estimates to all conventional ranges and applying DOE's estimate of 211 oven cooking cycles per year, DOE estimates that the average time a conventional range is operating in delay start mode per cycle is 14.2 minutes, or (14.2 minutes × 211 cycles per year) = 50 hours per year.

To estimate the annual time associated with cycle finished mode, DOE assumes that, on average, conventional ranges remain in cycle finished mode for 5 minutes after every cycle, resulting in (5 minutes × 211 cycles per year) = 18 annual hours associated with cycle finished mode.

The remaining 8,261.2 annual hours not associated with active, Sabbath, delay start, or cycle finished mode are allocated to off and inactive modes (8,760 annual hours − 422 active mode hours − 8.8 Sabbath mode hours − 50 delay start mode hours − 18 cycle finished mode hours). The hours for the relevant modes and estimates of power input and energy use are summarized in Table III.8. The approximate wattages associated with each mode, other than active mode, were determined from internal testing conducted by DOE on 21 conventional ranges.[32] For active mode, the typical average power level is based on the sum of the typical power levels for conventional ovens and cooktops, as shown in Table III.6 and Table III.7. While the hours per mode presented in this table are estimates based on limited study data, DOE believes that energy patterns illustrated in Table III.8 are representative for most conventional ranges because Sabbath mode hours would be reasonably a small percentage of annual hours and the non-active power levels are based on DOE test measurements.

TABLE III.8—ESTIMATE OF ANNUAL ENERGY USE OF CONVENTIONAL RANGE MODES

Mode	Hours	Typical power (*W*)	Annual energy use (*kWh*)
Active	422	709	†† 299.2.
Sabbath	* 8.8	3.72	0.033.
Delay Start	** 50	2.95	0.148.
Cycle Finished	† 18	2.52	0.045.
Off/Inactive	8,261.2	0 to 2.68	0 to 22.14.

* 1,584 (yearly work-free hours) × 1.04 (conventional ranges per household) × 0.54 percent (percent of U.S. households that observe kosher practices) = 8.8 hours.

[31] *See* "Range Modes.pdf," included as entry No. 5 in the docket for this rulemaking.

[32] *See* "Standby and Off Mode Power Measurements.pdf," included as entry No. 3 in the docket for this rulemaking.

** 79 percent (percentage of conventional ovens with delay start function) × 50 percent (percentage of machines for which the delay start function is used) × 5 percent (for consumers that use the delay start function, the percentage of cycles that the consumer would use this function) × 12 hours (average programmed duration of delay start period) × 211 (annual oven portion cooking cycles) = 50 hours.
† 211 (annual oven portion cooking cycles) × 5 minutes (estimated cycle finished minutes per cycle) = 18 hours.
†† 171 kWh (annual energy use for conventional ovens) + 128.2 kWh (annual energy use for conventional cooktops) = 299.2 kWh.

As discussed for conventional ovens, DOE believes delay start mode would not be considered part of standby mode, because it is not a mode which may persist indefinitely. Instead, DOE believes delay start mode to be a form of active mode. Therefore, DOE is not proposing amendments to the conventional range test procedure to define "delay start mode" or to measure power consumption in this mode. However, the comparison of annual energy consumption of different conventional oven ranges shows that energy use associated with delay start mode is relatively insignificant because only a small number of hours are associated with this mode. In addition, the power levels in this mode are similar to those for off/inactive modes for conventional ranges currently on the market. For this reason, DOE proposes to allocate delay start mode hours (which total 50 hours for this example case) to the inactive and off modes (which would then total 8,367.5 hours in this example case).

Also, as discussed for conventional ovens, DOE believes that Sabbath mode would be considered part of the active mode for conventional ranges because, in this mode, the automatic shutoff for the oven is overridden to allow for warming of pre-cooked foods during such periods as the Jewish Sabbath. Therefore, DOE is not proposing amendments to the conventional cooking products test procedure to define "Sabbath mode" or to measure power consumption in this mode. However, the comparison of annual energy consumption shows that energy use associated with Sabbath mode is insignificant because only a small number of hours are associated with this mode. DOE instead proposes to allocate the Sabbath mode hours (which total 8.8 hours for this example case) to the active mode hours (which would then total 430.8 hours in this example case.)

To determine the annual hours per mode for conventional ranges for which not all standby modes are possible, DOE estimated values by reallocating the hours for modes that are not present using the allocations discussed previously. If cycle finished mode, which is assumed to be a fixed value of 18 hours per year, is not possible, the off/inactive mode hours would be 8,760 total hours − 430.8 active mode hours = 8,329.2 hours. If cycle finished mode is possible, the off/inactive mode hours would be 8,760 total hours − 430.8 active mode hours − 18 cycle finished hours = 8,311.2 hours.

Also, for the same reasons as discussed for conventional ovens, DOE proposes that, in most cases, the combined inactive/off mode hours would be allocated fully either to inactive or off mode, depending on the type of controls present on the conventional range. However, for conventional ranges for which both inactive mode and off mode are present, DOE proposes to allocate half of the non-active hours to inactive mode and the other half to off mode. DOE welcomes comment and additional information on the proposed approach for calculating energy use for standby mode and off mode, including the decision to allocate all non-active mode hours to off and inactive modes.

In summary, DOE proposes to determine conventional range energy use associated with standby mode and off mode by: (1) Calculating the product of wattage and allocated hours for all possible standby and off modes; (2) summing the results; and (3) dividing the sum by 1,000 to convert from Wh to kWh. DOE invites comments on this proposed methodology and associated factors, including accuracy, allocation of annual hours, and test burden. DOE may also consider adoption in the final rule of the following alternative methodology based on comments received.

The comparison of annual energy use of different conventional range modes shows that cycle finished mode represents a relatively small number of hours at a low power consumption level. For conventional ranges currently on the market, these levels are distinct from but comparable to those for off/inactive mode. Thus, DOE could adopt an approach that would be limited to specifying the hours for only off/inactive mode when calculating energy use associated with standby and inactive/off modes. In that case, all of the non-active hours (8,329.2 hours total) would be allocated to the inactive/off mode. DOE invites comment on whether such an alternative would be representative of the standby mode and off mode power consumption of conventional ranges currently on the market.

F. Measures of Energy Consumption

Under 42 U.S.C. 6295(gg)(2)(A), EPCA directs that when DOE amends its test procedures to include standby mode and off mode energy consumption for a covered product, DOE shall integrate such energy consumption into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product, unless the Secretary determines that: (i) The current test procedures for a covered product already fully account for and incorporate the standby mode and off mode energy consumption of the covered product; or (ii) such an integrated test procedure is technically infeasible for a particular covered product, in which case the Secretary shall prescribe a separate standby mode and off mode energy use test procedure, if technically feasible.

In considering whether it is technically feasible to integrate standby mode and off mode energy use into a combined metric along with active mode energy use, DOE makes a case-by-case determination for the product in question. One general principle which DOE considers in making such determination is whether any mode of energy use would be so large as to overwhelm the other for standard-setting purposes. Although it may be possible to measure energy use in each mode with a substantial degree of precision, in some cases there may be very large differences in energy use in active mode versus standby/off modes, such that the effects of the lesser mode would not be reflected within the precision of the regulatory metric. In such cases, DOE believes that disparities in levels of energy use between the different modes may be so great that a combined metric would not be technically feasible, so a separate metric for standby mode and off mode would be warranted. In contrast, where the standby mode and off mode energy use is of a magnitude that it would materially affect that standard-setting process without overwhelming the effects of differing levels of active mode energy use, a combined metric would be meaningful and will be adopted as required by the EISA 2007 amendments to EPCA.

DOE analyzed whether the existing measures of energy consumption for dishwashers, dehumidifiers, and conventional cooking products can be

combined with standby mode and off mode energy use to form a single metric. DOE's tentative conclusions resulting from this inquiry are presented below.

1. Dishwashers

The DOE test procedure for dishwashers currently incorporates various measures of energy and water consumption. These include per-cycle machine electrical energy consumption, per-cycle energy consumption from drying dishes after termination of the last rinse cycle, per-cycle water consumption, per-cycle water heating energy consumption (for electrically-heated, gas-heated, or oil-heated water), and annual standby energy consumption. (*See* 10 CFR part 430, subpart B, appendix C, sections 5.1, 5.2, 5.4, and 5.6 for details.) The test procedure also provides a calculation for EAEU, EAOC, and EF. The current standards are based on EAEU, which incorporates a simplified measure of standby energy consumption. (10 CFR 430.32(f)(2))

Because the dishwasher test procedure already combines measures of active mode energy consumption and standby mode energy use to derive an overall "energy efficiency measure," DOE believes it is technically feasible to incorporate standby mode and off mode energy consumption into the overall energy efficiency descriptor, which is the EAEU. Furthermore, DOE notes that the analysis of overall energy use for dishwashers presented in section III.E shows that the standby mode and off mode energy use is of a magnitude that it would materially affect that standard-setting process without overwhelming the effects of differing levels of active mode energy use . Therefore, a combined measure of energy efficiency for dishwashers is a meaningful measure. As discussed in section III.B, DOE is proposing amendments to the testing methods to fully account for standby mode and off mode energy consumption for dishwashers. Because it is proposing those amendments, DOE also proposes to amend the calculation of EAEU to incorporate the revised measures of standby mode and off mode energy consumption. The revised EAEU metric would satisfy the EPCA requirement to integrate standby mode and off mode energy consumption into the overall energy consumption metric. (42 U.S.C. 6295(gg)(2)(A))

As noted in section I, EPCA requires that DOE must determine to what extent, if any, a 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)) The current DOE dishwasher test procedure defines "standby mode" as the "lowest power consumption mode which cannot be switched off or influenced by the user * * *" 10 CFR part 430, subpart B, appendix C, section 1.14. DOE is proposing to measure an additional standby mode (*i.e.,* cycle finished mode). However, the proposed amendments would clarify that the provisions related to the new measures of energy consumption in standby mode and off mode would not be required to be used by manufacturers until the compliance date of any amended dishwasher standards addressing standby mode and off mode energy use. Therefore, the proposed amendments to the dishwasher test procedure regarding standby mode and off mode would not alter the measured efficiency of any covered product under the existing test procedure.

As part of the final rule for the DOE dishwasher test procedure published in the **Federal Register** on August 29, 2003, DOE also revised the test procedure to include standby energy use in the EAOC calculation, and DOE notes that this amendment was supported by interested parties. 68 FR 51887, 51892–93. Because the current dishwasher test procedure already incorporates standby energy use in the EAOC, DOE believes that it is technically feasible to incorporate both standby mode and off mode energy use into the EAOC. Therefore, DOE proposes to amend the EAOC calculation to incorporate the revised measures of standby mode and off mode energy consumption.

The current dishwasher test procedure also includes a calculation of EF. EF is expressed in cycles per kWh and equals the inverse of the per-cycle machine electrical energy consumption minus half of the drying energy consumption.[33] DOE notes that the current EF metric does not include standby mode energy use. For the final rule amending the dishwasher test procedure published on August 29, 2003, DOE amended only the EAEU and EAOC calculations to include standby power consumption. DOE did not include standby power consumption in the EF calculation because, as defined in the test procedure, the EF: (1) Represents the amount of energy used during a cycle, and (2) standby power is energy consumed outside the wash cycle of a dishwasher and is, therefore, not a parameter in the EF calculation. 68 FR 51887, 51893. For these same reasons, and because the existing energy conservation standard is based on EAEU, DOE is not proposing changes to the EF calculation to include standby mode and off mode energy consumption. DOE expects that the annual energy use metric would continue to be the basis for energy conservation standards when they are next amended.

The dishwasher test procedure currently provides instructions for rounding EAOC to the nearest dollar per year. 10 CFR 430.23(c)(1). However, no instructions are provided for rounding the final values of EF, EAEU, or water consumption per cycle (the latter two of which are the metrics for the current dishwasher energy conservation standards), nor the contributory measurements and interim calculations. This lack of specificity for rounding may lead to uncertainty in the reported metrics or to discrepancies among test laboratories for the same product, resulting in difficulty for regulated entities to ascertain, certify, and report compliance with the existing standards. Therefore, DOE proposes to add instructions to 10 CFR 430.23(c) requiring that EF be rounded to two decimal places, water consumption be rounded to one decimal place, and EAEU be rounded to the nearest whole kWh/year.

2. Dehumidifiers

The DOE test procedure for dehumidifiers currently only incorporates energy consumption in the form of EF (see 10 CFR part 430, subpart B, appendix X for details). EF, defined as liters of water removed from the air per kWh, is the metric for the current energy conservation standards for dehumidifiers. (10 CFR 430.32(v)) The current DOE test procedure for dehumidifiers does not account for standby mode and off mode energy use.

As directed by EPCA, DOE analyzed whether standby mode and off mode energy consumption could be integrated into the overall energy efficiency metric. (42 U.S.C. 6295(gg)(2)(A)) DOE notes that the analysis of overall energy use for dehumidifiers presented in section III.E indicates the standby mode and off mode energy use is of a magnitude that it would materially affect that standard-setting process without overwhelming the effects of differing levels of active mode energy use. Therefore, a combined measure of energy efficiency for dehumidifiers is a meaningful measure.

DOE proposes to establish the following measure of energy consumption for dehumidifiers. The integrated energy factor (IEF) measure accounts for the product's energy use in

[33] The drying energy consumption for dishwashers is the energy consumed using the power-dry feature after the termination of the last rinse option of the normal cycle.

standby mode and off mode, as well as the energy use of the product's main functions. As discussed earlier, the current EF associated with dehumidifiers is calculated based on the liters of water removed from the air per kWh of energy consumed, as measured by a 24-hour test cycle. 10 CFR part 430, subpart B, appendix X, section 4. DOE notes that the calculation of EF represents the liters of water removed from the air per kWh of energy consumed over a given period of time, such as the number of active mode hours per year. If the ratio of the annual standby mode and off mode hours to the annual active mode hours is used to apportion standby mode and off mode power consumption over the active mode test period of one day, it is possible to calculate an IEF that incorporates both the efficiency of water removal from the air and the standby mode and off mode energy consumption. DOE proposes to calculate IEF using the following calculation: (The liters of water removed over the active mode test cycle)/((the active mode energy consumption over the active mode test cycle) + ((the standby mode and off mode annual energy consumption [34] × 24 hours)/(the active mode hours per year))).

Section 3 of the current dehumidifier test procedure provides instructions for rounding EF to two decimal places. Section 3 also states that measurements be recorded at the resolution of the test instrumentation, and that calculations be rounded off to the same number of significant digits as the previous step. 10 CFR part 30, subpart B, appendix X. DOE is proposing to retain these same instructions for EF in section 3.1 of the amended test procedure. DOE is also proposing to round the IEF value in section 5.2 to two decimal places.

3. Conventional Cooking Products

The DOE test procedures for conventional cooking tops, ovens, and ranges currently incorporate various measures of energy consumption. These include test energy consumption, annual cooking energy consumption, annual energy consumption of any continuously-burning pilot lights, annual self-cleaning energy consumption, annual clock energy consumption, total annual energy consumption, and cooking efficiency. (See 10 CFR part 430, subpart B, appendix I for details.) The test procedure also provides a calculation for EF [35] and EAOC. Although there are no current energy conservation standards based on performance for conventional cooking products (*see* 10 CFR 430.32(j)), historically, DOE's rulemaking analyses when considering standards have used EF as the energy conservation metric for conventional cooking products.

DOE notes that the conventional cooking products test procedure currently combines measures of energy consumption and narrow forms of standby energy use, including continuously-operating clock and gas standing pilot light energy consumption, to derive an overall "energy efficiency measure." Therefore, a combined measure of energy efficiency for conventional cooking products has already been demonstrated to be a workable and meaningful measure. For this reason, DOE believes that it would be technically feasible to incorporate standby mode and off mode energy consumption into the overall energy efficiency descriptor (*i.e.,* EF). Because DOE is proposing amendments to fully account for standby mode and off mode energy consumption for conventional cooking products, DOE proposes a combined metric addressing active, standby, and off modes for conventional cooking products, as explained in further detail below.

