[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Parts 429 and 430

[Docket No. EERE-2010-BT-TP-0039]

RIN: 1904-AC01

Energy Conservation Program: Test Procedures for Residential Dishwashers, Dehumidifiers, and Conventional Cooking Products

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

ACTION: Final rule.

SUMMARY: The U.S. Department of Energy (DOE) establishes new test procedures for residential dishwashers and dehumidifiers, and amends the currently applicable test procedure for conventional cooking products under the Energy Policy and Conservation Act. The new test procedures include provisions for measuring standby mode and off mode energy consumption, and update the provisions for measuring active mode energy consumption and, for dishwashers, water consumption. This final rule also amends the certification, compliance, and enforcement requirements for dishwashers, dehumidifiers and conventional cooking products, amends certain provisions in the currently applicable dishwasher test procedure, and eliminates an obsolete energy efficiency metric in the dishwasher test procedure and provisions in the cooking products test procedure that have become obsolete due to the elimination of standing pilot lights.

DATES: Effective Date: The effective date of this rule is **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].**

Compliance Dates: The new test procedures for dishwashers and dehumidifiers and the final rule changes to the currently applicable test procedure for conventional cooking products will be mandatory to demonstrate compliance with the applicable energy conservation standards starting on the compliance date of any amended standards for dishwashers, dehumidifiers, and conventional cooking products. For dishwashers, this date will be May 30, 2013, the compliance date of the direct final rule published on May 30, 2012, unless the direct final rule is withdrawn as a result of adverse comment. Use of the replacement items for obsolete dishware, flatware, and food items in the currently applicable dishwasher test procedure will be required on **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. Voluntary early use of the new dishwasher and dehumidifier test procedures and the final rule changes to the currently applicable test procedure for conventional cooking products to demonstrate compliance with applicable energy conservation standards or for representations of energy use (including the new standby mode and off mode provisions) is permissible on or after **INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

The incorporation by reference of certain publications listed in this rulemaking is approved by the Director of the Office of the Federal Register as of **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: The docket is available for review at regulations.gov, including Federal Register notices, framework documents, public meeting attendee lists and transcripts, comments, and other supporting documents/materials. All documents in the docket are listed in the regulations.gov index. However, not all documents listed in the index may be publicly available, such as information that is exempt from public disclosure. The docket web page can be found at: www.regulations.gov/#!docketDetail;rpp=10;po=0;D=EERE-2010-BT-TP-0039. This web page will contain a link to the docket for this notice on the regulations.gov site. The regulations.gov web page will contain simple instructions on how to access all documents, including public comments, in the docket.

For further information on how to review the docket, contact Ms. Brenda Edwards at (202) 586-2945 or by email: Brenda.Edwards@ee.doe.gov.

FOR FURTHER INFORMATION CONTACT:

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

Ms. Elizabeth Kohl, U.S. Department of Energy, Office of the General Counsel, GC-71, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-7796. E-mail: Elizabeth.Kohl@hq.doe.gov.

SUPPLEMENTARY INFORMATION:

This final rule incorporates by reference into parts 429 and 430 the following industry standards:

(1) ANSI/AHAM DW-1-2010, American National Standard, "Household Electric Dishwashers."

(2) ANSI/AHAM DH-1-2008. American National Standard, "Dehumidifiers."

Copies of AHAM standards can be obtained from the Association of Home Appliance Manufacturers, 1111 19th Street NW, Suite 402, Washington DC 20036, 202 872-5955, or www.aham.org.

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I. Authority and Background

Title III of the Energy Policy and Conservation Act (42 U.S.C. 6291, et seq.; "EPCA" or, "the Act") sets forth a variety of provisions designed to improve energy efficiency. (All references to EPCA refer to the statute as amended through the Energy Independence and Security Act of 2007 (EISA 2007), Pub. L. 110-140 (Dec. 19, 2007)). Part B of title III, which for editorial reasons was redesignated as Part A upon incorporation into the U.S. Code (42 U.S.C. 6291–6309), establishes the "Energy Conservation Program for Consumer Products Other Than Automobiles." These include residential dishwashers, dehumidifiers, and conventional cooking products,[1] the subject of today's final rule. (42 U.S.C. 6292(a)(6) and (10); 6295(cc))

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

[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).

A. General Test Procedure Rulemaking Process

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

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

EPCA, in relevant part, requires DOE to amend the test procedures for all residential covered products to include measures of standby mode and off mode energy consumption. Specifically, EPCA provides definitions of "standby mode" and "off mode" (42 U.S.C. 6295(gg)(1)(A)) and permits DOE to amend these definitions in the context of a given product (42 U.S.C. 6295(gg)(1)(B)). The statute requires integration of 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 for the covered product, if technically feasible. (42 U.S.C. 6295(gg)(2)(A))

Any such amendment must consider the most current versions of IEC Standard 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."[2] Id.

B. Summary of Current Test Procedures

1. 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 (Aug. 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 degrees Fahrenheit (°F) inlet water. 48 FR 9202 (Mar. 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

[2] DOE also considered IEC Standard 62087, which addresses the methods of measuring the power consumption of audio, video, and related equipment and is therefore not applicable to the products at issue in this rulemaking.

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 (Aug. 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).

2. Dehumidifiers

The DOE test procedure for dehumidifiers is found at 10 CFR 430, subpart B, appendix X. EPCA specifies that the dehumidifier test procedure must be based on the U.S. Environmental Protection Agency's (EPA) test criteria used under the ENERGY STAR[3] program unless revised by DOE. (42 U.S.C. 6293(b)(13)) The ENERGY STAR test criteria effective in January 2001 require that American National Standards Institute (ANSI)/Association of Home Appliance Manufacturers (AHAM) Standard DH-1, "Dehumidifiers," be used to measure capacity and that the Canadian Standards Association (CAN/CSA) standard CAN/CSA-C749-1994 (R2005), "Performance of Dehumidifiers," be used to calculate EF. DOE adopted those test criteria, along with related definitions and tolerances, as its test procedure for dehumidifiers. 71 FR 71340,

[3] For more information on the ENERGY STAR program, see: www.energystar.gov.

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.

3. 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 430 subpart B, appendix I. There is currently no EnergyGuide[4] labeling program for cooking products.

With respect to today's rulemaking, DOE issues a final rule amending its cooking products test procedure for conventional cooking products without addressing power consumption for microwave ovens. DOE is considering establishing a test procedure for active

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

mode microwave oven energy use. (77 FR 33106 (June 5, 2012))[5] DOE has also initiated a separate test procedure rulemaking to address standby mode and off mode power consumption for microwave ovens. See 73 FR 62134 (Oct. 17, 2008); 75 FR 42612 (July 22, 2010); 76 FR 12825 (March 9, 2011) (hereafter referred to as the March 2011 Interim Final Rule). 76 FR 72332 (Nov. 23, 2011); 77 FR 28805 (May 16, 2012).

C. Summary of the Current Rulemaking

1. The December 2010 NOPR

On December 2, 2010, DOE published a Notice of Proposed Rulemaking (NOPR) (hereafter referred to as the December 2010 NOPR) in which it proposed to incorporate by reference into the test procedures for dishwashers, dehumidifiers, and conventional cooking products specific provisions from IEC Standard 62301 "Household electrical appliances – Measurement of standby power," First Edition 2005-06 (IEC Standard 62301 (First Edition) or "First Edition") regarding test conditions and test procedures for measuring standby mode and off mode power consumption. 75 FR 75290, 75295–97. DOE also proposed to incorporate into each test procedure definitions of "active mode," "standby mode," and "off mode" based on the definitions for those terms provided in the most current draft of an updated version of IEC Standard 62301. Id. at 75297–300. Further, DOE proposed 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.[6] Id. at 75300–04. DOE

[5] DOE repealed its previous test procedure to measure the active mode energy use for microwave ovens after determining that the procedure did not procedure accurate and repeatable results. 75 FR 42579 (July 22, 2010).
[6] 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). DOE considered IEC Standard 62087 and determined that the standard addresses the methods of measuring the power consumption of audio, video, and related equipment and is therefore not applicable to the products addressed in today's proposal.

held a public meeting on December 17, 2010 (hereafter referred to as the NOPR Public Meeting) to receive comments on the December 2010 NOPR, and accepted written comments, data, and information until February 15, 2011. Commenters to the December 2010 NOPR suggested that the draft updated version of IEC Standard 62301 would provide practical improvement to the mode definitions and testing methodology for the test procedures that are the subject of this rulemaking.

2. The September 2011 Supplemental Notice of Proposed Rulemaking (SNOPR)

The IEC adopted and published IEC Standard 62301, "Household electrical appliances – Measurement of standby power," Edition 2.0 2011-01 (IEC Standard 62301 (Second Edition) or "Second Edition") on January 27, 2011. DOE reviewed this latest version of the IEC standard and determined that it improves some measurements of standby mode and off mode energy use. Accordingly, DOE proposed in an SNOPR published in the Federal Register on September 20, 2011 (76 FR 58346) (hereafter referred to as the September 2011 SNOPR), to incorporate certain provisions of the IEC Standard 62301 (Second Edition), along with clarifying language, into the DOE test procedures for residential dishwashers, dehumidifiers, and conventional cooking products. Other than the specific amendments proposed in the September 2011 SNOPR, the test procedure amendments in the December 2010 NOPR were not affected.

3. The May 2012 SNOPR

In response to comments received on the September 2011 SNOPR, DOE published an SNOPR on May 25, 2012 (77 FR 31444) (hereafter referred to as the May 2012 SNOPR). DOE proposed to amend the dishwasher test procedure to remove an obsolete efficiency metric and to include measures of energy consumption in fan-only mode, measures of energy and water

consumption due to periodic water softener regeneration, and clarified specifications for the normal cycle, power supply, energy test cycle, detergent dosing, and test load requirements. DOE also proposed amendments to the cooking products test procedure to measure energy consumption in conventional oven fan-only mode and remove obsolete provisions for gas pilot lights in the cooking products test procedure. For dehumidifiers, DOE proposed to update the industry test method specified in the test procedure. These proposals addressed comments received from interested parties in response to the December 2010 NOPR and September 2011 NOPR, and incorporated methods provided in test procedure waivers granted by DOE for certain water-softening dishwashers. (See 75 FR 62127 (Oct. 7, 2010) and 77 FR 33450 (June 6, 2012))

4. The August 2012 SNOPR

In response to comments received on the May 2012 SNOPR and during a public meeting held June 1, 2012 (hereafter referred to as the 2012 Public Meeting), DOE published an SNOPR on August 15, 2012 (77 FR 49064) (hereafter referred to as the August 2012 SNOPR) proposing to update certain obsolete dishware, flatware and food items used in the dishwasher test procedure[7]; amend the definition of the normal cycle, update the ambient temperature and preconditioning requirements; and update the referenced industry test method in the dishwasher test procedure. DOE also proposed to add water pressure, drain height, rack position, loading, rinse aid container, and soil preparation specifications to the dishwasher test procedure. DOE additionally proposed, for both dishwashers and cooking products, a revised test procedure to measure energy use in fan-only mode based on DOE analysis and comments received on the May 2012 SNOPR.

[7] The terms "obsolete" or "nearly obsolete" used in this context mean that the test load item, food item, or detergent is unavailable on the market or is available in such limited supply that it is not sufficiently available for testing purposes.

II. Summary of the Final Rule

In this final rule, DOE establishes new test procedures for residential dishwashers and dehumidifiers, and amends the test procedures for conventional cooking products, to incorporate by reference provisions from IEC Standard 62301 (Second Edition) for the measurement of energy use in standby mode and off mode, and, for dishwashers and conventional cooking products, methodology for the measurement of fan-only mode energy use, in the energy efficiency metrics.

In the new dishwasher test procedure established in today's final rule, DOE also: (1) adds a measure of the annual energy and water use associated with periodic water softener system regeneration for those dishwashers equipped with such systems; and (2) incorporates by reference the updated industry test standard AHAM DW-1-2009, which upon acceptance by ANSI was designated as ANSI/AHAM DW-1-2010, American National Standard, "Household Electric Dishwashers."

The final rule also clarifies in the new dishwasher test procedure: (1) the definitions of normal cycle, soil-sensing dishwasher, and non-soil-sensing dishwasher; (2) power supply requirements during testing; (3) energy test cycle requirements for soil-sensing dishwashers; (4) test load specifications and soiling requirements; (5) detergent dosing specifications; (6) rinse aid dosing specifications; and (7) length of time soils may sit before they are applied to dishware.

The final rule also amends the testing conditions in the new dishwasher test procedure by: (1) specifying the use of two pre-conditioning cycles to ensure the turbidity sensor is calibrated,

(2) establishing maximum allowable time for the water pressure to reach the specified test conditions for improved repeatability and reproducibility, and (3) specifying drain height and rack position in the absence of manufacturer's instructions to improve reproducibility.

In today's final rule, DOE also amends the current dishwasher test procedure to replace the obsolete flatware, dishware, and food items specified in the current test procedure with those proposed in Table 1 of the August 2012 SNOPR, except that the current cup and saucer and alternate fruit bowl specifications are retained and the product numbers are updated. The same replacement items are specified in the new dishwasher test procedure.

The final rule also updates the industry test method specified in the new dehumidifier test procedure. As noted above, EPCA specifies that the dehumidifier test procedure must be based on EPA's test criteria used under the ENERGY STAR program unless revised by DOE. (42 U.S.C. 6293(b)(13)) The ENERGY STAR test criteria effective in January 2001 require that ANSI/AHAM Standard DH-1, "Dehumidifiers," be used to measure energy use. DOE incorporates the most current version of the DH-1 standard (DH-1-2008) into the new test procedure for dehumidifiers.

Finally, today's final rule eliminates an obsolete metric from the dishwasher test procedure and provisions in the cooking products test procedure that have become obsolete due to the elimination of standing pilot lights. For cooking products, DOE eliminates measures of pilot light energy consumption from the test procedure. In a final rule published April 8, 2009, DOE established standards that prohibit constant-burning pilot lights in gas cooking products

manufactured on or after April 9, 2012. 74 FR 16040. For dishwashers, DOE removes the calculation of EF from the dishwasher test procedure because the current dishwasher energy conservation standards no longer require it for compliance or representations.

III. Discussion

A. Products Covered by the Proposed Test Procedure Amendments

The amendments adopted in today's final rule to the DOE test procedures cover dishwashers, which DOE currently 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 amendments to the DOE test procedures also cover dehumidifiers, which DOE currently 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.

Finally, today's amendments to the DOE test procedures also cover cooking products, specifically conventional cooking products, which are currently 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.[8]

> 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

[8] As stated in Section I, DOE is addressing test procedures for microwaves in separate rulemaking proceedings.

cooking appliance consisting of a conventional cooking top and one or more conventional ovens. Id.

DOE did not propose any amendments to these definitions in the December 2010 NOPR, the September 2011 SNOPR, the May 2012 SNOPR, or the August 2012 SNOPR.

Whirlpool Corporation (Whirlpool) commented that the definitions of conventional cooking top, conventional oven, and conventional range should include electromagnetic induction as a means of cooking or heating, so that induction cooking products would be covered. (Whirlpool, No. 12 at p. 2)[9] DOE may consider amendments to its cooking products test procedure to address active, standby, and off mode energy use of induction cooking products in a separate rulemaking.

BSH Home Appliances (BSH) asked how double ovens, microwave ovens, combination microwave ovens, and other combination products would be treated under this test procedure. (BSH, NOPR Public Meeting Transcript, No. 10 at pp. 21–22)[10] DOE proposed in the December 2010 SNOPR that the integrated energy factor of combinations of ovens and cooktops other than a kitchen range (i.e., a cooktop and oven combined), which would include products with two

[9] A notation in the form ''Whirlpool, No. 12 at p. 2 '' identifies a written comment: (1) Made by Whirlpool Corporation; (2) recorded in document number 12 that is filed in the docket of the residential dishwasher, dehumidifier, and conventional cooking products test procedures rulemaking (Docket No. EERE–2010–BT–TP–0039) and available for review at www.regulations.gov; and (3) which appears on page 2 of document number 12.

[10] A notation in the form "BSH, NOPR Public Meeting Transcript, No. 10 at pp. 21–22" identifies an oral comment that DOE received during the December 17, 2010, NOPR public meeting, was recorded in the public meeting transcript in the docket for the residential dishwasher, dehumidifier, and conventional cooking products test procedures rulemaking (Docket No. EERE–2010–BT–TP–0039), and is available for review at www.regulations.gov. This particular notation refers to a comment (1) made by BSH Home Appliances during the public meeting; (2) recorded in document number 10, which is the public meeting transcript that is filed in the docket of the residential dishwasher, dehumidifier, and conventional cooking products test procedures rulemaking; and (3) which appears on pages 21–22 of document number 10.

conventional ovens, would be 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, according to calculations newly provided in the test procedure. 75 FR 75290, 75333 (Dec. 2, 2010). DOE did not receive further comments or information regarding combination conventional cooking products, and this proposal was not affected by the subsequent SNOPRs. As discussed in Section I, DOE is addressing microwave ovens, including combination microwave ovens, in a separate rulemaking.

In the absence of additional comments or input, DOE does not amend its current definitions of dishwasher, dehumidifier, conventional cooking product, conventional cooking top, conventional oven, or conventional range in today's final rule.

B. Compliance Date

In the December 2010 NOPR, DOE proposed that the amended test procedures for residential dishwashers, dehumidifiers, and conventional cooking products would become effective 30 days after the test procedure final rule is published in the Federal Register. Any added procedures and calculations for standby mode and off mode energy consumption resulting from implementation of EISA 2007, however, would not need to be performed to determine compliance with the current energy conservation standards. Manufacturers would be required to use the 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 dishwashers, dehumidifiers, and conventional cooking products that address standby mode and off mode energy consumption. 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 would be required to be based upon results generated under the applicable provision of these test procedures, in accordance with 42 U.S.C. 6293(c)(2). 75 FR 75290, 75294–95 (Dec. 2, 2010).

In the May 2012 SNOPR, DOE proposed amendments clarifying the dishwasher test procedure that would apply on the effective date of the amended dishwasher test procedure (i.e., 30 days after the date of publication of the test procedure final rule in the Federal Register). 77 FR 31444, 31450–52 (May 25, 2012). DOE also proposed methods by which the energy and water use of dishwasher water softener regeneration would be measured, as well as provisions to measure dishwasher and conventional cooking products fan-only mode energy consumption that would be required to be included in the energy efficiency metrics upon the compliance date of any updated dishwasher and conventional cooking product energy conservation standards addressing standby mode and off mode energy use. 77 FR 31444, 31451 (May 25, 2012). In the August 2012 SNOPR, DOE proposed additional amendments to specify test load and soil items in place of obsolete or potentially obsolete items in the dishwasher test procedure that would be required 30 days after publication of the test procedure final rule in the Federal Register, and sought comment on whether the specified items could be procured in 30 days. (77 FR 49064, 49065 (Aug, 15, 2012)).

AHAM, BSH, Samsung Electronics America, Inc. (Samsung), and Whirlpool commented that DOE should clarify when the dishwasher test procedure amendments that could impact measured energy use, particularly the fan-only mode and water softener regeneration energy

measurements, would be required for compliance with dishwasher energy conservation standards. These commenters stated that energy consumption in these modes should be included in the final metric to determine compliance with a future standard that has not yet been proposed, and not for compliance with the standard in the recent direct final rule. However, if these modes are included in the metric used to determine compliance with the standards in the direct final rule, the commenters stated that DOE must ensure that the stringency of the standards does not change. (AHAM, No. 20 at p. 3; AHAM, No. 27 at pp. 2–3; AHAM, No. 35 at p. 2; BSH, No. 28 at p. 1; Samsung, No. 33 at p. 1; Whirlpool, No. 26 at pp. 1–2) According to BSH, adequate time will be needed to test all the different base models using the amended dishwasher test procedure and to determine whether sensor decisions need to be changed, which may include adjusting software and conducting additional tests. BSH also stated that time should be allowed to use any parts in the supply chain before manufacturers are required to use the new test procedure. In addition, BSH stated that past accepted test data that were based on the previous test procedure should continue to be accepted until production ceases. (BSH, No. 36 at pp. 1–2)

The energy use of dishwasher water softener regeneration must be measured to demonstrate compliance with current energy conservation standards for dishwashers. In the test procedure waivers granted for water softening dishwashers, DOE has required that such models meet the current energy conservation standards with the additional energy and water use associated with water softener regeneration included in the annual energy use and per-cycle water consumption metrics. (75 FR 62127 (Oct. 7, 2010) and 77 FR 33450 (June 5, 2012)). In accordance with the approach specified in these waivers, DOE determines that the energy and water use must be included in the metrics used to demonstrate compliance with any amended

dishwasher energy conservation standards, including those in the direct final rule. Compliance with the direct final rule will be required on May 30, 2013 unless the direct final rule is withdrawn as a result of adverse comment. 77 FR 31918 (May 30, 2012).

DOE has determined that use of the test procedures to measure the energy use in fan-only mode on the compliance date of any amended standards is appropriate. Compliance with the dishwasher standards published on May 30, 2012 will be required on May 30, 2013 unless DOE withdraws the direct final rule. The energy use in these modes is estimated to be less than 5 percent of the total energy use of standard dishwashers. Given that 65 percent of all standard dishwashers currently on the market meet or exceed the minimum energy conservation standards established in the direct final rule, inclusion of this small amount of energy use would not impact compliance with the revised standard. 77 FR 31918, 31948–31949. Therefore, DOE has determined that the energy use in fan-only mode is de minimus and insufficient to alter in a material manner the measured energy use of dishwashers. Therefore, DOE is not considering amending the standards set forth in the direct final rule.

DOE is requiring that the clarifications to the dishwasher test procedure described in the May 2012 SNOPR, which include the definition of the normal cycle, energy test cycle selection, power supply requirements, test load specifications and soiling requirements (except for the specification of replacement items for some obsolete dishware and flatware) and detergent dosing specifications, be used on the compliance date of any amended standards for dishwashers (May 30, 2013 unless the direct final rule is withdrawn). While DOE had earlier proposed that these requirements be mandatory 30 days after publication of the test procedure final rule in the

Federal Register, DOE is adopting, as discussed below, amendments to the existing test procedure that specify replacement items for obsolete test load and soil items and technical corrections that will be required for use on or after 45 days after publication of the test procedure final rule in the Federal Register. The remaining clarifications to the dishwasher test procedure, as well as the same specifications for replacement items, are provided in a new test procedure that will be required to be used on the compliance date of any amended standards for dishwashers (May 30, 2013 unless the direct final rule is withdrawn).

For the replacement of obsolete items, DOE did not receive any comments regarding the proposed requirement for the use of certain test load and soil items in place of obsolete or potentially obsolete items in the dishwasher test procedure 30 days after publication of the test procedure final rule in the Federal Register, nor did it receive comment on whether the specified items could be procured in 30 days. Because certain test load items may require purchase outside of the United States, however, 30 days may not allow sufficient time for acquisition. DOE concludes, therefore, that requiring the use of replacement test load and soil items 45 days after the publication of the final rule best weighs the need for manufacturers and test laboratories to utilize comparable testing items against the timeframe potentially required for obtaining the items.

In sum, with the exception of requirements for the use of replacement items for obsolete dishware, flatware, and food items specified as amendments to the current dishwasher test procedure, the final rule changes will be mandatory to demonstrate compliance with the applicable energy conservation standard starting on the compliance date of any amended

standards for dehumidifiers, dishwashers, and cooking products, as required under 42 U.S.C. 6295(s). For the amendments to the current dishwasher test procedure related to obsolete dishware, flatware, and food items, DOE has determined that use of these amended test procedure provisions would not alter a dishwasher's measured energy efficiency or measured energy use pursuant to 42 U.S.C. 6293(e)(1). DOE has concluded that today's final rule accords manufacturers with sufficient time to implement the test procedure changes contained herein.

In summary, DOE establishes a new dishwasher test procedure at 10 CFR part 430, subpart B, appendix C1 that incorporates these final rule changes, including the use of replacement items. By amending the current test procedure to also include the use of replacement items, appendix C may continue to be used until the compliance date of amended dishwasher energy conservation standards. Similarly, DOE establishes a new dehumidifier test procedure at 10 CFR part 430, subpart B, appendix X1, but allows for the use of the current dehumidifier test procedure until the compliance date of amended dehumidifier energy conservation standards. Because the current energy conservation standards for conventional cooking products consist of a prescriptive design requirement prohibiting the use of constant-burning pilot lights, which do not require the use of the DOE test procedure to demonstrate compliance, DOE incorporates the final rule changes as amendments to the existing conventional cooking products test procedure codified at 10 CFR part 430, subpart B, appendix I.

For dishwashers, the date upon which the use of new appendix C1 will be required will be May 30, 2013, the compliance date of the direct final rule published on May 30, 2012, unless the direct final rule is withdrawn. Until that date, manufacturers may continue to use appendix C

to certify compliance with the current dishwasher energy conservation standards. Any products manufactured on or after that date must be certified to demonstrate compliance with the amended energy conservation standards using appendix C1. However, use of the replacement items for obsolete dishware, flatware, and food items in the amendments to the currently applicable dishwasher test procedure will be required on **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

Today's final rule also clarifies that as of **[INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, any representations related to the standby mode and off mode energy consumption of these products must be based upon results generated under the applicable provisions of appendix C1, appendix I, and appendix X1. Manufacturers may use the new dishwasher and dehumidifier test procedures and amended conventional cooking products test procedure prior to this date consistent with DOE guidance available at: http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/tp_faq_2012-06-29.pdf.

C. Incorporation of IEC Standard 62301 (Second Edition) for Measuring Standby Mode and Off Mode Power Consumption

The December 2010 NOPR proposed to incorporate in the test procedures for dishwashers, dehumidifiers, and conventional cooking products relevant provisions from IEC Standard 62301 (First Edition) for measuring standby mode and off mode power. The amended test procedures would use these measured wattages in calculations to incorporate standby mode and off mode energy consumption into the test procedures. DOE reviewed the IEC Standard

62301 (First Edition) and tentatively concluded that it would be generally applicable to dishwashers, dehumidifiers, and conventional cooking products, although some clarification would be needed. Specifically, DOE proposed in the December 2010 NOPR for standby mode and off mode power measurements to provide a stabilization period of at least 30 minutes followed by an energy use measurement period of not less than 10 minutes for each of the covered products. 75 FR 75290, 75295–300 (Dec. 2, 2010). Additionally, for conventional cooking products, DOE proposed a specific standby mode power measurement methodology for units in which power varies as a function of displayed time. 75 FR 75290, 75302–04 (Dec. 2, 2010). With these clarifications, the December 2010 NOPR proposed to reference IEC Standard 62301 (First Edition) for the standby mode and off mode wattage measurements. DOE also proposed in the December 2010 NOPR to amend the dishwasher, dehumidifier, and conventional cooking products test procedures to include new definitions of "standby mode," "off mode," and "active mode" based on the most current draft version of the Second Edition at that time (IEC Standard 62301 (FDIS)). 75 FR 75290, 75296–97 (Dec. 2, 2010).

In response to comments on the December 2010 NOPR, and because IEC Standard 62301 (Second Edition) was issued on January 27, 2011, DOE evaluated in the September 2011 SNOPR the applicability of the Second Edition for measuring standby mode and off mode energy use in the dishwasher, dehumidifier, and conventional cooking products test procedures. Commenters noted that IEC Standard 62301 (Second Edition) is an internationally-accepted test procedure for measuring standby power in residential appliances, and stated that they supported harmonizing the mode definitions with those in IEC Standard 62301 (FDIS), which are substantively the same as those in IEC Standard 62301 (Second Edition). 76 FR 58346, 58350

(Sep. 20, 2011). DOE thus maintained in the September 2011 SNOPR the definitions for active mode, standby mode, and off mode that it had proposed in the December 2010 NOPR for dishwashers and dehumidifiers.