DOE proposes to establish the following measures of energy consumption for conventional ovens. The measures integrate the product's energy use in standby mode and off mode with energy use during main functions of the products. For conventional electric ovens, the "integrated annual energy consumption" will be defined as the sum of the annual standby mode and off mode energy consumption, annual primary cooking energy consumption, and annual primary self-cleaning energy consumption, expressed in kWh. For conventional gas ovens that use electrical energy, the "integrated annual electrical energy consumption" will be defined as the sum of the annual standby mode and off mode energy consumption, annual secondary cooking energy consumption,[36] and annual secondary self-cleaning energy consumption, expressed in kWh. For conventional electric ovens, IEF will be defined as the (annual useful cooking energy output)/(integrated annual energy consumption). For conventional gas ovens, IEF will be defined as the (annual useful cooking energy output)/(annual gas energy consumption + integrated annual electrical energy consumption). DOE also proposes to include similar integrated annual energy consumption and IEF metrics for section 4.1.2.6 of the cooking products test procedure regarding multiple conventional ovens (*i.e.,* cooking appliances that include more than one conventional oven).

DOE proposes to establish the following measures of energy consumption for conventional cooktops. The measures integrate the product's energy use in standby mode and off mode with energy use during the main functions of the products. For conventional electric cooktops, the "integrated annual energy consumption" will be defined as the (annual standby mode and off mode energy consumption) + (annual useful cooking energy output/conventional cooktop cooking efficiency), expressed in kWh. For conventional gas cooktops, the "integrated annual electrical energy consumption" will be defined as the sum of the annual standby mode and off mode energy consumption, annual energy consumption for cooking, and annual energy consumption of the gas standing pilot light, expressed in kWh. For conventional electric cooktops, IEF will be defined as the annual useful cooking energy output divided by the electric cooktop integrated annual energy consumption. For conventional gas cooktops, IEF will be defined as the annual useful cooking energy output divided by the gas cooktop integrated annual energy consumption.

DOE proposes to establish the following measures of energy consumption for conventional kitchen ranges (*i.e.,* a cooktop and oven combined). The measures integrate the product's energy use in standby mode and off mode with energy use during the main functions of the products. "Integrated annual energy consumption" shall be the sum of the annual cooking energy consumption of each of its components plus the conventional range annual standby mode and off mode energy consumption.[37] The IEF of a

[34] The standby mode and off mode annual energy consumption is equivalent to the average standby mode and off mode power multiplied by the number of standby mode and off mode hours per year.

[35] "Energy factor" is defined as the ratio of the annual useful energy output to the total annual energy input.

[36] "Secondary cooking energy consumption" includes any electrical energy consumption of a conventional gas cooking product during active mode operation.

[37] DOE proposes to measure the standby mode and off mode energy consumption for a conventional range as a single product and to add the standby mode and off mode energy consumption separately in the calculation of the integrated annual energy consumption. It proposes this so that the standby mode and off mode power consumption is not measured separately for each component (*i.e.,* cooktop and oven) and then summed with the cooking annual energy consumption, which would effectively double

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kitchen range shall be the sum of the annual useful cooking energy output of each component divided by the sum of the integrated annual energy consumption of each component.

DOE is also proposing to amend the estimated annual energy cost calculations in 10 CFR 430.23(i) to include the cost of energy consumed in standby mode and off mode for conventional cooking products because, as noted above, the current cooking products test procedure already incorporates measures of narrow forms of standby energy use in the EAOC. Thus, DOE believes that it is technically feasible to incorporate both standby mode and off mode energy use into the EAOC and proposes to amend the EAOC calculations to incorporate the revised measures of standby mode and off mode energy consumption, thereby more accurately representing the unit's EAOC.

The cooking products test procedure currently provides instructions for rounding EAOC to the nearest dollar per year, and the cooking efficiency and energy factor to three significant digits. 10 CFR 430.23(i)(1), (2), (4). DOE proposes to amend the test procedure to provide similar instructions requiring that EAOC based on total integrated annual electrical energy consumption be rounded to the nearest dollar per year and IEF to three significant digits.

G. Compliance With Other EPCA Requirements

1. Test Burden

As noted previously, under 42 U.S.C. 6293(b)(3), EPCA requires that "[a]ny 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." For the reasons that follow, DOE has tentatively concluded that amending the relevant DOE test procedures to incorporate clauses regarding test conditions and methods found in IEC Standard 62301 (First Edition), along with the proposed modifications, would produce the required test results and would not result in any undue burdens.

The proposed amendments to the DOE test procedures incorporate a test standard that is accepted internationally for measuring power consumption in standby mode and off mode. Based on its analysis of IEC Standard 62301 (First Edition), IEC Standard 62301 (CDV), and IEC Standard 62301 (FDIS), DOE has determined that the proposed amendments to the residential dishwashers, dehumidifiers, and conventional cooking products test procedures will produce standby mode and off mode average power consumption measurements that are representative of an average use cycle. These measures will be representative both when the measured power is stable and when it is unstable (*i.e.,* when the measured power varies by 5 percent or more during the proposed 30-minute stabilization period.) Also, the test methods and equipment that the amendments would require for measuring standby mode and off mode power in these products are not substantially different from the test methods and equipment required in the current DOE tests. Thus, the proposed test procedure amendments would not require manufacturers to make significant investments in test facilities and new equipment. Therefore, DOE has tentatively concluded that the amended test procedures would produce test results that measure the standby mode and off mode power consumption during representative use, and that the test procedure would not be unduly burdensome to conduct.

2. Potential Incorporation of IEC Standard 62087

Under 42 U.S.C. 6295(gg)(2)(A), EPCA directs DOE to consider IEC Standard 62087 when amending test procedures to include standby mode and off mode power measurements. As discussed in section III.C of this notice, DOE reviewed IEC Standard 62087, "Methods of measurement for the power consumption of audio, video, and related equipment" (Second Edition 2008–09), and has tentatively determined that it would not be applicable to measuring power consumption of electrical appliances such as dishwashers, dehumidifiers, and conventional cooking products. Therefore, DOE has tentatively concluded that referencing IEC Standard 62087 is not necessary for the proposed amendments to the test procedures that are the subject of this rulemaking.

3. Integration of Standby Mode and Off Mode Energy Consumption Into the Efficiency Metrics

Under 42 U.S.C. 6295(gg)(2)(A), EPCA requires that standby mode and off mode energy consumption be "integrated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product" unless the current test procedures already fully account for the standby mode and off mode energy consumption or if such an integrated test procedure is technically infeasible. For dishwashers, DOE proposes to incorporate the standby mode and off mode energy consumption into the test procedure's calculation of "estimated annual energy use" and "estimated annual operating cost," as discussed in section III.F. For dehumidifiers, DOE proposes to incorporate the standby mode and off mode energy consumption into an IEF metric, as discussed in section III.F. For conventional cooking products, DOE proposes to incorporate the standby mode and off mode energy consumption into an "integrated annual energy consumption," an IEF, and "estimated annual operating cost," as discussed in section III.F of this notice.

EPCA further provides that test procedure amendments adopted to comply with the new statutory requirements for standby mode and off mode energy consumption shall not be used to determine compliance with previously established standards. (42 U.S.C. 6295(gg)(2)(C)) Under this provision, the test procedure amendments pertaining to standby mode and off mode energy consumption that DOE proposes to adopt in this rulemaking would not apply to, and would have no impact on, existing standards.

Even though 42 U.S.C. 6295(gg)(2)(C) clearly states that the test procedure amendments for measurement of standby mode and off mode energy consumption shall not apply to existing standards, DOE must nonetheless determine the effect of such test procedure amendments on measured energy efficiency, measured energy use, or measured water use of any covered product, pursuant to 42 U.S.C. 6293(e)(1). This analysis is provided below. However, no amendments to the energy conservation standards will be required pursuant to 42 U.S.C. 6293(e)(2), because such test procedure amendments will not impact the existing energy conservation standards until the compliance date of a subsequent final rule that amends the standard to comprehensively address standby mode and off mode energy consumption.

For dishwashers, the current energy conservation standards are based on EAEU, which includes standby mode power consumption. Because today's proposed amendments would revise the calculations for EAEU and EAOC, both of which currently incorporate standby mode power to a limited extent, DOE investigated how the proposed amendments would affect the product's

count the contribution of standby mode and off mode energy consumption.

measured efficiency. DOE believes the proposed changes to the dishwasher testing methods for measuring standby mode and off mode energy consumption do not vary significantly from the methods currently in the DOE test procedure for measuring standby power and would not alter the measured efficiency. DOE also believes that the proposed revision to the definition of "standby mode" would be unlikely to significantly affect the measured efficiency. Therefore, DOE believes that the proposed amendments to the dishwasher test procedure would not alter the measured efficiency. In addition, because the proposed amendments would clarify that manufacturers would not be required to use the provisions relating to standby mode and off mode energy use in the EAEU to determine compliance with the energy conservation standard until the compliance date of new dishwasher standard addressing standby mode and off mode energy use, the proposed test procedure amendments would not affect a manufacturer's ability to demonstrate compliance with previously established standards for dishwashers.

For dehumidifiers, existing energy conservation standards are based on EF, which would not be altered by the proposed test procedure amendments. In addition, DOE notes that the new combined measure of energy consumption (*i.e.,* the integrated energy factor) which it is proposing would not affect the existing standard. However, the test procedure's amended provisions for standby mode and off mode would be a requirement for demonstrating compliance with DOE's energy conservation standards upon the effective date of a subsequent standards rulemaking for dehumidifiers that accounts for standby mode and off mode power consumption. Thus, the proposed test procedure amendments for dehumidifiers comply with these EPCA requirements.

The current energy conservation standards for conventional cooking products are prescriptive standards which ban standing pilot lights. There are no current performance-based Federal energy conservation standards for conventional cooking products (including energy use in standby mode and off mode). Even so, the new combined measure of energy consumption (*i.e.,* the integrated annual energy consumption) which DOE is proposing would not affect the existing annual energy consumption or EF metrics. The cooking products test procedure's amended provisions for standby mode and off mode would be a requirement for demonstrating compliance with any new performance-based energy conservation standards upon the effective date of a subsequent standards rulemaking for conventional cooking products that accounts for standby mode and off mode power consumption. Thus, the proposed test procedure amendments for cooking products would not impact a manufacturer's ability to certify compliance with existing requirements and, accordingly, comply with these EPCA requirements.

H. Impact of the Proposed Amendments on EnergyGuide and ENERGY STAR

DOE considered potential impacts of the proposed test procedure amendments to the Federal Trade Commission (FTC) EnergyGuide requirements and to the U.S. Environmental Protection Agency (EPA)/DOE ENERGY STAR voluntary labeling program and determined that there will be no impact. For dishwashers, the primary indication of energy use provided in the EnergyGuide label is EAEU and EAOC. In addition, the ENERGY STAR program for dishwashers is based on the EAEU and water consumption. As discussed in section III.G, DOE has clarified that the proposed amended calculations for dishwasher EAEU and EAOC shall be used for purposes other than demonstrating compliance with existing energy conservation standards, including the EnergyGuide and ENERGY STAR programs. Because, as also discussed in section III.G, the changes in EAEU and EAOC due to the proposed amendments are expected to be insignificant, DOE believes that there will be no measurable impact on these programs. For dehumidifiers, there are currently no FTC EnergyGuide labeling requirements, and the ENERGY STAR program is based on EF, which will not be changed by the proposed amendments. For conventional cooking products, there is currently no FTC EnergyGuide labeling requirement or ENERGY STAR voluntary labeling program.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

Today's proposed rule action is not a "significant regulatory action" under section 3(f) of Executive Order 12866, "Regulatory Planning and Review," 58 FR 51735 (Oct. 4, 1993). Accordingly, this proposed action was not subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (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 for any rule that by law must be proposed for public comment, unless the agency certifies that the proposed 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 rulemaking process. 68 FR 7990. DOE's procedures and policies may be viewed on the Office of the General Counsel's Web site (*http://www.gc.doe.gov*).

DOE reviewed today's proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. The proposed rule would prescribe test procedure amendments that would be used to determine compliance with energy conservation standards for the products that are the subject of this rulemaking.

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 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/idc/groups/public/documents/sba_homepage/serv_sstd_tablepdf.pdf.* The threshold number for NAICS classification code 335228, titled "Other Major Household Appliance Manufacturing," is 500 employees; this classification specifically includes residential dishwasher manufacturers. Additionally, the threshold number for NAICS classification code 335211, titled "Electric Housewares and Household Fan Manufacturing," is 750 employees; this classification specifically includes manufacturers of residential dehumidifiers. Finally, the threshold number for NAICS classification code 335221, titled "Household Cooking Appliance Manufacturing," is 750 employees; this classification specifically includes manufacturers of residential conventional cooking products.

Most of the manufacturers supplying residential dishwashers, dehumidifiers,

and/or conventional cooking products are large multinational corporations. DOE surveyed the AHAM member directory to identify manufacturers of residential dishwashers, dehumidifiers, and conventional cooking products. 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 two small businesses that manufacture conventional cooking products and no small businesses that manufacture dishwashers or dehumidifiers.

For the reasons stated in the preamble, DOE has tentatively concluded that the proposed rule would not have a significant impact on either small or large manufacturers under the applicable provisions of the Regulatory Flexibility Act. The proposed rule would amend DOE's test procedures for dishwashers, dehumidifiers, and conventional cooking products by incorporating testing provisions to address standby mode and off mode energy consumption that will be used to develop and test compliance with future energy conservation standards. The test procedure amendments involve measuring power input when the dishwasher, dehumidifier, or conventional cooking product is in standby mode and off mode. These tests can be conducted in the same facilities used for the current energy testing of these products, but could also be conducted in separate facilities consisting of little more than temperature-controlled space, so there would be no additional facilities costs required by the proposed rule. In addition, while the power meter required for these tests might require greater accuracy than the power meter used for current energy testing, the investment required for a possible instrumentation upgrade would likely be relatively modest. It is possible that the manufacturers, or their testing facilities, already have equipment that meets the requirements of IEC Standard 62301, but an Internet search of equipment that specifically meets the requirements of IEC Standard 62301 reveals a cost of approximately $2,700 to $3,000. This cost is small compared to the overall financial investment needed to undertake the business enterprise of testing consumer products which involves facilities, qualified staff, and specialized equipment.

Furthermore, the duration of the standby mode and off mode testing is generally not expected to exceed the time required to conduct current energy testing. The requirements for equipment and time necessary to conduct the additional proposed tests are not expected to impose a significant economic burden on entities subject to the applicable testing requirements.

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. Review Under the Paperwork Reduction Act of 1995

This rule contains a collection-of-information requirement subject to the Paperwork Reduction Act (PRA) which has been approved by OMB under Control Number 1910–1400. Public reporting burden for compliance reporting for energy and water conservation standards is estimated to average 30 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate, or any other aspect of this data collection, including suggestions for reducing the burden, to DOE (*see* **ADDRESSES**) and by e-mail to *Christine_J._Kymn@omb.eop.gov.*

Notwithstanding any other provision of the law, no person is required to 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 rulemaking, DOE proposes test procedure amendments that it expects would be used to develop and implement future energy conservation standards for residential dishwashers, dehumidifiers, and 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 for these products without changing their environmental effects, and, therefore, it is covered by the Categorical Exclusion in 10 CFR part 1021, subpart D, paragraph A5, which applies because this rule would establish revisions to existing test procedures that would not affect the amount, quality, or distribution of energy usage, and, therefore, would not result in any environmental impacts. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, "Federalism," imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. 64 FR 43255 (August 10, 1999). 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 that it will follow in developing such regulations. 65 FR 13735. DOE has examined this proposed rule and 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 today's proposed rule. States can petition DOE for exemption from such preemption to the extent, and based upon criteria, set forth in EPCA. (42 U.S.C. 6297(d)) Therefore, Executive Order 13132 requires no further action.