The definitions for standby mode and off mode energy use for cooking products, as well as a slightly modified definition of active mode, were established in the cooking products test procedure by the March 2011 Interim Final Rule for microwave ovens. The definition of active mode established by the March 2011 Interim Final Rule includes the statement that delay start mode is a one-off, user-initiated, short-duration function that is associated with an active mode.[11] The May 2012 SNOPR added reference to fan-only mode functions in active mode for dishwashers and cooking products. Detailed discussion of each of these mode definitions, including comments from interested parties, is presented in section III.D.

DOE determined that the updated version of IEC Standard 62301 provides clarification to certain sections as compared to the First Edition. In particular, DOE proposed to incorporate by reference in the dishwasher, dehumidifier, and conventional cooking products test procedures the following provisions from IEC Standard 62301 (Second Edition): (1) the room ambient air temperature requirements in section 4, paragraph 4.2; (2) the electrical supply voltage requirements in section 4, paragraph 4.3.2; (3) the power equipment specifications in section 4, paragraph 4.4; (4) the instructions for allowing the product to enter a lower power state prior to the test measurement in section 5, paragraph 5.1, note 1; and (5) portions of the installation and setup procedures in section 5, paragraph 5.2. DOE also proposed that the measurement of

[11] Because DOE accepted comments on the March 2011 Interim Final Rule until shortly before publication of the September 2011 SNOPR, DOE continued to include the cooking products mode definitions in this proposal.

standby mode and off mode power be made according to section 5, paragraph 5.3.2 in each of the test procedures, except in the case of conventional cooking products in which power varies as a function of the clock time displayed in standby mode. For such products, DOE tentatively concluded that the application of the test methodology from the Second Edition would cause manufacturers to incur significant burden that would not be warranted by any potential improved accuracy of the test measurement. Thus, DOE maintained its original proposal from the December 2010 NOPR for 10-minute and 12-hour test methods for these products in the conventional cooking products test procedure, in which case testers would be allowed to choose measuring standby power by means of either of the following methods:

(a) 10-Minute Test

(1) Allow the product to stabilize according to section 5, paragraph 5.3 of IEC Standard 62301 (First Edition), which requires a minimum of 5 minutes;

(2) Set the clock time to 3:23;

(3) Allow another stabilization period until the clock time reaches 3:33;

(4) Use the average power approach in section 5, paragraph 5.3.2(a) to measure standby mode power for a period of 10 minutes +0/-2 seconds; or

(b) 12-Hour Test

(1) At any clock time, allow the product to stabilize according to section 5, paragraph 5.3 of IEC Standard 62301 (First Edition), which requires a minimum of 5 minutes;

(2) Use the average power approach in section 5, paragraph 5.3.2(a) to measure standby mode power for a period of 12 hours +0/-30 seconds.

According to the proposal, manufacturers could elect to conduct either a 10-minute test, a 12-hour test, or both. Based on DOE testing, use of the 10-minute test period produced results that were within ±2 percent of the results for the full 12-hour test. Therefore, DOE proposed that, for verification and enforcement purposes, results of the 10-minute test that are within ±2 percent of the results for the 12-hour test would be deemed to be representative of average energy use. 75 FR 75290, 75302–304 (Dec. 2, 2010); 76 FR 58346, 58349–53 (Sep. 20, 2011).

The Appliance Standards Awareness Project (ASAP), American Council for an Energy Efficient Economy (ACEEE), and National Consumer Law Center (NCLC), jointly (hereafter referred to as the "SNOPR Joint Comment"), AHAM, and Whirlpool support the incorporation by reference of IEC Standard 62301 (Second Edition). AHAM stated that the Second Edition contains important clarifications and would reduce test burden, while Whirlpool commented that the Second Edition provides more complete mode definitions and more robust measurements. AHAM and the SNOPR Joint Comment stated that the Second Edition would allow for international harmonization. (AHAM, No. 20 at pp. 1–2; SNOPR Joint Comment, No. 22 at p. 1; Whirlpool, No. 21 at p. 2)

DOE acknowledges the clarity and improvement in the measurement of standby mode and off mode power consumption through the use of IEC Standard 62301 (Second Edition), as well as the benefits of harmonization with international testing methods and the associated

reduction in test burden for those manufacturers that sell products internationally by not requiring multiple standby power tests to be conducted according to different testing methods in different countries. For these reasons, in today's final rule, DOE incorporates by reference into the new dishwasher and dehumidifier and amended conventional cooking products test procedures the previously noted provisions from IEC Standard 62301 (Second Edition), including mode definitions, qualified as discussed in section III.D for the specific products, testing conditions, equipment, and methodology.

DOE did not receive comments objecting to the proposed incorporation by reference of provisions from IEC Standard 62301 (First Edition) for standby mode power measurement for conventional cooking products with power consumption that varies as a function of the time displayed. DOE determines that the lower test burden for manufacturers is not warranted by any potential improved accuracy of the test measurement if the Second Edition were to be used. Therefore, DOE adopts in today's final rule the average power method from IEC Standard 62301 (First Edition) for these products.

D. Determination and Classification of Operational Modes

1. Active Mode, Standby Mode, and Off Mode

As noted previously, EPCA provides definitions of "active mode," "standby mode," and "off mode" (42 U.S.C. 6295(gg)(1)(A)) and permits DOE to amend these definitions in the context of a given product (42 U.S.C. 6295(gg)(1)(B)).

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))

In the December 2010 NOPR, DOE discussed that the statutory 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 proposed 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.

a. Active Mode

In the December 2010 NOPR, DOE proposed the following clarifications for the range of main functions that would be classified as active mode for each product:

Dishwashers – "Active mode" means a mode in which the dishwasher is connected to a mains power source, has been activated, and is performing the 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.

Conventional Cooking Products – "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[12] 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.
75 FR 75290, 75297–98 (Dec. 2, 2010).

For the September 2011 SNOPR, DOE's proposal included a revised version of the active mode definition in the cooking products test procedure, based upon updates adopted by the March 2011 Interim Final Rule. Although that rulemaking addressed microwave ovens, the mode definitions in the test procedure at appendix I cover all cooking products, including microwave ovens and conventional cooking products. Therefore, in the September 2011 SNOPR, DOE proposed for cooking products that "active mode means a mode in which the product is connected to a mains power source, has been activated, and is performing the main function of producing heat by means of a gas flame, electric resistance heating, or microwave energy. Delay start mode is a one-off, user-initiated, short-duration function that is associated with an active mode." 76 FR 58346, 58363 (Sep. 20, 2011).

Northwest Energy Efficiency Alliance (NEEA) agreed with DOE's proposed definitions of active mode for each product. (NEEA, No. 11 at p. 2) Whirlpool also agreed with DOE's

[12] In the preamble to the December 2010 NOPR, DOE discussed that the main function of producing heat may be used for cooking, heating, proofing, or holding the cooking load. Such specificity was not included in the proposed regulatory text in appendix I.

proposed definition of active mode for dehumidifiers and conventional cooking products, provided that delay start is part of active mode. Whirlpool also agreed with DOE's proposed definition of active mode for dishwashers as long as cycle finished mode is a part of active mode. (Whirlpool, No. 12 at p. 2) DOE evaluates delay start mode and cycle finished mode in the product-specific discussions in section III.D.2, and notes that the amendments adopted in today's final rule provide for measurement of all active mode, standby mode, and off mode energy use, including delay start mode and cycle finished mode, in the dishwasher, dehumidifier, and conventional cooking products test procedures.

As discussed in sections III.F.2 and III.F.3, DOE further proposed in the May 2012 SNOPR that active mode for dishwashers would additionally include the functions of circulating air (fan-only mode) and regenerating a built-in water softening system. Therefore, DOE proposed a revised definition of active mode in the dishwasher test procedure that would include these functions. For cooking products, DOE proposed that circulating air in fan-only mode would be an active mode function, and accordingly proposed to add air circulation to the active mode functions. 77 FR 31444, 31447–49, 31462 (May 25, 2012).

DOE did not receive comments objecting to the definitions of active mode for each of the covered products that were proposed in the May 2012 SNOPR, Thus, in today's final rule, DOE incoporates in the new dishwasher and dehumidifier test procedures and the amendments to the conventional cooking product test procedure the definition of active mode as proposed in the May 2012 SNOPR.

b. Standby Mode

DOE also proposed in the December 2010 NOPR 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:

- 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. 75 FR 75290, 75290 (Dec. 2, 2010).

In the December 2010 NOPR, DOE also proposed 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. Id.

AHAM stated that it supported the standby mode definition based on IEC Standard 62301 (FDIS), although IEC Standard 62301 (Second Edition) should be the basis for the definition once the Second Edition was issued. AHAM and Whirlpool also requested that DOE require that all products default to the standby mode, as delivered from the factory. (AHAM, No. 14 at p. 3; AHAM, NOPR Public Meeting Transcript, No. 10 at p. 36; Whirlpool, No. 12 at pp. 2, 4) DOE notes that its test procedures are used to measure the energy consumption of covered products in active, standby, and off modes, and do not prescribe specific operational characteristics for those products.

DOE proposed in the December 2010 NOPR to amend the "standby mode" definition in the dishwasher test procedure based on the definition provided in IEC Standard 62301 (FDIS), but also proposed to retain and redesignate the current DOE definition of standby mode for dishwashers as a "simplified standby mode" to allow manufacturers to continue to use the existing standby mode provisions to determine compliance with the current dishwasher energy conservation standards until the compliance date of amended standards that address standby mode and off mode energy use. Id.

Whirlpool commented that the retention of a simplified standby mode as a bridging step from the current DOE dishwasher test procedure is unnecessary. (Whirlpool, No. 12 at p. 2) In this final rule, DOE is retaining the existing methodology for measuring energy use in this "simplified standby mode" in appendix C. Use of the new standby mode provisions in appendix C1 will be required on May 30, 2013, unless the direct final rule published on May 30, 2012 is withdrawn.

In the December 2010 NOPR, DOE proposed 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. Id.

AHAM and NEEA supported DOE's proposed definition of inactive mode. (AHAM, No. 14 at p. 4; NEEA, No. 11 at p. 3) For the December 2010 NOPR, DOE derived the proposed

mode definitions from IEC Standard 62301 (FDIS), which were retained for IEC Standard 62301 (Second Edition). DOE retains this definition of inactive mode in this final rule.

c. Off Mode

In the December 2010 NOPR, DOE also proposed 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 would be included within the classification of off mode. This definition of "off mode" was based on the definitions provided in IEC Standard 62301 (FDIS), and DOE stated that it would be useful in terms of expanding the scope of the EPCA mode definitions to clarify which functions are associated with off mode. 75 FR 75290, 75299 (Dec. 2, 2010).

Under these 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 considered part of off mode. Id.

NEEA supports the proposed definition of off mode for dishwashers, dehumidifiers, and conventional cooking products, to the extent that it is consistent with IEC Standard 62301. (NEEA, No. 11 at pp. 4–5) Whirlpool stated that the EPCA definition of off mode is adequate for each of these products. (AHAM, No. 12 at pp. 2–3) DOE determined that the definition of off mode that is consistent with the definition in IEC Standard 62301 (Second Edition) is an important expansion to the EPCA definition that provides clarity for testing, and adopts in today's final rule the proposed definition of off mode for the new dishwasher and dehumidifier test procedures and the amended conventional cooking products test procedure.

AHAM and Whirlpool do not support classifying the energy use of a one-way remote control as part of standby mode, even though the EPCA definition of standby mode includes activation by means of remote control. According to these commenters, a standard remote that powers a product "off" actually powers the unit down, such that it can be turned on again through the use of the remote. A one-way remote does not put the product in standby mode; it only allows the product to be turned off. AHAM commented that there are few, if any, one-way remotes in the United States. AHAM believes that including one-way remotes in off mode instead of standby mode will encourage manufacturers to design products with one-way remotes, which could decrease energy use. (AHAM, No. 14 at p. 4; Whirlpool, No. 12 at p. 3) DOE agrees that once the one-way remote turns the product off, such that there is no standby function

present and the unit cannot be returned to either active or standby mode by means of the remote, the unit would be considered to be operating in off mode. However, if the product is consuming energy without being in active mode while waiting for a signal from the one-way remote, the product would be classified as operating in standby mode because the remote would be available for deactivation of the main unit, regardless of whether other standby functions were present. Therefore, DOE clarifies that if energy is consumed by the appliance in the presence of a one-way remote control prior to turning the unit off from a non-active mode, the unit would be considered to be operating in standby mode because the remote control would be used to deactivate other mode(s). Once the product is turned off by the one-way remote, it would be deemed to be operating in either standby mode or off mode, depending on the functions present in the appliance other than the remote control function, because the one-way remote would not be able to activate or deactivate other mode(s) at that point.

2. Additional Product-Specific Modes

In addition to the general mode definitions, DOE discussed in the December 2010 NOPR its analysis of 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, as follows:

a. Dishwashers

In the December 2010 NOPR, DOE stated that it is aware of two additional relevant modes for dishwashers: (1) delay start mode; and (2) cycle finished mode. “Delay start mode” would be defined as a mode in which activation of an active mode is facilitated by a timer.

"Cycle finished mode" would be 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, delay start mode would not be considered part of standby mode, but instead would be a form of active mode. DOE did not propose amendments to the dishwasher test procedure to define "delay start mode" or to measure power consumption in this mode. DOE stated that it may consider amendments addressing delay start mode issues in a future dishwasher test procedure rulemaking. 75 FR 75290, 75298 (Dec. 2, 2010).

Based on the "standby mode" definition proposed in the December 2010 NOPR, cycle finished mode, which provides a continuous status display and may persist for an indefinite time, would be considered as part of a standby mode. Therefore, DOE proposed in the December 2010 NOPR to define cycle finished mode for dishwashers as "a mode which provides continuous status display following operation in active mode." Id. For the May 2012 SNOPR, DOE also identified fan-only mode for dishwashers (77 FR 31444, 31447–49 (May 25, 2012)), which is discussed separately in section III.F.2 of this notice, as well as dishwasher water softener regeneration (77 FR 31444, 31449–50 (May 25, 2012)), which is discussed in section III.F.3 of this notice.

ASAP, ACEEE, NCLC, and Natural Resources Defense Council (NRDC), jointly (hereafter referred to as the "NOPR/SNOPR2 Joint Comment"), Southern California Edison, Southern California Gas Company, and San Diego Gas and Electric Company, jointly (hereafter

the "California Utilities"), AHAM, NEEA, Pacific Gas and Electric Company (PG&E), and Whirlpool agree with DOE's proposal that delay start mode should be classified as a form of active mode. AHAM supported DOE's decision not to propose amendments to the dishwasher test procedure to measure energy use in delay start mode, while the California Utilities, the NOPR/SNOPR2 Joint Comment, and PG&E stated that DOE should include measures of delay start mode energy use in the dishwasher test procedure. The NOPR/SNOPR2 Joint Comment believes that if energy consumption in delay start mode is not measured, manufacturers will have no incentive to reduce it. (AHAM, No. 14 at p. 5; AHAM, NOPR Public Meeting Transcript, No. 10 at p. 41; California Utilities, No. 16 at p. 2; NEEA, No. 11 at p. 2; NOPR/SNOPR2 Joint Comment, No. 13 at pp. 2–3; PG&E, No. 17 at p. 2; Whirlpool, No. 12 at p. 2) DOE retains the classification of delay start mode as part of active mode for dishwashers in today's final rule. Although DOE is not adopting specific provisions to measure energy use in delay start mode alone, DOE is including provisions in the dishwasher test procedure at appendix C1 to measure the energy use in all low-power modes combined, which includes modes other than the active washing and drying cycle, fan-only mode, and water softener regeneration. (See section III.F.1).

AHAM and Whirlpool disagree with DOE's proposal to classify cycle finished mode for dishwashers as a standby mode. According to Whirlpool, any function begun by the user when initiating the active mode includes all power consumed until the full conclusion of that operation. Whirlpool stated that cycle-finished mode actions include vent opening/closing, a signal to the consumer that the dishes are clean, or other modest users of energy. Whirlpool believes that establishing a separate cycle finished mode adds complications and cost to the dishwasher test procedure without any corresponding improvement in energy consumption or value to the

consumer. (AHAM, No. 14 at p. 5; AHAM, NOPR Public Meeting Transcript, No. 10 at pp. 41–42; Whirlpool, No. 12 at p. 2) NEEA stated that DOE should define cycle finished mode as the portion of the active mode between the end of the active washing mode and the beginning of the inactive mode. However, NEEA interpreted cycle finished mode to mean the period in which a fan operates after the end of the active washing and drying cycle. NEEA noted that after the fan run time, the dishwasher reverts to a status display (inactive) mode that will persist indefinitely until the user opens the door. NEEA believes that the status display (inactive) mode is a standby mode. NEEA further commented that if DOE defines such a status display mode as "cycle finished mode," that the cycle finished period of some specified average duration should be added to the active mode test procedure. (NEEA, No. 11 at pp. 2–3)

DOE notes that in its proposals, it narrowly defined cycle finished mode for dishwashers as providing continuous status display following operation in active mode. Because the function specified in this definition is a status display that may persist for an indefinite time until the user opens the door, cycle finished mode for dishwashers would be classified as a standby mode under the general definition of "standby mode" adopted in today's final rule for the new dishwasher test procedure. DOE has also determined that any period of fan operation after the end of the active washing and drying cycle would be classified as a "fan-only mode" that is part of active mode. As discussed in section III.F.2 of today's final rule, DOE includes in the new dishwasher test procedure provisions to measure the energy use in fan-only mode if the dishwasher is capable of such operation. In today's final rule, DOE also adds definitions of cycle finished mode and fan-only mode to the dishwasher test procedure to aid the tester in differentiating these modes and to clarify that the energy use in cycle finished mode is included

in the combined low-power energy use measurement, as discussed in section III.F.1 of this notice.

b. Dehumidifiers

In the December 2010 NOPR, DOE stated that it is aware of three additional relevant modes for dehumidifiers: (1) delay start mode; (2) off-cycle mode; and (3) bucket full/removed mode. DOE proposed that the definition for "delay start mode" for dehumidifiers would be the same as that for dishwashers. "Off-cycle mode" would be 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" would be 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, delay start mode would not be considered a standby mode, but instead would be a form of active mode. DOE did not propose in the December 2010 NOPR amendments to define or to measure power consumption in delay start mode. DOE stated that it may consider amendments addressing delay start mode issues in a future dehumidifier test procedure rulemaking. 75 FR 75290, 75298 (Dec. 2, 2010).

DOE discussed in the December 2010 NOPR 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. DOE proposed amending its

dehumidifier test procedure to include definitions of "off-cycle mode" and "bucket full/removed mode." 75290, 75298–99 (Dec. 2, 2010).

The NOPR/SNOPR2 Joint Comment, the California Utilities, AHAM, NEEA, PG&E, and Whirlpool agree with DOE's proposal that delay start mode should be classified as a form of active mode for dehumidifiers. AHAM supported DOE's decision not to propose amendments to the dehumidifier test procedure to measure energy use in delay start mode. The California Utilities, the NOPR/SNOPR2 Joint Comment, and PG&E stated that DOE should include measures of delay start mode energy use in the dehumidifier test procedure. The NOPR/SNOPR2 Joint Comment stated that if energy consumption in delay start mode is not measured, manufacturers will have no incentive to reduce it. (AHAM, No. 14 at p. 5; AHAM, NOPR Public Meeting Transcript, No. 10 at p. 45; California Utilities, No. 16 at p. 2; NEEA, No. 11 at p. 2; NOPR/SNOPR2 Joint Comment, No. 13 at pp. 2–3; PG&E, No. 17 at p. 2; Whirlpool, No. 12 at p. 2) DOE maintains this determination that delay start mode is part of active mode for dehumidifiers in today's final rule. DOE includes provisions in the new dehumidifier test procedure to measure the energy use in all low-power modes combined, which includes all modes other than active dehumidification mode (i.e., delay start mode, bucket full/removed mode, inactive mode, off-cycle mode, and off mode.) (See section III.F.1).

Several commenters objected to DOE's proposed classification of bucket full/removed mode as a standby mode. GE Consumer & Industrial (GE) and NEEA consider bucket full/removed mode as a cycle finished mode, and while it may persist for an indefinite period of time, it is associated with the active mode cycle, much like the dishwasher cycle finished mode.

NEEA further stated that DOE should consider bucket full/removed mode as the portion of the active mode between the end of the active cycle and the beginning of the inactive mode when the user empties and/or replaces the bucket. (GE, NOPR Public Meeting Transcript, No. 10 at p. 45; NEEA, No. 11 at pp. 3–4) Whirlpool and AHAM also consider bucket full/removed mode to be part of active mode. (Whirlpool, No. 12 at p. 2; AHAM, No. 14 at p. 5) However, in the event that DOE retains bucket full/removed mode as a standby mode, AHAM suggested that the definition of bucket full/removed mode should clarify that the dehumidifier has automatically powered off its main function by detecting when the water bucket is full or has been removed, and does not have its fan or blower operating. (AHAM, No. 14 at p. 5)

DOE agrees that the bucket full/removed mode can be associated with the active mode function in which moisture is removed from the air and collected in the bucket. However, bucket full/removed mode can also occur when the bucket is removed, regardless of whether the dehumidifier was actively removing moisture or circulating air at the time the bucket was removed. For example, the bucket may be removed during off-cycle mode, which is a standby mode. In addition, bucket full/removed mode may persist indefinitely with a continuous status display and no main function, which would meet the definition of a standby mode. DOE maintains its determination that bucket full/removed mode is a standby mode for today's final rule. DOE agrees that the fan or blower shall not be operating during bucket full/removed mode, because such operation would result in the dehumidifier circulating air as part of active mode, but does not adopt a definition of bucket full/removed mode in the new dehumidifier test procedure because bucket full/removed mode energy use is included in the combined measurement of all low-power mode energy use.

Whirlpool agreed with DOE's proposal to classify off-cycle mode as a standby mode. (Whirlpool, No. 12 at p. 2) In today's final rule, DOE includes the proposed definition of off-cycle mode in appendix X1, and includes off-cycle mode in the measurement of energy use in the combined low-power modes.

c. Conventional Cooking Products

DOE stated in the December 2010 NOPR that it 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" would be the same as defined for dishwashers. "Sabbath mode" would be 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, delay start mode would not be considered a standby mode, but instead would be a form of active mode. In addition, the Sabbath mode function of warming food would also be considered part of the active mode. DOE did not propose in the December 2010 NOPR amendments to define or to measure power consumption in "delay start mode" or "Sabbath mode." DOE stated that it may consider amendments addressing delay start mode and Sabbath mode issues in a future cooking products test procedure rulemaking 75 FR 75290, 75299 (Dec. 2, 2010).

DOE discussed in the December 2010 NOPR 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. DOE proposed to amend its conventional cooking products test procedure to include a definition of "cycle finished mode." 75 FR 75290, 75299 (Dec. 2, 2010). For the May 2012 SNOPR, DOE also identified fan-only mode for conventional cooking products, which is discussed in section III.F.2 of this notice.

The NOPR/SNOPR2 Joint Comment, the California Utilities, AHAM, NEEA, PG&E, and Whirlpool commented that delay start mode should be considered part of active mode for conventional cooking products. The California Utilities, the NOPR/SNOPR2 Joint Comment, and PG&E stated that DOE should include measures of delay start mode energy use in the test procedure. The NOPR/SNOPR2 Joint Comment believes that if energy consumption in delay start mode is not measured, manufacturers will have no incentive to reduce it. (AHAM, No. 14 at p. 5; AHAM, NOPR Public Meeting Transcript, No. 10 at p. 46; California Utilities, No. 16 at p. 2; NEEA, No. 11 at p. 2, NOPR/SNOPR2 Joint Comment, No. 13 at pp. 2–3; PG&E, No. 17 at p. 2; Whirlpool, No. 12 at p. 2) NEEA and Whirlpool also agree with DOE that Sabbath mode is part of active mode. (NEEA, No. 11 at p. 4; Whirlpool, No. 12 at p. 3)

For the reasons discussed in section III.F.1 of this notice, DOE amends the cooking products test procedure to add provisions for measuring the combined low-power energy use, which will account for all energy use outside of the active cooking cycle[13] and fan-only mode.

AHAM and Whirlpool disagree with DOE's proposal to classify cycle finished mode for conventional cooking products as a standby mode. According to Whirlpool, any function begun

[13] In the December 2010, DOE proposed to allocate the 8.9 estimated annual Sabbath mode hours to the active cooking mode. 75 FR 75290, 75309–10 (Dec. 2, 2010).

by the user when initiating the active mode includes all power consumed until the full conclusion of that operation. Whirlpool believes that establishing a separate cycle finished mode adds complications and cost to the conventional cooking products test procedure without any corresponding improvement in energy consumption or value to the consumer. (AHAM, No. 14 at p. 5; AHAM, NOPR Public Meeting Transcript, No. 10 at pp. 46–47; Whirlpool, No. 12 at pp. 2–3) NEEA stated that operation of the cooling fan that protects the electronic controls comprises cycle finished mode, with its duration being directly related to the temperature at which the active cooking function was conducted. According to NEEA, DOE should define cycle finished mode as the portion of the active mode between the end of the active cooking mode and the beginning of the inactive mode, when the cooling fan stops. (NEEA, No. 11 at pp. 2–4)

As with dishwashers, DOE's proposals narrowly defined cycle finished mode for conventional cooking products as providing continuous status display following operation in active mode. Because the function specified in this definition is a status display that may persist for an indefinite time until the user takes action, cycle finished mode for conventional cooking products would be classified as a standby mode under the general definition of "standby mode" adopted in today's final rule for the conventional cooking products test procedure. DOE has also determined that any period of fan operation after the end of the active cooking cycle would be classified as a "fan-only mode" that is part of active mode. As discussed in section III.F.2 of today's final rule, DOE includes in its amendments to the cooking products test procedure provisions to measure the energy use in fan-only mode if the conventional cooking product is capable of such operation. In today's final rule, DOE also adds definitions of cycle finished

mode and fan-only mode to the cooking products test procedure.

3. Network Mode

Section 3.7 of IEC Standard 62301 (FDIS) 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 acknowledged in the December 2010 NOPR 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 the time of the December 2010 NOPR, however, DOE was 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. As a result, DOE could not evaluate networked units, even in terms of categorizing network mode as a standby mode or off mode function. In particular, DOE was unaware of methods for

appropriately configuring networks or methods for collecting data about the energy use of appropriately configured networks. DOE also had no information as to whether network connection speed or the number and type of network connections affect power consumption for these products. DOE also had no information as to whether wireless network devices in such products would have different levels of power consumption when a device is establishing a connection versus when the network connection is established. DOE stated in the December 2010 NOPR that it was 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 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 the December 2010 NOPR did not include provisions for testing network mode energy consumption in dishwashers, dehumidifiers, and conventional cooking products. DOE noted that 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. 75 FR 75290, 75299 (Dec. 2, 2010).

AHAM and Whirlpool agreed with DOE that there are no dishwashers, dehumidifiers, or conventional cooking products on the market currently that are capable of operation in network mode, and that there is no way for DOE to gather data on this mode. Thus, these commenters agreed with DOE's proposal not to address network mode until such time that sufficient data are available. AHAM and Whirlpool also stated that network mode would be distinct from standby or off mode. (AHAM, No. 14 at p. 6; AHAM, NOPR Public Meeting Transcript, No. 10 at pp.

48, 50; Whirlpool, No. 12 at p. 4)

The NOPR/SNOPR2 Joint Comment, the California Utilities, ASAP, NEEA, and PG&E urged DOE to develop test methodology for network mode. According to these commenters, a number of major manufacturers are developing network-enabled dishwashers and cooking products, and these products are expected to be available on the market when the amended test procedures become effective. Further, these commenters stated that products with network capability may consume significant energy in network mode. ASAP and the NOPR/SNOPR2 Joint Comment stated that the energy use in network mode should be captured regardless of whether the product is actually connected to a network. NEEA noted that IEC Standard 62301 defines network mode as part of inactive mode, and that DOE should adopt a definition of network mode consistent with the one in IEC Standard 62301, along with methodology to measure network mode energy use during inactive mode testing. The SNOPR Joint Comment stated that the definition of standby mode is sufficiently broad to encompass energy use in network mode. (ASAP, NOPR Public Meeting Transcript, No. 10 at pp. 49–50; California Utilities, No. 16 at p. 3; NOPR/SNOPR2 Joint Comment, No. 13 at pp. 3–4; SNOPR Joint Comment, No. 22 at p. 1; NEEA, No. 11 at pp. 4–5; PG&E, No. 17 at p. 3)

In response to these comments, DOE observes that it is still not aware of any network-equipped dishwashers, dehumidifiers, and conventional cooking products that could allow sufficient analysis on which to categorize the functionality of network mode in these products, nor did commenters provide information or data on which to develop test methodology for measuring energy use in a network mode. Therefore, for the same reasons that DOE did not

address network mode in the December 2010 NOPR, DOE is not adopting a definition or testing methodology for network mode in the dishwasher, dehumidifier, or conventional cooking products test procedures in today's final rule. DOE reiterates, however, that it may consider amending these test procedures in a separate rulemaking in the future should network-equipped products and data on their functionality become available.

4. Disconnected Mode

DOE also noted in the December 2010 NOPR 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 stated in the December 2010 NOPR that there would be no energy use in a disconnected mode and agreed that it would not be part of off mode, standby mode, or network mode. Therefore, DOE did not propose a definition or testing method for disconnected mode in the test procedures for residential dishwashers, dehumidifiers, or conventional cooking products. 75 FR 75290, 75299–300 (Dec. 2, 2010).

AHAM agreed that there would be no energy use in disconnected mode, and supported DOE's decision not to amend the test procedures accordingly. (AHAM, No. 14 at p. 4) In consideration of this support and for the reasons discussed above, DOE does not amend the dishwasher, dehumidifier, and conventional cooking products test procedures to define or add testing provisions for disconnected mode in today's final rule.

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

As discussed in section III.C of this notice, DOE proposed in the December 2010 NOPR to specify testing equipment and conditions for measuring standby mode and off mode energy use in the dishwasher, dehumidifier, and conventional cooking products test procedures, based on provisions in IEC Standard 62301 (First Edition). 75 FR 75290, 75300–04 (Dec. 2, 2010). In September 2011 SNOPR, it proposed to incorporate by reference in the dishwasher, dehumidifier, and conventional cooking products test procedures the following provisions from IEC Standard 62301 (Second Edition) for testing equipment and conditions: (1) the room ambient air temperature requirements in section 4, paragraph 4.2; (2) the electrical supply voltage requirements in section 4, paragraph 4.3.2; (3) the power equipment specifications in section 4, paragraph 4.4; (4) the instructions for allowing the product to enter a lower power state prior to the test measurement in section 5, paragraph 5.1, note 1; and (5) portions of the installation and setup procedures in section 5, paragraph 5.2. 76 FR 58436, 58349–54 (Sep. 20, 2011).

1. Ambient Conditions, Including for Active Mode

In the December 2010 NOPR, DOE proposed that test room ambient temperatures for standby mode and off mode testing be specified for all dishwashers, dehumidifiers, and conventional cooking products according to section 4, paragraph 4.2 of IEC Standard 62301 (First Edition). 75 FR 75290, 75301–02 (Dec. 2, 2010). The First Edition specified a temperature range of 73.4 ± 9 °F. Section 4, paragraph 4.2 of IEC Standard 62301 (Second Edition) contains

an identical requirement for the test room ambient temperature, which DOE proposed to reference for standby mode and off mode testing in the September 2011 SNOPR. In the December 2010 NOPR, DOE also compared the IEC Standard 62301 (First Edition) ambient temperature ranges to those specified in the current DOE dishwasher, dehumidifier, and conventional cooking products test procedures for active mode testing as follows. Because the same IEC ambient temperatures were specified in the Second Edition, DOE drew the same tentative conclusions in the September 2011 SNOPR.

DOE noted in the December 2010 NOPR that the current DOE test procedure for dishwashers includes a test room ambient air temperature requirement of 75 ± 5 ºF, which helps ensure consistent and repeatable test results for active mode measurements in which heat losses could affect energy consumption. Because energy use in standby mode or off mode is less affected by ambient temperature than active mode energy use, DOE proposed to allow manufacturers of dishwashers to use the less stringent ambient temperature range in IEC Standard 62301 (First Edition) for standby mode and off mode power consumption measurement. DOE further stated that manufacturers could choose to use the 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. 75 FR 75290, 75301 (Dec. 2, 2010).

For dehumidifiers, the current DOE test procedure specifies a test room ambient temperature of 80 ± 2 °F. As with dishwashers, DOE's proposal in the December 2010 NOPR 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. 75 FR 75290, 75301 (Dec. 2, 2010).

The current DOE test procedure for conventional cooking products includes a test room ambient air temperature specification of 77 ± 9 ºF, which varies slightly from the range specified by IEC Standard 62301 of 73.4 ± 9 °F. DOE stated in the December 2010 NOPR that the higher temperatures allowed for active mode energy testing could be representative of ambient temperatures during a cooking process, but that maintaining lower allowable temperatures for standby mode and off mode power consumption measurements would 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 proposal 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. 75 FR 75290, 75301–02 (Dec. 2, 2010).

AHAM stated that DOE should use the ambient temperature requirements in its current dishwasher, dehumidifier, and conventional cooking products test procedures for standby mode and off mode energy use measurements, which AHAM stated would produce accurate, repeatable, and reproducible results. AHAM and Whirlpool noted that the DOE temperature requirements are more stringent for dishwashers and dehumidifiers, and that DOE's ambient temperature requirements in the cooking products test procedure substantially overlaps with the IEC temperature range. For the same reasons as AHAM outlined, BSH commented that the more stringent DOE ambient temperature requirements in the dishwasher test procedure should apply for standby mode and off mode testing. (AHAM, No. 14 at pp. 7–8; AHAM, No. 27 at p. 12; AHAM, NOPR Public Meeting Transcript, No. 10 at p. 63; BSH, No. 28 at pp. 9–10; Whirlpool, No. 26 at p. 1) AHAM, BSH, and Whirlpool suggested a single temperature range would reduce inadvertent testing error. Whirlpool recommended more stringent ambient room temperatures for the dishwasher and conventional cooking products test procedures for all testing— 75 ± 2 °F for dishwashers and 75 ± 5 °F for conventional cooking products—and supported conducting all dehumidifier testing under the current DOE active mode test conditions of 80 ± 2 °F. According to Whirlpool, a 1°F difference in ambient temperature can cause a 1.5 kWh change in the measurement of dishwasher annual energy use. AHAM stated that not every laboratory could achieve a tolerance tighter than ± 5 °F for dishwasher testing. (AHAM, No. 14 at pp. 7–8; AHAM, No. 27 at p. 12; AHAM, 2012 Public Meeting Transcript, No. 38 at pp. 152–153; BSH, No. 28 at pp. 9–10; Whirlpool, No. 12 at pp. 4–5; Whirlpool, No. 21 at p. 3; Whirlpool, No. 26 at pp. 1, 5) AHAM, BSH, and Whirlpool also stated that the dishwasher test procedure should clarify that the tolerances specified indicate the allowable limits of variation in temperature, but do not permit the deliberate variation with those limits. (AHAM, No. 27 at p. 12; AHAM, 2012

Public Meeting Transcript, No. 38 at p. 151; BSH, No. 28 at p. 10; Whirlpool, No. 26 at p. 1; Whirlpool, 2012 Public Meeting Transcript, No. 38 at pp. 153–154) Intertek noted that it understood that the intent of the dishwasher test procedure is to target 75 °F, and they aim to maintain this ambient temperature. According to Intertek, it is also important to maintain this temperature prior to conducting the test when the soils are drying on the test load. (Intertek, 2012 Public Meeting Transcript, No. 38 at pp. 154–155)

In the August 2012 SNOPR, DOE maintained its proposals that the standby mode and off mode testing for dishwashers, dehumidifiers, and conventional cooking products be allowed to be conducted under either the ambient temperature range specified in IEC Standard 62301 (Second Edition) or the ambient temperature range specified in the DOE test procedure where the DOE active mode temperature range overlaps the IEC temperature range. DOE re-examined this issue in light of the comments received. DOE confirmed its proposed approach to not require that standby mode and off mode testing be conducted under the same ambient temperature as active mode testing because no data were available to suggest that the standby mode and off mode power of residential dishwashers varies significantly within the allowable ambient temperature range of IEC Standard 62301 (Second Edition), and because this approach would increase the burden for those manufacturers or laboratories that choose to conduct standby mode and off mode testing separately from active mode testing. 77 FR 49064, 49066 (Aug. 15, 2012)

In the August 2012 SNOPR, DOE also responded to comments on the intent of the ambient temperature range in the dishwasher test procedure by noting that the tolerances specified in the DOE test procedures provide a range of temperatures under which the test results

are considered valid, regardless of the reasons for why a particular temperature within the range was selected or achieved. Therefore, DOE did not alter its proposal to state that the dishwasher test should be conducted at the nominal center of the ambient temperature range. DOE stated that it recognized the impact of ambient temperature on the active mode measurement, however, and as an alternative to the ±5 °F tolerance in the current test procedure for active mode testing, DOE proposed to tighten the tolerance on the test room ambient temperature in the dishwasher test procedure to ±2 °F for active mode testing. Id.

DOE did not receive comments in response to the August 2012 SNOPR on the proposal that the standby mode and off mode testing for dishwashers, dehumidifiers, and conventional cooking products may be conducted within the range of ambient temperatures where the specified temperature ranges of IEC Standard 62301 (Second Edition) and the DOE test procedure overlap if the testing laboratory chooses to conduct standby mode and off mode testing in the same facility as for active mode testing. DOE acknowledges the previous comments which identify the potential for inadvertent testing error if the standby mode and off mode testing is conducted under different ambient temperatures than active mode testing, but determined that the potential for such error is outweighed by the flexibility provided to manufacturers and testing laboratories to conduct standby mode and off mode testing separately from active mode testing. In addition, commenters did not provide information that would suggest that the more stringent ambient temperature requirements currently specified in the DOE dishwasher, dehumidifier, and conventional cooking product test procedures would reduce variability in the standby mode and off mode energy use measurement. For these reasons, today's final rule incorporates by reference in the new dishwasher and dehumidifier test

procedures and amended conventional cooking products test procedure the ambient temperature requirements specified in section 4 of IEC Standard 62301 (Second Edition) for measuring standby mode and off mode power consumption.

In response to the August 2012 SNOPR, AHAM, BSH, Samsung, and Whirlpool continued to suggest that the dishwasher active mode test should be conducted at the nominal center of the ambient temperature range, but acknowledged that a tighter tolerance would also help minimize test-to-test variation. Whirlpool supported the proposal to tighten the tolerance to ±2 °F, and stated that any additional burden associated with this requirement is small. Whirlpool commented that it will be able to meet the proposed tighter ambient temperature tolerance. None of the commenters provided information on whether all laboratories are capable of achieving a ±2 °F temperature range, but AHAM, BSH, and Samsung believe that some laboratories would need to make significant investments to meet this requirement. BSH added that at certain times of the year its laboratories would not be able to meet the 75 ±2 °F temperature range, requiring costly modifications to achieve consistent performance. BSH noted that it also conducts dishwasher testing according to the IEC dishwasher test procedure that requires an ambient temperature range of 64.4 to 71.6 °F. The current DOE active mode temperature specification provides an overlap between the lower end of the DOE temperature range and the upper end of the IEC range, allowing BSH to conduct both tests in the same laboratory at the same time. DOE's proposal for 75 ±2 °F would not allow this overlap, and could potentially require BSH to have separate laboratories for DOE and IEC testing. (AHAM, No. 35 at p. 7; BSH, No. 36 at p. 3; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1; Whirlpool, No. 34 at p. 2)

DOE carefully considered these comments and whether the potential improvement in the test procedure results by requiring a tighter ambient temperature tolerance for dishwasher active mode testing would warrant the significant costs that could potentially be incurred by at least some test laboratories and manufacturers. Although it does not have information on the number of affected laboratories, DOE observes that at least one manufacturer would need to upgrade its facilities, and would incur additional cost by not being able to conduct all its active mode testing, i.e., testing both for demonstrating compliance with DOE energy conservation standards and for evaluating consumer utility associated with cleaning performance, in a single laboratory. Although test repeatability and reproducibility would be improved by specifying a more stringent ambient temperature tolerance, DOE determined that the significant potential costs do not warrant the benefits of such a specification. As a result, DOE is not changing the required range in ambient temperatures for active mode testing in the dishwasher test procedure. In addition, for the reasons stated in the August 2012 SNOPR, DOE is not amending the dishwasher test procedure to require that the active mode test be conducted at the nominal center of the ambient temperature range.

AHAM and GE stated that the test room humidity should be specified for dehumidifier standby mode and off mode testing to prevent the unit from inadvertently cycling on. (AHAM, No. 14 at p. 7; GE, NOPR Public Meeting Transcript, No. 10 at p. 64) Neither commenter provided information on an appropriate ambient humidity level for this testing, and no such requirement is contained within IEC Standard 62301 (Second Edition). Therefore, DOE is not adopting an ambient humidity requirement in today's final rule for standby mode and off mode testing in the new dehumidifier test procedure. DOE does, however, clarify in section 4.2 of

appendix X1 that standby mode and off mode testing should be conducted while ensuring that the dehumidifier does not enter active mode during the test.

2. Installation and Power Supply Requirements

AHAM and Whirlpool supported the requirement to conduct standby mode and off mode testing at the factory or default setting, or where there are no indications of those settings, in the as-shipped condition, in accordance with section 5.2 of IEC Standard 62301 (Second Edition). According to these commenters, this requirement would provide clarity, ensure repeatability, and reduce testing burden. (AHAM, No. 14 at pp. 3–4, 6; Whirlpool, No. 12 at pp. 2, 4; Whirlpool, NOPR Public Meeting Transcript, No. 10 at p. 58) AHAM also stated that it supports the power supply requirements proposed to be referenced from IEC Standard 62301 (Second Edition). (AHAM, No. 14 at pp. 7–8) DOE adopts in today's new dishwasher and dehumidifier test procedures and amended conventional cooking products test procedure references to the electrical supply voltage requirements in section 4, paragraph 4.3.2 and portions of the installation and setup procedures in section 5, paragraph 5.2 of IEC Standard 62301 (Second Edition).

3. Standby Mode and Off Mode Testing Methodology

In the December 2010 NOPR, DOE also proposed for all covered products to require measurement of standby mode and off mode power using section 5, paragraph 5.3 of IEC Standard 62301 (First Edition), clarified by requiring the product to stabilize for at least 30 minutes and using an energy use measurement period of not less than 10 minutes. Further, for any dishwasher or dehumidifier in which the power varies over a cycle, as described in section 5,

paragraph 5.3.2 of IEC Standard 62301 (First Edition), the December 2010 NOPR proposed to require the use of the average power approach in section 5, paragraph 5.3.2(a), with the same 30-minute minimum stabilization and 10-minute minimum measurement periods, as long as the measurement period comprises one or more complete cycles. 75 FR 75290, 75300–01 (Dec. 2, 2010) DOE additionally proposed specific methodology for conventional cooking products in which power varies as a function of the time displayed. In that case, testers would be allowed to choose measuring standby power by means of either the 10-minute test or the 12-hour test, as described in section III.C of today's notice. According to the proposal, manufacturers could elect to conduct either a 10-minute test or a 12-hour test, or both, and results of the 10-minute test that are within ±2 percent of the results for the 12-hour test would be deemed to be representative of average energy use. Id. at 75302–04, 75328.

In the September 2011 SNOPR, DOE updated its proposal to reference testing methodology from IEC Standard 62301 (Second Edition). DOE tentatively concluded that the application of the provisions of the Second Edition to all power measurements in standby mode and off mode for dishwashers and dehumidifiers would be appropriate, and proposed incorporation by reference of the relevant paragraphs of section 5.3 of IEC Standard 62301 (Second Edition) in the test procedures for these products. Further, DOE noted in the September 2011 SNOPR that although the Second Edition allows the choice of multiple test methods for both stable and unstable non-cyclic power consumption, the IEC preferred sampling method provides for a test duration that is approximately the same or shorter than the allowable IEC alternative methods and does not require classification of the nature of the power consumption (e.g., stable or unstable, non-cyclic) in advance of the test. By monitoring the variation in power

consumption during the test, the test operator could determine whether it is stable or unstable, and, thus, the required duration of the sampling periods. For cyclic power consumption, the Second Edition requires the use of the sampling method. Thus, DOE proposed in the September 2011 SNOPR to specify the use of the sampling method in section 5.3.2 of IEC Standard 62301 (Second Edition) for all measures of standby mode and off mode power consumption for residential dishwashers and dehumidifiers. 76 FR 58346, 58351–53 (Sep. 20, 2011).

DOE did not receive comments in response to the proposed standby mode and off mode power consumption measurement methods for dishwashers and dehumidifiers, and for the reasons discussed, adopts such amendments in the new dishwasher and dehumidifier test procedures in today's final rule.

For conventional cooking products, DOE tentatively concluded in the September 2011 SNOPR that section 5.3 of IEC Standard 62301 (Second Edition) includes provisions that are appropriate for measuring off mode and standby modes, except in the case of a unit's clock whose power consumption varies by the time displayed, and that the sampling method in section 5.3.2 of IEC Standard 62301 (Second Edition) would also provide for measurements with minimal test burden. Thus, DOE proposed in the September 2011 SNOPR for conventional cooking products to require the use of the sampling method in section 5.3.2 of IEC Standard 62301 (Second Edition), except as follows. In the narrow case of cooking products with power consumption that varies as a function of the time displayed, DOE determined that the application of the test methodology from IEC Standard 62301 (Second Edition) would cause manufacturers to incur significant burden that would not be warranted by any potential improved accuracy of

the test measurement. For this reason, DOE continued to propose in the September 2011 SNOPR the 10-minute and 12-hour test methods for these products in the conventional cooking products test procedure, based upon the average power method from IEC Standard 62301 (First Edition). The September 2011 SNOPR also proposed to amend the reference in 10 CFR 430.3 to add a reference to IEC Standard 62301 (Second Edition). DOE's proposal for conventional cooking products, based on relevant sections of IEC Standard 62301 (Second Edition) would neither be affected by, nor impact, the testing procedures for microwave ovens other than section renumbering as appropriate. 76 FR 58346, 58351–53. (Sep. 20, 2011).

AHAM and Whirlpool supported the 10-minute testing methodology for conventional cooking products with power consumption that varies as a function of the time displayed, but stated that the time that a product takes to return to the lowest power consumption state after setting the clock may vary and that this stabilization period may be shorter or longer than 10 minutes. They commented that DOE should require the clock to be set to a time of 3:33 minus the number of minutes of the stabilization period. According to AHAM, each manufacturer will know the length of the stabilization period for its products. AHAM also suggested that DOE could require manufacturers to submit in their certification report to DOE the length of the stabilization period, which should not be made public since it is confidential business information. (AHAM, No. 14 at p. 8; AHAM, No. 20 at pp. 2–3; AHAM, NOPR Public Meeting Transcript, No. 10 at pp. 73, 77; Whirlpool, No. 12 at p. 5; Whirlpool, No. 21 at p. 2) Whirlpool stated that the 12-hour test would place significant burden on manufacturers, and that the 10-minute test has been demonstrated to yield representative results. (Whirlpool, No. 21 at p. 2)

ASAP commented that the proposed approach for allowing either a 10-minute or 12-hour test was a reasonable balance between manufacturer test burden and enforcement. (ASAP, NOPR Public Meeting Transcript, No. 10 at pp. 76–77) AHAM and Whirlpool questioned whether a model that met an energy conservation standard when tested by the manufacturer using the 10-minute method but that did not meet the standard when tested by DOE using the 12-hour method would be deemed compliant if the results between the two tests were within the 2-percent variation. Whirlpool believes that the option of two test methods is unnecessary. (AHAM, No. 14 at p. 9; AHAM, No. 20 at p. 3; AHAM, NOPR Public Meeting Transcript, No. 10 at pp. 73–75; Whirlpool, No. 12 at p. 5; Whirlpool, No. 21 at p. 2)

Upon review of comments from interested parties, DOE concludes that a 12-hour test requirement would represent a significant burden to manufacturers, and that the alternative 10-minute method would minimize additional test burden. DOE agrees that the time required by certain products may be different than the 10-minute stabilization period provided in the 10-minute test method. DOE does not believe, however, that allowing the manufacturers to individually determine the stabilization period would optimize the accuracy and repeatability of the test procedure, particularly when the method is used at testing laboratories other than that of the manufacturer. Based on its testing, DOE determined that a requirement to set the display time to 3:23 and allowing a 10-minute stabilization period prior to a 10-minute measurement period would best balance the need for reproducibility of the test procedure with the burden placed on manufacturers. Therefore, DOE adopts in today's final rule the proposed standby mode and off mode testing methodology for conventional cooking products, but eliminating the 12-hour

testing option for conventional cooking products with power consumption that varies as a function of the time displayed.

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 amendments reflect 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. 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.

F. Calculation of Energy Use Associated with Operational Modes

1. Standby Mode and Off Mode

In the December 2010 NOPR, DOE proposed a methodology for measuring energy consumption in modes other than active washing mode for dishwashers and active cooking mode for conventional cooking products; i.e., inactive (standby) mode and off mode, as well as delay start mode and cycle finished mode. These modes are collectively referred to as low-power modes. DOE also raised the possibility of using a similar methodology for measuring low-power modes for dehumidifiers, including inactive (standby) mode, off mode, off-cycle mode, and bucket full/removed mode. DOE proposed in the December 2010 NOPR to allocate specific annual hours to each of the active, standby, and off modes. Using this approach, the annual energy use associated with the low-power modes would be calculated by: (1) calculating the product of wattage and allocated hours for all possible low-power modes; (2) summing the results; and (3) dividing the sum by 1,000 to convert from Wh to kWh. For each product, DOE estimated the hours allocated to each mode, and for those products with both electronic controls and a mechanical on/off switch, DOE proposed to evenly split the hours between inactive mode and off mode. For the per-cycle energy use metrics for dishwashers and conventional cooking products, this value would be divided by the proposed annual active use cycles per year. For dehumidifiers, which measure energy use over a 24-hour period, the annual energy use in the

low-power mode would be divided by the active mode hours per year and multiplied by 24 hours. 75 FR 75290, 75306, 75310–15 (Dec. 2, 2010).

As an alternate approach for dishwashers and conventional cooking products, DOE also proposed measuring power consumption for only off and inactive modes for the purpose of calculating the total energy consumed in all low-power modes. Using this approach, energy use in delay start and cycle finished mode would be accounted for by allocating all the hours not associated with active washing or cooking mode to the inactive (standby) and off modes and then measuring standby or off mode power. For dehumidifiers, DOE considered the possibility of a similar alternative approach in which energy use in which all hours other than active dehumidification mode would be allocated to inactive mode, off-cycle mode, and off mode. DOE observed that dehumidifiers are generally capable of either off mode or inactive mode, depending on the type of controls, when the unit is plugged in but not turned on. Each type of dehumidifier would operate in off-cycle mode when the unit is powered on and the relative humidity level in the room is below the dehumidifier humidity set point. 75 FR 75290, 75306, 76308, 75310–13 (Dec. 2, 2010). DOE retained these proposals in the September 2011 SNOPR and received comments in support of the alternate approach. As a result, DOE proposed the alternate approach for dishwashers and conventional cooking products in the May 2012 SNOPR. 77 FR 31444, 31451 (May 25, 2012).

AHAM, BSH, the California Utilities, PG&E, and Whirlpool opposed the allocation of annual hours to different modes proposed for the dishwasher, dehumidifier, and conventional cooking products test procedures, commenting that DOE did not base the proposals on sufficient

U.S. consumer use data. AHAM, BSH, and Whirlpool further commented that if DOE moves forward with its proposal, the alternative approach is preferable. (AHAM, No. 14 at pp. 9–14; AHAM, No. 27 at p. 13; AHAM, NOPR Public Meeting Transcript, No. 10 at pp. 85, 97–98, 109; BSH, No. 28 at p. 11; California Utilities, No. 16 at p. 3; PG&E, No. 17 at p. 3; Whirlpool, No. 12 at p. 6; Whirlpool, No. 26 at pp. 1, 3) The California Utilities and PG&E commented that delay start mode should be measured as part of active mode, but supported including delay start energy use in standby mode energy use as a temporary measure. ASAP, the California Utilities, and PG&E questioned DOE's estimates of the annual hours spent in cycle finished mode, while GE stated that DOE's estimates for dehumidifier bucket full/removed mode are too high. (ASAP, NOPR Public Meeting Transcript, No. 10 at pp. 109–110; California Utilities, No. 16 at pp. 2, 4; PG&E, No. 17 at pp. 2,4; Whirlpool, NOPR Public Meeting Transcript, No. 10 at pp. 94–95)

ASAP, the California Utilities, the NOPR/SNOPR2 Joint Comment, and PG&E stated that DOE should specify the placement of the mechanical on/off switch so that consumers would turn the product off, thereby justifying the proposed split between inactive mode and off mode hours. AHAM (ASAP, NOPR Public Meeting Transcript, No. 10 at pp. 87, 109; California Utilities, No. 16 at p. 4; NOPR/SNOPR2 Joint Comment, No. 13 at p. 6; PG&E, No. 17 at p. 4) AHAM commented that DOE should require that mechanical on/off switch be accessible to the consumer, but should not specify product design. (AHAM, No. 14 at p. 12)

In today's final rule, DOE maintains its determination from the May 2012 SNOPR for both dishwashers and conventional cooking products, and, as contemplated in the December 2010 NOPR, makes a similar determination for dehumidifiers, that the power consumption in

each of the low-power modes is similar, and that in such a case, measuring power consumption of each mode separately would introduce significant test burden without a corresponding improvement in a representative measure of annual energy use. In consideration of support from interested parties for the alternate calculation method and the lack of additional consumer use data that would improve the original proposal, DOE establishes in the new dishwasher and amended conventional cooking products test procedures provisions to account for standby mode and off mode energy use by measuring inactive mode and off mode power consumption only, and allocating that power consumption to all hours spent in the low-power modes combined.

The same alternative calculation of combined low-power mode energy use is adopted in today's final rule in the new dehumidifier test procedure. The provisions require that dehumidifiers with off mode capability (i.e., those units with electronic controls that may be shut off with a mechanical switch or with mechanical controls) shall be measured in off mode and off-cycle mode. For dehumidifiers not capable of operation in off mode (i.e., units with electronic controls that may not be shut off with a mechanical switch), inactive mode and off-cycle mode shall be measured. The annual hours for all low-power modes combined shall be split evenly between off-cycle mode and either inactive mode and off mode, depending on the unit's capability. Although DOE did not previously propose this specific alternative methodology for dehumidifiers, it suggested that such an approach could be adopted in the final rule. DOE is adopting this approach today after noting the preponderance of supporting comments for the alternative approach, and weighing carefully the benefits of reduced testing burden of this approach against the minor improvements in accuracy of the standby mode and off mode energy use obtained by measuring each low-power mode separately.

2. Fan-Only Mode

In the May 2012 SNOPR, DOE proposed to define fan-only mode in the test procedures for dishwashers and conventional cooking products as an active mode in which a fan circulates air for a finite period of time after the end of the dishwasher cycle or conventional cooking product heating function, as indicated to the consumer. DOE also proposed provisions to measure energy use in fan-only mode, in which the power consumption and duration of fan-only mode would be measured at the end of each active mode cycle required by the test procedure, and the resulting energy consumption would be included in the energy efficiency metrics for that product. 77 FR 31444, 31451 (May 25, 2012).