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 clearly specifies the following: (1) The preemptive effect, if any; (2) any effect on existing Federal law or regulation; (3) a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) the retroactive effect, if any; (5) definitions of key terms; and (6) 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 whether 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, this 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) (Pub. L. 104–4; 2 U.S.C. 1501 *et seq.*) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. 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 estimates of the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) 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 such governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820. (The policy is also available at *http://www.gc.doe.gov.*) Today's proposed rule contains neither an intergovernmental mandate nor a mandate that may result in an 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. Today's 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

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

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

Section 515 of the Treasury and General Government Appropriations Act, 2001 (Pub. L. 106–554; 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 today's notice 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 OIRA a Statement of Energy Effects for any proposed significant energy action. A "significant energy action" is defined as any action by an agency that promulgates 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 if the proposal is implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use. Today's proposed regulatory action to amend the test procedures for residential dishwashers, dehumidifiers, and conventional cooking products to address standby mode and off mode energy use is not a significant regulatory action under Executive Order 12866 or any successor order. It would not have a significant adverse effect on the supply, distribution, or use of energy. Moreover, it has not been designated by the Administrator of OIRA as a significant energy action. 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 DOE Organization Act (Pub. L. 95–91; 42 U.S.C. 7101 *et seq.*), 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 (FEAA). (15 U.S.C. 788) Section 32 essentially provides that, where a proposed rule authorizes or requires use of commercial standards, the 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 modifications to test procedures addressed by this proposed rule incorporate testing methods contained in the commercial standard, IEC Standard 62301 "Household electrical appliances—Measurement of standby power." DOE has evaluated this standard and is unable to conclude whether it fully complies with the requirements of section 32(b) of the FEAA (*i.e.,* whether it was 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 about the impact on competition of using the methods contained in this standard before prescribing a final rule.

V. Public Participation

A. Attendance at the Public Meeting

The time, date, and location of the public meeting are listed in the **DATES** and **ADDRESSES** sections at the beginning of this NOPR. To attend the public meeting, please notify Ms. Brenda Edwards at (202) 586–2945. As explained in the **ADDRESSES** section, foreign nationals visiting DOE Headquarters are subject to advance security screening procedures.

B. Procedure for Submitting Requests To Speak

Any person who has an interest in the topics addressed in this notice, or who is a representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation at the public meeting. Such persons may hand-deliver requests to speak to the address shown in the **ADDRESSES** section at the beginning of this notice between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Requests may also be sent by mail or e-mail to Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121, or *Brenda.Edwards@ee.doe.gov.* Persons who wish to speak should include with their request a computer diskette or CD–ROM in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format that briefly describes the nature of their interest in this rulemaking and the topics they wish to discuss. Such persons should also provide a daytime telephone number where they can be reached.

DOE requests persons selected to make an oral presentation to submit an advance copy of their statements at least one week before the public meeting. DOE may permit persons who cannot supply an advance copy of their statement to participate, if those persons have made advance alternative arrangements with the Building Technologies Program. As necessary, requests to give an oral presentation should ask for such alternative arrangements.

C. Conduct of the Public Meeting

DOE will designate a DOE official to preside at the public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with section 336 of EPCA (42 U.S.C. 6306). There shall not be discussion of proprietary information, costs or prices, market share, or other commercial matters regulated by U.S. anti-trust laws. A court reporter will be present to record the proceedings and prepare a transcript.

The public meeting will be conducted in an informal, conference style. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the public meeting. DOE will present summaries of comments received before the public meeting, allow time for presentations by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a prepared general statement (within time limits determined by DOE), before the discussion of specific topics. DOE will permit other participants to comment briefly on any general statements. At the end of all prepared statements on each specific topic, DOE will permit participants to clarify their statements briefly and comment on statements made by others.

Participants should be prepared to answer DOE's and other participants' questions. DOE representatives may also ask participants about other matters relevant to this rulemaking. The official conducting the public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification of these procedures that may be needed for the proper conduct of the public meeting. After the public meeting, interested parties may submit further comments on the proceedings as well as on any aspect of the rulemaking until the end of the comment period.

DOE will make the entire record of this proposed rulemaking, including the transcript from the public meeting, available for inspection at the U.S. Department of Energy, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024, (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Copies of the transcript will be posted on the DOE Web site and will also be available for purchase from the transcribing reporter.

D. Submission of Comments

DOE will accept comments, data, and information regarding the proposed rule before or after the public meeting, but no later than the date provided at the beginning of this notice. Comments, data, and information submitted to DOE's e-mail address for this rulemaking should be provided in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format. Stakeholders should avoid the use of special characters or any form of encryption, and wherever possible, comments should include the electronic signature of the author. Comments, data, and information submitted to DOE via mail or hand delivery/courier should include one signed paper original. No telefacsimiles (faxes) will be accepted.

Pursuant 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 two copies: One copy of the document that includes all of the information believed to be confidential, and one copy of the document with that information deleted. DOE will make its own determination as to the confidential status of the information and treat it accordingly.

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 was previously made available to others without obligation concerning its confidentiality; (5) an explanation of the competitive injury to the submitting person that 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.

E. Issues on Which DOE Seeks Comment

Although comments are welcome on all aspects of this rulemaking, DOE is particularly interested in receiving comments and views of interested parties on the following issues:

1. *Incorporation of IEC Standard 62301 (First Edition).* DOE invites comment on the adequacy of IEC Standard 62301 (First Edition) to measure standby mode and off mode power consumption for residential dishwashers, dehumidifiers, and conventional cooking products, and the suitability of incorporating into DOE regulations the following specific provisions from IEC Standard 62301 (First Edition): section 4 ("General conditions for measurements"), paragraph 4.2, "Test room," paragraph 4.4, "Supply voltage waveform," and paragraph 4.5, "Power measurement accuracy," and section 5 ("Measurements"), paragraph 5.1, "General," and paragraph 5.3, "Procedure." (*See* section III.B)

2. *Mode definitions.* DOE welcomes comment on the proposed definitions of

"standby mode," "off mode," and "active mode," which are based on the definitions provided in IEC Standard 62301 (FDIS). (*See* section III.C)

3. *Dishwasher standby and off modes.* DOE invites comment on the proposed establishment of inactive mode and cycle finished mode as standby modes for dishwashers and the determination that "delay start mode" would not be considered a standby mode. DOE further invites comment as to whether there are any modes consistent with the "active mode," "standby mode," or "off mode" definitions that have not been identified in this NOPR and the extent to which these modes would represent significant energy use. (*See* section III.C)

4. *Dehumidifier standby and off modes.* DOE invites comment on the proposed establishment of inactive mode, off-cycle mode, and bucket full/removed mode as standby modes for dehumidifiers and the determination that "delay start mode" would not be considered a standby mode. DOE further invites comment as to whether there are any modes consistent with the "active mode," "standby mode," or "off mode" definitions that have not been identified in this NOPR and the extent to which these modes would represent significant energy use. (*See* section III.C)

5. *Conventional cooking products standby and off modes.* DOE invites comment on the proposed establishment of inactive mode and cycle finished mode as standby modes for conventional cooking products and the determination that "delay start mode" and "Sabbath mode" would not be considered a standby mode. DOE further invites comment as to whether there are any modes consistent with the "active mode," "standby mode," or "off mode" definitions that have not been identified in this NOPR and the extent to which these modes would represent significant energy use. (*See* section III.C)

6. *Network mode.* DOE welcomes comment on whether dishwashers, dehumidifiers, and conventional cooking products are currently available that incorporate a networking function and whether a definition for "network mode" and related testing procedures should be incorporated into the DOE test procedure. DOE also requests comment on appropriate methodologies for measuring energy consumption in a network mode for these products, and data on the results and repeatability of such testing methodology. (*See* section III.C)

7. *Default settings.* DOE welcomes comment on the suitability of using product default settings in testing standby energy consumption, on any methodologies that can account for consumer actions that might increase energy use, and data on the repeatability of such testing procedures. (*See* section III.D)

8. *Test room ambient temperature.* DOE seeks comment on the appropriateness of the proposed modified test room ambient temperature range for residential dishwashers, dehumidifiers, and conventional cooking products, which would allow manufacturers to conduct standby mode and off mode testing separately from performance testing under the less stringent ambient conditions specified in the IEC Standard 62301 (First Edition) (*i.e.,* 73.4 ± 9 °F). (*See* section III.D)

9. *Test period.* DOE seeks comment on whether a method in which the clock time on conventional cooking products would be set to 3:23 prior to a 10-minute stabilization period, followed by a 10-minute measurement period commencing at 3:33 would be an acceptable alternative to the method that DOE is proposing (*i.e.,* a 10-minute initial stabilization period, after which the clock would be set to 3:23 and another 10-minute stabilization period provided before a 10-minute measurement starting at a clock time of 3:33). DOE also requests comment on its proposed approach requiring results under the 12-hour test and the 10-minute test to be within ± 2 percent of each other and welcomes data which would show that some other range is more appropriate.

10. *Energy use calculation for standby mode and off mode.* DOE invites comment on the approach for calculating total energy use for standby mode and off mode for dishwashers, dehumidifiers, and conventional cooking products. DOE also invites comment on the allocation of annual hours and test burden, as well as the alternative methodology for allocation of annual hours for each product. (*See* section III.E)

11. *New integrated measures of energy consumption and energy efficiency.* DOE invites comment on the proposed plan to establish new integrated measures of energy consumption for dehumidifiers ("integrated annual energy consumption") and conventional cooking products ("integrated energy factor"). DOE also invites comment on the proposed plan to modify the existing "estimated annual energy use" for dishwashers and "estimated annual operating cost" metrics for dishwashers and conventional cooking products to incorporate the revised measurements of standby mode and off mode energy consumption. (*See* section III.F)

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this notice of proposed rulemaking.

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 November 18, 2010.

Cathy Zoi,

Assistant Secretary, Energy Efficiency and Renewable Energy.

For the reasons stated in the preamble, DOE proposes to amend part 430 of Chapter II, Subchapter D of Title 10 of the 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.

§ 430.3 [Amended]

2. Section 430.3 is amended in paragraph (l)(1) by removing "Appendix N" and adding in its place "Appendix C, Appendix D, Appendix F, Appendix I, Appendix J1, and Appendix N".

3. Section 430.23 is amended by revising paragraphs (c), (i) and (z) to read as follows:

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

* * * * *

(c) *Dishwashers.* (1) The Estimated Annual Operating Cost (EAOC) for dishwashers must be rounded to the nearest dollar per year and is defined as follows:

(i) When cold water (50 °F) is used,

(A)(*1*) For dishwashers having a truncated normal cycle as defined in section 1.21 of appendix C to this subpart, and which are manufactured before May 31, 2011:

$$EAOC = (D_e \times S) + (D_e \times N \times (M - (E_D/2)))$$

(*2*) For dishwashers having a truncated normal cycle as defined in section 1.21 of appendix C to this subpart, and which are manufactured on or after May 31, 2011:

$$EAOC = (D_e \times E_{TSO}) + (D_e \times N \times (M - (E_D/2)))$$

(B)(*1*) For dishwashers not having a truncated normal cycle, and which are manufactured before May 31, 2011:

$EAOC = (D_e \times S) + (D_e \times N \times M)$

(*2*) For dishwashers not having a truncated normal cycle, and which are manufactured on or after May 31, 2011:

$EAOC = (D_e \times E_{TSO}) + (D_e \times N \times M)$

Where,

D_e = the representative average unit cost of electrical energy, in dollars per kilowatt-hour, as provided by the Secretary,

S = the simplified annual standby electrical energy in kilowatt-hours per year and determined according to section 5.6 of appendix C to this subpart,

E_{TSO} = the annual standby mode and off mode electrical energy in kilowatt-hours per year and determined according to section 5.7 of appendix C to this subpart,

N = the representative average dishwasher use of 215 cycles per year,

M = the machine electrical energy consumption per-cycle for the normal cycle as defined in section 1.10 of appendix C to this subpart, in kilowatt-hours and determined according to section 5.1 of appendix C to this subpart,

E_D = the drying energy consumption defined as energy consumed using the power-dry feature after the termination of the last rinse option of the normal cycle and determined according to section 5.2 of appendix C to this subpart.

(ii) When electrically-heated water (120 °F or 140 °F) is used,

(A)(*1*) For dishwashers having a truncated normal cycle as defined in section 1.21 of appendix C to this subpart, and which are manufactured before May 31, 2011:

$EAOC = (D_e \times S) + (D_e \times N \times (M - (E_D/2))) + (D_e \times N \times W)$

(*2*) For dishwashers having a truncated normal cycle as defined in section 1.21 of appendix C to this subpart, and which are manufactured on or after May 31, 2011:

$EAOC = (D_e \times E_{TSO}) + (D_e \times N \times (M - (E_D/2))) + (D_e \times N \times W)$

(B)(*1*) For dishwashers not having a truncated normal cycle, and which are manufactured before May 31, 2011:

$EAOC = (D_e \times S) + (D_e \times N \times M) + (D_e \times N \times W)$

(*2*) For dishwashers not having a truncated normal cycle, and which are manufactured on or after May 31, 2011:

$EAOC = (D_e \times E_{TSO}) + (D_e \times N \times M) + (D_e \times N \times W)$

Where,

D_e, S, E_{TSO}, N, M, and E_D, are defined in paragraph (c)(1)(i) of this section, and

W = the total water energy consumption per cycle for the normal cycle as defined in section 1.10 of appendix C to this subpart, in kilowatt-hours per cycle and determined according to section 5.4 of appendix C to this subpart.

(iii) When gas-heated or oil-heated water is used,

(A)(*1*) For dishwashers having a truncated normal cycle as defined in section 1.21 of appendix C to this subpart, and which are manufactured before May 31, 2011:

$EAOC_g = (D_e \times S) + (D_e \times N \times (M - (E_D/2))) + (D_g \times N \times W_g)$

(*2*) For dishwashers having a truncated normal cycle as defined in section 1.21 of appendix C to this subpart, and which are manufactured on or after May 31, 2011:

$EAOC_g = (D_e \times E_{TSO}) + (D_e \times N \times (M - (E_D/2))) + (D_g \times N \times W_g)$

(B)(*1*) For dishwashers not having a truncated normal cycle, and which are manufactured before May 31, 2011:

$EAOC_g = (D_e \times S) + (D_e \times N \times M) + (D_g \times N \times W_g)$

(*2*) For dishwashers not having a truncated normal cycle, and which are manufactured on or after May 31, 2011:

$EAOC_g = (D_e \times E_{TSO}) + (D_e \times N \times M) + (D_g \times N \times W_g)$

Where,

D_e, S, E_{TSO}, N, M, and E_D are defined in paragraph (c)(1)(i) of this section,

D_g = the representative average unit cost of gas or oil, as appropriate, in dollars per Btu, as provided by the Secretary, and

W_g = the total water energy consumption per cycle for the normal cycle as defined in section 1.10 of appendix C to this subpart, in Btus per cycle and determined according to section 5.5 of appendix C to this subpart.

(2) The energy factor for dishwashers, EF, expressed in cycles per kilowatt-hour must be rounded to two decimal places and is defined as follows:

(i) When cold water (50 °F) is used,

(A) For dishwashers having a truncated normal cycle as defined in section 1.21 of appendix C to this subpart,

$EF = 1/(M - (E_D/2))$

(B) For dishwashers not having a truncated normal cycle,

$EF = 1/M$

Where,

M, and E_D are defined in paragraph (c)(1)(i) of this section.

(ii) When electrically-heated water (120 °F or 140 °F) is used,

(A) For dishwashers having a truncated normal cycle as defined in section 1.21 of appendix C to this subpart,

$EF = 1/(M - (E_D/2) + W)$

(B) For dishwashers not having a truncated normal cycle,

$EF = 1/(M + W)$

Where,

M, and E_D are defined in paragraph (c)(1)(i) of this section, and W is defined in paragraph (c)(1)(ii) of this section.

(3) The estimated annual energy use, EAEU, expressed in kilowatt-hours per year must be rounded to the nearest kilowatt-hour per year and is defined as follows:

(i) For dishwashers having a truncated normal cycle as defined in section 1.21 of appendix C to this subpart, and which are:

(A) Manufactured before May 31, 2011; or

(B)(*1*) Manufactured on or after May 31, 2011 and for which EAEU is calculated to determine compliance with energy conservation standards for dishwashers:

$EAEU = (M - (E_D/2) + W) \times N + S$

(*2*) For dishwashers having a truncated normal cycle as defined in section 1.21 of appendix C to this subpart, and which are manufactured on or after May 31, 2011 and for which EAEU is calculated for purposes other than to determine compliance with energy conservation standards for dishwashers:

$EAEU = (M - (E_D/2) + W) \times N + E_{TSO}$

Where,

M, E_D, N, S, and E_{TSO} are defined in paragraph (c)(1)(i) of this section, and W is defined in paragraph (c)(1)(ii) of this section.

(ii) For dishwashers not having a truncated normal cycle and which are:

(A) Manufactured before May 31, 2011; or

(B)(*1*) Manufactured on or after May 31, 2011 and for which EAEU is calculated to determine compliance with energy conservation standards for dishwashers:

$EAEU = (M + W) \times N + S$

(*2*) For dishwashers not having a truncated normal cycle and which are manufactured on or after May 31, 2011 and for which EAEU is calculated for purposes other than to determine compliance with energy conservation standards for dishwashers:

$EAEU = (M + W) \times N + E_{TSO}$

Where,

M, N, S, and E_{TSO} are defined in paragraph (c)(1)(i) of this section, and W is defined in paragraph (c)(1)(ii) of this section.

(4) The water consumption, V, expressed in gallons per cycle and defined in section 5.3 of appendix C to this subpart, must be rounded to one decimal place.

(5) Other useful measures of energy consumption for dishwashers are those which the Secretary determines are likely to assist consumers in making purchasing decisions and which are

derived from the application of appendix C to this subpart.

* * * * *

(i) *Kitchen ranges and ovens.* (1) The estimated annual operating cost for conventional ranges, conventional cooking tops, and conventional ovens shall be the sum of the following products:

(i) The total integrated annual electrical energy consumption for any electrical energy usage, in kilowatt-hours (kWh's) per year, 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's) per year, 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's per year, times the representative average unit cost for propane, in dollars per Btu, as provided pursuant to section 323(b)(2) of the Act. The total annual energy consumption for conventional ranges, conventional cooking tops, and conventional ovens shall be as determined according to sections 4.3, 4.2.2, and 4.1.2, respectively, of appendix I to this subpart. For conventional gas cooking tops, total integrated annual electrical energy consumption shall be equal to E_{CTSO}, defined in section 4.2.2.2.4 of appendix I to this subpart. The estimated annual operating cost shall be rounded off to the nearest dollar per year.

(2) The cooking efficiency for conventional cooking tops and conventional ovens shall be the ratio of the cooking energy output for the test to the cooking energy input for the test, as determined according to 4.2.1 and 4.1.3, respectively, of appendix I to this subpart. The final cooking efficiency values shall be rounded off to three significant digits.

(3) [Reserved]

(4) The energy factor for conventional ranges, conventional cooking tops, and conventional ovens shall be the ratio of the annual useful cooking energy output to the total annual energy input, as determined according to 4.3, 4.2.3.1, and 4.1.4.1, respectively, of appendix I to this subpart. The final energy factor values shall be rounded off to three significant digits.

(5) The integrated energy factor for conventional ranges, conventional cooking tops, and conventional ovens shall be the ratio of the annual useful cooking energy output to the total integrated annual energy input, as determined according to 4.3, 4.2.3.2, and 4.1.4.2, respectively, of appendix I to this subpart. The final integrated energy factor values shall be rounded off to three significant digits.

(6) There shall be two estimated annual operating costs, two cooking efficiencies, and two energy factors for convertible cooking appliances—

(i) An estimated annual operating cost, a cooking efficiency, and an energy factor which represent values for those three measures of energy consumption for the operation of the appliance with natural gas; and

(ii) An estimated annual operating cost, a cooking efficiency, and an energy factor which represent values for those three measures of energy consumption for the operation of the appliance with LP-gas.

(7) There shall be two integrated energy factors for convertible cooking appliances—

(i) An integrated energy factor which represents the value for this measure of energy consumption for the operation of the appliance with natural gas; and

(ii) An integrated energy factor which represents the value for this measure of energy consumption for the operation of the appliance with LP-gas.

(8) The estimated annual operating cost for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(6)(i) of this section, shall be determined according to paragraph (i)(1) of this section using the total annual gas energy consumption for natural gas times the representative average unit cost for natural gas.

(9) The estimated annual operating cost for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(6)(ii) of this section, shall be determined according to paragraph (i)(1) 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.

(10) The cooking efficiency for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(6)(i) of this section, shall be determined according to paragraph (i)(2) of this section when the appliance is tested with natural gas.

(11) The cooking efficiency for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(6)(ii) of this section, shall be determined according to paragraph (i)(2) of this section, when the appliance is tested with either natural gas or propane.

(12) The energy factor for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(6)(i) of this section, shall be determined according to paragraph (i)(4) of this section when the appliance is tested with natural gas.

(13) The integrated energy factor for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(7)(i) of this section, shall be determined according to paragraph (i)(5) of this section when the appliance is tested with natural gas.

(14) The energy factor for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(6)(ii) of this section, shall be determined according to paragraph (i)(4) of this section when the appliance is tested with either natural gas or propane.

(15) The integrated energy factor for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(7)(ii) of this section, shall be determined according to paragraph (i)(5) of this section when the appliance is tested with natural gas or propane.

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

* * * * *

(z) *Dehumidifiers.* (1) The energy factor for dehumidifiers, expressed in liters per kilowatt hour (L/kWh), shall be measured in accordance with section 4.1 of appendix X of this subpart.

(2) The integrated energy factor for dehumidifiers, expressed in L/kWh, shall be determined according to paragraph 5.2 of appendix X to this subpart.

* * * * *

4. Appendix C to subpart B of part 430 is amended by:

a. Revising the introductory text;

b. Revising section 1. Definitions:

c. In section 2. Testing Conditions:

1. Revising section 2.1;

2. Adding new section 2.2.3;

3. Revising section 2.5;

4. Adding new sections 2.5.1 and 2.5.2;

5. Revising sections 2.6.3.1 through 2.6.3.3;

6. Revising sections 2.8 through 2.10;

d. In section 3. Instrumentation, adding new section 3.8;

e. In section 4, Test Cycle and Measurements:

1. Revising section 4.4;
2. Adding new sections 4.5 and 4.5.1 through 4.5.3;

f. In section 5, Calculation of Derived Results From Test Measurements:
1. Revising section 5.6; and
2. Adding new section 5.7.

The additions and revisions read as follows:

Appendix C to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Dishwashers

Note: The procedures and calculations that refer to standby mode and off mode energy consumption (*i.e.,* sections 4.5, 4.5.1 through 4.5.3, and 5.7 of this Appendix C) need not be performed to determine compliance with energy conservation standards for dishwashers at this time. However, any representation related to standby mode and off mode energy consumption of these products made after May 31, 2011 must be based upon results generated under this test procedure using sections 4.5, 4.5.1 through 4.5.3, and 5.7 and disregarding sections 4.4 and 5.6, consistent with the requirements of 42 U.S.C. 6293(c)(2). After July 1, 2010, any adopted energy conservation standard shall incorporate standby mode and off mode energy consumption, and upon the compliance date for such standards, compliance with the applicable provisions of this test procedure will also be required.

1. Definitions

1.1 *Active mode* means a mode in which the dishwasher is connected to a mains power source, has been activated, and is performing one of the main functions of washing, rinsing, or drying (when a drying process is included) dishware, glassware, eating utensils, and most cooking utensils by chemical, mechanical, and/or electrical means, or is involved in functions necessary for these main functions, such as admitting water into the dishwasher or pumping water out of the dishwasher.

1.2 *AHAM* means the Association of Home Appliance Manufacturers.

1.3 *Compact dishwasher* means a dishwasher that has a capacity of less than eight place settings plus six serving pieces as specified in ANSI/AHAM DW–1 (incorporated by reference; see § 430.3), using the test load specified in section 2.7 of this Appendix.

1.4 *Cycle* means a sequence of operations of a dishwasher which performs a complete dishwashing function, and may include variations or combinations of washing, rinsing, and drying.

1.5 *Cycle finished mode* means a standby mode which provides continuous status display following operation in active mode.

1.6 *Cycle type* means any complete sequence of operations capable of being preset on the dishwasher prior to the initiation of machine operation.

1.7 *IEC 62301* means the 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).

1.8 *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.

1.9 *Non-soil-sensing dishwasher* means a dishwasher that does not have the ability to adjust automatically any energy consuming aspect of a wash cycle based on the soil load of the dishes.

1.10 *Normal cycle* means the cycle type recommended by the manufacturer for completely washing a full load of normally soiled dishes including the power-dry feature.

1.11 *Off mode* means a mode in which the dishwasher is connected to a mains power source and is not providing any active mode or standby mode 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.

1.12 *Power-dry feature* means the introduction of electrically-generated heat into the washing chamber for the purpose of improving the drying performance of the dishwasher.

1.13 *Preconditioning cycle* means any cycle that includes a fill, circulation, and drain to ensure that the water lines and sump area of the pump are primed.

1.14 *Sensor heavy response* means, for standard dishwashers, the set of operations in a soil-sensing dishwasher for completely washing a load of dishes, four place settings of which are soiled according to ANSI/AHAM DW–1 (incorporated by reference; *see* § 430.3). For compact dishwashers, this definition is the same, except that two soiled place settings are used instead of four.

1.15 *Sensor light response* means, for both standard and compact dishwashers, the set of operations in a soil-sensing dishwasher for completely washing a load of dishes, one place setting of which is soiled with half of the gram weight of soils for each item specified in a single place setting according to ANSI/AHAM DW–1 (incorporated by reference; *see* § 430.3).

1.16 *Sensor medium response* means, for standard dishwashers, the set of operations in a soil-sensing dishwasher for completely washing a load of dishes, two place settings of which are soiled according to ANSI/AHAM DW–1 (incorporated by reference; *see* § 430.3). For compact dishwashers, this definition is the same, except that one soiled place setting is used instead of two.

1.17 *Simplified standby mode* means the lowest power consumption mode which cannot be switched off or influenced by the user and that may persist for an indefinite time when the dishwasher is connected to the main electricity supply and used in accordance with the manufacturer's instructions.

1.18 *Soil-sensing dishwasher* means a dishwasher that has the ability to adjust any energy-consuming aspect of a wash cycle based on the soil load of the dishes.

1.19 *Standard dishwasher* means a dishwasher that has a capacity equal to or greater than eight place settings plus six serving pieces as specified in ANSI/AHAM DW–1 (incorporated by reference; *see* § 430.3), using the test load specified in section 2.7 of this Appendix.

1.20 *Standby mode* means a mode in which the dishwasher 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: (a) to facilitate the activation of other modes (including activation or deactivation of active mode) by remote switch (including remote control), internal sensor, or timer; (b) 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 provides regular scheduled tasks (*e.g.,* switching) and that operates on a continuous basis.

1.21 *Truncated normal cycle* means the normal cycle interrupted to eliminate the power-dry feature after the termination of the last rinse operation.

1.22 *Truncated sensor heavy response* means the sensor heavy response interrupted to eliminate the power-dry feature after the termination of the last rinse operation.

1.23 *Truncated sensor light response* means the sensor light response interrupted to eliminate the power-dry feature after the termination of the last rinse operation.

1.24 *Truncated sensor medium response* means the sensor medium response interrupted to eliminate the power-dry feature after the termination of the last rinse operation.

1.25 *Water-heating dishwasher* means a dishwasher which, as recommended by the manufacturer, is designed for heating cold inlet water (nominal 50 °F) or designed for heating water with a nominal inlet temperature of 120 °F. Any dishwasher designated as water-heating (50 °F or 120 °F inlet water) must provide internal water heating to above 120 °F in a least one wash phase of the normal cycle.

2. Testing Conditions

2.1 *Installation Requirements.* Install the dishwasher according to the manufacturer's instructions. A standard or compact under-counter or under-sink dishwasher must be tested in a rectangular enclosure constructed of nominal 0.374 inch (9.5 mm) plywood painted black. The enclosure must consist of a top, a bottom, a back, and two sides. If the dishwasher includes a counter top as part of the appliance, omit the top of the enclosure. Bring the enclosure into the closest contact with the appliance that the configuration of the dishwasher will allow. For standby mode and off mode testing, these products shall also be installed in accordance with Section 5, Paragraph 5.2 of IEC 62301 (incorporated by reference; *see* § 430.3).

* * * * *

2.2.3 *Supply voltage waveform.* For the standby mode and off mode testing, maintain the electrical supply voltage waveform indicated in Section 4, Paragraph 4.4 of IEC 62301 (incorporated by reference; *see* § 430.3).

* * * * *

2.5 *Ambient Temperature.*

2.5.1 *Active mode ambient and machine temperature.* Using a temperature measuring device as specified in section 3.1 of this Appendix, maintain the room ambient air temperature at 75 ° ± 5 ° F and ensure that the dishwasher and the test load are at room ambient temperature at the start of each test cycle.

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 (incorporated by reference; *see* § 430.3).

* * * * *

2.6.3.1 For tests of the sensor heavy response, as defined in section 1.14 of this Appendix:

(A) For standard dishwashers, the test unit is to be loaded with a total of eight place settings plus six serving pieces as specified in section 2.7 of this Appendix. Four of the eight place settings must be soiled according to ANSI/AHAM DW–1 (incorporated by reference, *see* § 430.3) while the remaining place settings, serving pieces, and all flatware are not soiled.

(B) For compact dishwashers, the test unit is to be loaded with four place settings plus six serving pieces as specified in section 2.7 of this Appendix. Two of the four place settings must be soiled according to ANSI/AHAM DW–1 (incorporated by reference, *see* § 430.3) while the remaining place settings, serving pieces, and all flatware are not soiled.

2.6.3.2 For tests of the sensor medium response, as defined in section 1.16 of this Appendix:

(A) For standard dishwashers, the test unit is to be loaded with a total of eight place settings plus six serving pieces as specified in section 2.7 of this Appendix. Two of the eight place settings must be soiled according to ANSI/AHAM DW–1 (incorporated by reference, *see* § 430.3) while the remaining place settings, serving pieces, and all flatware are not soiled.

(B) For compact dishwashers, the test unit is to be loaded with four place settings plus six serving pieces as specified in section 2.7 of this Appendix. One of the four place settings must be soiled according to ANSI/AHAM DW–1 (incorporated by reference, *see* § 430.3) while the remaining place settings, serving pieces, and all flatware are not soiled.

2.6.3.3 For tests of the sensor light response, as defined in section 1.15 of this Appendix:

(A) For standard dishwashers, the test unit is to be loaded with a total of eight place settings plus six serving pieces as specified in section 2.7 of this Appendix. One of the eight place settings must be soiled with half of the soil load specified for a single place setting according to ANSI/AHAM DW–1 (incorporated by reference, *see* § 430.3) while the remaining place settings, serving pieces, and all flatware are not soiled.

(B) For compact dishwashers, the test unit is to be loaded with four place settings plus six serving pieces as specified in section 2.7 of this Appendix. One of the four place settings must be soiled with half of the soil load specified for a single place setting according to the ANSI/AHAM DW–1 (incorporated by reference, *see* § 430.3) while the remaining place settings, serving pieces, and all flatware are not soiled.