In response to the May 2012 SNOPR, the NOPR/SNOPR2 Joint Comment stated that it supports incorporating measurement of fan-only mode energy use in the dishwasher and conventional cooking products test procedures, as this would provide an incentive to manufacturers to reduce fan-only mode energy consumption. (NOPR/SNOPR2 Joint Comment, No. 29 at p. 1) AHAM, BSH, and Whirlpool stated they would not oppose the measurement of fan-only mode energy use for dishwashers or conventional cooking products, as long as fan-only mode is not a user-selectable option. Whirlpool commented that classifying fan-only mode as part of active mode would be consistent with a determination that active mode persists until the end of the operating cycle. However, AHAM, BSH, and Whirlpool stated that measuring energy consumption in this mode according to the proposed method would represent a significant burden due to the increased length of each test. AHAM, BSH, and Whirlpool recommended that DOE allow as an option a one-time measurement or sampling approach to measure fan-only

mode energy use over a brief time period combined with a calculation to properly account for its contribution to annual energy use in the test procedures for dishwashers and conventional cooking products. (AHAM, No. 27 at pp. 2–3; BSH, No. 28 at p. 2; Whirlpool, No. 26 at pp. 1–2)

Whirlpool further commented that DOE's estimate that a dishwasher fan could run for 4 hours after each cycle, consuming 17 kWh per year or 4.7 percent of the current maximum energy consumption, was incorrect. Whirlpool stated that fan operation is a function of the residual heat remaining in the unit after completion of the wash cycle and the degree of drying selected, and thus, the fan will not operate for this length of time on every cycle. Whirlpool similarly commented that DOE's estimate that a conventional cooking product fan could run for 3.5 hours after each cycle, consuming as much as 38 kWh per year, was incorrect because fan operation is a function of the residual heat remaining in the unit after completion of the cooking cycle and of the ambient temperature. (Whirlpool, No. 26 at p. 2)

As part of the calculation in the May 2012 SNOPR, DOE provided a range of the annual impacts of fan-only energy consumption in residential dishwashers and conventional cooking products. While DOE agrees that most dishwashers and conventional cooking products will not operate in fan-only mode for 4 hours or 3.5 hours, respectively, DOE is aware of products capable of these durations, and therefore concludes that the values in the May 2012 SNOPR are appropriate estimates of the maximum amount of energy consumed in this mode. However, the proposal for dishwasher and conventional cooking product test methods for measuring energy

use in fan-only mode in the May 2012 SNOPR would be based on the actual length of fan-only mode for the product under test.

For the August 2012 SNOPR, DOE continued to propose the methodology first proposed in the May 2012 SNOPR, and also provided an alternative methodology to reduce test burden in which, if fan-only mode is not a user-selectable option, the power consumption would be measured for a brief time period, such as 10 minutes, and then extrapolated over the length of the entire fan-only mode cycle. DOE sought representative data on the length of the fan-only mode cycle for dishwashers and conventional cooking products. 77 FR 49064, 49067 (Aug. 15, 2012).

AHAM, BSH, Samsung, and Whirlpool support the alternative approach under which the energy use of fan-only mode would be measured only if is not a user-selectable option, although they noted this approach could produce non-representative results if the energy use during fan-only mode is not constant. These commenters cited an example in which the fan could stop and start over the course of the fan-only mode, or it could operate at a different wattage at times other than during the sampling period. Therefore, AHAM, BSH, Samsung, and Whirlpool suggest that DOE include language to require that the measured time period of 10 minutes be representative of average energy usage. If the measurement period is not representative, the full fan-only mode should be measured. (AHAM, No. 35 at pp. 9–10; BSH, No. 36 at p. 3; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1) ASAP, NCLC, and NRDC, jointly (hereafter the "SNOPR3 Joint Comment") support measuring fan-only mode energy use for the duration of fan-only mode, as originally proposed in the May 2012 SNOPR. These commenters stated they are not aware of available data on the representative cycle times of fan-only mode for dishwashers or

conventional cooking products, and that given the wide variations in fan-only cycle times observed in the products, any assumed cycle time would result in significantly over-estimating or under-estimating the actual energy consumption in fan-only mode for a majority of products. (SNOPR3 Joint Comment, No. 37 at pp. 1–2)

Measuring fan-only mode energy use over the full duration of fan-only mode may provide slightly more accuracy in the results, but such an approach can represent significant testing burden in the event that the duration of fan-only mode extends to several hours. Additionally, DOE agrees with the SNOPR3 Joint Comment that any single value for a representative duration of fan-only mode for a dishwasher or conventional cooking product that DOE may prescribe in its test procedures would likely not result in representative energy use for a number of such products. To use the alternate method and extrapolate the results over the duration of fan-only mode, manufacturers must know and use the length of the fan-only mode operation. Use of the alternative approach would substantially reduce testing burden while resulting in representative energy use for this mode. Therefore, in today's final rule, DOE adopts provisions in the new dishwasher test procedure and amends the current conventional cooking products test procedure to include the methodology proposed in the May 2012 SNOPR for measuring energy use over the full duration of fan-only mode, but also allow the choice of the alternative method, using a testing duration of 10 minutes, where the duration of fan-only mode is known and the resulting energy use extrapolated over the entire fan-only mode will be representative. For conventional cooking products, DOE's proposed amendments for measuring fan-only mode energy use are corrected in today's final rule so that the energy use is determined in kilowatt-hours rather than hours.

AHAM and Whirlpool also commented that DOE should clarify what "as indicated to the consumer" means in the fan-only mode definition. According to AHAM, this could refer to the end of the heating function for a cooking product or dishwasher cycle, or when the consumer is notified of the end of the heating function or dishwasher cycle and the fan is running, or something else. (AHAM, No. 27 at p. 2; Whirlpool, No. 26 at p. 1) In today's final rule, DOE provides further clarification in the definition of fan-only mode that indication to the consumer of the end of the cycle is by means of a display, indicator light, or audible signal.

3. Dishwasher Water Softener Regeneration

In the May 2012 SNOPR, DOE proposed a method for measuring the energy consumed during regeneration cycles for water softeners built into certain residential dishwashers. The proposed test procedure would measure the machine electrical energy consumption and the water consumption of a water softener regeneration cycle. DOE considered information submitted by manufacturers in petitions for waiver from the DOE test procedure to determine an appropriate method for incorporating water softener regeneration energy and water consumption into the overall metrics. 77 FR 31444, 31449–52 (May 25, 2012).

The NOPR/SNOPR2 Joint Comment supported the proposed water softener regeneration test procedure, and noted that the test procedure would eliminate the need for additional test procedure waivers. (NOPR/SNOPR2 Joint Comment, No. 29 at p. 1) AHAM, BSH, and Whirlpool opposed the proposed test method because it would be burdensome and result in only a small amount of additional measured energy and water consumption. Whirlpool commented

that it submitted detailed data on the frequency, energy use, and water use of water softeners in its petition for wavier, and in granting the waiver, DOE agreed to add constant values of 4 kWh and 23 gallons per year to the results calculated under the test procedure. According to Whirlpool, these represent a very modest amount of annual energy and water consumption. (AHAM, No. 27 at pp. 3–4; BSH, No. 28 at p. 2; BSH, No. 36 at p. 2; Whirlpool, No. 26 at pp. 1–3; Whirlpool, No. 34 at p. 2)

AHAM, BSH, and Whirlpool noted that the proposed test method is not consistent with the approach taken by the European standards EN 50242/EN 60436 and the IEC Standard 60436, which disregard energy and water consumption during water softener regeneration, and that the lack of harmonization increases test burden. These commenters also stated that if the water softener does not operate as part of the "normal" energy cycle and is user selectable, it should be treated like other options in the test procedure and should not be measured. (AHAM, No. 27 at p. 4; BSH, No. 28 at pp. 2–3; BSH, No. 36 at p. 2; Whirlpool, No. 26 at pp. 1–3; Whirlpool, No. 34 at p. 2)

AHAM, BSH, and Whirlpool further stated that DOE overestimated the energy use associated with water softener regeneration cycles because it did not account for households with hard water that use home water softening systems. According to BSH, dishwashers with built-in water softening systems are the most costly units, and homes that can afford these high-end dishwashers and have water hardness above 180 parts per million (ppm) (the maximum water hardness for which modern phosphate-free detergents are effective) are more likely to have home water softening systems, although BSH did not provide supporting data. BSH stated that it

produces about 50,000 units per year with built-in water softening systems, totaling a small amount of energy consumption for water softener regeneration according to the current waiver calculation methods. (AHAM, No. 27 at p. 4; BSH, No. 28 at p. 2; BSH, No. 36 at p. 2; Whirlpool, No. 26 at p. 1) The NOPR/SNOPR2 Joint Comment stated that in the absence of data regarding the percentage of households with hard water that have their entire water supply softened, DOE's assumption that all dishwashers with built-in water softeners perform the periodic regeneration is reasonable. (NOPR/SNOPR2 Joint Comment, No. 29 at pp. 1–2)

Whirlpool also commented that specifying an exact test water hardness of 217 mg/L (12.7 grains) would not be practical, and a tolerance would be required, such as 9 to 14 grains, allowing laboratories to use existing water supplies and reduce the additional test burden of special mixing of water for this test. (Whirlpool, No. 26 at p. 3)

AHAM, BSH, and Whirlpool commented that if DOE includes water softener regeneration in the test procedure, DOE should adopt a method of adding constant values for the water and energy use, similar to the method DOE agreed to in the test procedure waivers, which would be provided by the manufacturer and would account for regeneration frequency, water use, and energy use. (AHAM, No. 27 at p. 4; BSH, No. 28 at p. 3; BSH, No. 36 at p. 2; Whirlpool, No. 26 at pp. 1, 3; Whirlpool, No. 34 at p. 2)

In the waivers granted to manufacturers for water softening dishwashers, DOE has already determined that the energy and water use for water softener regeneration, although small in comparison to the overall energy and water use of the dishwasher, must be included to

accurately represent true energy and water consumption characteristics. DOE recognizes that the proposed methodology to measure water softener regeneration would result in a significant increase in testing burden, by requiring up to 10 additional testing cycles to determine the energy and water use associated with that process. The waivers granted to manufacturers of different water softening dishwashers demonstrate that the values for the additional water and energy consumption necessary for water softener regeneration, as well as the frequency of the regeneration process, will vary depending on the specific model of dishwasher. For that reason, DOE cannot adopt fixed values for these parameters in the dishwasher test procedure. As an alternative approach that will minimize significantly the testing burden for including water softener regeneration in the dishwasher test procedure, DOE adopts in appendix C1 measures of energy and water consumption for water softener regeneration using manufacturer-reported values for the energy and water use for each regeneration cycle and the number of annual regeneration cycles. In today's final rule, DOE also amends 10 CFR 429.19 to require manufacturers to certify and submit to DOE the fixed values, along with data and calculations by which they are derived, for each basic dishwasher model equipped with a built-in water softener system.

DOE does not have data available at this time to determine the percentage of households with hard water that have their entire water supply softened, and for that reason does not provide an adjustment factor to the energy and water use calculations adopted in today's final rule. Because DOE is not adopting methodology for conducting water softener regeneration testing, but instead is incorporating energy and water use measures by means of fixed values, DOE is not adding any specification in the new dishwasher test procedure for the supply water hardness.

G. Measures of Energy Consumption

For the December 2010 NOPR, DOE analyzed whether it is technically feasible, as required by EPCA, to combine the existing measures of energy consumption for dishwashers, dehumidifiers, and conventional cooking products with standby mode and off mode energy use to form a single metric. DOE's tentative conclusions at that time are discussed as follows.

1. Dishwashers

Because the dishwasher test procedure already combines measures of active mode energy consumption and a simplified measure of standby mode energy use to derive EAEU, the current energy use metric for standards, it is technically feasible to incorporate standby mode and off mode energy consumption into the overall energy efficiency descriptor. Furthermore, DOE noted in the December 2010 NOPR that its analysis of overall energy use for dishwashers 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. DOE proposed to amend the calculation of EAEU to incorporate the revised measures of standby mode and off mode energy consumption, and the revised EAEU metric would satisfy the EPCA requirement to integrate standby mode and off mode energy consumption into the overall energy consumption metric. 75 FR 75290, 75314 (Dec. 2, 2010).

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. DOE proposed in the December 2010 NOPR to measure an additional standby mode (i.e., cycle finished mode). However, the proposed amendments clarified 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. 75 FR 75290, 75314 (Dec. 2, 2010).

Because the current dishwasher test procedure already incorporates standby energy use in the EAOC, it is technically feasible to incorporate both standby mode and off mode energy use into the EAOC. Therefore, DOE proposed in the December 2010 NOPR to amend the EAOC calculation to incorporate the revised measures of standby mode and off mode energy consumption. Id.

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 EAEU or water consumption per cycle (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 proposed in the December 2010 NOPR to add instructions to 10 CFR 430.23(c) requiring that water consumption be rounded to one decimal place, and EAEU be rounded to the nearest whole kWh/year. DOE also proposed at that time to provide rounding instructions for EF, but as discussed in section III.J, is removing provisions for determining EF because it is obsolete. 75 FR 75290, 75314 (Dec. 2, 2010).

AHAM commented that is did not oppose modifying the existing EAEU metric for dishwashers as proposed, and supported the rounding instructions proposed. (AHAM, No. 14 at p. 12) Whirlpool stated that, although it is technically feasible to create an integrated metric for dishwashers, delay start mode and cycle finished mode represent de-minimus contributors to EAEU and EAOC. According to Whirlpool, the annual cost of energy consumed in inactive/off mode would range from $0 to $0.65. Whirlpool stated that measurement of these modes adds cost and complication to the test procedure with no corresponding value, and should not be included in the test procedure. (Whirlpool, No. 12 at p. 6) Because integrated dishwasher energy use metrics are technically feasible, DOE revises in today's final rule the EAEU and EAOC metrics in the new dishwasher test procedure to incorporate measures of standby mode and off mode energy use, as required by 42 U.S.C. 6295(gg). DOE also adopts in 10 CFR 430.23(c) the rounding instructions for EAEU and water consumption that were proposed in the December 2010 NOPR.

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.

In the December 2010 NOPR, DOE noted that its analysis of overall energy use for dehumidifiers 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, DOE stated that a combined measure of energy efficiency for dehumidifiers is a meaningful measure. 75 FR 75290, 75314–15 (Dec. 2, 2010).

DOE proposed in the December 2010 NOPR to establish an integrated energy factor (IEF) measure to account for the product's energy use in standby mode and off mode, as well as the energy use of the product's main functions. DOE noted 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 proposed 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[14]×24 hours)/(the active mode hours per year))). 75 FR 75290, 75315 (Dec. 2, 2010).

Section 3 of the current dehumidifier test procedure provides instructions for rounding EF to two decimal places. DOE proposed in the December 2010 NOPR to round the IEF value to two decimal places as well. Id.

AHAM stated that is did not oppose the proposed integrated metric for dehumidifiers, and supports the rounding instructions proposed. (AHAM, No. 14 at p. 12) Whirlpool stated that, although it is technically feasible to create an integrated metric for dehumidifiers, delay start mode and bucket full/removed mode represent de-minimus contributors to annual energy consumption and operating cost. According to Whirlpool, the annual cost of energy consumed in off-cycle and inactive modes would range from $0 to $0.36. Whirlpool stated that measurement of these modes adds cost and complication to the test procedure with no corresponding value, and should not be included in the test procedure. (Whirlpool, No. 12 at p. 6) Because an integrated dehumidifier energy use metric is technically feasible, DOE adopts in today's final rule the new IEF metric in the new dehumidifier test procedure to incorporate measures of standby mode and off mode energy use, as required by 42 U.S.C. 6295(gg). DOE also adopts the rounding instructions for IEF that were proposed in the December 2010 NOPR.

3. Conventional Cooking Products

The DOE test procedures for conventional cooking tops, ovens, and ranges currently

[14] 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.

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 .) The test procedure also provides a calculation for EF[15] 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.

In the December 2010 NOPR, DOE noted 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 tentatively concluded that it would be technically feasible to incorporate standby mode and off mode energy consumption into the overall energy efficiency descriptor (i.e., EF). In the December 2010 NOPR, DOE proposed to establish, for conventional electric ovens, the "integrated annual energy consumption," 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" would be defined as the sum of the annual standby mode and off mode

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

energy consumption, annual secondary cooking energy consumption,[16] and annual secondary self-cleaning energy consumption, expressed in kWh. For conventional electric ovens, IEF would be defined as the (annual useful cooking energy output)/(integrated annual energy consumption). For conventional gas ovens, IEF would be defined as the (annual useful cooking energy output)/(annual gas energy consumption + integrated annual electrical energy consumption). DOE also proposed similar integrated annual energy consumption and IEF metrics for multiple conventional ovens (i.e., cooking appliances that include more than one conventional oven). 75 FR 75290, 75315 (Dec. 2, 2010).

Also in the December 2010 NOPR, DOE proposed to establish measures integrating 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" would 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" would 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 would be defined as the annual useful cooking energy output divided by the electric cooktop integrated annual energy consumption. For conventional gas cooktops, IEF would be defined as the annual useful cooking energy output divided by the gas cooktop integrated annual energy consumption. Id.

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

DOE proposed in the December 2010 NOPR to establish the following measures of energy consumption for conventional kitchen ranges (i.e., a cooktop and oven combined). "Integrated annual energy consumption" would 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.[17] The IEF of a kitchen range would 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. 75 FR 75290, 75315–16 (Dec. 2, 2010).

DOE is also proposed in the December 2010 NOPR 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. 75 FR 75290, 75316 (Dec. 2, 2010). 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 proposed in the December 2010 NOPR 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. 75 FR 75290, 75316 (Dec. 2, 2010).

AHAM commented that is did not oppose the proposed integrated metrics for conventional cooking products, and supports the rounding instructions proposed. (AHAM, No.

[17] 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 count the contribution of standby mode and off mode energy consumption.

14 at p. 12) Whirlpool stated that, although it is technically feasible to create an integrated metric for conventional cooking products, delay start mode, cycle finished mode, and Sabbath mode represent de-minimus contributors to annual energy consumption and operating cost. Whirlpool stated that measurement of these modes adds cost and complication to the test procedure with no corresponding value, and should not be included in the test procedure. (Whirlpool, No. 12 at p. 6) ASAP stated that an integrated metric for conventional cooking products could preclude the possibility of a future standard for standby energy use for conventional cooking products, as is being considered for microwave ovens. (ASAP, NOPR Public Meeting Transcript, No. 10 at p. 120.

Because integrated energy use metrics for conventional cooking products are technically feasible, DOE adopts in today's final rule new IEF and integrated annual energy consumption metrics in the cooking products test procedure as described to incorporate measures of standby mode and off mode energy use, as required by 42 U.S.C. 6295(gg). The cooking products test procedure amendments also include separate measures of standby mode and off mode energy use that feed into the calculation of IEF. Should DOE in the future consider new energy efficiency standards for conventional cooking products, DOE will take appropriate action consistent with 42 U.S.C. 6295(gg). DOE also amends in 10 CFR 430.23(i) the estimated annual energy cost calculations to include the cost of energy consumed in standby mode and off mode for conventional cooking products, as well as to provide rounding instructions for EAOC and IEF as proposed in the December 2010 NOPR.

H. Dishwasher Test Procedure Clarifications

1. Energy Test Cycle Selection and Normal Cycle Definition

DOE proposed in the May 2012 SNOPR that soil-sensing dishwashers be tested on the normal cycle under section 2.6.3 of appendix C if soil-sensing is available as an option in the normal cycle. If soil-sensing is not available for the normal cycle, DOE proposed that the dishwasher be tested by selecting the cycle type that uses the soil-sensing system, and contains all the elements of a normal cycle including the power-dry feature (if such a feature is provided). 77 FR 31444, 31452–53 (May 25, 2010). DOE continued to propose this clarification in the August 2012 SNOPR and further proposed that, for units with multiple temperature options, the unit shall be tested at the manufacturer-recommended setting, or absent a manufacturer recommendation, at the highest temperature setting. 77 FR 49064, 49065–66 (Aug. 15, 2012).

AHAM, BSH, and Whirlpool opposed the proposals in the May 2012 SNOPR and the August 2012 SNOPR, stating that it contradicts the definition of normal cycle, may not represent typical consumer usage, and creates confusion for the tester and consumer. These commenters stated that the "normal cycle" is the appropriate energy test cycle, and manufacturers must assume the consumer will use the manufacturer-recommended cycle even if that cycle is non-soil-sensing on a dishwasher capable of soil-sensing. The commenters further stated that manufacturers may do this in order to provide soil-sensing only on a specialty cycle(s), such as the cycle intended for washing pots and pans, and then recommend the non-soil-sensing normal cycle to completely wash a full load of normally soiled dishes. Additionally, AHAM, BSH, and Whirlpool noted that it is difficult to determine which cycles use the soil sensor. (AHAM, No. 27 at pp.4 –6; BSH, No 28. at pp. 3–4; Whirlpool, No. 26 at p. 1; Whirlpool, 2012 Public Meeting

Transcript, No. 38 at pp. 88–89) AHAM commented that DOE issued guidance in 2010 stating that a soil-sensing cycle is to be used, even if the normal cycle is fixed. AHAM stated that to some, this guidance changed the interpretation of the test procedure. (AHAM, 2012 Public Meeting Transcript, No. 38 at pp. 85–86)

Additionally, AHAM, BSH, Samsung, and Whirlpool pointed out that a manufacturer may make multiple recommendations for cycles that would completely wash a full load of normally soiled dishes, which could invite manufacturer recommendation of alternative cycles or option combinations that could be interpreted by consumers to be alternatives to the "normal cycle". These commenters stated it is therefore logical that the energy test cycle and "normal cycle" should be the cycle most commonly used by consumers on an everyday basis. Accordingly, AHAM, BSH, and Whirlpool suggested that the definition of "normal cycle" be revised to clarify that intent, and to encourage manufacturers to recommend cycles to the consumer that are consistent with the energy and water use measured by the test procedure. In response to the May 2012 SNOPR, they proposed the following definition for normal cycle: "normal cycle means the cycle type recommended by the manufacturer for daily, regular, or typical use to completely wash a full load of normally soiled dishes, including the power-dry feature. If multiple cycles are recommended by the manufacturer for daily, regular, or typical use to completely wash a full load of normally soiled dishes, the most energy intensive of those recommended cycles shall be considered the normal cycle for the purposes of this test procedure." AHAM and Whirlpool opposed the specification of temperature options in the normal cycle definition, but commented that if DOE adds temperature options to that definition, DOE should require selection of the highest temperature settings in the absence of manufacturer

recommendations. BSH also supported a requirement to select the highest temperature settings in the absence of manufacturer recommendations. AHAM and Whirlpool stated that, in the absence of data indicating which temperature settings are most representative of actual consumer use, consumers could select the highest temperature settings. (AHAM, No. 27 at pp. 5–6; AHAM, No. 35 at p. 6; BSH, No. 28 at pp. 3–4; BSH, No. 36 at p. 2; Samsung, No. 33 at p. 1; Whirlpool, No. 26 at pp. 1, 4; Whirlpool, No. 32 at p. 1)

In response to DOE's updated proposal for the definition of "normal cycle" in the August 2012 SNOPR, AHAM, BSH, Samsung, and Whirlpool submitted a revised definition which would state that the "[n]ormal cycle means the cycle type recommended in the manufacturer's instructions for daily, regular, or typical use to completely wash a full load of normally soiled dishes, including the power-dry feature. If no cycle or more than one cycle is recommended in the manufacturer's instructions for daily, regular, or typical use to completely wash a full load of normally soiled dishes, the most energy intensive of these cycles shall be considered the normal cycle for purposes of this test procedure." (AHAM, No. 35 at p. 6; BSH, No. 36 at pp. 2–3; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1)

Whirlpool commented that DOE should include a "statement of intent" in the dishwasher test procedure to clarify the test procedure for new technology developments, and to prevent manufacturers from creating a specifically designed test cycle that fails to perform the functions desired by the consumer, similar to a recent refrigerator rulemaking. (Whirlpool, No. 26 at pp. 3–4; Whirlpool, No. 32 at pp. 1–2) Samsung also requested that DOE add a statement of intent to help manufacturers, certification bodies, and consumers understand that the intent of the energy

test cycle selection is to reflect the representativeness of the test procedure to consumer use conditions. (Samsung, No. 33 at p. 1) According to BSH, however, any additional statements of intent and/or additional wording seeking to further clarify the definition may, in some cases, result in confusion as to what cycle should be selected for testing. (BSH, No. 36 at p. 2)

Under EPCA, any test procedure for consumer products that DOE prescribes or amends shall be reasonably designed to produce test results which measure energy consumption or energy efficiency of these products during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(3)) DOE is aware of products available on the market that have multiple cycles recommended by the manufacturer for washing a full load of normally soiled dishes, and that for soil-sensing dishwasher these cycles may be soil-sensing or non-soil sensing. Upon consideration of the arguments put forth by commenters that consumers are most likely to select cycles that are recommended by the manufacturer when washing a full load of normally soiled dishes, DOE determines that it would be contrary to the EPCA requirements if DOE were to require the preferential selection of a soil-sensing cycle for a soil-sensing dishwasher, regardless of the manufacturer's instructions to the consumer. Therefore, DOE agrees with the stakeholder recommendation for the definition of normal cycle, including the requirement to test on the most energy-intensive of multiple recommended cycles or, in the absence of a manufacturer recommendation, the most energy-intensive of all cycles. Because the most energy-intensive cycle would include the highest energy consumption temperature options for washing and drying, DOE includes such a clarification in the definition of the normal cycle in appendix C1, which would be required to be used on the compliance date of any final amended standards for dishwashers (i.e., May 30, 2013 unless the direct final rule issued on May 30, 2012 is

withdrawn). On that compliance date, the definition of normal cycle that DOE adopts in today's final rule supersedes the 2010 guidance. For the reasons discussed above, DOE withdraws the guidance effective May 30, 2013 (unless the direct final rule issued on May 30, 2012 is withdrawn, in which case the guidance will remain in effect). DOE also clarifies in appendix C1 that "non-soil-sensing dishwasher" refers to a dishwasher that does not have the ability to adjust automatically any energy consuming aspect of the normal cycle based on the soil load of the dishes, and that a "soil-sensing-dishwasher" does have the ability to adjust automatically any energy consuming aspect of the normal cycle based on the soil load of the dishes. In addition, DOE clarifies that soil-sensing dishwashers shall be tested on the normal cycle. Furthermore, DOE has not included a statement of intent in the amendments to the dishwasher test procedure adopted in today's final rule. EPCA's requirement that test procedures measure energy efficiency, energy use or water use during a representative average use cycle obviates the need for specific clarification of that purpose in the residential dishwasher test procedure in the absence of any indication that manufactures are designing products that test under conditions different than those used by the consumer.