* * * * *

2.8 *Detergent.* Use half the quantity of detergent specified according to ANSI/AHAM DW–1 (incorporated by reference, *see* § 430.3).

2.9 *Testing requirements.* Provisions in this Appendix pertaining to dishwashers that operate with a nominal inlet temperature of 50 °F or 120 °F apply only to water-heating dishwashers as defined in section 1.25 of this Appendix.

2.10 *Preconditioning requirements.* Precondition the dishwasher by establishing the testing conditions set forth in sections 2.1 through 2.5 of this Appendix. Set the dishwasher to the preconditioning cycle as defined in section 1.13 of this Appendix, without using a test load, and initiate the cycle.

3. Instrumentation

* * * * *

3.8 *Standby mode and off mode watt meter.* The watt meter used to measure standby mode and off mode power consumption shall have the resolution specified in Section 4, Paragraph 4.5 of IEC 62301 (incorporated by reference, *see* § 430.3). The watt meter shall also be able to record a "true" average power as specified in Section 5, Paragraph 5.3.2(a) of IEC 62301.

4. Test Cycle and Measurements

* * * * *

4.4 *Simplified standby mode power.* Connect the dishwasher to a standby wattmeter or a standby watt-hour meter as specified in sections 3.6 and 3.7, respectively, of this Appendix. Select the conditions necessary to achieve operation in the simplified standby mode as defined in section 1.17 of this Appendix. Monitor the power consumption but allow the dishwasher to stabilize for at least 5 minutes. Then monitor the power consumption for at least an additional 5 minutes. If the power level does not change by more than 5 percent from the maximum observed value during the later 5 minutes and if there is no cyclic or pulsing behavior of the load, the load can be considered stable. For stable operation, simplified standby mode power, S_m, can be recorded directly from the standby watt meter in watts or accumulated using the standby watt-hour meter over a period of at least 5 minutes. For unstable operation, the energy must be accumulated using the standby watt-hour meter over a period of at least 5 minutes and must capture the energy use over one or more complete cycles. Calculate the average simplified standby mode power, S_m, expressed in watts by dividing the accumulated energy consumption by the duration of the measurement period.

4.5 *Standby mode and off mode power.* Connect the dishwasher to a standby mode and off mode watt meter as specified in sections 3.8 of this Appendix. Establish the testing conditions set forth in sections 2.1, 2.2, and 2.5.2 of this Appendix. For dishwashers 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 (incorporated by reference; see § 430.3), allow sufficient time for the dishwasher to reach the lower power state before proceeding with the test measurement. Follow the test procedure specified in Section 5, Paragraph 5.3 of IEC 62301 for testing in each possible mode as described in sections 4.5.1 through 4.5.3 of this Appendix, except allowing the product to stabilize for at least 30 minutes and using an energy use measurement period of not less than 10 minutes. For units in which power varies over a cycle, as described in Section 5, Paragraph 5.3.2 of IEC 62301, use the average power approach in Paragraph 5.3.2(a) of IEC 62301, except allowing the product to stabilize for at least 30 minutes and using an energy use measurement period of not less than 10 minutes.

4.5.1 If the dishwasher has an inactive mode, as defined in section 1.8, measure and record the average inactive mode power of the dishwasher, P_{IA}, in watts.

4.5.2 If the dishwasher has an off mode, as defined in section 1.11, measure and record the average off mode power, P_{OFF}, in watts.

4.5.3 If the dishwasher has a cycle finished mode, as defined in section 1.5, measure and record the average cycle finished mode power, P_{CF}, in watts.

5. Calculation of Derived Results From Test Measurements

* * * * *

5.6 *Annual simplified standby energy consumption.* Calculate the estimated annual simplified standby energy consumption. First determine the number of standby hours per year, H_s, defined as:

$$H_s = H - (N \times L)$$

Where,

H = the total number of hours per year = 8766 hours per year,

N = the representative average dishwasher use of 215 cycles per year,

L = the average of the duration of the normal cycle and truncated normal cycle, for non-soil-sensing dishwashers with a truncated normal cycle; the duration of the normal cycle, for non-soil-sensing dishwashers without a truncated normal cycle; the average duration of the sensor light response, truncated sensor light response, sensor medium response, truncated sensor medium response, sensor heavy response, and truncated sensor heavy response, for soil-sensing dishwashers with a truncated cycle option; the average duration of the sensor light response, sensor medium response, and sensor heavy response, for soil-sensing dishwashers without a truncated cycle option.

Then calculate the estimated annual simplified standby power use, S, expressed in kilowatt-hours per year and defined as:

$$S = S_m \times ((H_s)/1000)$$

Where,

S_m = the simplified standby mode power in watts as determined in section 4.4 of this Appendix.

5.7 *Standby mode and off mode annual energy consumption.* Calculate the standby mode and off mode annual energy

consumption for dishwashers, E_{TSO}, expressed in kilowatt-hours per year, according to the following:

$E_{TSO} = [(P_{IA} \times S_{IA}) + (P_{OFF} \times S_{OFF}) + (P_{CF} \times S_{CF})] \times K$

Where:

P_{IA}= dishwasher inactive mode power, in watts, as measured in section 4.5.1.

P_{OFF} = dishwasher off mode power, in watts, as measured in section 4.5.2.

P_{CF} = dishwasher cycle finished mode power, in watts, as measured in section 4.5.3.

If the dishwasher has both inactive mode and off mode, S_{IA} and S_{OFF} both equal $S_{TOT}/2$;

S_{TOT} equals the total number of inactive mode and off mode hours per year, defined as:

If the dishwasher has cycle finished mode, S_{TOT}, in hours, equals $H_{TSO} - S_{CF}$;

If the dishwasher does not have cycle finished mode, S_{TOT} equals H_{TSO};

H_{TSO} equals the total number of standby mode and off mode hours per year, defined as:

$H_{TSO} = H - (N \times L)$

Where,

H = the total number of hours per year = 8766 hours per year,

N = the representative average dishwasher use of 215 cycles per year,

L = the average of the duration of the normal cycle and truncated normal cycle, for non-soil-sensing dishwashers with a truncated normal cycle; the duration of the normal cycle, for non-soil-sensing dishwashers without a truncated normal cycle; the average duration of the sensor light response, truncated sensor light response, sensor medium response, truncated sensor medium response, sensor heavy response, and truncated sensor heavy response, for soil-sensing dishwashers with a truncated cycle option; the average duration of the sensor light response, sensor medium response, and sensor heavy response, for soil-sensing dishwashers without a truncated cycle option;

If the dishwasher 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_{OFF}, is equal to 0;

If the dishwasher has an off mode but no inactive mode, S_{IA} is equal to 0 and S_{OFF} is equal to S_{TOT};

S_{CF} = 237, dishwasher cycle finished mode annual hours;

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

5. Appendix I to subpart B of part 430 is amended:

a. By adding a Note after the appendix heading;

b. In section 1. Definitions, by:

1. Redesignating section 1.10 as 1.15;

2. Redesignating section 1.9 as 1.16;

3. Redesignating section 1.7 as 1.12, and revising it;

4. Redesignating section 1.8 as 1.13;

5. Redesignating section 1.6 as 1.11;

6. Redesignating section 1.5 as 1.9;

7. Redesignating sections 1.2 through 1.4 as 1.4 through 1.6;

8. Redesignating section 1.1 as 1.2; and

9. Adding new sections 1.1, 1.3, 1.7, 1.8, 1.10, and 1.14;

c. In section 2. Test Conditions, by:

1. Revising sections 2.1, 2.1.1, 2.1.2, 2.2.1, 2.5, and 2.6; and

2. Adding new sections 2.2.1.1, 2.2.1.2, 2.5.1, 2.5.2, and 2.9.1.3;

d. In section 3. Test Methods and Measurements, by:

1. Revising sections 3.1.1, 3.1.1.1, and 3.1.2;

2. Adding new sections 3.1.1.3, 3.1.1.3.1, 3.1.1.3.2, and 3.1.1.3.3;

3. Adding new sections 3.1.2.2, 3.1.2.2.1, and 3.1.2.2.2;

4. Adding new sections 3.1.3, 3.1.3.1, 3.1.3.2, and 3.1.3.3;

5. Revising sections 3.2.1, 3.2.1.1, 3.2.1.2, and 3.2.1.4;

6. Redesignating section 3.2.2.1 as 3.2.2.3;

7. Revising section 3.2.2 and adding new sections 3.2.2.1 and 3.2.2.2;

8. Adding new section 3.2.3; and

9. Revising section 3.3.8;

e. In section 4. Calculation of Derived Results From Test Measurements, by:

1. Revising section 4.1.1, 4.1.1.1, 4.1.2.3.1, 4.1.2.4, and 4.1.2.5.1;

2. Redesignating section 4.1.2.5.2 as 4.1.2.5.3, and revising it;

3. Adding new section 4.1.2.5.2;

4. Revising section 4.1.2.6.1;

5. Redesignating section 4.1.2.6.2 as 4.1.6.2.3, and revising newly redesignated section 4.1.6.2.3;

6. Adding new section 4.1.2.6.2;

7. Revising section 4.1.4;

8. Adding new sections 4.1.4.1 and 4.1.4.2;

9. Revising section 4.2.1.1;

10. Revising section 4.2.2.1;

11. Adding new sections 4.2.2.1,1 and 4.2.2.1.2;

12. Revising section 4.2.2.2.3;

13. Adding new section 4.2.2.2.4;

14. Revising section 4.2.3;

15. Adding new sections 4.2.3.1 and 4.2.3.2; and

16. Revising section 4.3.

The additions and revisions read as follows:

Appendix I to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Conventional Ranges, Conventional Cooking Tops, Conventional Ovens, and Microwave Ovens

Note: The procedures and calculations in this Appendix I need not be performed to determine compliance with energy conservation standards for conventional ranges, conventional cooking tops, and conventional ovens at this time. However, any representation related to standby mode and off mode energy consumption of these products made after May 31, 2011 must be based upon results generated under this test procedure, consistent with the requirements of 42 U.S.C. 6293(c)(2). After July 1, 2010, any adopted energy conservation standard shall incorporate standby mode and off mode energy consumption, and upon the compliance date for such standards, compliance with the applicable provisions of this test procedure will also be required. Although microwave ovens are not currently included in this test procedure, future revisions may add relevant provisions for measuring active mode, standby mode, and off mode energy consumption in those products.

1. Definitions

1.1 *Active mode* means a mode in which a conventional cooking top, conventional oven, or conventional range is connected to a mains power source, has been activated, and is performing the main function of producing heat by means of either a gas flame or electric resistance heating.

* * * * *

1.3 *Cycle finished mode* means a standby mode in which a conventional cooking top, conventional oven, or conventional range provides continuous status display following operation in active mode.

* * * * *

1.7 *IEC 62301* 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).

1.8 *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.

* * * * *

1.10 *Off mode* means a mode in which the product is connected to a mains power source and is not providing any active mode or standby mode 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.

* * * * *

1.12 *Secondary energy consumption* means any electrical energy consumption of a conventional gas oven.

* * * * *

1.14 *Standby mode* means any modes where the 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: (a) To facilitate the activation of other modes (including activation or deactivation of active mode) by remote switch (including remote control), internal sensor, or timer; (b) 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

provides regular scheduled tasks (*e.g.,* switching) and that operates on a continuous basis.

* * * * *

2. Test Conditions

2.1 *Installation.* A free standing kitchen range shall 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. There shall be no side walls. A drop-in, built-in or wall-mounted appliance shall be installed in an enclosure in accordance with the manufacturer's instructions. These appliances are to be completely assembled with all handles, knobs, guards and the like mounted in place. Any electric resistance heaters, gas burners, baking racks, and baffles shall be in place in accordance with the manufacturer's instructions; however, broiler pans are to be removed from the oven's baking compartment.

2.1.1 *Conventional electric ranges, ovens, and cooking tops.* These products shall be connected to an electrical supply circuit with voltage as specified in section 2.2.1 with a watt-hour meter installed in the circuit. The watt-hour meter shall be as described in section 2.9.1.1. For standby mode and off mode testing, these products shall also be installed in accordance with Section 5, Paragraph 5.2 of IEC 62301 (incorporated by reference; *see* § 430.3).

2.1.2 *Conventional gas ranges, ovens, and cooking tops.* These products shall be connected 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 2.9.2. Conventional gas ranges, ovens, and cooking tops with electrical ignition devices or other electrical components shall be connected 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 2.9.1.1. For standby mode and off mode testing, these products shall also be installed in accordance with Section 5, Paragraph 5.2 of IEC 62301 (incorporated by reference; *see* § 430.3).

* * * * *

2.2.1 *Electrical Supply*

2.2.1.1 *Supply voltage and frequency.* Maintain the electrical supply to the conventional range, conventional cooking top, and conventional oven being tested at 240/120 volts except that basic models rated only at 208/120 volts shall be tested at that rating. Maintain the voltage within 2 percent of the above-specified voltages. For conventional range, conventional cooking top, and conventional oven standby mode and off mode testing, maintain the electrical supply frequency at 60 hertz ± 1 percent. For microwave oven testing, maintain the electrical supply at 120 volts ± 1 volt and at 60 hertz.

2.2.1.2 *Supply voltage waveform.* For the standby mode and off mode testing, maintain the electrical supply voltage waveform indicated in Section 4, Paragraph 4.4 of IEC 62301 (incorporated by reference; *see* § 430.3).

* * * * *

2.5 *Ambient temperature.*

2.5.1 *Active mode ambient room air temperature.* During the active mode test, maintain an ambient room air temperature, T_R, of 77 °± 9 °F (25 °± 5 °C) for conventional ovens and cooking tops, as measured at least 5 feet (1.5 m) and not more than 8 feet (2.4 m) from the nearest surface of the unit under test and approximately 3 feet (0.9 m) above the floor. The temperature shall be measured with a thermometer or temperature indicating system with an accuracy as specified in section 2.9.3.1.

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 (incorporated by reference; *see* § 430.3).

2.6 *Normal nonoperating temperature.* All areas of the appliance to be tested shall attain the normal nonoperating temperature, as defined in section 1.9 of this Appendix, before any testing begins. The equipment for measuring the applicable normal nonoperating temperature shall be as described in sections 2.9.3.1, 2.9.3.2, 2.9.3.3, and 2.9.3.4, as applicable.

* * * * *

2.9.1.3 *Standby mode and off mode watt meter.* The watt meter used to measure standby mode and off mode shall have a resolution as specified in Section 4, Paragraph 4.5 of IEC 62301 (incorporated by reference, *see* § 430.3). The watt meter shall also be able to record a "true" average power as specified in Section 5, Paragraph 5.3.2(a) of IEC 62301.

* * * * *

3. Test Methods and Measurements

* * * * *

3.1.1 *Conventional oven.* Perform a test by establishing the testing conditions set forth in section 2, *Test Conditions,* of this Appendix, and adjust any pilot lights of a conventional gas oven in accordance with the manufacturer's instructions and turn off the gas flow to the conventional cooking top, if so equipped. Before beginning the test, the conventional oven shall be at its normal nonoperating temperature as defined in section 1.9 and described in section 2.6. Set the conventional oven test block W_1 approximately in the center of the usable baking space. If there is a selector switch for selecting the mode of operation of the oven, set it for normal baking. If an oven permits baking by either forced convection by using a fan, or without forced convection, the oven is to be tested in each of those two modes. The oven shall remain on for at least one complete thermostat "cut-off/cut-on" of the electrical resistance heaters or gas burners after the test block temperature has increased 234 °F (130 °C) above its initial temperature.

3.1.1.1 *Self-cleaning operation of a conventional oven.* Establish the test conditions set forth in Section 2, *Test Conditions,* of this Appendix. Adjust any pilot lights of a conventional gas oven in accordance with the manufacturer's instructions and turn off the gas flow to the conventional cooking top. The temperature of the conventional oven shall be its normal nonoperating temperature as defined in section 1.9 and described in section 2.6. Then set the conventional oven's self-cleaning process in accordance with the manufacturer's instructions. If the self-cleaning process is adjustable, use the average time recommended by the manufacturer for a moderately soiled oven.

* * * * *

3.1.1.3 *Conventional oven 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 conventional 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 (incorporated by reference; *see* § 430.3), allow sufficient time for the conventional 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 of IEC 62301 for testing in each possible mode as described in 3.1.1.3.1 through 3.1.1.3.3, except allowing the product to stabilize for at least 30 minutes and using an energy use measurement period not less than 10 minutes. For units in which power varies as a function of displayed time in standby mode, either: (1) Set the clock time to 3:23 at the end of the stabilization period specified in Section 5, Paragraph 5.3 of IEC 62301, and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301, but with a single test period of 10 minutes +0/−2 sec after an additional stabilization period until the clock time reaches 3:33; or (2) at any starting clock time, allow a stabilization period as described in Section 5, Paragraph 5.3 of IEC 62301, and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301, but with a single test period of 12 hours +0/−30 sec. Testing may be conducted using either a 12-hour test, a 10-minute test, or both tests; however, if a manufacturer elects to perform both tests on a unit, the manufacturer may only use the results from one of the test (*i.e.,* the 12-hour test or the 10-minute test) as the test results for that unit. Results of the 10-minute test that are within ± 2 percent of the 12-hour test are deemed to be representative of average energy use.

3.1.1.3.1 If the conventional oven has an inactive mode, as defined in section 1.8, measure and record the average inactive mode power of the conventional oven, P_{IA}, in watts.

3.1.1.3.2 If the conventional oven has an off mode, as defined in section 1.10, measure and record the average off mode power of the conventional oven, P_{OFF}, in watts.

3.1.1.3.3 If the conventional oven has a cycle finished mode, as defined in section 1.3, measure and record the average cycle finished mode power of the conventional oven, P_{CF}, in watts.

3.1.2 C*onventional cooking top.* Establish the test conditions set forth in section 2, *Test Conditions,* of this Appendix. Adjust any pilot lights of a conventional gas cooking top in accordance with the manufacturer's instructions and turn off the gas flow to the conventional oven(s), if so equipped. The temperature of the conventional cooking top shall be its normal

nonoperating temperature as defined in section 1.9 and described in section 2.6. Set the test block in the center of the surface unit under test. The small test block, W_2, shall be used on electric surface units of 7 inches (178 mm) or less in diameter. The large test block, W_3, shall be used on electric surface units over 7 inches (178 mm) in diameter and on all gas surface units. Turn on the surface unit under test and set its energy input rate to the maximum setting. When the test block reaches 144 °F (80 °C) above its initial test block temperature, immediately reduce the energy input rate to 25±5 percent of the maximum energy input rate. After 15±0.1 minutes at the reduced energy setting, turn off the surface unit under test.

* * * * *

3.1.2.2 *Conventional cooking top 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 conventional cooktops 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 (incorporated by reference; *see* § 430.3), allow sufficient time for the conventional cooktop to reach the lower power state before proceeding with the test measurement. Follow the test procedure as specified in Section 5, Paragraph 5.3 of IEC 62301 for testing in each possible mode as described in sections 3.1.2.2.1 and 3.1.2.2.2 of this Appendix, except allowing the product to stabilize for at least 30 minutes and using an energy use measurement period not less than 10 minutes. For units in which power varies as a function of displayed time in standby mode, either: (1) set the clock time to 3:23 at the end of the stabilization period specified in Section 5, Paragraph 5.3 of IEC 62301, and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301, but with a single test period of 10 minutes +0/−2 sec after an additional stabilization period until the clock time reaches 3:33; or (2) at any starting clock time, allow a stabilization period as described in Section 5, Paragraph 5.3 of IEC 62301, and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301, but with a single test period of 12 hours +0/−30 sec. Testing may be conducted using either a 12-hour test, a 10-minute test, or both tests; however, if a manufacturer elects to perform both tests on a unit, the manufacturer may only use the results from one of the test (*i.e.,* the 12-hour test or the 10-minute test) as the test results for that unit. Results of the 10-minute test that are within ± 2 percent of the 12-hour test are deemed to be representative of average energy use.

3.1.2.2.1 If the conventional cooking top has an inactive mode, as defined in section 1.8, measure and record the average inactive mode power of the conventional cooking top, P_{IA}, in watts.

3.1.2.2.2 If the conventional cooking top has an off mode, as defined in section 1.10, measure and record the average off mode power of the conventional cooking top, P_{OFF}, in watts.

3.1.3 *Conventional range 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 conventional ranges 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 (incorporated by reference; see § 430.3), allow sufficient time for the conventional range to reach the lower power state before proceeding with the test measurement. Follow the test procedure as specified in Section 5, Paragraph 5.3 of IEC 62301 for testing in each possible mode as described in sections 3.1.3.1 through 3.1.3.3 of this Appendix, except allowing the product to stabilize for at least 30 minutes and using an energy use measurement period not less than 10 minutes. For units in which power varies as a function of displayed time in standby mode, either: (1) set the clock time to 3:23 at the end of the stabilization period specified in Section 5, Paragraph 5.3 of IEC 62301, and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301, but with a single test period of 10 minutes +0/−2 sec after an additional stabilization period until the clock time reaches 3:33; or (2) at any starting clock time, allow a stabilization period as described in Section 5, Paragraph 5.3 of IEC 62301, and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301, but with a single test period of 12 hours +0/−30 sec. Testing may be conducted using either a 12-hour test, a 10-minute test, or both tests; however, if a manufacturer elects to perform both tests on a unit, the manufacturer may only use the results from one of the test (*i.e.,* the 12-hour test or the 10-minute test) as the test results for that unit. Results of the 10-minute test that are within ± 2 percent of the 12-hour test are deemed to be representative of average energy use.

3.1.3.1 If the conventional range has an inactive mode, as defined in section 1.8, measure and record the average inactive mode power of the conventional range, P_{IA}, in watts.

3.1.3.2 If the conventional range has an off mode, as defined in section 1.10, measure and record the average off mode power of the conventional range, P_{OFF}, in watts.

3.1.3.3 If the conventional range has a cycle finished mode, as defined in section 1.3, measure and record the average cycle finished mode power of the conventional range, P_{CF}, in watts.

* * * * *

3.2.1 *Conventional oven test energy consumption.* If the oven thermostat controls the oven temperature without cycling on and off, measure the energy consumed, E_O, when the temperature of the block reaches T_O (T_O is 234 °F (130 °C) above the initial block temperature, T_I). If the oven thermostat operates by cycling on and off, make the following series of measurements: Measure the block temperature, T_A, and the energy consumed, E_A, or volume of gas consumed, V_A, at the end of the last "ON" period of the conventional oven before the block reaches T_O. Measure the block temperature, T_B, and the energy consumed, E_B, or volume of gas consumed, V_B, at the beginning of the next "ON" period. Measure the block temperature, T_C, and the energy consumed, E_C, or volume of gas consumed, V_C, at the end of that "ON" period. Measure the block temperature, T_D, and the energy consumed, E_D, or volume of gas consumed, V_D, at the beginning of the following "ON" period. Energy measurements for E_O, E_A, E_B, E_C, and E_D should be expressed in watt-hours (kJ) for conventional electric ovens, and volume measurements for V_A, V_B, V_C, and V_D should be expressed in standard cubic feet (L) of gas for conventional gas ovens. For a gas oven, measure in watt-hours (kJ) any electrical energy, E_{IO}, consumed by an ignition device or other electrical components required for the operation of a conventional gas oven while heating the test block to T_O.

3.2.1.1 *Conventional oven average test energy consumption.* If the conventional oven permits baking by either forced convection or without forced convection and the oven thermostat does not cycle on and off, measure the energy consumed with the forced convection mode, $(E_O)_1$, and without the forced convection mode, $(E_O)_2$, when the temperature of the block reaches T_O (T_O is 234 °F (130 °C) above the initial block temperature, T_I). If the conventional oven permits baking by either forced convection or without forced convection and the oven thermostat operates by cycling on and off, make the following series of measurements with and without the forced convection mode: Measure the block temperature, T_A, and the energy consumed, E_A, or volume of gas consumed, V_A, at the end of the last "ON" period of the conventional oven before the block reaches T_O. Measure the block temperature, T_B, and the energy consumed, E_B, or volume of gas consumed, V_B, at the beginning of the next "ON" period. Measure the block temperature, T_C, and the energy consumed, E_C, or volume of gas consumed, V_C, at the end of that "ON" period. Measure the block temperature, T_D, and the energy consumed, E_D, or volume of gas consumed, V_D, at the beginning of the following "ON" period. Energy measurements for E_O, E_A, E_B, E_C, and E_D should be expressed in watt-hours (kJ) for conventional electric ovens, and volume measurements for V_A, V_B, V_C, and V_D should be expressed in standard cubic feet (L) of gas for conventional gas ovens. For a gas oven that can be operated with or without forced convection, measure in watt-hours (kJ) any electrical energy consumed by an ignition device or other electrical components required for the operation of a conventional gas oven while heating the test block to T_O using the forced convection mode, $(E_{IO})_1$, and without using the forced convection mode, $(E_{IO})_2$.

3.2.1.2 *Energy consumption of self-cleaning operation.* Measure the energy consumption, E_S, in watt-hours (kJ) of electricity or the volume of gas consumption, V_S, in standard cubic feet (L) during the self-cleaning test set forth in section 3.1.1.1 of this Appendix. For a gas oven, also measure in watt-hours (kJ) any electrical energy, E_{IS}, consumed by ignition devices or other electrical components required during the self-cleaning test.

* * * * *

3.2.1.4 *Standby mode and off mode energy consumption.* Make measurements as specified in section 3.1.1.3 of this Appendix.

If the conventional oven is capable of operating in inactive mode, measure the average inactive mode power of the conventional oven, P_{IA}, in watts as specified in section 3.1.1.3.1 of this Appendix. If the conventional oven is capable of operating in off mode, measure the average off mode power of the conventional oven, P_{OFF}, in watts as specified in section 3.1.1.3.2 of this Appendix. If the conventional oven is capable of operating in cycle finished mode, measure the average cycle finished mode power of the conventional oven, P_{CF}, in watts as specified in section 3.1.1.3.3 of this Appendix.

3.2.2 *Conventional surface unit test energy consumption.*

3.2.2.1 *Conventional surface unit average test energy consumption.* For the surface unit under test, measure the energy consumption, E_{CT}, in watt-hours (kJ) of electricity or the volume of gas consumption, V_{CT}, in standard cubic feet (L) of gas and the test block temperature, T_{CT}, at the end of the 15 minute (reduced input setting) test interval for the test specified in section 3.1.2 of this Appendix and the total time, t_{CT}, in hours, that the unit is under test. Measure 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 cooktop in watt-hours (kJ).

3.2.2.2 *Conventional surface unit standby mode and off mode energy consumption.* Make measurements as specified in section 3.1.2.2 of this Appendix. If the conventional surface unit is capable of operating in inactive mode, measure the average inactive mode power of the conventional surface unit, P_{IA}, in watts as specified in section 3.1.2.2.1 of this Appendix. If the conventional surface unit is capable of operating in off mode, measure the average off mode power of the conventional surface unit, P_{OFF}, in watts as specified in section 3.1.2.2.2 of this Appendix.

* * * * *

3.2.3 *Conventional range standby mode and off mode energy consumption.* Make measurements as specified in section 3.1.3 of this Appendix. If the conventional range is capable of operating in inactive mode, measure the average inactive mode power of the conventional range, P_{IA}, in watts as specified in section 3.1.3.1 of this Appendix. If the conventional range is capable of operating in off mode, measure the average off mode power of the conventional range, P_{OFF}, in watts as specified in section 3.1.3.2 of this Appendix. If the conventional range is capable of operating in cycle finished mode, measure the average cycle finished mode power of the conventional range, P_{CF}, in watts as specified in section 3.1.3.3 of this Appendix.

* * * * *

3.3.8 For conventional ovens, record the conventional oven standby mode and off mode test measurements P_{IA}, P_{OFF}, and P_{CF}, if applicable. For conventional cooktops, record the conventional cooktop standby mode and off mode test measurements P_{IA} and P_{OFF}, if applicable. For conventional ranges, record the conventional range standby mode and off mode test measurements P_{IA}, P_{OFF}, and P_{CF}, if applicable.

* * * * *

4. Calculation of Derived Results From Test Measurements

* * * * *

4.1.1 *Test energy consumption.* For a conventional oven with a thermostat which operates by cycling on and off, calculate the test energy consumption, E_O, expressed in watt-hours (kJ) for electric ovens and in Btu's (kJ) for gas ovens, and defined as:

$$E_O = E_{AB} + \left[\left(\frac{T_O - T_{AB}}{T_{CD} - T_{AB}} \right) \times \left(E_{CD} - E_{AB} \right) \right]$$

for electric ovens, and,

$$E_O = \left(V_{AB} \times H \right) + \left[\left(\frac{T_O - T_{AB}}{T_{CD} - T_{AB}} \right) \times \left(V_{CD} - V_{AB} \right) \times H \right]$$

for gas ovens,

Where:

H = either H_n or H_p, the heating value of the gas used in the test as specified in section 2.2.2.2 and section 2.2.2.3 of this Appendix, expressed in Btu's per standard cubic foot (kJ/L).

T_O = 234 °F (130 °C) plus the initial test block temperature.

and,

$$E_{AB} = \frac{\left(E_A + E_B \right)}{2}, \quad E_{CD} = \frac{\left(E_C + E_D \right)}{2},$$

$$V_{AB} = \frac{\left(V_A + V_B \right)}{2}, \quad V_{CD} = \frac{\left(V_C + V_D \right)}{2},$$

$$T_{AB} = \frac{\left(T_A + T_B \right)}{2}, \quad T_{CD} = \frac{\left(T_C + T_D \right)}{2},$$

Where:

T_A = block temperature in °F (°C) at the end of the last "ON" period of the conventional oven before the test block reaches T_O.

T_B = block temperature in °F (°C) at the beginning of the "ON" period following the measurement of T_A.

T_C = block temperature in °F (°C) at the end of the "ON" period which starts with T_B.

T_D = block temperature in °F (°C) at the beginning of the "ON" period which follows the measurement of T_C.

E_A = electric energy consumed in Wh (kJ) at the end of the last "ON" period before the test block reaches T_O.

E_B = electric energy consumed in Wh (kJ) at the beginning of the "ON" period following the measurement of T_A.

E_C = electric energy consumed in Wh (kJ) at the end of the "ON" period which starts with T_B.

E_D = electric energy consumed in Wh (kJ) at the beginning of the "ON" period which follows the measurement of T_C.

V_A = volume of gas consumed in standard cubic feet (L) at the end of the last "ON" period before the test block reaches T_O.

V_B = volume of gas consumed in standard cubic feet (L) at the beginning of the "ON" period following the measurement of T_A.

V_C = volume of gas consumed in standard cubic feet (L) at the end of the "ON" period which starts with T_B.

V_D = volume of gas consumed in standard cubic feet (L) at the beginning of the "ON" period which follows the measurement of T_C.

4.1.1.1 *Average test energy consumption.* If the conventional oven can be operated with or without forced convection, determine the average test energy consumption, E_O and $E_{IO,}$ in watt-hours (kJ) for electric ovens and Btu's (kJ) for gas ovens using the following equations:

$$E_O = \frac{(E_O)_1 + (E_O)_2}{2}$$

$$E_{IO} = \frac{(E_{IO})_1 + (E_{IO})_2}{2}$$

Where:

$(E_O)_1$ = test energy consumption using the forced convection mode in watt-hours (kJ) for electric ovens and in Btu's (kJ) for gas ovens as measured in section 3.2.1.1 of this Appendix.