AHAM, BSH, and Whirlpool recommend that manufacturers be required to submit with their certification reports: (1) whether the unit is soil-sensing; (2) the cycle selected for the energy test; and (3) the options selected for the energy test. AHAM also recommended manufacturers certify in the report whether the test cycle is soil-sensing. AHAM, BSH, and Whirlpool suggested that manufacturers include a clear recommendation for the cycle setting and options in their use and care guides, or on the product controls. (AHAM, No. 27 at p. 6; AHAM, 2012 Public Meeting Transcript, No. 38 at p. 87; BSH, No. 28 at pp. 4–5; BSH, 2012 Public

Meeting Transcript, No. 38 at pp. 91–92; Whirlpool, No. 26 at p. 1) Intertek commented that currently, the only way for laboratories to know if a unit has a soil sensor is to reference the use and care manual. (Intertek, 2012 Public Meeting Transcript, No. 38 at p. 91) BSH and Whirlpool indicated that their user manuals likely indicate whether a unit has a soil sensor, while GE noted their manuals do not necessarily indicate which cycles are soil-sensing, and which are fixed. (BSH, 2012 Public Meeting Transcript, No. 38 at p. 92; Whirlpool, 2012 Public Meeting Transcript, No. 38 at p. 92; GE, 2012 Public Meeting Transcript, No. 38 at p. 98)

DOE notes that the certification requirements for dishwashers included in 10 CFR part 429.19 require manufacturers to report the following information for each certified basic model: the capacity in number of place settings as specified in ANSI/AHAM DW–1, presence of a soil sensor (if yes, the number of cycles required to reach calibration), and the water inlet temperature used for testing in °F. In today's final rule, DOE determined, for reproducibility of the test procedure, to additionally require that manufacturers submit the cycle used for energy testing, whether that cycle is soil-sensing, and the options selected for that cycle during energy testing.

2. Preconditioning

In the May 2012 SNOPR, DOE proposed that, for soil-sensing dishwashers, the cycle setting for the active mode cycle (in which the soil sensor is active) be selected for the preconditioning cycle. 77 FR 31444, 31452 (May 25, 2012). In the August 2012 SNOPR, DOE additionally proposed requiring two preconditioning cycles to ensure the soil sensor is properly

calibrated, and to clean any debris out of the dishwasher prior to testing. 77 FR 49064, 49066 (Aug. 15, 2012).

AHAM, BSH, Samsung, and Whirlpool agreed with using the test cycle for preconditioning, but also commented that the definition of preconditioning is vague and not adequate for the way some products operate today. They commented that the proposed language may be confusing, and recommended that the cycle used for preconditioning be the same as the cycles used for the test. (AHAM, No. 27 at p. 9; AHAM, No. 35 at p. 7; AHAM, 2012 Public Meeting Transcript, No. 38 at pp. 107–108; BSH, No. 36 at p. 3; BSH, No. 28 at p. 7; Samsung, No. 33 at p. 1; Whirlpool, No. 26 at p. 1; Whirlpool, No. 32 at p. 1) AHAM, BSH, Samsung, and Whirlpool also support the requirement for two preconditioning cycles. (AHAM, No. 35 at p. 7; BSH, No. 36 at p. 3; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1) Whirlpool and BSH commented that some laboratories perform more than one preconditioning cycle to ensure that the machine is cleaned out and water usage is quantified, although Whirlpool's products are designed so that the sensor calibrates in one cycle. Whirlpool acknowledged, however, that if its dishwasher does not calibrate in the first cycle, then it uses the next cycle as well, and will keep trying on subsequent cycles if there is still an error. BSH commented that the action taken if the sensor fails to calibrate on the first cycle varies from manufacturer to manufacturer. Whirlpool and BSH stated that they have equipment in their own laboratories that can determine whether the sensor has calibrated, but they further noted that there is not a clear way for a third-party laboratory to determine whether the sensor had calibrated, because the energy and water use that would indicate a calibration process are model-specific and the sensor responses are complex. According to BSH, sensor responses may include changes in motor speed and water

temperatures, as well as water consumption. Whirlpool and BSH added that their sensors are designed to calibrate with clean water, rather than with a soiled load. (BSH, 2012 Public Meeting Transcript, No. 38 at pp. 111–113, 115–116, 118; Whirlpool, 2012 Public Meeting Transcript, No. 38 at pp. 109–115, 117, 119–120) Viking Range Corporation (Viking) commented that user manuals typically contain energy use information for cycles that would provide an indication to a laboratory as to whether a calibration occurred. (Viking, 2012 Public Meeting Transcript, No. 38 at pp. 120–121) BSH stated that it provides a minimum and maximum water consumption, but water use above the maximum is not necessarily indicative of a problem with calibration. (BSH, 2012 Public Meeting Transcript, No. 38 at p. 122) UL stated that it performs one preconditioning cycle because that is the recommendation in ANSI/AHAM DW-1. (UL, 2012 Public Meeting Transcript, No. 38 at p. 123)

DOE has determined that specifying the energy test cycle would provide clarity and the most accurate possible water usage measurement for calculation of detergent dosing. Thus, in appendix C1 established by today's final rule, DOE includes the requirement that the preconditioning cycle be conducted using the same cycle setting as the energy test cycle, as proposed in the May 2012 SNOPR and August 2012 SNOPR. DOE has added further clarification by revising the definition for "preconditioning cycle" to state that it is a normal cycle run with no test load to ensure that the water lines and sump area of the pump are primed. DOE also determines that there would be a slight additional test burden of conducting two preconditioning cycles, but that this increase is warranted by the improvement in test measurements by ensuring sensor calibration and cleaning out the machine and is not unduly burdensome to conduct, as discussed in section III.K. In addition, specifying two preconditioning

cycles would eliminate the need for laboratories to interpret testing data to determine whether sensor calibration occurred successfully after the first preconditioning, thus improving reproducibility of the test procedure. For these reasons, DOE is requiring the use of two preconditioning cycles in the dishwasher test procedure established at appendix C1.

3. Detergent

In the May 2012 SNOPR, DOE proposed determining detergent dosing using the pre-wash and main wash fill volumes during the preconditioning cycle, and outlined the calculations for the proper dosing. Additionally, the proposal updated the type of detergent to the currently-available "Cascade with the Grease Fighting Power of Dawn" powder detergent. 77 FR 31444, 31453 (May 25, 2012). In the August 2012 SNOPR, DOE continued to propose detergent dosing as outlined in the May 2012 SNOPR, with the clarification that the pre-wash and main wash fill volumes be recorded during the second proposed preconditioning cycle. 77 FR 49064, 49066 (Aug. 15, 2012).

AHAM commented that the proposed detergent dosage calculation leaves room for interpretation. (AHAM, 2012 Public Meeting Transcript, No. 38 at p. 93) AHAM, BSH, and Whirlpool commented that the concentration approach for detergent dosing may no longer be representative of actual consumer use because consumers are more likely to use a monodose detergent. AHAM, BSH, and Whirlpool recommended that DOE should base the decision about whether to specify a certain amount of powder detergent or a unitized dose such as a tablet on consumer usage data, and cited an AC Nielson Homescan Panel study which found a trend towards monodose detergents from 2000 to 2011. According to these commenters, the study

showed that dishwasher detergent usage was 14.5 percent monodose, 39 percent gel, and 46.5 percent powder in 2000, which shifted to 53.5 percent monodose, 28.5 percent gel, and 18 percent powder in 2011. AHAM, BSH, and Whirlpool stated that a fixed detergent dose in the dishwasher test procedure would be more representative of consumer usage, less burdensome, and more accurate than the powder detergent dosage currently required, which can vary from test to test due to its complexity. AHAM and Whirlpool further commented that DOE may also consider consumer use of monodose tablets including rinse aid. (AHAM, No. 27 at pp. 10–11; BSH, No. 28 at pp. 7–8; Whirlpool, 2012 Public Meeting Transcript, No. 38 at pp. 94, 96–97; Whirlpool, No. 26 at p. 1)

AHAM, BSH, and Whirlpool commented that DOE should consider whether the detergent should be a laboratory formulation or a formulation available on the market. (AHAM, No. 27 at p. 10; BSH, No. 28 at pp. 7–8; Whirlpool, No. 26 at p. 1) BSH proposed that DOE consider an IEC test detergent to eliminate variation due to manufacturing tolerances and formulation changes. (BSH, No. 28 at p. 8) In the interim, however, without a consumer use study, AHAM, BSH, and Whirlpool support DOE's proposal to update the detergent requirement to the "Cascade with the Grease Fighting Power of Dawn" formulation powder detergent. AHAM and BSH commented, though, that DOE would need to consider how a phosphate-free detergent would affect energy and water use results. (AHAM, No. 27 at p. 10; AHAM, 2012 Public Meeting Transcript, No. 38 at pp. 93–94; BSH, No. 28 at p. 8; Whirlpool, No. 26 at p. 1)

BSH noted that detergent dosing based on the preconditioning cycle with a clean load may not reflect the amount of water that would be used during a test cycle with a soiled load, and

that the food load and soil sensors will affect each other. BSH also commented that the detergent can influence the sensor decision. (BSH, 2012 Public Meeting Transcript, No. 38 at pp. 94–96, 99)

DOE has determined to adopt the concentration specification for "Cascade with the Grease Fighting Power of Dawn" rather than the other detergent dosing methods. A monodose detergent would result in the same amount of detergent being dispensed for every dishwasher, regardless of water consumption. This may skew test results for dishwashers with either high or low water consumption due to the changes in detergent concentration that could impact how easily soils are removed from the test load. A concentration-based detergent dosing ensures that the detergent concentration is similar from unit-to-unit.

Additionally, DOE does not have any information indicating that this phosphate-free detergent would have any impact on energy and water use results. DOE notes that the detergent specified in ANSI/AHAM DW-1-1992 has been unavailable for a number of years. DOE understands that manufacturers and third-party test laboratories have used "Cascade with the Grease Fighting Power of Dawn" in its absence, with no apparent impact in the resulting energy and water consumption results.

DOE acknowledges that the water consumption in the second preconditioning cycle with no soil load may be different from the water consumed during the test cycle. However, running a soiled load with no detergent to determine water consumption may also yield water consumptions different from the test cycle due to the lack of detergent and less-effective removal

of soils from the test load. The method of basing detergent dosing on the preconditioning water consumptions helps to limit test burden for manufacturers and third-party test laboratories. Additionally, the requirement to run the preconditioning cycle on the same setting as the test cycles would likely lead to similar water consumptions for both preconditioning and testing.

Therefore, DOE continues to include the concentration-based detergent calculation using the pre-wash and main wash water consumptions as measured during the second preconditioning cycle, and to update the detergent specification to "Cascade with the Grease Fighting Power of Dawn" for appendix C1 in today's final rule. DOE also amends appendix C to specify the detergent as "Cascade with the Grease Fighting Power of Dawn" because the currently specified detergent is no longer available, thereby making such specification obsolete.

4. Power Supply Requirements

In the May 2012 SNOPR, DOE proposed that power be continuously supplied to the unit during testing, including after the preconditioning cycle and between all test cycles. 77 FR 31444, 31452 (May 25, 2012). The August 2012 SNOPR updated the proposed continuous power supply requirement to also cover the second preconditioning test cycle proposed to ensure sensor calibration. 77 FR 49064, 49066 (Aug. 15, 2012).

AHAM, BSH, and Whirlpool commented that the requirement to maintain the power supply throughout testing would add test burden for manufacturers who know that their soil sensors do not lose calibration with an interruption in the power supply. The commenters suggested DOE add a note to the test procedure that some soil sensors may lose calibration, so

that third-party test laboratories would be aware of this behavior, without including the requirement to maintain the power supply. This would allow manufacturers to avoid unnecessary test burden. (AHAM, No. 27 at p. 7; BSH, No. 28 at p. 5; Whirlpool, No. 26 at p. 1)

DOE understands that maintaining the power supply represents an increase in test burden for manufacturers of units whose soil sensors do not lose calibration. However, given the difficulty in determining whether a soil sensor is calibrated, DOE includes the continuous power supply requirement in appendix C1 to ensure consistent testing by either a manufacturer or a third-party laboratory.

5. Updated Industry Standard

In response to the May 2012 SNOPR, AHAM, BSH, and Whirlpool commented that DOE should incorporate by reference the most recent versions of external test procedures, including ANSI/AHAM DW-1-2009 (or the latest version of DW-1 at the time DOE updates its incorporation by reference). These commenters stated that DOE would need to determine whether this change would result in changes to measured energy (resulting from a change in dishware, for example). AHAM and Whirlpool also noted that there are differences in the food soils specified, although Whirlpool characterized them as "fairly subtle." (AHAM, No. 27 at pp. 12–13; AHAM, 2012 Public Meeting Transcript, No. 38 at pp. 155–156; BSH, No. 28 at p. 10; BSH, 2012 Public Meeting Transcript, No. 38 at p. 156; Whirlpool, No. 26 at pp. 1, 5; Whirlpool, 2012 Public Meeting Transcript, No. 38 at p. 156)

In response to these comments, for the August 2012 SNOPR, DOE proposed to update the industry standard test reference in appendix C from ANSI/AHAM DW-1-1992 to DW-1-2010. 77 FR 49064, 49066 (Aug. 15, 2012).

AHAM, BSH, Samsung, and Whirlpool support the proposal to update the industry standard reference to ANSI/AHAM DW-1-2010, but noted they do not currently have data on the effect on energy use of changing to the updated version of the standard. These commenters stated that DOE must determine whether there would be changes to the measured energy use. (AHAM, No. 35 at pp. 7–8; BSH, No. 36 at p. 3, Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1)

The DOE dishwasher test procedure references certain sections of ANSI/AHAM DW-1 related to soil preparation and application. Differences in other provisions such as the dishware specifications would not impact the measurement of energy and water use under the DOE test. When DOE compared the relevant sections of 1992 and 2010 versions of the standard, it identified the following differences:

(1) The brand and product description for the coffee and preserves;

(2) The preparation method for the eggs and cream corn;

(3) The amount of reconstituted milk used in the potato mixture;

(4) The grinding specifications for the ground beef; and

(5) The order of soil application.

DOE has not been presented with any data or information that would show that these differences would impact the results from the DOE dishwasher test procedure for specific dishwasher models. DOE also notes the uniform support from commenters to reference the most recent version of industry standards in its test procedures and observes that some test laboratories are already conducting dishwasher testing according to ANSI/AHAM DW-1-2010. Further, these amendments will not be required until the compliance date of new standards, which will be May 30, 2013, unless the direct final rule is withdrawn. If manufacturers determine that the new DOE test procedure does not measure energy and water use that is representative for their products, they may submit to DOE a petition for waiver from the DOE test procedure to determine an appropriate method. For the reasons discussed above, DOE has decided to update the reference in its dishwasher test procedure at appendix C1 to ANSI/AHAM DW-1-2010 in today's final rule.

6. Water Pressure

As noted in the August 2012 SNOPR, DOE received comments in response to the May 2012 SNOPR regarding transient water pressure drop when the water supply valve first opens. AHAM, BSH, and Whirlpool commented that laboratories interpret differently how and where the water pressure is measured and controlled. These commenters recommended that, for repeatability and reproducibility, DOE should specify that the water pressure drops to the required 35 pounds per square inch gauge (psig) ± 2.5 psig in no more than 2 seconds after the valve opens. According to AHAM, its members and independent laboratories indicated that this is the minimum length of time that they are capable of achieving. (AHAM, No. 27 at p. 12; AHAM, 2012 Public Meeting Transcript, No. 38 at p. 137; BSH, No. 28 at p. 9; BSH, 2012

Public Meeting Transcript, No. 38 at p. 158; Whirlpool, No. 26 at p. 1) Samsung noted that the time for the transient pressure drop should be minimized so that it does not affect a water fill, since the fill time can be approximately 1 minute. (Samsung, 2012 Public Meeting Transcript, No. 38 at pp. 139–140) According to Whirlpool, the height at which the pressure measurement is made affects the measurement, although not significantly. (Whirlpool, 2012 Public Meeting Transcript, No. 38 at p. 137)

In the August 2012 SNOPR, DOE acknowledged that transient pressure variations should be minimized for reasons of test stability and reproducibility, and, based on commenters' indication of laboratory capabilities, proposed that the specified pressure be achieved within 2 seconds. 77 FR 49064, 49066 (Aug. 15, 2012). AHAM, BSH, Samsung, and Whirlpool supported this proposal, reiterating that the duration of the pressure drop should be limited to ensure that water is flowing into the dishwasher at the proper pressure and that AHAM's members indicated that 2 seconds is the minimum length of time their laboratories can achieve. (AHAM, No. 35 at p. 8; BSH, No. 36 at p. 3, Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1)

In consideration of these comments and for the reasons already noted, DOE adopts in today's final rule the requirement in the new dishwasher test procedure that the water pressure shall be achieved within 2 seconds of opening the water supply valve. DOE is not requiring the pressure to be measured at a particular location because DOE did not receive sufficient information regarding a representative position or the impact of pressure measurement position on the energy and water use results.

7. Water Hardness

DOE received comments in response to the May 2012 SNOPR and the August 2012 SNOPR that DOE should add a water hardness specification to the dishwasher test procedure. AHAM, BSH, Samsung and Whirlpool commented that DOE should reference the water hardness specification in ANSI/AHAM DW-1-2010 of 0 to 5 grains, or 0 to 85 ppm, to reduce test variation. (AHAM, No. 27 at p. 11; AHAM, No. 35 at p. 10; BSH, No. 28 at p. 9; Samsung, No. 33 at p. 1; Whirlpool, No. 26 at pp. 1, 5) AHAM and Whirlpool further clarified that the American Water Works Association found this to be the normal range occurring in municipal water supplies, and Whirlpool stated that the water hardness specification was intended to reduce lab-to-lab test variation. (AHAM, No. 27 at p. 11; Whirlpool, No. 26 at p. 1; Whirlpool, 2012 Public Meeting Transcript, No. 38 at pp. 148–150) Whirlpool later changed its recommendation for a water hardness requirement to a range of 0 to 2 grains, or 0 to 34 ppm, based on total hardness and not just calcium carbonate, to account for magnesium as well. According to Whirlpool, laboratories can control water hardness to this range with water softening systems. (Whirlpool, No. 34 at p. 2) UL commented that varying between soft and hard water could potentially impact test results. (UL, 2012 Public Meeting Transcript, No. 38 at p. 151) AHAM noted that in the process of developing an ENERGY STAR test method for dishwasher cleaning performance, DOE proposed to adopt the water hardness requirement in ANSI/AHAM DW-1-1992. (AHAM, 2012 Public Meeting Transcript, No. 38 at pp. 146–147)

DOE proposed a water hardness requirement as part of the ENERGY STAR test method for evaluating dishwasher cleaning performance because it may have an impact on cleaning performance. However, DOE is not aware of data indicating how variations in water hardness may impact energy and water consumption under the DOE test procedure, and, therefore, is not

adopting a water hardness requirement in the test procedure at this time. DOE may consider this topic in a future rulemaking if such data become available.

8. Drain Height

AHAM noted at the 2012 Public Meeting that the height of the dishwasher drain is not currently specified in the DOE test procedure, and that such a specification should be added to reduce testing variability. AHAM, BSH, and Whirlpool subsequently proposed in their comments on the May 2012 SNOPR that the drain height should be specified per the manufacturer installation instructions. In the absence of such instructions, these commenters recommended a drain height of 20 inches. (AHAM, No. 27 at p. 11; AHAM, 2012 Public Meeting Transcript, No. 38 at p. 141; BSH, No. 28 at pp. 8–9; Whirlpool, No. 26 at p. 1)

In the August 2012 SNOPR, DOE agreed that the use of manufacturer's instructions for drain height, or a standard height in the absence of such information, would improve reproducibility of the test and proposed corresponding amendments to the dishwasher test procedure, including a standard drain height of 20 inches. 77 FR 49064, 49066 (Aug. 15, 2012).

AHAM, BSH, Samsung, and Whirlpool supported the proposed approach to require installation of the dishwasher with a drain height as specified in the manufacturer's instructions, and that in the absence of such instructions, the drain height should be a standard level of 20 inches. (AHAM, No. 35 at p. 8; BSH, No. 36 at p. 3; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1) For reasons of test reproducibility and in the absence of comments objecting to this

approach, DOE includes the drain height requirements in the new dishwasher test procedure in today's final rule according to the proposal in the August 2012 SNOPR.

9. Test Load Specifications and Soiling Requirements, Including Obsolete Dishware and Food Items

In the May 2012 SNOPR, DOE observed that the requirement for soil-sensing dishwashers in the current DOE test procedure to soil a certain number of place settings, while leaving the remaining place settings, serving pieces, and all flatware in the test load unsoiled could be ambiguous because the test procedure does not define which items a "place setting" comprises. Therefore, DOE proposed to amend section 2.7 of appendix C to specify the individual items in a place setting and to identify the serving pieces, as well as to clarify in section 2.6.3 of appendix C that the flatware that is part of a soiled place setting is to remain unsoiled. 77 FR 31444, 31453 (May 25, 2012). DOE maintained this proposal for the August 2012 SNOPR. AHAM, BSH, and Whirlpool commented that the test procedure was already clear in requiring that the flatware is not to be soiled, but did not object to the proposed clarification. (AHAM, No. 27 at pp. 7–8; BSH, No. 28 at p. 6; Whirlpool, No. 26 at p. 1) DOE has therefore included these amendments to section 2.7 and 2.63 of the new dishwasher test procedure at appendix C1 in today's final rule.

In the May 2012 SNOPR, DOE also identified a number of test items, including the cup and saucer, salad fork, serving fork, and serving spoon, which are no longer available, thereby making such specifications obsolete. DOE noted that AHAM had submitted information providing alternative specifications for all flatware and serving pieces, which DOE proposed as

amendments to the test load specifications in section 2.7 of appendix C. DOE also sought comment on alternative specifications for other obsolete test items, such as the cup and saucer.

AHAM, BSH, and Whirlpool noted the importance to manufacturers and third-party laboratories of identifying replacement test load items swiftly to run the test and certify compliance properly. AHAM and BSH supported DOE's proposal for replacements to obsolete flatware and serving pieces. AHAM and BSH noted, however, that although the cup and saucer are obsolete, alternatives may be available from the same source but with a new item number. These commenters also suggested that the bread and butter plate and fruit bowl may become obsolete. (AHAM, No. 27 at pp. 7–8; BSH, No. 28 at pp. 5–6; Whirlpool, No. 26 at pp. 1, 5)

In addition to comments on the obsolete test load items, DOE received comments on obsolete food items for the soil requirements. AHAM, BSH, and Whirlpool stated that the margarine specified in the current dishwasher test procedure was no longer available, and proposed a replacement brand and product formulation even though it is not possible to determine if the replacement margarine would impact measured energy use. (AHAM, No. 27 at p. 8; AHAM, 2012 Public Meeting Transcript, No. 38 at pp. 101–102; BSH, No. 28 at p. 6; BSH, 2012 Public Meeting Transcript, No. 38 at pp. 102–103; Whirlpool, No. 26 at p. 1; Whirlpool, 2012 Public Meeting Transcript, No. 38 at pp. 103, 129)

For the August 2012 SNOPR, DOE considered these comments, and based on these and additional research, proposed the items shown below in Table 1 as replacements for obsolete or nearly obsolete items. 77 FR 49064, 49065 (Aug. 15, 2012).

Table 1 Proposed Specifications for Replacing Obsolete or Nearly Obsolete Items

Item	Obsolete or Potentially Obsolete Item	Proposed Item
Cup	8 oz. Ceramic Cup; Corning Comcor®/Corelle® 6014162; alternatively, Arzberg 3824732100	0.20 liter Coffee Cup; Arzberg 2000-00001-4732-1; alternatively, Arzberg 3824732100
Saucer	6 inch Saucer; Corning Comcor®/Corelle® 6010972; alternatively, Arzberg 3824731100	14 cm Saucer; Arzberg 2000-00001-4731-1; alternatively, Arzberg 3824731100
Bread and butter plate	6.75 inch Bread and Butter; Corning Comcor®/Corelle® 6003887; alternatively, Arzberg 8500217100	6.75 inch Bread and Butter; Corning Comcor®/Corelle® 6003887; alternatively, 17 cm Bread and Butter; Arzberg 2000-00001-0217-1
Fruit bowl	10 oz. Dessert Bowl; Corning Comcor®/Corelle® 6003899; alternatively, Arzberg 3820513100	10 oz. Dessert Bowl; Corning Comcor®/Corelle® 6003899; alternatively, Arzberg 38205131001 or Arzberg 2000-00001-0615-1;
Knife	Oneida® Accent 2619KPVF	Table Knife, WMF "Gastro 0800" 12.0803.6047
Dinner Fork	Oneida® Accent 2619FRSF	Dessert Fork, WMF "Signum 1900" 12.1905.6040
Salad Fork	Oneida® Accent 2619FSLF	Cake Fork, WMF "Signum 1900" 12.1964.6040
Teaspoon	Oneida® Accent 2619STSF	Coffee/Tea Spoon", WMF "Signum 1900" 12.1910.6040
Margarine	Fleischmann's corn oil (6 g of fat per 14 g serving) not whipped	Fleischmann's Original stick margarine
Coffee	Folgers, Decaffeinated Drip Grind	Folgers Classic Decaf

AHAM, BSH, Samsung, and Whirlpool support the proposed replacement items for the flatware, serving pieces, and food items, including the margarine and coffee. (AHAM, No. 35 at pp. 2–3; BSH, No. 36 at p. 2; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1) Therefore, DOE adopts these replacement flatware, serving pieces, and food items in the amendments to

appendix C procedure in today's final rule. DOE also includes these replacement items in the new dishwasher test procedure at appendix C1.

For the dishware replacements, AHAM, BSH, Samsung, and Whirlpool noted that, although the primary cups and saucers specified in the test procedure are obsolete, the alternate Arzberg items specified are still available, albeit with new product numbers. The alternate cup, Arzberg product number 3824732100, currently specified in the dishwasher test procedure is now designated as product number 1382 00001 4732. The alternate saucer, Arzberg product number 3824731100, currently specified in the dishwasher test procedure is now designated as product number 1382 00001 4731. Because the shapes of DOE's proposed replacement cup and saucer are different than for the existing alternate Arzberg cup saucer and it is not known how these differences could affect the test results, these commenters recommend not adopting DOE's proposal for the cup and saucer. Instead, they suggest that DOE designate the current alternate Arzberg cup saucer, identified by their new product numbers, as the primary items and not specify alternates. AHAM, BSH, Samsung, and Whirlpool further commented that DOE's proposed replacement cup and saucer could potentially be acceptable alternates, but manufacturers would first need to assess the impacts of such variables as the weight of the items and the ability of various rack designs to accommodate them. These commenters stated that it would be ideal for at least one option for the cup and saucer to be sourced from within the United States in order to minimize burden. (AHAM, No. 35 at pp. 3–4; BSH, No. 36 at p. 2; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1)

DOE has ascertained that the alternate cup and saucer currently specified in the DOE test procedure are available for purchase at this time under the different item numbers identified by commenters. Therefore, for consistency in the dishwasher test results, DOE amends the dishwasher test procedure in today's final rule to specify the current alternate Arzberg cup and saucer by their new product numbers as the alternate test load items. DOE reconsidered its proposal to eliminate the specifications for the obsolete Corning Comcor/Corelle cup and saucer, and instead retains these as the primary test load items so that manufacturers and testing laboratories may continue to use items they may already possess. DOE also includes these replacement item specifications in the new dishwasher test procedure at appendix C1. If DOE receives additional information regarding dishwasher energy and water consumption using the Arzberg replacement cup and saucer proposed in the August 2012 SNOPR, or other alternatives suggested by interested parties, DOE may consider updating the test procedure at that time so that additional options for the cup and saucer are available to manufacturers and testing laboratories.

For the bread and butter plate, AHAM, BSH, Samsung, and Whirlpool agreed that the existing Corning Comcor/Corelle test item be retained. In addition, these commenters agreed with the proposed Arzberg replacement item, product number 2000 00001 0217 1, as an alternate item, but noted that it may actually be the redesignated product number for the existing Arzberg alternate bread and butter plate, product number 8500217100. These commenters recommend that DOE list both product numbers as alternates in the dishwasher test procedure so that testing can continue until it is verified whether the products are the same. (AHAM, No. 35 at p. 5; BSH, No. 36 at p. 2; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1)

DOE agrees with that the approach will minimize impact on manufacturers and testing laboratories, and adopts in today's final rule specifications for the two Arzberg bread and butter plate product numbers as allowable alternate test load items in appendix C and appendix C1.