$(E_O)_2$ = test energy consumption without using the forced convection mode in watt-hours (kJ) for electric ovens and in Btu's (kJ) for gas ovens as measured in section 3.2.1.1 of this Appendix.

$(E_{IO})_1$ = electrical energy consumption in watt-hours (kJ) of a gas oven in forced convection mode as measured in section 3.2.1.1 of this Appendix.

$(E_{IO})_2$ = electrical energy consumption in watt-hours (kJ) of a gas oven without using the forced convection mode as measured in section 3.2.1.1 of this Appendix.

* * * * *

4.1.2.3.1 *Annual primary energy consumption.* Calculate the annual primary energy consumption for conventional oven self-cleaning operations, $E_{SC,}$ expressed in kilowatt-hours (kJ) per year for electric ovens and in Btu's (kJ) for gas ovens, and defined as:

$E_{SC} = E_S \times S_e \times K$, for electric ovens,

Where:

E_S = energy consumption in watt-hours, as measured in section 3.2.1.2 of this Appendix.

S_e = 4, average number of times a self-cleaning operation of a conventional electric oven is used per year.

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

or

$E_{SC} = V_S \times H \times S_g$, for gas ovens,

Where:

V_S = gas consumption in standard cubic feet (L), as measured in section 3.2.1.2 of this Appendix.

H = H_n or H_p, the heating value of the gas used in the test as specified in section 2.2.2.2 and section 2.2.2.3 of this Appendix in Btu's per standard cubic foot (kJ/L).

S_g = 4, average number of times a self-cleaning operation of a conventional gas oven is used per year.

* * * * *

4.1.2.4 *Annual standby mode and off mode energy consumption of a single conventional oven.* Calculate the annual standby mode and off mode energy consumption for conventional ovens, E_{OTSO}, expressed in kilowatt-hours (kJ) per year and defined as:

$E_{OTSO} = [(P_{IA} \times S_{IA}) + (P_{OFF} \times S_{OFF}) + (P_{CF} \times S_{CF})] \times K$

Where:

P_{IA} = conventional oven inactive mode power, in watts, as measured in section 3.1.1.3.1 of this Appendix.

P_{OFF} = conventional oven off mode power, in watts, as measured in section 3.1.1.3.2 of this Appendix.

P_{CF} = conventional oven cycle finished mode power, in watts, as measured in section 3.1.1.3.3 of this Appendix.

If the conventional oven has cycle finished mode, S_{TOT} equals 8,522.1 hours:

Where:

S_{TOT} equals the total number of inactive mode and off mode hours per year;

If the conventional oven does not have cycle finished mode, S_{TOT} equals 8,540.1 hours;

If the conventional oven has both inactive mode and off mode, S_{IA} and S_{OFF} both equal $S_{TOT}/2$;

If the conventional oven 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_{OFF}, is equal to 0;

If the conventional oven has an off mode but no inactive mode, S_{IA} is equal to 0 and S_{OFF} is equal to S_{TOT};

S_{CF} = 18, conventional oven cycle finished mode annual hours;

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

* * * * *

4.1.2.5.1 *Conventional electric oven energy consumption.* Calculate the total annual energy consumption of a conventional electric oven, E_{AO}, expressed in kilowatt-hours (kJ) per year and defined as:

$E_{AO} = E_{CO} + E_{SC}$,

Where:

E_{CO} = annual primary cooking energy consumption as determined in section 4.1.2.1.1 of this Appendix.

E_{SC} = annual primary self-cleaning energy consumption as determined in section 4.1.2.3.1 of this Appendix.

4.1.2.5.2 *Conventional electric oven integrated energy consumption.* Calculate the total integrated annual electrical energy consumption of a conventional electric oven, IE_{AD}, expressed in kilowatt-hours (kJ) per year and defined as:

$IE_{AO} = E_{CO} + E_{SC,} + E_{OTSO,}$,

Where:

E_{CO} = annual primary cooking energy consumption as determined in section 4.1.2.1.1 of this Appendix.

E_{SC} = annual primary self-cleaning energy consumption as determined in section 4.1.2.3.1 of this Appendix.

E_{OTSO} = annual standby mode and off mode energy consumption as determined in section 4.1.2.4 of this Appendix.

4.1.2.5.3 *Conventional gas oven energy consumption.* Calculate the total annual gas energy consumption of a conventional gas oven, $E_{AOG,}$ expressed in Btu's (kJ) per year and defined as:

$E_{AOG} = E_{CO} + E_{SC} + E_{PO}$,

Where:

E_{CO} = annual primary cooking energy consumption as determined in section 4.1.2.1.1 of this Appendix.

E_{PO} = annual pilot light energy consumption as determined in section 4.1.2.2 of this Appendix.

E_{SC} = annual primary self-cleaning energy consumption as determined in section 4.1.2.3.1 of this Appendix.

If the conventional gas oven uses electrical energy, calculate the total annual electrical energy consumption, E_{AOE}, expressed in kilowatt-hours (kJ) per year and defined as:

$E_{AOE} = E_{SO} + E_{SS}$,

Where:

E_{SO} = annual secondary cooking energy consumption as determined in section 4.1.2.1.2 of this Appendix.

E_{SS} = annual secondary self-cleaning energy consumption as determined in section 4.1.2.3.2 of this Appendix.

If the conventional gas oven uses electrical energy, also calculate the total integrated annual electrical energy consumption, IE_{AOE}, expressed in kilowatt-hours (kJ) per year and defined as:

$IE_{AOE} = E_{SO} + E_{SS} + E_{OTSO}$,

Where:

E_{SO} = annual secondary cooking energy consumption as determined in section 4.1.2.1.2 of this Appendix.

E_{SS} = annual secondary self-cleaning energy consumption as determined in section 4.1.2.3.2 of this Appendix.

E_{OTSO} = annual standby mode and off mode energy consumption as determined in section 4.1.2.4 of this Appendix.

* * * * *

4.1.2.6.1 *Conventional electric oven energy consumption.* Calculate the total annual energy consumption, E_{TO}, in kilowatt-hours (kJ) per year and defined as:

$E_{TO} = E_{ACO} + E_{ASC}$,

Where:

$$E_{ACO} = \frac{1}{n}\sum_{i=1}^{n}\left(E_{CO}\right)_i ,$$

is the average annual primary energy consumption for cooking, and where:

n = number of conventional ovens in the basic model.

E_{CO} = annual primary energy consumption for cooking as determined in section 4.1.2.1.1 of this Appendix.

$$E_{ASC} = \frac{1}{n}\sum_{i=1}^{n}\left(E_{SC}\right)_i ,$$

average annual self-cleaning energy consumption,

Where:

n = number of self-cleaning conventional ovens in the basic model.

E_{SC} = annual primary self-cleaning energy consumption as determined according to section 4.1.2.3.1 of this Appendix.

4.1.2.6.2 *Conventional electric oven integrated energy consumption.* Calculate the total integrated annual energy consumption, IE_{TO}, in kilowatt-hours (kJ) per year and defined as:

$IE_{TO} = E_{ACO} + E_{ASC} + E_{OTSO}$,

Where:

$$E_{ACO} = \frac{1}{n}\sum_{i=1}^{n}\left(E_{CO}\right)_i ,$$

is the average annual primary energy consumption for cooking, and where:

n = number of conventional ovens in the basic model.

E_{CO} = annual primary energy consumption for cooking as determined in section 4.1.2.1.1 of this Appendix.

$$E_{ASC} = \frac{1}{n}\sum_{i=1}^{n}\left(E_{SC}\right)_i ,$$

average annual self-cleaning energy consumption,

Where:

n = number of self-cleaning conventional ovens in the basic model.

E_{SC} = annual primary self-cleaning energy consumption as determined according to section 4.1.2.3.1 of this Appendix.

E_{OTSO} = annual standby mode and off mode energy consumption for the cooking appliance as determined in section 4.1.2.4 of this Appendix.

4.1.2.6.3 *Conventional gas oven energy consumption.* Calculate the total annual gas energy consumption, E_{TOG}, in Btus (kJ) per year and defined as:

$E_{TOG} = E_{ACO} + E_{ASC} + E_{TPO}$,

Where:

E_{ACO} = average annual primary energy consumption for cooking in Btu's (kJ) per year and is calculated as:

$$E_{ACO} = \frac{1}{n}\sum_{i=1}^{n}\left(E_{CO}\right)_i ,$$

Where:

n = number of conventional ovens in the basic model.

E_{CO} = annual primary energy consumption for cooking as determined in section 4.1.2.1.1 of this Appendix.

and,

E_{ASC} = average annual self-cleaning energy consumption in Btu's (kJ) per year and is calculated as:

$$E_{ASC} = \frac{1}{n}\sum_{i=1}^{n}\left(E_{SC}\right)_i ,$$

Where:

n = number of self-cleaning conventional ovens in the basic model.

E_{SC} = annual primary self-cleaning energy consumption as determined according to section 4.1.2.3.1 of this Appendix.

$$E_{TPO} = \sum_{i=1}^{n}\left(E_{PO}\right)_i ,$$

total energy consumption of any pilot lights,

Where:

E_{PO} = annual energy consumption of any continuously-burning pilot lights determined according to section 4.1.2.2 of this Appendix.

n = number of pilot lights in the basic model.

If the oven also uses electrical energy, calculate the total annual electrical energy consumption, E_{TOE}, in kilowatt-hours (kJ) per year and defined as:

$E_{TOE} = E_{ASO} + E_{AAS}$,

Where:

$$E_{ASO} = \frac{1}{n}\sum_{i=1}^{n}\left(E_{SO}\right)_i ,$$

is the average annual secondary energy consumption for cooking,

Where:

n = number of conventional ovens in the basic model.

E_{SO} = annual secondary energy consumption for cooking of gas ovens as determined in section 4.1.2.1.2 of this Appendix.

$$E_{AAS} = \frac{1}{n}\sum_{i=1}^{n}\left(E_{SS}\right)_i ,$$

is the average annual secondary self-cleaning energy consumption,

Where:

n = number of self-cleaning ovens in the basic model.

E_{SS} = annual secondary self-cleaning energy consumption of gas ovens as determined in section 4.1.2.3.2 of this Appendix.

If the oven also uses electrical energy, also calculate the total integrated annual electrical energy consumption, IE_{TOE}, in kilowatt-hours (kJ) per year and defined as:

$IE_{TOE} = E_{ASO} + E_{AAS} + E_{OTSO}$,

Where:

$$E_{ASO} = \frac{1}{n}\sum_{i=1}^{n}\left(E_{SO}\right)_i ,$$

is the average annual secondary energy consumption for cooking,

Where:

n = number of conventional ovens in the basic model.

E_{SO} = annual secondary energy consumption for cooking of gas ovens as determined in section 4.1.2.1.2 of this Appendix.

$$E_{AAS} = \frac{1}{n}\sum_{i=1}^{n}\left(E_{SS}\right)_i ,$$

is the average annual secondary self-cleaning energy consumption,

Where:

n = number of self-cleaning ovens in the basic model.

E_{SS} = annual secondary self-cleaning energy consumption of gas ovens as determined in section 4.1.2.3.2 of this Appendix.

E_{OTSO} = annual standby mode and off mode energy consumption as determined in section 4.1.2.4 of this Appendix.

* * * * *

4.1.4 *Conventional oven energy factor and integrated energy factor.*

4.1.4.1 *Conventional oven energy factor.* Calculate the energy factor, or the ratio of useful cooking energy output to the total energy input, R_O, using the following equations:

$$R_O = \frac{O_O}{E_{AO}}$$

For electric ovens,

Where:

O_O = 29.3 kWh (105,480 kJ) per year, annual useful cooking energy output.

E_{AO} = total annual energy consumption for electric ovens as determined in section 4.1.2.5.1 of this Appendix.

For gas ovens:

$$R_O = \frac{O_O}{E_{AOG} + (E_{AOE} \times K_e)}$$

Where:

O_O = 88.8 kBtu (93,684 kJ) per year, annual useful cooking energy output.

E_{AOG} = total annual gas energy consumption for conventional gas ovens as determined in section 4.1.2.5.3 of this Appendix.

E_{AOE} = total annual electrical energy consumption for conventional gas ovens as determined in section 4.1.2.5.3 of this Appendix.

K_e = 3,412 Btu/kWh (3,600 kJ/kWh), conversion factor for kilowatt-hours to Btu's.

4.1.4.2 *Conventional oven integrated energy factor.* Calculate the integrated energy factor, or the ratio of useful cooking energy output to the total integrated energy input, IR_O, using the following equations:

$$IR_O = \frac{O_O}{IE_{AO}}$$

For electric ovens,

Where:

O_O = 29.3 kWh (105,480 kJ) per year, annual useful cooking energy output.

IE_{AO} = total integrated annual energy consumption for electric ovens as determined in section 4.1.2.5.2 of this Appendix.

For gas ovens:

$$IR_O = \frac{O_O}{E_{AOG} + (E_{AOE} \times K_e)}$$

Where:

O_O = 88.8 kBtu (93,684 kJ) per year, annual useful cooking energy output.

E_{AOG} = total annual gas energy consumption for conventional gas ovens as determined in section 4.1.2.5.3 of this Appendix.

IE_{AOE} = total integrated annual electrical energy consumption for conventional gas ovens as determined in section 4.1.2.5.3 of this Appendix.

K_e = 3,412 Btu/kWh (3,600 kJ/kWh), conversion factor for kilowatt-hours to Btu's.

* * * * *

4.2.1.1 *Electric surface unit cooking efficiency.* Calculate the cooking efficiency, Eff_{SU}, of the electric surface unit under test, defined as:

$$Eff_{SU} = W \times C_P \times \left(\frac{T_{SU}}{K_e \times E_{CT}} \right)$$

Where:

W = measured weight of test block, W_2 or W_3, expressed in pounds (kg).

C_p = 0.23 Btu/lb-°F (0.96 kJ/kg ÷ °C), specific heat of test block.

T_{SU} = temperature rise of the test block: final test block temperature, T_{CT}, as determined in section 3.2.2 of this Appendix, minus the initial test block temperature, T_I, expressed in °F (°C) as determined in section 2.7.5 of this Appendix.

K_e = 3.412 Btu/Wh (3.6 kJ/Wh), conversion factor of watt-hours to Btu's.

E_{CT} = measured energy consumption, as determined according to section 3.2.2 of this Appendix, expressed in watt-hours (kJ).

* * * * *

4.2.2.1 *Conventional electric cooking top*

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

$$E_{CA} = \frac{O_{CT}}{Eff_{CT}}$$

Where:

O_{CT} = 173.1 kWh (623,160 kJ) per year, annual useful cooking energy output.

Eff_{CT} = conventional cooking top cooking efficiency as defined in section 4.2.1.3 of this Appendix.

4.2.2.1.2 *Integrated annual energy consumption of a conventional electric cooking top.* Calculate the total integrated annual electrical energy consumption of an electric cooking top, IE_{CA}, in kilowatt-hours (kJ) per year, defined as:

$$IE_{CA} = \frac{O_{CT}}{Eff_{CT}} + E_{CTSO}$$

Where:

O_{CT} = 173.1 kWh (623,160 kJ) per year, annual useful cooking energy output.

Eff_{CT} = conventional cooking top cooking efficiency as defined in section 4.2.1.3 of this Appendix.

$E_{CTSO} = [(P_{IA} \times S_{IA}) + (P_{OFF} \times S_{OFF})] \times K$

Where:

P_{IA} = conventional cooktop inactive mode power, in watts, as measured in section 3.1.2.2.1 of this Appendix.

P_{OFF} = conventional cooktop off mode power, in watts, as measured in section 3.1.2.2.2 of this Appendix.

If the conventional cooktop has both inactive mode and off mode annual hours, S_{IA} and S_{OFF} both equal 4273.4;

If the conventional cooktop 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_{OFF}, is equal to 0;

If the conventional cooktop has an off mode but no inactive mode, S_{IA} is equal to 0 and S_{OFF} is equal to 8546.9;

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

* * * * *

4.2.2.2.3 *Total annual energy consumption of a conventional gas cooking top.* Calculate the total annual gas energy consumption of a conventional gas cooking top, E_{CA}, in Btu's (kJ) per year, defined as:

$E_{CA} = E_{CC} + E_{PC}$,

Where:

E_{CC} = energy consumption for cooking as determined in section 4.2.2.2.1 of this Appendix.

E_{PC} = annual energy consumption of the pilot lights as determined in section 4.2.2.2.2 of this Appendix.

4.2.2.2.4 *Total integrated annual energy consumption of a conventional gas cooking top.* Calculate the total integrated annual energy consumption of a conventional gas cooking top, IE_{CA}, in Btu's (kJ) per year, defined as:

$IE_{CA} = E_{CC} + E_{PC} + E_{CTSO}$,

Where:

E_{CC} = energy consumption for cooking as determined in section 4.2.2.2.1 of this Appendix.

E_{PC} = annual energy consumption of the pilot lights as determined in section 4.2.2.2.2 of

$E_{CTSO} = [(P_{IA} \times S_{IA}) + (P_{OFF} \times S_{OFF})] \times K$

Where:

P_{IA} = conventional cooktop inactive mode power, in watts, as measured in section 3.1.2.2.1 of this Appendix.

P_{OFF} = conventional cooktop off mode power, in watts, as measured in section 3.1.2.2.2 of this Appendix.

If the conventional cooktop has both inactive mode and off mode annual hours, S_{IA} and S_{OFF} both equal 4273.4;

If the conventional cooktop 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_{OFF}, is equal to 0;

If the conventional cooktop has an off mode but no inactive mode, S_{IA} is equal to 0 and S_{OFF} is equal to 8546.9;

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

4.2.3 *Conventional cooking top energy factor and integrated energy factor.*

4.2.3.1 *Conventional cooking top energy factor.* Calculate the energy factor or ratio of useful cooking energy output for cooking to the total energy input, R_{CT}, as follows:

For an electric cooking top, the energy factor is the same as the cooking efficiency as determined according to section 4.2.1.3 of this Appendix.

For gas cooking tops,

$$R_{CT} = \frac{O_{CT}}{E_{CA}}$$

Where:

O_{CT} = 527.6 kBtu (556,618 kJ) per year, annual useful cooking energy output of cooking top.

E_{CA} = total annual energy consumption of cooking top determined according to section 4.2.2.2.3 of this Appendix.

4.2.3.2 *Conventional cooking top integrated energy factor.* Calculate the integrated energy factor or ratio of useful cooking energy output for cooking to the total integrated energy input, $IR_{CT,}$ as follows:

For electric cooking tops,

$$IR_{CT} = \frac{O_{CT}}{IE_{CA}}$$

Where:

O_{CT} = 527.6 kBtu (556,618 kJ) per year, annual useful cooking energy output of cooking top.

IE_{CA} = total annual integrated energy consumption of cooking top determined according to section 4.2.2.1.2 of this Appendix.

For gas cooking tops,

$$IR_{CT} = \frac{O_{CT}}{IE_{CA}}$$

Where:

O_{CT} = 527.6 kBtu (556,618 kJ) per year, annual useful cooking energy output of cooking top.

IE_{CA} = total annual energy consumption of cooking top determined according to section 4.2.2.2.4 of this Appendix.

4.3 *Combined components.* The annual energy consumption of a kitchen range (*e.g.,* a cooktop and oven combined) shall be the sum of the annual energy consumption of each of its components. The integrated annual energy consumption of a kitchen range shall be the sum of the annual energy consumption of each of its components plus the conventional range integrated annual standby mode and off mode energy consumption, E_{RTSO}, defined as:

$E_{RTSO} = [(P_{IA} \times S_{IA}) + (P_{OFF} \times S_{OFF}) + (P_{CF} \times S_{CF})] \times K$

Where:

P_{IA} = conventional range inactive mode power, in watts, as measured in section 3.1.3.1 of this Appendix.

P_{OFF} = conventional range off mode power, in watts, as measured in section 3.1.3.2 of this Appendix.

P_{CF} = conventional range cycle finished mode power, in watts, as measured in section 3.1.3.3 of this Appendix.

If the conventional range has cycle finished mode, S_{TOT}, equals 8,311.2 hours;

Where:

S_{TOT} equals the total number of inactive mode and off mode hours per year;

If the conventional range does not have cycle finished mode, S_{TOT}, equals 8,329.2 hours;

If the conventional range has both inactive mode and off mode, S_{IA} and S_{OFF} both equal $S_{TOT}/2$;

If the conventional range 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_{OFF}, is equal to 0;

If the conventional range has an off mode but no inactive mode, S_{IA} is equal to 0 and S_{OFF} is equal to S_{TOT};

S_{CF} = 18, conventional range cycle finished mode annual hours;

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

The annual energy consumption for other combinations of ovens and cooktops will also be treated as the sum of the annual energy consumption of each of its components. The energy factor of a combined component is the sum of the annual useful cooking energy output of each component divided by the sum of the total annual energy consumption of each component. The integrated energy factor of other combinations of ovens and cooktops is the sum of the annual useful cooking energy output of each component divided by the sum of the total integrated annual energy consumption of each component.

6. Appendix X to subpart B of part 430 is revised to read as follows:

Appendix X to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Dehumidifiers

Note: The procedures and calculations that refer to standby mode and off mode energy consumption (*i.e.,* sections 3.2, 3.2.1 through 3.2.4, 4.2, 4.2.1 through 4.2.4, 5.1, and 5.2 of this Appendix X) need not be performed to determine compliance with energy conservation standards for dehumidifiers at this time. However, any representation related to standby mode and off mode energy consumption of these products made after May 31, 2011 must be based upon results generated under this test procedure, consistent with the requirements of 42 U.S.C. 6293(c)(2). After July 1, 2010, any adopted energy conservation standard shall incorporate standby mode and off mode energy consumption, and upon the compliance date for such standards, compliance with the applicable provisions of this test procedure will also be required.

1. Scope

This appendix covers the test requirements used to measure the energy performance of dehumidifiers.

2. Definitions

a. *Active mode* means a mode in which a dehumidifier is connected to a mains power source, has been activated, and is performing the main functions of removing moisture from air by drawing moist air over a refrigerated coil using a fan, or circulating air through activation of the fan without activation of the refrigeration system.

b. *Bucket full/removed mode* means a standby mode in which the dehumidifier has automatically powered off its main function by detecting when the water bucket is full or has been removed.

c. *Energy factor for dehumidifiers* means a measure of energy efficiency of a dehumidifier calculated by dividing the water removed from the air by the energy consumed, measured in liters per kilowatt-hour (L/kWh).

d. *IEC 62301* 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).

e. *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.

f. *Off mode* means a mode in which the dehumidifier is connected to a mains power source and is not providing any active mode or standby mode function, and where the mode may persist for an indefinite time. An indicator that only shows the user that the dehumidifier is in the off position is included within the classification of an off mode.

g. *Off-cycle mode* means a standby mode in which the dehumidifier:

(1) Has cycled off its main function by humidistat or humidity sensor;

(2) Does not have its fan or blower operating; and

(3) Will reactivate the main function according to the humidistat or humidity sensor signal.

h. *Product capacity for dehumidifiers* means a measure of the ability of the dehumidifier to remove moisture from its surrounding atmosphere, measured in pints collected per 24 hours of continuous operation.

i. *Standby mode* means any modes where the dehumidifier 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) To facilitate the activation of other modes (including activation or deactivation of active mode) by remote switch (including remote control), internal sensor, or timer;

(2) 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 provides regular scheduled tasks (*e.g.,* switching) and that operates on a continuous basis.

3. Test Apparatus and General Instructions

3.1 *Active mode.* The test apparatus and instructions for testing dehumidifiers shall conform to the requirements specified in section 1, "Definitions," section 2,

"Qualifying Products," and section 4, "Test Criteria," of the EPA's "ENERGY STAR Program Requirements for Dehumidifiers," effective January 1, 2001 (incorporated by reference, *see* § 430.3). Record measurements at the resolution of the test instrumentation. Round off calculations to the same number of significant digits as the previous step. Round the final minimum energy factor value to two decimal places as follows:

(i) A fractional number at or above the midpoint between two consecutive decimal places shall be rounded up to the higher of the two decimal places; or

(ii) A fractional number below the midpoint between two consecutive decimal places shall be rounded down to the lower of the two decimal places.

3.2 *Standby mode and off mode.*

3.2.1 *Installation requirements.* For the standby mode and off mode testing, the dehumidifier shall be installed in accordance with Section 5, Paragraph 5.2 of IEC 62301 (incorporated by reference, *see* § 430.3).

3.2.2 *Electrical energy supply.*

3.2.2.1 *Electrical supply.* For the standby mode and off mode testing, maintain the electrical supply voltage indicated in section 4, "Test Criteria," of the EPA's "ENERGY STAR Program Requirements for Dehumidifiers," effective January 1, 2001, (incorporated by reference, *see* § 430.3) and the electrical supply frequency indicated in section 4, "Test Criteria," of the EPA's "ENERGY STAR Program Requirements for Dehumidifiers," ±1 percent.

3.2.2.2 *Supply voltage waveform.* For the standby mode and off mode testing, maintain the electrical supply voltage waveform indicated in Section 4, Paragraph 4.4 of IEC 62301, (incorporated by reference; *see* § 430.3).

3.2.3 *Standby watt meter.* The watt meter used to measure standby mode and off mode power consumption shall have the resolution specified in Section 4, Paragraph 4.5 of IEC 62301 (incorporated by reference, see § 430.3). The watt meter shall also be able to record a "true" average power as specified in Section 5, Paragraph 5.3.2(a) of IEC 62301.

3.2.4 *Standby 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 (incorporated by reference; *see* § 430.3).

4. Test Measurement

4.1 *Active mode.* Measure the energy factor for dehumidifiers, expressed in liters per kilowatt hour (L/kWh) and product capacity in pints per day (pints/day), in accordance with the test requirements specified in section 4, "Test Criteria," of EPA's "ENERGY STAR Program Requirements for Dehumidifiers," effective January 1, 2001 (incorporated by reference, *see* § 430.3).

4.2 *Standby mode and off mode.* Establish the testing conditions set forth in section 3.2 of this Appendix. For dehumidifiers 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, (incorporated by reference; *see* § 430.3), allow sufficient time for the dehumidifier to reach the lower power state before proceeding with the test measurement. Follow the test procedure specified in Section 5, Paragraph 5.3 of IEC 62301 for testing in each possible mode as described in sections 4.2.1 through 4.2.4 of this Appendix, except allowing the product to stabilize for at least 30 minutes and using an energy use measurement period of not less than 10 minutes. For units in which power varies over a cycle, as described in Section 5, Paragraph 5.3.2 of IEC 62301, use the average power approach in Section 5, Paragraph 5.3.2(a) of IEC 62301, except allowing the product to stabilize for at least 30 minutes and using an energy use measurement period of not less than 10 minutes.

4.2.1 If the dehumidifier has an inactive mode, as defined in section 2(e) of this Appendix, measure and record the average inactive mode power of the dehumidifier, P_{IA}, in watts.

4.2.2 If the dehumidifier has an off-cycle mode, as defined in section 2(g) of this Appendix, measure and record the average off-cycle mode power of the dehumidifier, P_{OC}, in watts.

4.2.3 If the dehumidifier has a bucket full/removed mode, as defined in section 2(b) of this Appendix, measure and record the average bucket full/removed mode power of the dehumidifier, P_{BFR}, in watts.

4.2.4 If the dehumidifier has an off mode, as defined in section 2(f) of this Appendix, measure and record the average off mode power, P_{OFF}, in watts.

5. Calculation of Derived Results From Test Measurements

5.1 *Standby mode and off mode annual energy consumption.* Calculate the standby mode and off mode annual energy consumption for dehumidifiers, E_{TSO}, expressed in kilowatt-hours per year, according to the following:

$$E_{TSO} = [(P_{IA} \times S_{IA}) + (P_{OC} \times S_{OC}) + (P_{BFR} \times S_{BFR}) + (P_{OFF} \times S_{OFF})] \times K$$

Where:

P_{IA} = dehumidifier inactive mode power, in watts, as measured in section 4.2.1 of this Appendix.

P_{OC} = dehumidifier off-cycle mode power, in watts, as measured in section 4.2.2 of this Appendix.

P_{BFR} = dehumidifier bucket full/removed mode power, in watts, as measured in section 4.2.3 of this Appendix.

P_{OFF} = dehumidifier off mode power, in watts, as measured in section 4.2.4 of this Appendix.

If the dehumidifier has an inactive mode and off-cycle mode but no off mode, the inactive mode annual hours, S_{IA}, is equal to $S_{TOT}/2$; the off-cycle mode annual hours, S_{OC}, is equal to $S_{TOT}/2$; and the off mode annual hours, S_{OFF}, is equal to 0;

S_{TOT} equals the total number of inactive mode, off-cycle mode, and off mode hours per year, defined as:

If the dehumidifier has bucket full/removed mode, S_{TOT} equals 3,024 hours;

If the dehumidifier does not have bucket full/removed mode, S_{TOT} equals 3,681 hours;

If the dehumidifier has an inactive mode and off mode but no off-cycle mode, the inactive mode annual hours, S_{IA}, is equal to $S_{TOT}/2$; the off mode annual hours, S_{OFF}, is equal to $S_{TOT}/2$; and the off-cycle mode annual hours, S_{OC}, is equal to 0;

If the dehumidifier has an inactive mode but no off-cycle mode or off mode, the inactive mode annual hours, S_{IA}, is equal to S_{TOT}, and the off-cycle mode annual hours, S_{OC}, and the off mode annual hours, S_{OFF}, are each equal to 0;

If the dehumidifier has an off-cycle mode and off mode but no inactive mode, the off-cycle mode annual hours, S_{OC}, is equal to $S_{TOT}/2$; the off mode annual hours, S_{OFF}, is equal to $S_{TOT}/2$; and the inactive mode annual hours, S_{IA}, is equal to 0;

If the dehumidifier has an off-cycle mode but no off mode or inactive mode, the off-cycle mode annual hours, S_{OC}, is equal to S_{TOT}, and the off mode annual hours, S_{OFF}, and the inactive mode annual hours, S_{IA}, are each equal to 0;

If the dehumidifier has an off mode but no inactive mode or off-cycle mode, the off mode annual hours, S_{OFF}, is equal to S_{TOT}, and the inactive mode annual hours, S_{IA}, and the off-cycle mode annual hours, S_{OC}, are both equal to 0;

If the dehumidifier has an inactive mode, off-cycle mode, and off mode, the inactive mode annual hours, S_{IA}, is equal to $S_{TOT}/3$; the off-cycle mode annual hours, S_{OC}, is equal to $S_{TOT}/3$; and the off mode annual hours, S_{OFF}, is equal to $S_{TOT}/3$;

S_{BFR} = 657, dehumidifier bucket full/removed mode annual hours;

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

5.2 *Integrated energy factor.* Calculate the integrated energy factor, IEF, expressed in liters per kilowatt-hour, rounded to two decimal places, according to the following:

$$IEF = L_W/(E_{active} + ((E_{TSO} \times 24)/S_{active}))$$

Where:

L_W = water removed from the air during dehumidifier energy factor test, in liters, as measured in section 4.1 of this Appendix.

E_{active} = dehumidifier energy factor test energy consumption, in kilowatt-hours, as measured in section 4.1 of this Appendix.

E_{TSO} = standby mode and off mode annual energy consumption, in kilowatt-hours per year, as calculated in section 5.1 of this Appendix.

24 = hours per day.

S_{active} = 1,095, dehumidifier active mode annual hours.

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