For the fruit bowl, AHAM, BSH, Samsung, and Whirlpool agreed with DOE's proposal to retain the existing primary Corning Comcor/Corelle specification but objected to DOE's proposed Arzberg additional alternate specification. The commenters stated that the additional replacement fruit bowl is significantly larger than the existing fruit bowl, so there could be an impact on measured energy use due to the weight difference and ability for the bowl to fit into racks. However, the commenters did not provide a suggestion for a recommended replacement for the alternate fruit bowl. (AHAM, No. 35 at p. 5; BSH, No. 36 at p. 2; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1)

DOE acknowledges that the impact of a fruit bowl that is larger than the item currently specified in the dishwasher test procedure is not known. Therefore, for consistency in the dishwasher test results, DOE does not adopt the proposed Arzberg replacement fruit bowl as an additional alternate test load item in today's final rule. DOE also reconsidered its proposal to eliminate the specifications for the obsolete Arzberg fruit bowl currently specified as the alternate item, and instead retains this product as an alternate test load item in both appendix C and appendix C1 so that manufacturers and testing laboratories may continue to use items they may already possess. If DOE receives additional information regarding dishwasher energy and water consumption while using the Arzberg replacement fruit bowl proposed in the August 2012

SNOPR, or another alternative suggested by interested parties, DOE may consider updating the test procedure at that time so that additional options for the fruit bowl are available to manufacturers and testing laboratories.

In response to the May 2012 SNOPR, DOE also received comments that DOE should clarify in the dishwasher test procedure the length of time that soils may sit or be stored before they are applied to the dishware. AHAM, BSH, and Whirlpool stated that potatoes will get stiffer the longer they sit, and proposed that prepared potatoes should be used within 30 minutes of preparation. AHAM and Whirlpool also noted that oatmeal settles and thus proposed that it should be prepared and applied as specified in both ANSI/AHAM DW-1-1992 and ANSI/AHAM DW-1-2010; i.e., the oatmeal should stand for 1 minute after preparation and then be used immediately. Whirlpool noted that the length of time that the prepared oatmeal sits could cause variability in the test procedure. AHAM, BSH, and Whirlpool additionally recommended that the reconstituted milk should be allowed to be stored for use over the course of a day, and that the prepared one-pound packages of beef be allowed to be stored in a freezer for up to 6 months to minimize variability in the test procedure. (AHAM, No. 27 at pp. 8–9; BSH, No. 28 at p. 6; Whirlpool, No. 26 at p. 1; Whirlpool, 2012 Public Meeting Transcript, No. 38 at p. 128)

In the August 2012 SNOPR, DOE proposed to amend the dishwasher test procedure to require the potatoes to be used within 30 minutes of preparation and the reconstituted milk be allowed to be stored for use over the course of 1 day, as recommended by commenters. DOE's proposal also included provisions for reconstituting the milk. DOE additionally proposed to adopt the commenters' recommendation that the 1-pound packages of ground beef shall be

stored frozen for no more than 6 months. DOE determined that the instructions contained within the referenced sections of both versions of ANSI/AHAM DW-1 pertaining to soil preparation and application, which are or were proposed to be referenced in appendix C, are sufficiently clear in requiring the prepared oatmeal to sit no longer than 1 minute before using. Therefore, DOE did not propose any clarifications in the August 2012 SNOPR for the oatmeal preparation. 77 FR 49064, 49067 (Aug. 15, 2012).

AHAM, BSH, Samsung, and Whirlpool support DOE's proposed clarifications to the soil preparation and storage requirements for potatoes, reconstituted milk, and ground beef, even though these commenters added that manufacturer's instructions for reconstituting the milk could change. The commenters also reiterated their recommendation that the dishwasher test procedure specifically require that the oatmeal be prepared and used consistent with ANSI/AHAM DW-1-1992 and 2009. (AHAM, No. 35 at p. 9; BSH, No. 36 at p. 3; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1) Viking commented that it was aware of outside laboratories that do not put water into the milk formulation directly and measure dry milk into the oatmeal mixture. (Viking, 2012 Public Meeting Transcript, No. 38 at p. 133)

For the reasons stated above, and consideration of comments expressing support, DOE is revising the soil preparation and storage provisions for potatoes, reconstituted milk, and ground beef for the new dishwasher test procedure in today's final rule as proposed in the August 2012 SNOPR. DOE also clarifies in appendix C1 that the nonfat dry milk shall be reconstituted with water before mixing with the oatmeal and potatoes. DOE notes that the referenced section 5.5 of ANSI/AHAM DW-1-2010 pertaining to soil preparation explicitly requires that the oatmeal

mixture be allowed to stand for 1 minute after mixing, then used immediately. Thus the instructions the commenters seek regarding the use of the oatmeal mixture are incorporated by reference in today's new dishwasher test procedure without requiring additional clarification.

AHAM commented that there have been some questions about the use of a brush versus a spatula for soiling the dishes because ANSI/AHAM DW-1-1992 references utensils, but does not provide specific details beyond the order of the soil application. (AHAM, 2012 Public Meeting Transcript, No. 38 at p. 127) In today's final rule, DOE updates the industry test method in appendix C1 from the previous ANSI/AHAM DW-1-1992 to ANSI/AHAM DW-1-2010. DOE notes that the newer version of this standard includes clarification as to which soils should be spread with a spatula or brush.

BSH and Whirlpool commented that DOE should harmonize these changes with the Canadian test method because Canada may have different interpretations than DOE. (BSH, 2012 Public Meeting Transcript, No. 38 at p. 107; Whirlpool, 2012 Public Meeting Transcript, No. 38 at p. 107)

DOE is aware of the Canadian test procedure, which is similar to the DOE test procedure in appendix C. To DOE's knowledge, the proposed substitutions and soiling times represent an industry consensus on these issues, and therefore are appropriate additions to the DOE test procedure regardless of the Canadian interpretation. Additionally, the substitute materials available in the United States may differ from those available in Canada. As a result, DOE has included the proposed substitutions and soiling times in today's amendments.

10. Rack Position and Loading

DOE received comments in response to the May 2012 SNOPR which indicated that the rack position and loading pattern for the test load should be specified in the dishwasher test procedure. AHAM, BSH, and Whirlpool stated that the position of the upper rack can affect water pressure during a test, which BSH and Whirlpool felt could influence the rate at which food soils fall off the test load and the turbidity sensor decisions. AHAM, BSH, and Whirlpool recommended that for the energy test, the upper rack should be in the position recommended by the manufacturer, or, in the absence of such a recommendation, in the as-shipped position to reduce potential test variation. (AHAM, No. 27 at p. 11; AHAM, 2012 Public Meeting Transcript; No. 38 at pp. 141–142; BSH, No. 28 at p. 9; BSH, 2012 Public Meeting Transcript; No. 38 at pp. 143–144; Whirlpool, No. 26 at p. 1; Whirlpool, 2012 Public Meeting Transcript, No. 38 at p. 145) Intertek stated that it tests dishwashers with the rack in the as-shipped position, while UL commented that it tests according to the manufacturer instructions. (Intertek, 2012 Public Meeting Transcript, No. 38 at p. 146; UL, 2012 Public Meeting Transcript, No. 38 at p. 151) According to BSH, rack position varies from product-to-product. Different platforms may have the same as-shipped position for the racks, yet have different manufacturer recommendations in the user manuals. (BSH, 2012 Public Meeting Transcript, No. 38 at p. 144) Furthermore, AHAM stated that the as-shipped position of the rack for a particular model may not always be the same. (AHAM, 2012 Public Meeting Transcript, No. 38 at p. 143)

AHAM, BSH, and Whirlpool commented that it is difficult to standardize loading patterns due to varying rack designs. These commenters stated DOE should require a loading

pattern according to the manufacturer's recommendation. The commenters further stated that the unsoiled dishes should be loaded first to settle the loading arrangement, and then the appropriate number of unsoiled dishes should be replaced with soiled ones in an alternating pattern, avoiding placing all soiled dishes in one grouped area or in the corners of the racks. AHAM, BSH, and Whirlpool pointed out that this method is similar to what DOE proposed in its first draft performance test procedure for ENERGY STAR. (AHAM, No. 27 at p. 9; BSH, No. 28 at p. 7; Whirlpool, No. 26 at p. 1)

In the August 2012 SNOPR, DOE proposed amendments to the dishwasher test procedure that would require adjusting the rack position according to the manufacturer recommendations and loading the soiled dishes according to section 5.8 of ANSI/AHAM DW-1-2010, which specifies loading the dishware in accordance with manufacturer's recommendation, following the loading pattern provided in the manufacturer's use and care guide, without nesting the dishware or flatware. DOE concluded that these proposed amendments would improve test repeatability and reproducibility. 77 FR 49064, 49066–67 (Aug. 15, 2012).

AHAM, BSH, Samsung, and Whirlpool supported the requirement that the rack be positioned according to manufacturer recommendations for washing a full load of normally soiled dishes. But they further recommended that DOE specify that, in the absence of a manufacturer recommendation regarding rack position for the normal cycle, the rack shall be positioned in the as-shipped position. (AHAM, No. 35 at p. 8; BSH, No. 36 at p. 3; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1) DOE notes that, although AHAM had also indicated in response to the May 2012 SNOPR that the as-shipped position may vary for a particular model,

it is likely that in such instances, manufacturers would provide instructions as to the appropriate rack placement during operation. Furthermore, it is likely that a dishwasher that does not provide instructions regarding rack position would be shipped with the rack in a position suitable for washing a full load of normally soiled dishes. Therefore, to provide clarity to testing laboratories regarding rack position for both situations, DOE adopts in today's final rule for appendix C1 the instructions to install the dishwasher with the rack positioned according to manufacturer instructions for washing a full load of normally soiled dishes, and that in the absence of such instructions, the rack shall be maintained in the as-shipped position.

AHAM, BSH, Samsung, and Whirlpool reiterated that dish loading is a potential source for variation, and that it is difficult to achieve standardization of loading patterns because rack designs vary. The commenters also noted that DOE did not propose specifications for how the soiled items are to be distributed when loaded (i.e., all positioned together or alternating with the unsoiled items.) Thus, AHAM, BSH, Samsung, and Whirlpool recommend a loading pattern according to the manufacturer's recommended loading pattern, with addition specification that the unsoiled dishes be loaded first to settle the loading arrangement, and then the appropriate number of unsoiled dishes be replaced with soiled ones with soiled and unsoiled dishes alternating. The commenters would further recommend that testers should avoid placing all soiled dishes in one grouped area or in the corners of the racks. AHAM, BSH, Samsung, and Whirlpool again noted these instructions would be similar to those proposed in the first draft ENERGY STAR test method for dishwasher performance, and they encouraged DOE to harmonize the loading requirements in appendix C and the future ENERGY STAR test method.

(AHAM, No. 35 at p. 10; BSH, No. 36 at p. 3; Samsung, No. 33 at p. 1; Whirlpool, No. 31 at p. 1)

DOE is not aware of, nor did commenters provide, data indicating whether the loading arrangement of dishes may impact the measured energy and water consumption of a particular dishwasher, but notes that the loading requirements proposed in the August 2012 SNOPR, which reference section 5.8 of ANSI/AHAM DW-1-2010 and accordingly its requirement to follow the manufacturer's instructions, do not generally preclude testing using an alternating loading pattern of soiled and clean dishware. However, some manufacturer's instructions could conflict with specific requirements for the location of the soiled items. For example, the manufacturer may recommend that the most heavily soiled items be placed in a certain location on the rack, which would conflict with the instructions to alternate soiled and clean items. For these reasons, DOE is not adding in today's final rule any additional loading instructions in the dishwasher test procedure beyond those specified in section 5.8 of ANSI/AHAM DW-1-2010.

11. Rinse Aid Container

The dishwasher test procedure precludes the use of rinse aid during testing, including preconditioning. However, AHAM, BSH, and Whirlpool commented in response to the May 2012 SNOPR that some third-party laboratories fill the rinse aid container before the starting the energy test cycle, presumably to prevent an indicator light from turning on during the test. These commenters believe that DOE should clarify that the rinse aid container should not be filled with water. According to BSH, the added water creates a thermal mass that must be heated when the dishwasher is operated, which would result in higher energy use. AHAM, BSH, and Whirlpool

stated that if the indicator light does turn on, its energy use should be measured. (AHAM, No. 27 at p. 11; AHAM, 2012 Public Meeting Transcript, No. 38 at pp. 135–136; BSH, No. 28 at p. 8; BSH, 2012 Public Meeting Transcript, No. 38 at p. 136; Whirlpool, No. 26 at p. 1)

DOE agreed with commenters, and for reasons of consistency in testing, proposed in the August 2012 SNOPR amendments to the dishwasher test procedure that would clarify that the rinse aid container should not be filled with water for energy testing. 77 FR 49064, 49067 (Aug. 15, 2012). AHAM, BSH, Samsung, and Whirlpool agreed with this proposal. (AHAM, No. 35 at p. 8; BSH, No. 36 at p. 3; Samsung, No. 33 at p. 1; Whirlpool, No. 32 at p. 1) DOE adopts in today's final rule this provision for the new dishwasher test procedure to ensure reproducibility of results.

12. Technical Corrections

In the May 2012 SNOPR, DOE noted that in sections 5.4.1 and 5.4.2 of the current dishwasher test procedure, water energy consumption is calculated as specified for both non-soil-sensing and soil-sensing dishwashers using electrically heated water "[f]or the normal and truncated normal test cycle." Because the normal and truncated normal test cycles do not apply to soil-sensing dishwashers, DOE proposed to remove this qualification in newly designated sections 5.5.1.1 and 5.5.2.1. Similarly, in sections 5.5.1 and 5.5.2 of the current dishwasher test procedure, water energy consumption is calculated as specified for both non-soil-sensing and soil-sensing dishwashers using gas-heated or oil-heated water "[f]or each test cycle." Because for soil-sensing dishwashers the calculation is applied to a single weighted-average water consumption measured over the sensor heavy response, sensor medium response, and sensor

light response cycles, this qualification may cause confusion. Therefore, DOE proposed to remove this qualification in newly designated sections 5.6.1.1 and 5.6.2.1. DOE also proposed to correct references to the water consumption values used in the calculation of water energy consumption in these sections of the dishwasher test procedure, so that separate references are provided for non-soil-sensing and soil-sensing dishwashers. 77 FR 31444, 31454 (May 25, 2012).

In addition, DOE stated in the May 2012 SNOPR that, due to a transcription error in publication, the September 2011 SNOPR erroneously specified in the regulatory text for the proposed dishwasher test procedure amendments the calculation of estimated annual operating cost for dishwashers having a truncated normal cycle which operate at 50 °F inlet water temperature. Specifically, the calculation proposed in 10 CFR 430.23(c)(1)(i)(B) contained extraneous variables "B" and "V." DOE proposed, therefore, in the May 2012 SNOPR to remove these extraneous variables to correct the calculation. 77 FR 31444, 31455 (May 25, 2012).DOE maintained these proposals in the August 2012 SNOPR.

AHAM, BSH, and Whirlpool commented that they did not oppose these two technical corrections to the dishwasher test procedure. (AHAM, No. 27 at p. 13; BSH, No. 28 at p. 10; Whirlpool, No. 26 at p. 1) For the reasons explained above, DOE adopts in today's final rule the corrections to water energy consumption provisions in both the new and currently applicable dishwasher test procedures. DOE also adopts the corrected calculation described above in its amendments to 10 CFR 430.23(c).

Whirlpool commented that DOE should revise its proposal in the May 2012 SNOPR for section 4.1.2 in the dishwasher test procedure to specify that V_{WSavg} is defined as the average of $V_{WS,1}$ and $V_{WS,2}$. (Whirlpool, No. 26 at p. 1) These variables represent the water consumption measured during test cycles performed to determine the water use associated with water softener regeneration. In the initial portion of the test, two test cycles are run, and the water consumption measured for each ($V_{WS,1}$ and $V_{WS,2}$) are compared. If the difference in water consumption between the two cycles is greater than 10 percent, the cycle in which the larger water use occurred is deemed to contain a water softener regeneration event. The water consumption associated with a cycle containing a water softener regeneration event (V_{WSmax}) is, under these conditions, the larger of $V_{WS,1}$ and $V_{WS,2}$. The smaller of $V_{WS,1}$ and $V_{WS,2}$ would be deemed to represent a typical non-water softener regeneration cycle, denoted by V_{WSavg}. DOE proposed this terminology because, if a water softener regeneration event doesn't occur in the first two test cycles, additional cycles are run, with the water consumption for each new cycle being compared to the average of water consumptions for the previous cycles. Averaging the water consumptions for the non-water softener regeneration cycles would decrease variation in the test procedure results. Because V_{WSavg} represents a typical non-water softener regeneration cycle, not a numerical average of $V_{WS,1}$ and $V_{WS,2}$, DOE did not alter its proposal for the August 2012 SNOPR as Whirlpool suggested, nor is it adopting such a revision to the provisions in the new dishwasher test procedure established in today's final rule because the water consumption for water softener regeneration shall be a value reported by the manufacturer.

In the May 2012 SNOPR, DOE inadvertently proposed in section 4.4.2 of the dishwasher test procedure language that refers to section 1.11 of the test procedure. DOE corrected that

proposal in the August 2012 SNOPR to properly refer to section 1.13. DOE includes section 4.2.2 of appendix C1 in today's final rule according to the August 2012 SNOPR.

I. Incorporation by Reference of an Updated AHAM Dehumidifier Test Procedure

In the May 2012 SNOPR, DOE proposed updating the dehumidifier test procedure to clarify which version of the AHAM test method "Dehumidifiers" (DH-1) should be used for testing. DOE evaluated both DH-1-1992 and DH-1-2008, and concluded that both versions would produce comparable results for the DOE dehumidifier test procedure. However, DOE proposed referencing the newer version, DH-1-2008, for both the capacity and EF measurements because it provides additional clarity and specificity that may improve test accuracy, repeatability, and reproducibility. DOE also proposed removing the reference to the ENERGY STAR qualification criteria for determining EF, given that the EF methodology is included in DH-1-2008. 77 FR 31444, 31453–54 (May 25, 2012). DOE maintained this proposal for the August 2012 SNOPR.

AHAM, BSH, and Whirlpool support DOE's proposal to incorporate by reference ANSI/AHAM DH-1-2008 for the measurement of capacity and EF, and the calculation of IEF, in its dehumidifier test procedure. The commenters stated that clarity and consistency for regulated parties is critical so that all regulated and other parties (e.g., third-party laboratories, DOE, EPA) are testing per the same test procedure; therefore, they believe it is important that DOE clarify which version of DH-1 it intends to reference in its test procedure. AHAM, BSH, and Whirlpool commented that, to their knowledge, there is no difference in the measured energy between versions of DH-1, but each version contains important technical improvements and clarifications,

making the most current version of the standard the best one to reference. (AHAM, No. 27 at p. 13; BSH, No. 28 at p. 10; Whirlpool, No. 26 at p. 1)

In consideration of this support and for the reasons previously stated, DOE incorporates by reference ANSI/AHAM DH-1-2008 in appendix X1 as the test method for determining capacity and EF. DOE also does not include in appendix X1 the previous reference to the ENERGY STAR qualification criteria for determining EF.

J. Removal of Obsolete Measures of Gas Pilot Light Energy Consumption in the Conventional Cooking Products Test Procedure and of Energy Factor Calculations for Dishwashers

The energy conservation standards for cooking products require that gas cooking products manufactured on or after April 9, 2012, shall not be equipped with a constant-burning pilot light. 10 CFR 430.32(j). In the May 2012 SNOPR, DOE proposed removing the provisions for measuring the energy consumption of constant-burning pilot lights from the conventional cooking products test procedures. 77 FR 31444, 31455 (May 25, 2012).

AHAM, BSH, and Whirlpool support removing the constant-burning pilot light provisions from the conventional cooking products test procedures. (AHAM, No. 27 at p. 13; BSH, No. 28 at p. 11; Whirlpool, No. 26 at pp. 1, 5) Given this support and the obsolescence of constant-burning pilot lights, today's amendments remove the standing pilot light provisions from the test procedures for conventional cooking products. Specifically, today's final rule removes the following existing sections in 10 CFR part 430, subpart B, appendix I:

- Section 2.9.2.2 ("Flow meter");

- Section 3.1.1.2 (“Continuously burning pilot lights of a conventional gas oven”);
- Section 3.1.2.1 (“Continuously burning pilot lights of a conventional gas cooking top”);
- Section 3.2.1.3 (“Gas consumption of continuously burning pilot lights” [for conventional gas ovens]);
- Section 3.2.2.1 (“Gas consumption of continuously burning pilot lights” [for conventional gas cooking tops]);
- Section 3.3.7 (recording the gas flow rate or gas consumption and elapsed time for a continuously burning pilot light of a conventional gas oven);
- Section 3.3.10 (recording the gas flow rate or gas consumption and elapsed time for a continuously burning pilot light of a conventional gas cooking top);
- Section 4.1.2.2 (“Annual energy consumption of any continuously burning pilot lights” [for conventional gas ovens]); and
- Section 4.2.2.2.2 (“Annual energy consumption of any continuously burning gas pilots” [for conventional gas cooking tops]).

Today’s final rule also modifies (and renumbers where appropriate) the following existing sections in appendix I to eliminate the measures of energy use relating to gas pilot lights:

- Section 1.7 (“Normal nonoperating temperature”);
- Section 1.14 (“Symbol usage”);
- Section 2.9.2.1 (“Positive displacement meters”);
- Section 3.1.1 “Conventional oven”);
- Section 3.1.1.1 (“Self-cleaning operation of a conventional oven”);
- Section 3.1.2 (“Conventional cooking top”);

- Section 4.1.2.5.2 (“Conventional gas oven energy consumption”);
- Section 4.1.2.6.2 (“Conventional gas oven energy consumption” [for multiple conventional gas ovens”]);
- Section 4.2.1.2 (“Gas surface unit cooking efficiency”); and
- Section 4.2.2.2.3 (“Total annual energy consumption of a conventional gas cooking top”).

In the May 2012 SNOPR, DOE also proposed to eliminate the calculation of energy factor for dishwashers in 10 CFR 430.23 because this metric is no longer used in DOE’s energy conservation standards for dishwashers or to make representations of energy efficiency. 77 FR 31444, 31455 (May 25, 2012). DOE did not receive any comments on this proposal, and amends 10 CFR 430.23 in today’s final rule to eliminate the energy factor calculation.

K. Compliance With Other EPCA Requirements

1. Test Burden

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

In the December 2010 NOPR, DOE noted that the proposed amendments to the residential dishwasher, dehumidifier, and conventional cooking products test procedures would incorporate a test standard that is accepted internationally for measuring power consumption in standby mode and off mode (IEC Standard 62301). DOE analyzed the available versions of IEC

Standard 62301 at that time—IEC Standard 62301 (First Edition), IEC Standard 62301 (CDV), and IEC Standard 62301 (FDIS)—and determined that the proposed amendments to the residential dishwashers, dehumidifiers, and conventional cooking products test procedures would produce standby mode and off mode average power consumption measurements representative of an average use cycle. DOE also determined that the test methods and equipment that the amendments would require for measuring standby mode and off mode power in these products would not be substantially different from the test methods and equipment required in the current DOE tests. Thus, DOE tentatively concluded that the proposed test procedure amendments would not require manufacturers to make significant investments in test facilities and new equipment. In sum, DOE tentatively concluded in the December 2010 NOPR 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 procedures would not be unduly burdensome to conduct. 75 FR 75290, 75316 (Dec. 2, 2010).

The September 2011 SNOPR proposed amendments to the DOE test procedures based on an updated version of IEC Standard 62301, IEC Standard 62301 (Second Edition), which has been the subject of significant review and input from interested parties and, thus, continues to be an internationally accepted test standard for measuring standby mode and off mode power consumption. As discussed in the September 2011 SNOPR, the provisions of IEC Standard 62301 (Second Edition) that DOE proposed to incorporate by reference provide a means to measure power consumption with greater accuracy and repeatability than the provisions from IEC Standard 62301 (First Edition) that were originally proposed in the December 2010 NOPR. For this reason, DOE tentatively concluded that the amendments proposed in the September

2011 SNOPR would also provide measurements representative of average consumer use of the product under test. DOE further determined that these new provisions in the applicable sections of IEC Standard 62301 (Second Edition) would improve test results without undue testing burden. DOE acknowledged in the September 2011 SNOPR that certain methods from IEC Standard 62301 (Second Edition) may increase test duration, but where such an increase was deemed excessive (i.e., for products with clocks that can vary in power consumption as a function of time displayed), DOE retained the method previously proposed to mitigate test burden. The potential for increased test burden in other power consumption measurements is offset by more reasonable requirements for testing equipment, while maintaining measurement accuracy deemed acceptable and practical by voting members for IEC Standard 62301 (Second Edition). Thus, DOE tentatively concluded that the amended test procedures proposed in the September 2011 SNOPR would produce test results that measure the standby mode and off mode power consumption during representative use, and that the test procedures would not be unduly burdensome to conduct. 76 FR 58346, 58354 (Sep. 20, 2011).

In the May 2012 SNOPR, DOE proposed to measure energy use in fan-only mode for dishwashers and conventional cooking products as a continuation of the active mode cycle, which would require more stringent specifications for the watt-hour meters than currently specified in the dishwasher and conventional cooking products test procedures. By not requiring a separate cycle to be run, the proposed approach would minimize test burden associated with the measurement of fan-only mode. The May 2012 SNOPR also proposed amendments to incorporate the energy and water use associated with dishwasher water softener regeneration. Manufacturers would need to run up to an additional ten cycles to ensure that a regeneration

process is captured. DOE based this proposal on the information supplied by manufacturers that, on average, water-softening dishwashers regenerate approximately once every six cycles. To minimize test burden, particularly for soil-sensing dishwashers, DOE proposed in the May 2012 SNOPR that these cycles would be run with no test load, since DOE believes that a substantial part of the burden for the existing test procedure is incurred by the preparation and application of soils to the dishware. 77 FR 31444, 31447–51 (May 25, 2012).

The May 2012 SNOPR's proposal to reference AHAM DH-1-2008 in the dehumidifier test procedure would, according to DOE's estimates, require more accurate measurement equipment that would cost approximately $500. DOE also noted in the May 2012 SNOPR that the proposed test room requirements could require the use of a larger test chamber than is specified under the current test procedure, and could also require different air handling equipment. DOE noted that many test laboratories may already be using AHAM DH-1-2008 and, thus, may already meet these requirements. In addition, for those laboratories that are recording data manually, the more frequent data recording events in DOE's proposal could result in three times the data recording events than are currently required. Because only four parameters are recorded for each event, however, DOE estimated in the May 2012 SNOPR that the total increase in operator time would be less than 1 hour. 77 FR 31444, 31453–54 (May 25, 2012).

In the August 2012 SNOPR, DOE noted that the replacement items proposed were intended to be inexpensive, representative of commonly-found items, and in some cases already used by manufacturers in testing dishwashers. In addition, DOE proposed a definition of normal cycle for dishwashers supported by manufacturers because it will lead to consistent,

representative results. The updated industry test method for dishwashers was also supported by manufactures because it will lead to, among other things, reduced test variation, as would the proposals for consistent preparation time for the soils used in the test procedure, the positioning of the dishwasher rack during testing, the method of loading, the tighter tolerances on ambient temperature, the added specifications for water pressure measurement and drain height, and the clarifications for the rinse aid container. Finally, DOE proposed an alternative method of measuring the energy use in fan-only mode for dishwashers and cooking products that could significantly decrease overall testing time. 77 FR 49064, 49065–67 (Aug. 15, 2012).

AHAM, BSH, and Whirlpool estimated the test burden associated with the proposed water softener regeneration test method for the dishwasher test procedure to be 20 to 30 additional test hours. (AHAM, No. 27 at p. 4; BSH, No. 28 at p. 2; Whirlpool, No. 26 at p. 1) DOE considered manufacturer test burden when it evaluated comments on its proposed methodology for measuring energy and water use due to water softener regeneration, and acknowledges that the proposal would add burden by requiring up to an additional 10 dishwasher washing and drying cycles, compared to either one or three washing and drying cycles and one preconditioning cycle currently required in the test procedure. As discussed in section III.F.3, DOE is not adopting the proposed testing methodology in today's final rule due to this burden, Instead, DOE includes in the new dishwasher test procedure measures of energy and water consumption for water softener regeneration using manufacturer-reported values for the energy and water use for each regeneration cycle and the number of annual regeneration cycles.

DOE additionally discusses in section IV.B of this notice comments received regarding the investments that manufacturers may incur due to today's final rule and DOE's determination that they do not represent significant burden. Therefore, for the reasons discussed above, DOE concludes that the new and amended test procedures for dishwashers, dehumidifiers, and conventional cooking products will produce test results that measure the active mode, standby mode, and off mode power consumption during representative use, and that the test procedures will not be unduly burdensome to conduct.

2. Certification Requirements

As codified at 42 U.S.C. 6299, et seq., EPCA authorizes DOE to enforce compliance with the energy and water conservation standards established for covered consumer products. On March 7, 2011, the Department published a final rule in the Federal Register, which revised, consolidated, and streamlined its existing certification, compliance, and enforcement regulations for covered consumer products, including dishwashers, dehumidifiers, and conventional cooking products. 76 FR 12422.[18] The certification regulations are codified at 10 CFR 429.19 (dishwashers), 10 CFR 429.23 (conventional cooking tops, conventional ovens, microwave ovens), and 10 CFR 429.36 (dehumidifiers).

The certification requirements for each of the products covered in today's final rule consist of a sampling plan for selection of units for testing and requirements for certification reports. AHAM commented that no revisions would be required for current standards for dehumidifiers and conventional cooking products, so that no changes are necessary for the reporting requirements for these products. AHAM also supported DOE's proposed changes to

[18] Certification requirements for industrial equipment are also included in these regulations.

the sampling plan for dehumidifiers and conventional cooking products. (AHAM, No. 20 at p. 3) Because the amendments and new provisions adopted for dehumidifiers and conventional cooking products test procedures will not revise the current energy conservation standards, DOE is not proposing any amendments to the certification reporting requirements for these products. However, because DOE in today's final rule introduces a new metric (IEF) for both conventional cooking products and dehumidifiers, DOE additionally amends provisions in the sampling plan at 10 CFR 429.23 and 10 CFR 429.36 that include IEF along with the existing measure of EF.

AHAM stated that the measured energy use for dishwashers will be affected by the amendments to the dishwasher test procedure. For example, cycle finished mode energy use is not currently measured, but will required to be included under the amended test procedure. AHAM commented that DOE should amend the reporting requirements to account for the change. (AHAM, No. 20 at p. 3) No such amendments are adopted for residential dishwashers in today's final rule because DOE is not adding any new energy efficiency metric for these products. DOE is, though, amending in today's final rule the reporting requirements in 10 CFR 429.19 for dishwashers to specify that manufacturers submit with their certification reports: (1) the cycle selected for the energy test; (2) whether the cycle selected for the energy test is soil-sensing; (3) the options selected for the energy test; and (4) whether the dishwasher has a built-in water softening system, and if yes, the energy and water use required for each regeneration of the water softening system, the number of regeneration cycles per year, and data and calculations used to derive these values.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

The Office of Management and Budget has determined that test procedure rulemakings do not constitute "significant regulatory actions" under section 3(f) of Executive Order 12866, Regulatory Planning and Review, 58 FR 51735 (Oct. 4, 1993). Accordingly, this action was not subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) in 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 a regulatory flexibility analysis for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, "Proper Consideration of Small Entities in Agency Rulemaking," 67 FR 53461 (Aug. 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's website: www.gc.doe.gov/gc/office-general-counsel

DOE reviewed today's final rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. DOE has concluded that the rule would not have a significant impact on a substantial number of small entities. The factual basis for this certification is as follows:

The Small Business Administration (SBA) considers a business entity to be small

business, if, together with its affiliates, it employs less than a threshold number of workers specified in 13 CFR part 121. These size standards and codes are established by the North American Industry Classification System (NAICS). The threshold number for NAICS classification code 335228, "Other Major Household Appliance Manufacturing," which applies to residential dishwasher manufacturers, is 500 employees. The threshold number for NAICS classification code 335221, "Household Cooking Appliance Manufacturing," which applies to manufacturers of residential conventional cooking products, is 750 employees. The threshold number for NAICS classification code 335211, "Electric Housewares and Household Fan Manufacturing," which applies to dehumidifier manufacturers, is 750 employees.

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 identified no small businesses that manufacture dishwashers, five small businesses that manufacture dehumidifiers, and two small businesses that manufacture conventional cooking products.

Today's final rule amends DOE's test procedures for dishwashers, dehumidifiers, and cooking products. Because DOE is unaware of any small businesses that manufacture

dishwashers, there are no impacts on such manufacturers due to the amendments to DOE's dishwasher test procedure.

Today's rule amends DOE's test procedures for dehumidifiers and conventional cooking products by incorporating testing provisions to address standby mode and off mode energy use in these products, as well as cooking products fan-only mode energy consumption. The test procedure amendments involve measuring power input when the product is in standby mode or off mode, as well as fan-only mode for a conventional cooking product. These tests can be conducted in the same facilities used for the current energy testing of these products, so there are no additional facilities costs required by this final rule. In addition, while the watt-hour meter required for these tests might require greater accuracy than the watt-hour 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 more stringent meter requirements, but an Internet search of equipment that specifically meets the requirements reveals a cost of approximately $2,000.

Whirlpool stated that the equipment necessary to meet the requirements of IEC Standard 62301 (Second Edition) for measuring airflow and harmonics either does not exist or does not exist in sufficient accuracy or quantity. Whirlpool estimated that the cost to its company of such equipment would be up to $48,000, and that the cost for test equipment upgrades for the harmonics measurement alone would be $10,000. (Whirlpool, No.21 at p. 3; Whirlpool, No. 26 at p. 6) Although Whirlpool's estimates are higher than DOE's, DOE recognizes that a large manufacturer may require multiple meters to equip its testing facilities, and that a small business

would likely require investments in the range of DOE's estimates.

Today's final rule also updates the industry test method for dehumidifiers in new appendix X1. As discussed in III.K.1, this update could impose on manufacturers a cost for new measurement equipment of approximately $500, as well as potentially increasing operator time by less than 1 hour over the course of a 24-hour test.

The costs described above are 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. Based on its review of industry data,[19] DOE estimates that the small dehumidifier and cooking product businesses have annual revenues of $10 million to $60 million.

DOE recognizes that the updated reference to the industry dehumidifier test method could potentially require manufacturers to install a larger test chamber and different air handling equipment. However, some manufacturers may already be using ANSI/AHAM DH-1-2008 in certifying their products. DOE notes that one of the small businesses has products listed in AHAM's current dehumidifier certification database, indicating that those tests were conducted according to DH-1-2008. In addition, AHAM selected an independent test laboratory to conduct dehumidifier testing and verification using DH-1-2008. It is likely that testing that this laboratory performs for manufacturers to determine compliance with energy conservation standards would be conducted in the same facility. Therefore, DOE concludes that small businesses would not be

[19] Annual revenue estimates based on financial reports obtained from Hoover's Inc., available online at www.hoovers.com.

likely to require investments in facility upgrades due to the new dehumidifier test procedure that references DH-1-2008.

Furthermore, DOE adopts in today's final rule amendments that limit the duration of the fan-only mode testing for conventional ovens and conventional ranges to minimize test burden. Under today's final rule, the energy use in fan-only mode is measured for 10 minutes, and then extrapolated over the duration of the fan-mode. DOE estimates that the total time currently required for conventional oven testing (or for testing the conventional oven portion of a range) to be approximately 4 hours for products not equipped with the capability for forced convection or self-cleaning, with an additional 3 hours required for testing forced convection and an additional 4 hours required for testing self-clean operation. DOE's research did not identify any conventional ovens or conventional ranges manufactured by either of the two small cooking products manufacturers that are equipped with either forced convection or self-clean capability. DOE estimates that fan-only mode testing in the absence of such features could increase testing time by approximately 3 percent. However, DOE's research also suggests that none of the conventional ovens and conventional ranges manufactured by the two small cooking products businesses are capable of operation in fan-only mode, and therefore it is unlikely that these manufacturers would be impacted by the fan-only mode testing provisions.

For these reasons, DOE concludes and certifies that today's final rule will 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 has transmitted 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

Manufacturers of residential dishwashers, dehumidifiers, and conventional cooking products must certify to DOE that their products comply with any applicable energy conservation standards. In certifying compliance, manufacturers must test their products according to the DOE test procedures for residential dishwashers, dehumidifiers, and conventional cooking products including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including residential dishwashers, dehumidifiers, and conventional cooking products. (76 FR 12422 (Mar. 7, 2011). The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (PRA). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 20 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.

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 final rule, DOE amends its test procedure 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 rule amends an existing rule without affecting the amount, quality or distribution of energy usage, and, therefore, will not result in any environmental impacts. Thus, this rulemaking is covered by Categorical Exclusion A5 under 10 CFR part 1021, subpart D, which applies to any rulemaking that interprets or amends an existing rule without changing the environmental effect of that rule. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, "Federalism," 64 FR 43255 (Aug. 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE examined this final rule and determined that it will 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 final rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

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

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. No. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a regulatory action resulting in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed "significant intergovernmental mandate," and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at www.gc.doe.gov. DOE examined today's final rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of $100 million or more in any year, so these requirements do not apply.

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

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. Today's final rule will not have any impact on the autonomy or

integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

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

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

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). DOE has reviewed today's final rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any significant energy action. A "significant energy action" is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that: (1) is a significant regulatory action under

Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use if the regulation is implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

Today's regulatory action is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

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

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

The amendments to the test procedures in today's final rule incorporate testing methods contained in certain sections of the following commercial standards:

1. ANSI/AHAM Standard DH-1-2008, Dehumidifiers, 2008, ANSI approved May 9, 2008.

2. ANSI/AHAM Standard DW-1-2010, Household Electric Dishwashers, ANSI approved September 10, 2010.

3. IEC Standard 62301, Household electrical appliances—Measurement of standby power, Edition 2.0, 2011-01.

DOE has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA (i.e., whether they were developed in a manner that fully provides for public participation, comment, and review.) DOE has consulted with both the Attorney General and the Chairman of the FTC about the impact on competition of using the methods contained in these standards and has received no comments objecting to their use.

M. Congressional Notification

As required by 5 U.S.C. 801, DOE will report to Congress on the promulgation of today's rule before its effective date. The report will state that it has been determined that the rule is not a "major rule" as defined by 5 U.S.C. 804(2).

V. Approval of the Office of the Secretary

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

List of Subjects

10 CFR Part 429

Administrative practice and procedure, Buildings and facilities, Business and industry, Energy conservation, Grant programs-energy, Housing, Incorporation by reference, Reporting and recordkeeping requirements, Technical assistance.

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 September 14, 2012.

Kathleen B. Hogan
Deputy Assistant Secretary for Energy Efficiency
Energy Efficiency and Renewable Energy

For the reasons stated in the preamble, DOE amends parts 429 and 430 of title 10 of the Code of Federal Regulations, as set forth below:

PART 429 -- CERTIFICATION, COMPLIANCE, AND ENFORCEMENT FOR CONSUMER PRODUCTS AND COMMERCIAL AND INDUSTRIAL EQUIPMENT

1. The authority citation for part 429 continues to read as follows:

Authority: 42 U.S.C. 6291–6317.

2. Section 429.4 is amended by adding paragraph (b)(2) to read as follows:

§ 429.4 Materials incorporated by reference.

* * * * *

(b) * * *

(2) ANSI/AHAM DW-1-2010, Household Electric Dishwashers, (ANSI approved September 18, 2010), IBR approved for § 429.19.

* * * * *

3. Section 429.19 is amended by revising paragraph (b)(3) to read as follows:

§ 429.19 Dishwashers.

* * * * *

(b) * * *

(3) Pursuant to § 429.12(b)(13), a certification report shall include the following additional product-specific information when using appendix C or appendix C1: the capacity in number of

place settings as specified in ANSI/AHAM DW–1–1992 when using appendix C (incorporated by reference, see § 429.4) and ANSI/AHAM DW–1–2010 when using appendix C1 (incorporated by reference, see § 429.4), presence of a soil sensor (if yes, the number of cycles required to reach calibration), and the water inlet temperature used for testing in degrees Fahrenheit (°F). When using appendix C1, additionally: the cycle selected for energy testing and whether that cycle is soil-sensing, the options selected for the energy test, and presence of a built-in water softening system (if yes, the energy use in kilowatt-hours and the water use in gallons required for each regeneration of the water softening system, the number of regeneration cycles per year, and data and calculations used to derive these values).

4. Section 429.23 is amended by revising paragraph (a)(2)(ii) introductory text to read as follows:

§ 429.23 Conventional cooking tops, conventional ovens, microwave ovens.

(a) * * *

(2) * * *

(ii) Any represented value of the energy factor, integrated energy factor, or other measure of energy consumption of a basic model for which consumers would favor higher values shall be less than or equal to the lower of:

* * * * *

5. Section 429.36 is amended by revising paragraph (a)(2)(ii) introductory text to read as follows:

§ 429.36 Dehumidifiers.

(a) * * *

(2) * * *

(ii) Any represented value of the energy factor, integrated energy factor, or other measure of energy consumption of a basic model for which consumers would favor higher values shall be less than or equal to the lower of:

* * * * *

PART 430 -- ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

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

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

7. Section 430.3 is amended by:

a. Redesignating paragraphs (h)(1), and (h)(2) through (h)(5) as (h)(2), and (h)(4) through (h)(7) respectively;

b. Adding new paragraphs (h)(1) and (h)(3); and

c. Revising paragraph (m)(2).

The additions and revisions read as follows:

§ 430.3 Materials incorporated by reference.

* * * * *

(h) * * *

(1) ANSI/AHAM DH-1-2008 ("ANSI/AHAM DH-1"), Dehumidifiers, ANSI approved May 9, 2008, IBR approved for appendix X1 to subpart B.

* * * * *

(3) ANSI/AHAM DW-1-2010, , Household Electric Dishwashers, (ANSI approved September 18, 2010), IBR approved for appendix C1 to subpart B.

* * * * *

(m) * * *

(2) IEC Standard 62301 ("IEC 62301"), Household electrical appliances–Measurement of standby power (Edition 2.0, 2011–01), IBR approved for appendix C1, appendix I, appendix J2, and appendix X1 to subpart B.

* * * * *

8. 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) When using appendix C (see the note at the beginning of appendix C), for dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart, EAOC = $(D_e \times S) + (D_e \times N \times (M - (E_D/2)))$.

(B) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers having a truncated normal cycle as defined in section 1.22 of appendix C1 to this

subpart, EAOC = ($D_e \times E_{TLP}$) + ($D_e \times N \times (M + M_{WS} + E_F - (E_D/2))$).

(C) When using appendix C (see the note at the beginning of appendix C), for dishwashers not having a truncated normal cycle, EAOC = ($D_e \times S$) + ($D_e \times N \times M$).

(D) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers not having a truncated normal cycle, EAOC = ($D_e \times E_{TLP}$) + ($D_e \times N \times (M + M_{WS} + E_F)$). Where,

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

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

E_{TLP} = the annual combined low-power mode energy consumption in kilowatt-hours per year and determined according to section 5.7 of appendix C1 to this subpart,

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

M = the machine energy consumption per cycle for the normal cycle, as defined in section 1.6 of appendix C to this subpart, in kilowatt-hours and determined according to section 5.1 of appendix C to this subpart when using appendix C (see the note at the beginning of appendix C); the normal cycle is defined in section 1.12 of appendix C1 to this subpart, and the machine energy consumption per cycle in kilowatt-hours must be determined according to section 5.1.1 of appendix C1 to this subpart for non-soil-sensing dishwashers and section 5.1.2 of appendix C1 to this subpart for soil-sensing dishwashers when using appendix C1 (see the note at the beginning of appendix C1),

M_{WS} = the machine energy consumption per cycle for water softener regeneration, in kilowatt-hours and determined according to section 5.1.3 of appendix C1 to this subpart,

E_F = the fan-only mode energy consumption per cycle, in kilowatt-hours and determined according to section 5.2 of appendix C1 to this subpart, and

E_D = the drying energy consumption, in kilowatt-hours and defined as energy consumed using the power-dry feature after the termination of the last rinse option of the normal cycle; E_D is determined according to section 5.2 of appendix C to this subpart when using appendix C (see the note at the beginning of appendix C), and determined according to section 5.3 of appendix C1 to this subpart when using appendix C1 (see the note at the beginning of appendix C1),

(E) Manufacturers calculating EAOC pursuant to paragraph (c)(1)(i)(A) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(A) of this section. Manufacturers calculating EAOC pursuant to paragraphs (c)(1)(i)(B) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(B) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(i)(C) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(A) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(i)(D) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(B) of this section.

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

(A) When using appendix C (see the note at the beginning of appendix C), for dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart, $EAOC = (D_e \times S) + (D_e \times N \times (M - (E_D/2))) + (D_e \times N \times W)$.

(B) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers having a truncated normal cycle as defined in section 1.22 of appendix C1 to this subpart,

$EAOC = (D_e \times E_{TLP}) + (D_e \times N \times (M + M_{WS} + E_F - (E_D/2))) + (D_e \times N \times (W + W_{WS}))$.

(C) When using appendix C (see the note at the beginning of appendix C), for dishwashers not having a truncated normal cycle,

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

(D) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers not having a truncated normal cycle,

$EAOC = (D_e \times E_{TLP}) + (D_e \times N \times (M + M_{WS} + E_F)) + (D_e \times N \times (W + W_{WS}))$.

Where,

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

W = the water energy consumption per cycle for the normal cycle as defined in section 1.6 of appendix C to this subpart, in kilowatt-hours and determined according to section 5.4 of appendix C to this subpart when using appendix C (see the note at the beginning of appendix C); when using appendix C1 (see the note at the beginning of appendix C1), the normal cycle is as defined in section 1.12 of appendix C1 to this subpart, and the water energy consumption per cycle in kilowatt-hours is determined according to section 5.5.1.1 of appendix C1 to this subpart for dishwashers that operate with a nominal 140 °F inlet water temperature and section 5.5.2.1 of appendix C1 to this subpart for dishwashers that operate with a nominal inlet water temperature of 120 °F, and

W_{WS} = the water softener regeneration water energy consumption per cycle in kilowatt-hours and determined according to section 5.5.1.2 of appendix C1 to this subpart for dishwashers that operate with a nominal 140 °F inlet water temperature and section 5.5.2.2 of appendix C1 to this subpart for dishwashers that operate with a nominal inlet water temperature of 120 °F.

(E) Manufacturers calculating EAOC pursuant to paragraph (c)(1)(ii)(A) of this section

should calculate EAEU pursuant to paragraph (c)(2)(i)(A) of this section. Manufacturers calculating EAOC pursuant to paragraphs (c)(1)(ii)(B) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(B) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(ii)(C) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(A) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(ii)(D) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(B) of this section.

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

(A) When using appendix C (see the note at the beginning of appendix C), for dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart,

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

(B) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers having a truncated normal cycle as defined in section 1.22 of appendix C1 to this subpart,

$EAOC_g = (D_e \times E_{TLP}) + (D_e \times N \times (M + M_{WS} + E_F - (E_D/2))) + (D_g \times N \times (W_g + W_{WSg}))$.

(C) When using appendix C (see the note at the beginning of appendix C), for dishwashers not having a truncated normal cycle,

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

(D) When using appendix C1 (see the note at the beginning of appendix C1), for dishwashers not having a truncated normal cycle,

$EAOC_g = (D_e \times E_{TLP}) + (D_e \times N \times (M + M_{WS} + E_F)) + (D_g \times N \times (W_g + W_{WSg}))$.

Where,

D_e, S, E_{TLP}, N, M, M_{WS}, E_F, 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,

W_g = the water energy consumption per cycle for the normal cycle as defined in section 1.6 of appendix C to this subpart, in Btus and determined according to section 5.5 of appendix C to this subpart when using appendix C (see the note at the beginning of appendix C); when using appendix C1 (see the note at the beginning of appendix C1), the normal cycle is as defined in section 1.12 of appendix C1 to this subpart, and the water energy consumption per cycle in Btus is determined according to section 5.6.1.1 of appendix C1 to this subpart for dishwashers that operate with a nominal 140 °F inlet water temperature and section 5.6.2.1 of appendix C1 to this subpart for dishwashers that operate with a nominal inlet water temperature of 120 °F and

W_{WSg} = the water softener regeneration energy consumption per cycle in Btu per cycle and determined according to section 5.6.1.2 of appendix C1 to this subpart for dishwashers that operate with a nominal 140 °F inlet water temperature and section 5.6.2.2 of appendix C1 to this subpart for dishwashers that operate with a nominal inlet water temperature of 120 °F.

(E) Manufacturers calculating EAOC pursuant to paragraph (c)(1)(iii)(A) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(A) of this section. Manufacturers calculating EAOC pursuant to paragraphs (c)(1)(iii)(B) of this section should calculate EAEU pursuant to paragraph (c)(2)(i)(B) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(iii)(C) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(A) of this section. Manufacturers calculating EAOC pursuant to paragraph (c)(1)(iii)(D) of this section should calculate EAEU pursuant to paragraph (c)(2)(ii)(B) of this section.

(2) 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) When using appendix C (see the note at the beginning of appendix C), for dishwashers having a truncated normal cycle as defined in section 1.15 of appendix C to this subpart and when using appendix C1 (see the note at the beginning of appendix C), as defined in section 1.22 of appendix C1 to this subpart,

(A) EAEU = $(M-(E_D/2)+W)\times N+S$ may be used for units manufactured:

1. Before [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] to make representations of energy efficiency; and
2. Before the compliance date of any amended standards to demonstrate compliance.

(B) EAEU = $(M+M_{WS}+E_F-(E_D/2)+W+W_{WS})\times N+(E_{TLP})$ must be used for units manufactured:

1. On or after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] to make representations of energy efficiency; and
2. On or after the compliance date of any amended standards to demonstrate compliance.

Where,

M, M_{WS}, S, E_D, N, E_F, and E_{TLP} are defined in paragraph (c)(1)(i) of this section, and W and W_{WS}, are defined in paragraph (c)(1)(ii) of this section.

(C) Manufacturers calculating EAEU pursuant to paragraph (c)(2)(i)(A) of this section should calculate EAOC pursuant to paragraph (c)(1)(i)(A), (c)(1)(ii)(A), or (c)(1)(iii)(A) of this section, as appropriate. Manufacturers calculating EAEU pursuant to paragraph (c)(2)(i)(B) of this section should calculate EAOC pursuant to paragraph (c)(1)(i)(B), (c)(1)(ii)(B), or (c)(1)(iii)(B) of this section, as appropriate.

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

(A) EAEU = (M+W)×N+S may be used for units manufactured:

1. Before [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] to make representations of energy efficiency; and

2. Before the compliance date of any amended standards to demonstrate compliance.

(B) EAEU = $(M+M_{WS}+E_F+W+W_{WS})\times N+E_{TLP}$ must be used for units manufactured:

1. On or after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] to make representations of energy efficiency; and

2. On or after the compliance date of any amended standards to demonstrate compliance.

Where,

M, M_{WS}, S, N, E_F, and E_{TLP} are defined in paragraph (c)(1)(i) of this section, and W and W_{WS} are defined in paragraph (c)(1)(ii) of this section.

(C) Manufacturers calculating EAEU pursuant to paragraph (c)(2)(ii)(A) of this section should calculate EAOC pursuant to paragraph (c)(1)(i)(C), (c)(1)(ii)(C), or (c)(1)(iii)(C) of this section, as appropriate. Manufacturers calculating EAEU pursuant to paragraph (c)(2)(ii)(B) of this section should calculate EAOC pursuant to paragraph (c)(1)(i)(D), (c)(1)(ii)(D), or (c)(1)(iii)(D) of this section, as appropriate.

(3) When using appendix C (see the note at the beginning of appendix C), the water consumption, V, expressed in gallons per cycle and defined in section 5.3 of appendix C to this subpart, and when using appendix C1 (see the note at the beginning of appendix C1), water consumption, V, and the sum of the water consumption, V, and the water consumption during

water softener regeneration, V_{WS}, expressed in gallons per cycle and defined in section 5.4 of appendix C1 to this subpart, must be rounded to one decimal place.

(i) Water consumption, V, may be measured for units manufactured:

(A) Before [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] to make representations of energy efficiency; and

(B) Before the compliance date of any amended standards to demonstrate compliance.

(ii) Manufacturers calculating water consumption pursuant to paragraph (c)(3)(i) of this section should calculate EAOC as described in paragraph (c)(1)(i)(A), (c)(1)(i)(C), (c)(1)(ii)(A), (c)(1)(ii)(C), (c)(1)(iii)(A), or (c)(1)(iii)(C) of this section, as appropriate. Manufacturers calculating water consumption pursuant to paragraph (c)(3)(i) of this section should calculate EAEU as described in paragraph (c)(2)(i)(A) or (c)(2)(ii)(A) of this section, as appropriate.

(iii) The sum of the water consumption, V, and the water consumption during water softener regeneration, V_{WS}, must be measured for units manufactured:

(A) On or after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] to make representations of energy efficiency; and

(B) On or after the compliance date of any amended standards to demonstrate compliance.

(C) Manufacturers calculating water consumption pursuant to paragraph (c)(3)(iii) of this section should calculate EAOC as described in paragraph (c)(1)(i)(B), (c)(1)(i)(D), (c)(1)(ii)(B), (c)(1)(ii)(D), (c)(1)(iii)(B), or (c)(1)(iii)(D) of this section, as appropriate. Manufacturers calculating water consumption pursuant to paragraph (c)(3)(iii) of this section should calculate EAEU as described in paragraph (c)(2)(i)(B) or (c)(2)(ii)(B) of this section, as appropriate.

(4) 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 and appendix C1 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 (kWhs) 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 (Btus) 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 Btus 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 sections 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 sections 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 sections 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) When using appendix X (see the note at the beginning of appendix X), 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) When using appendix X1 (see the note at the beginning of appendix X1), the integrated energy factor for dehumidifiers, expressed in L/kWh, shall be determined according to paragraph 5.2 of appendix X1 to this subpart.

* * * * *

Appendix C to Subpart B of Part 430—[Amended]

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

a. Revising the introductory text after the appendix heading;

b. Revising sections 1.2, 1.9, 1.10, 1.11, and 1.13;

c. Revising section 2.6.2, 2.6.3.1, 2.6.3.2, 2.6.3.3, 2.7, and 2.8;

d. Adding sections 2.7.1, 2.7.2, 2.7.2.1, and 2.7.2.2; and

e. Revising sections 5.4.1, 5.4.2; 5.5.1, and 5.5.2;

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: Prior to the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption (May 30, 2013 unless the direct final rule published on May 30, 2012 is withdrawn), manufacturers may use either Appendix C or Appendix C1 to certify compliance with existing DOE energy conservation standards and to make any representations related to energy and/or water consumption of dishwashers, with the following exception. If the compliance date is after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**], manufacturers that make representations related to standby mode and off mode energy consumption must use Appendix C1 for any representations made after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] of the energy and/or water consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

After the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption (May 30, 2013 unless the direct

final rule published on May 30, 2012 is withdrawn), all dishwashers shall be tested using the provisions of Appendix C1 to certify compliance with amended energy conservation standards and to make any representations related to energy and/or water consumption, with the following exception. If the compliance date is before [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**], manufacturers may use Appendix C for any representations until [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] of energy and/or water consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

* * * * *

1.2 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-1-1992 (incorporated by reference; see § 430.3), using the test load specified in section 2.7.1 of this appendix.

* * * * *

1.9 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-1-1992 (incorporated by reference; see § 430.3) and as additionally specified in section 2.7.2 of this appendix. For compact dishwashers, this definition is the same, except that two soiled place settings are used instead of four.

1.10 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-1-1992 (incorporated by reference; see § 430.3) and as additionally specified in section 2.7.2 of this appendix.

1.11 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-1-1992 (incorporated by reference; see § 430.3) and as additionally specified in section 2.7.2 of this appendix. For compact dishwashers, this definition is the same, except that one soiled place setting is used

* * * * *

1.13 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-1-1992 (incorporated by reference; see § 430.3), using the test load specified in section 2.7.1 of this appendix.

* * * * *

2. Testing Conditions

* * * * *

2.6.2 Non-soil-sensing dishwashers to be tested at a nominal inlet temperature of 50 ºF or 120 ºF. These units must be tested on the normal cycle with a clean load of eight place settings plus six serving pieces, as specified in section 2.7.1 of this appendix. If the capacity of the dishwasher, as stated by the manufacturer, is less than eight place settings, then the test load must be the stated capacity.

* * * * *

2.6.3.1 For tests of the sensor heavy response, as defined in section 1.9 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 2.7.1 of this appendix. Four of the eight place settings must be soiled according to ANSI/AHAM DW-1-1992 (incorporated by reference,

see § 430.3) and as additionally specified in section 2.7.2 of this appendix, 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 2.7.1 of this appendix. Two of the four place settings must be soiled according to ANSI/AHAM DW-1-1992 and as additionally specified in section 2.7.2 of this appendix, 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 1.11 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 2.7.1 of this appendix. Two of the eight place settings must be soiled according to ANSI/AHAM DW-1-1992 (incorporated by reference, see § 430.3) and as additionally specified in section 2.7.2 of this appendix, 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 2.7.1 of this appendix. One of the four place settings must be soiled according to ANSI/AHAM DW-1-1992 and as additionally specified in section 2.7.2 of this appendix, 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 1.10 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 2.7.1 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-1-1992 (incorporated by reference, see § 430.3) and as additionally specified in section 2.7.2 of this appendix, 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 2.7.1 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 ANSI/AHAM DW-1-1992 and as additionally specified in section 2.7.2 of this appendix, while the remaining place settings, serving pieces, and all flatware are not soiled.

2.7 Test load.

2.7.1 Test load items.

Dishware/glassware/ flatware item	Primary source	Description	Primary No.	Alternate source	Alternate source No.
Dinner Plate	Corning Comcor®/Corelle®	10 inch Dinner Plate	6003893		
Bread and Butter Plate	Corning Comcor®/Corelle®	6.75 inch Bread & Butter	6003887	Arzberg	8500217100 or 2000-00001-0217-1
Fruit Bowl	Corning Comcor®/Corelle®	10 oz. Dessert Bowl	6003899	Arzberg	3820513100
Cup	Corning Comcor®/Corelle®	8 oz. Ceramic Cup	6014162	Arzberg	1382-00001-4732
Saucer	Corning Comcor®/Corelle®	6 inch Saucer	6010972	Arzberg	1382-00001-4731
Serving Bowl	Corning Comcor®/Corelle®	1 qt. Serving Bowl	6003911		
Platter	Corning Comcor®/Corelle®	9.5 inch Oval Platter	6011655		
Glass—Iced Tea	Libbey		551 HT		
Flatware—Knife	Oneida®—Accent		2619KPVF	WMF—Gastro 0800	12.0803.6047
Flatware—Dinner Fork	Oneida®—Accent		2619FRSF	WMF—Signum 1900	12.1905.6040
Flatware—Salad Fork	Oneida®—Accent		2619FSLF	WMF—Signum 1900	12.1964.6040
Flatware—Teaspoon	Oneida®—Accent		2619STSF	WMF—Signum 1900	12.1910.6040
Flatware—Serving Fork	Oneida®—Flight		2865FCM	WMF—Signum 1900	12.1902.6040
Flatware—Serving Spoon	Oneida®—Accent		2619STBF	WMF—Signum 1900	12.1904.6040

2.7.2 Soils. The soils shall be as specified in ANSI/AHAM DW-1-1992 (incorporated by reference, see § 430.3), except for the following substitutions.

2.7.2.1 Margarine. The margarine shall be Fleischmann's Original stick margarine.

2.7.2.2 Coffee. The coffee shall be Folgers Classic Decaf.

2.8 Detergent. Use half the quantity of detergent specified according to ANSI/AHAM DW-1-1992 (incorporated by reference, see § 430.3), using Cascade with the Grease Fighting

Power of Dawn powder as the detergent formulation.

* * * * *

5. Calculation of Derived Results From Test Measurements

* * * * *

5.4 * * *

5.4.1 Dishwashers that operate with a nominal 140 °F inlet water temperature, only.

Calculate the water energy consumption, W, expressed in kilowatt-hours per cycle and defined as:

$W = V \times T \times K$

where,

V = water consumption in gallons per cycle, as determined in section 5.3.1 of this appendix for non-soil-sensing dishwashers and section 5.3.2 of this appendix for soil-sensing dishwashers,

T = nominal water heater temperature rise = 90 °F, and

K = specific heat of water in kilowatt-hours per gallon per degree Fahrenheit = 0.0024.

5.4.2 Dishwashers that operate with a nominal inlet water temperature of 120 °F.

Calculate the water energy consumption, W, expressed in kilowatt-hours per cycle and defined as:

$W = V \times T \times K$

where,

V = water consumption in gallons per cycle, as determined in section 5.3.1 of this appendix for non-soil-sensing dishwashers and section 5.3.2 of this appendix for soil-sensing dishwashers,

T = nominal water heater temperature rise = 70 °F, and

K = specific heat of water in kilowatt-hours per gallon per degree Fahrenheit = 0.0024,

5.5 * * *

5.5.1 Dishwashers that operate with a nominal 140 °F inlet water temperature, only.

Calculate the water energy consumption using gas-heated or oil-heated water, W_g, expressed in Btu's per cycle and defined as:

$W_g = V \times T \times C/e$

where,

V = water consumption in gallons per cycle, as determined in section 5.3.1 of this appendix for non-soil-sensing dishwashers and section 5.3.2 of this appendix for soil-sensing dishwashers,

T = nominal water heater temperature rise = 90 °F,

C = specific heat of water in Btu's per gallon per degree Fahrenheit = 8.2, and

e = nominal gas or oil water heater recovery efficiency = 0.75,

5.5.2 Dishwashers that operate with a nominal inlet water temperature of 120 °F.

Calculate the water energy consumption using gas-heated or oil-heated water, W_g, expressed in Btu's per cycle and defined as:

$W_g = V \times T \times C/e$

where,

V = water consumption in gallons per cycle, as determined in section 5.3.1 of this appendix for non-soil-sensing dishwashers and section 5.3.2 of this appendix for soil-sensing dishwashers,

T = nominal water heater temperature rise = 70 °F,

C = specific heat of water in Btu's per gallon per degree Fahrenheit = 8.2, and

e = nominal gas or oil water heater recovery efficiency = 0.75.

* * * * *

10. Add a new Appendix C1 to subpart B of part 430 to read as follows:

APPENDIX C1 TO SUBPART B OF PART 430–UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF DISHWASHERS

Note: Prior to the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption (May 30, 2013 unless the direct final rule published on May 30, 2012 is withdrawn), manufacturers may use either Appendix C or Appendix C1 to certify compliance with existing DOE energy conservation standards and to make any representations related to energy and/or water consumption of dishwashers, with the following exception. If the compliance date is after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**], manufacturers that make representations related to standby mode and off mode energy consumption must use Appendix C1 for any representations made after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] of the energy and/or water consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

After the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption (May 30, 2013 unless the direct

final rule published on May 30, 2012 is withdrawn), all dishwashers shall be tested using the provisions of Appendix C1 to certify compliance with amended energy conservation standards and to make any representations related to energy and/or water consumption, with the following exception. If the compliance date is before [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**], manufacturers may use Appendix C for any representations until [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] of energy and/or water consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

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, pumping water out of the dishwasher, circulating air, or regenerating an internal water softener.

1.2 AHAM means the Association of Home Appliance Manufacturers.

1.3 Combined low-power mode means the aggregate of available modes other than active mode.

1.4 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-1-2010 (incorporated by reference; see § 430.3), using the test load specified in section 2.7 of this appendix.

1.5 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.

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

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

1.8 Fan-only mode means an active mode that is not user-selectable, and in which a fan circulates air for a finite period of time after the end of the cycle, where the end of the cycle is indicated to the consumer by means of a display, indicator light, or audible signal.

1.9 IEC 62301 means the standard published by the International Electrotechnical Commission, titled "Household electrical appliances-Measurement of standby power," Publication 62301 (Edition 2.0, 2011-01) (incorporated by reference; see § 430.3).

1.10 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.

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

1.12 Normal cycle means the cycle type, including washing and drying temperature options, recommended in the manufacturer's instructions for daily, regular, or typical use to completely wash a full load of normally soiled dishes including the power-dry feature. If no cycle or more than one cycle is recommended in the manufacturer's instructions for daily, regular, or typical use to completely wash a full load of normally soiled dishes, the most energy

intensive of these cycles shall be considered the normal cycle. In the absence of a manufacturer recommendation on washing and drying temperature options, the highest energy consumption options must be selected.

1.13 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.

1.14 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.

1.15 Preconditioning cycle means a normal cycle run with no test load to ensure that the water lines and sump area of the pump are primed.

1.16 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-1-2010 (incorporated by reference; see § 430.3) and as additionally specified in section 2.7 of this appendix. For compact dishwashers, this definition is the same, except that two soiled place settings are used instead of four.

1.17 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-1-2010 (incorporated by reference; see § 430.3) and as additionally specified in section 2.7 of this appendix.

1.18 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-1-2010 (incorporated by reference; see § 430.3) and as additionally specified in section 2.7 of this appendix. For compact dishwashers, this definition is the same, except that one soiled place setting is used instead of two.

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

1.20 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-1-2010 (incorporated by reference; see § 430.3), using the test load specified in section 2.7 of this appendix.

1.21 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.

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

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

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

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

1.26 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.

1.27 Water-softening dishwasher means a dishwasher which incorporates a water softening system that periodically consumes additional water and energy during the cycle to regenerate.

2. Testing Conditions

2.1 Installation requirements. Install the dishwasher according to the manufacturer's instructions, including drain height. If the manufacture does not provide instructions for a specific drain height, the drain height shall be 20 inches. The racks shall be positioned according to the manufacturer recommendation for washing a full load of normally soiled dishes, or in the absence of a recommendation, the racks shall be maintained in the as-shipped position. The rinse aid container shall remain empty. 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), disregarding the provisions regarding batteries and the determination, classification, and testing of relevant modes.

2.2 Electrical energy supply.

2.2.1 Dishwashers that operate with an electrical supply of 115 volts. Maintain the electrical supply to the dishwasher at 115 volts ±2 percent and within 1 percent of the nameplate frequency as specified by the manufacturer. Maintain a continuous electrical supply to the unit throughout testing, including the preconditioning cycles, specified in section 2.9 of this appendix, and in between all test cycles.

2.2.2 Dishwashers that operate with an electrical supply of 240 volts. Maintain the electrical supply to the dishwasher at 240 volts ±2 percent and within 1 percent of the nameplate frequency as specified by the manufacturer. Maintain a continuous electrical supply to the unit throughout testing, including the preconditioning cycles, specified in section 2.9 of this appendix, and in between all test cycles.

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 4.3.2 of IEC 62301 (incorporated by reference; see § 430.3).

2.3 Water temperature. Measure the temperature of the water supplied to the dishwasher using a temperature measuring device as specified in section 3.1 of this appendix.

2.3.1 Dishwashers to be tested at a nominal 140 ºF inlet water temperature. Maintain the water supply temperature at 140º ±2 ºF.

2.3.2 Dishwashers to be tested at a nominal 120 ºF inlet water temperature. Maintain the water supply temperature at 120º ±2 ºF.

2.3.3 Dishwashers to be tested at a nominal 50 ºF inlet water temperature. Maintain the water supply temperature at 50º ±2 ºF.

2.4 Water pressure. Using a water pressure gauge as specified in section 3.4 of this appendix, maintain the pressure of the water supply at 35 ±2.5 pounds per square inch gauge (psig) when the water is flowing. The pressure shall be achieved within 2 seconds of opening the water supply valve.

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 º ±5 ºF 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 Test cycle and load.

2.6.1 Non-soil-sensing dishwashers to be tested at a nominal inlet temperature of 140 ºF. All non-soil-sensing dishwashers to be tested according to section 4.1 of this appendix at a nominal inlet temperature of 140 ºF must be tested on the normal cycle and truncated normal cycle without a test load if the dishwasher does not heat water in the normal cycle.

2.6.2 Non-soil-sensing dishwashers to be tested at a nominal inlet temperature of 50 ºF or 120 ºF. All non-soil-sensing dishwashers to be tested according to section 4.1 of this appendix at a nominal inlet temperature of 50 ºF or 120 ºF must be tested on the normal cycle with a clean load of eight place settings plus six serving pieces, as specified in section 2.7 of this

appendix. If the capacity of the dishwasher, as stated by the manufacturer, is less than eight place settings, then the test load must be the stated capacity.

2.6.3 Soil-sensing dishwashers to be tested at a nominal inlet temperature of 50 ºF, 120 ºF, or 140 ºF. All soil-sensing dishwashers shall be tested according to section 4.1 of this appendix on the normal cycle. The dishwasher shall be tested first for the sensor heavy response, then tested for the sensor medium response, and finally for the sensor light response with the following combinations of soiled and clean test loads.

2.6.3.1 For tests of the sensor heavy 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. Four of the eight place settings, except for the flatware, must be soiled according to sections 5.3 through 5.7 of ANSI/AHAM DW-1-2010 (incorporated by reference, see § 430.3) and as additionally specified in sections 2.7.4 and 2.7.5 of this appendix, while the remaining place settings, serving pieces, and all flatware are not soiled. The test load is to be loaded in the dishwasher according to section 5.8 of ANSI/AHAM DW-1-2010.

(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, except for the flatware, must be soiled according to sections 5.3 through 5.7 of ANSI/AHAM DW-1-2010 and as additionally specified in sections 2.7.4 and 2.7.5 of this appendix, while the remaining place settings, serving pieces, and all flatware are not soiled. The test load is to be loaded in the dishwasher according to section 5.8 of ANSI/AHAM DW-1-2010.

2.6.3.2 For tests of the sensor medium response, as defined in section 1.18 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, except for the flatware, must be soiled according to sections 5.3 through 5.7 of ANSI/AHAM DW-1-2010 (incorporated by reference, see § 430.3) and as additionally specified in sections 2.7.4 and 2.7.5 of this appendix, while the remaining place settings, serving pieces, and all flatware are not soiled. The test load is to be loaded in the dishwasher according to section 5.8 of ANSI/AHAM DW-1-2010.

(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, except for the flatware, must be soiled according to sections 5.3 through 5.7 of ANSI/AHAM DW-1-2010 and as additionally specified in sections 2.7.4 and 2.7.5 of this appendix, while the remaining place settings, serving pieces, and all flatware are not soiled. The test load is to be loaded in the dishwasher according to section 5.8 of ANSI/AHAM DW-1-2010.

2.6.3.3 For tests of the sensor light response, as defined in section 1.17 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, except for the flatware, must be soiled with half of the soil load specified for a single place setting according to sections 5.3 through 5.7 of ANSI/AHAM DW-1-2010 (incorporated by reference, see § 430.3) and as additionally specified in sections 2.7.4 and 2.7.5 of this appendix, while the remaining place settings, serving pieces, and all flatware are not soiled. The test load is to be loaded in the dishwasher according to section 5.8 of ANSI/AHAM DW-1-2010.

(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, except for the flatware, must be soiled with half of the soil load specified for a single place setting according to sections 5.3 through 5.7 of ANSI/AHAM DW-1-2010 and as additionally specified in sections 2.7.4 and 2.7.5 of this appendix, while the remaining place settings, serving pieces, and all flatware are not soiled. The test load is to be loaded in the dishwasher according to section 5.8 of ANSI/AHAM DW-1-2010.

2.7 Test load.

2.7.1 Test load items.

Dishware/glassware/ flatware item	Primary source	Description	Primary No.	Alternate source	Alternate source No.
Dinner Plate	Corning Comcor®/Corelle®	10 inch Dinner Plate	6003893		
Bread and Butter Plate	Corning Comcor®/Corelle®	6.75 inch Bread & Butter	6003887	Arzberg	8500217100 or 2000-00001-0217-1
Fruit Bowl	Corning Comcor®/Corelle®	10 oz. Dessert Bowl	6003899	Arzberg	3820513100
Cup	Corning Comcor®/Corelle®	8 oz. Ceramic Cup	6014162	Arzberg	1382-00001-4732
Saucer	Corning Comcor®/Corelle®	6 inch Saucer	6010972	Arzberg	1382-00001-4731
Serving Bowl	Corning Comcor®/Corelle®	1 qt. Serving Bowl	6003911		
Platter	Corning Comcor®/Corelle®	9.5 inch Oval Platter	6011655		
Glass—Iced Tea	Libbey		551 HT		
Flatware—Knife	Oneida®—Accent		2619KPVF	WMF—Gastro 0800	12.0803.6047
Flatware—Dinner Fork	Oneida®—Accent		2619FRSF	WMF—Signum 1900	12.1905.6040
Flatware—Salad Fork	Oneida®—Accent		2619FSLF	WMF—Signum 1900	12.1964.6040
Flatware—Teaspoon	Oneida®—Accent		2619STSF	WMF—Signum 1900	12.1910.6040
Flatware—Serving Fork	Oneida®—Flight		2865FCM	WMF—Signum 1900	12.1902.6040
Flatware—Serving Spoon	Oneida®—Accent		2619STBF	WMF—Signum 1900	12.1904.6040

2.7.2 Place setting. A place setting shall consist of one cup, one saucer, one dinner plate, one bread and butter plate, one fruit bowl, one iced tea glass, one dinner fork, one salad fork, one knife, and two teaspoons.

2.7.3 Serving pieces. Serving pieces shall consist of two serving bowls, one platter, one serving fork, and two serving spoons.

2.7.4 Soils. The soils shall be as specified in section 5.4 of ANSI/AHAM DW-1-2010

(incorporated by reference, see § 430.3), except for the following substitutions.

2.7.4.1 Margarine. The margarine shall be Fleischmann's Original stick margarine.

2.7.4.2 Coffee. The coffee shall be Folgers Classic Decaf.

2.7.5 Soil Preparation. Soils shall be prepared according to section 5.5 of ANSI/AHAM DW-1-2010 (incorporated by reference, see § 430.3), with the following additional specifications.

2.7.5.1 Milk. The nonfat dry milk shall be reconstituted before mixing with the oatmeal and potatoes. It shall be reconstituted with water by mixing 2/3 cup of nonfat dry milk with 2 cups of water until well mixed. The reconstituted milk may be stored for use over the course of 1 day.

2.7.5.2 Instant mashed potatoes. The potato mixture shall be applied within 30 minutes of preparation.

2.7.5.3 Ground beef. The 1-pound packages of ground beef shall be stored frozen for no more than 6 months.

2.8 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 1.26 of this appendix.

2.9 Preconditioning requirements. Precondition the dishwasher twice by establishing the testing conditions set forth in sections 2.1 through 2.5 of this appendix. For each preconditioning, set the dishwasher to the preconditioning cycle as defined in section 1.15 of this appendix, without using a test load, and initiate the cycle. During the second preconditioning, measure the prewash fill water volume, V_{pw}, if any, and the main wash fill water volume, V_{mw}.

2.10 Detergent. Use half the quantity of detergent specified according to section 4.1 of

ANSI/AHAM DW-1-2010 (incorporated by reference, see § 430.3), using Cascade with the Grease Fighting Power of Dawn powder as the detergent formulation. Determine the amount of detergent (in grams) to be added to the prewash compartment (if provided) or elsewhere in the dishwasher (if recommended by the manufacturer) and the main wash compartment according to sections 2.10.1 and 2.10.2 of this appendix.

2.10.1 Prewash Detergent Dosing. If the cycle setting for the test cycle includes prewash, determine the quantity of dry prewash detergent, D_{pw}, in grams (g) that results in 0.25 percent concentration by mass in the prewash fill water as:

$D_{pw} = V_{pw} \times \rho \times k \times 0.25/100$

where,

V_{pw} = the prewash fill volume of water in gallons,

ρ = water density = 8.343 pounds (lb)/gallon for dishwashers to be tested at a nominal inlet water temperature of 50 °F (10 °C), 8.250 lb/gallon for dishwashers to be tested at a nominal inlet water temperature of 120 °F (49 °C), and 8.205 lb/gallon for dishwashers to be tested at a nominal inlet water temperature of 140 °F (60 °C), and

k = conversion factor from lb to g = 453.6 g/lb.

2.10.2 Main Wash Detergent Dosing. Determine the quantity of dry main wash detergent, D_{mw}, in grams (g) that results in 0.25 percent concentration by mass in the main wash fill water as:

$D_{mw} = V_{mw} \times \rho \times k \times 0.25/100$

where,

V_{mw} = the main wash fill volume of water in gallons, and

ρ, and k are defined in section 2.10.1 of this appendix.

3. Instrumentation

Test instruments must be calibrated annually.

3.1 Temperature measuring device. The device must have an error no greater than ±1 °F over the range being measured.

3.2 Timer. Time measurements for each monitoring period shall be accurate to within 2 seconds.

3.3 Water meter. The water meter must have a resolution of no larger than 0.1 gallons and a maximum error no greater than ±1.5 percent of the measured flow rate for all water temperatures encountered in the test cycle.

3.4 Water pressure gauge. The water pressure gauge must have a resolution of one pound per square inch (psi) and must have an error no greater than 5 percent of any measured value over the range of 35 ±2.5 psig.

3.5 Watt-hour meter. The watt-hour meter must have a resolution of .1 watt-hour or less and a maximum error of no more than 1 percent of the measured value for any demand greater than 5 watts.

3.6 Standby mode and off mode watt meter. The watt meter used to measure standby mode and off mode power consumption shall meet the requirements specified in Section 4, Paragraph 4.4 of IEC 62301 (incorporated by reference, see § 430.3).

4. Test Cycle and Measurements

4.1 Active mode cycle. Perform a test cycle by establishing the testing conditions set forth in section 2 of this appendix, setting the dishwasher to the cycle type to be tested according to section 2.6.1, 2.6.2, or 2.6.3 of this appendix, initiating the cycle, and allowing the cycle to proceed to completion.

4.1.1 Machine electrical energy consumption. Measure the machine electrical energy consumption, M, expressed as the number of kilowatt-hours of electricity consumed by the machine during the entire test cycle, using a water supply temperature as set forth in section 2.3 of this appendix and using a watt-hour meter as specified in section 3.5 of this appendix.

4.1.2 Fan electrical energy consumption. If the dishwasher is capable of operation in fan-only mode, measure the fan electrical energy consumption, M_F, expressed as the number of kilowatt-hours of electricity consumed by the machine for the duration of fan-only mode, using a watt-hour meter as specified in section 3.5 of this appendix. Alternatively, if the duration of fan-only mode is known, the watt-hours consumed may be measured for a period of 10 minutes in fan-only mode, using a watt-hour meter as specified in section 3.5 of this appendix. Multiply this value by the time in minutes that the dishwasher remains in fan-only mode, L_F, and divide by 10,000 to obtain M_F. The alternative approach may be used only if the resulting M_F is representative of energy use during the entire fan-only mode.

4.1.3 Water consumption. Measure the water consumption, V, expressed as the number of gallons of water delivered to the machine during the entire test cycle, using a water meter specified in section 3.3 of this appendix.

4.2 Standby mode and off mode power. Connect the dishwasher to a standby mode and off mode watt meter as specified in section 3.6 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 take some time to enter a stable state from a higher power state as discussed in Section 5, Paragraph 5.1, note 1 of IEC 62301 (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 5.3.2 of IEC 62301 for testing in each possible mode

as described in sections 4.2.1 and 4.2.2 of this appendix.

4.2.1 If the dishwasher has an inactive mode, as defined in section 1.10 of this appendix, measure and record the average inactive mode power of the dishwasher, P_{IA}, in watts.

4.2.2 If the dishwasher has an off mode, as defined in section 1.13 of this appendix, measure and record the average off mode power, P_{OM}, in watts.

5. Calculation of Derived Results From Test Measurements

5.1 Machine energy consumption.

5.1.1 Machine energy consumption for non-soil-sensing electric dishwashers. Take the value recorded in section 4.1.1 of this appendix as the per-cycle machine electrical energy consumption. Express the value, M, in kilowatt-hours per cycle.

5.1.2 Machine energy consumption for soil-sensing electric dishwashers. The machine energy consumption for the sensor normal cycle, M, is defined as:

$M = (M_{hr} \times F_{hr}) + (M_{mr} \times F_{mr}) + (M_{lr} \times F_{lr})$

where,

M_{hr} = the value recorded in section 4.1.1 of this appendix for the test of the sensor heavy response, expressed in kilowatt-hours per cycle,

M_{mr} = the value recorded in section 4.1.1 of this appendix for the test of the sensor medium response, expressed in kilowatt-hours per cycle,

M_{lr} = the value recorded in section 4.1.1 of this appendix for the test of the sensor light response, expressed in kilowatt-hours per cycle,

F_{hr} = the weighting factor based on consumer use of heavy response = 0.05,

F_{mr} = the weighting factor based on consumer use of medium response = 0.33, and

F_{lr} = the weighting factor based on consumer use of light response = 0.62.

5.1.3 Machine energy consumption during water softener regeneration for water-softening dishwashers. The machine energy consumption for water softener regeneration, M_{WS}, is defined as:

$M_{WS} = M_{WScycle} \times N_{WS}/N$

where,

$M_{WScycle}$ = the reported value of the additional machine electrical energy consumption required for water softener regeneration during a cycle including water softener regeneration, expressed in kilowatt-hours,

N_{WS} = the reported representative average number of water softener regeneration cycles per year, and

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

5.2 Fan-only mode energy consumption.

5.2.1 Electrical energy consumption for fan-only mode for non-soil-sensing electric dishwashers. Take the value recorded in section 4.1.2 of this appendix as the per-cycle electrical energy consumption for fan-only mode. Express the value, E_F, in kilowatt-hours per cycle. If the dishwasher is not capable of operation in fan-only mode, $E_F = 0$.

5.2.2 Electrical energy consumption for fan-only mode for soil-sensing electric dishwashers. The fan-only mode electrical energy consumption, E_F, for the sensor normal cycle is defined as:

$E_F = (E_{Fhr} + E_{Fmr} + E_{Flr})/3$

where,

E_{Fhr} = the value recorded in section 4.1.2 of this appendix for the test of the sensor heavy response, expressed in kilowatt-hours per cycle,

E_{Fmr} = the value recorded in section 4.1.2 of this appendix for the test of the sensor medium response, expressed in kilowatt-hours per cycle,

E_{Flr} = the value recorded in section 4.1.2 of this appendix for the test of the sensor light response, expressed in kilowatt-hours per cycle,

If the dishwasher is not capable of operation in fan-only mode, $E_F = 0$.

5.3 Drying energy.

5.3.1 Drying energy consumption for non-soil-sensing electric dishwashers. Calculate the amount of energy consumed using the power-dry feature after the termination of the last rinse option of the normal cycle. Express the value, E_D, in kilowatt-hours per cycle.

5.3.2 Drying energy consumption for soil-sensing electric dishwashers. The drying energy consumption, E_D, for the sensor normal cycle is defined as:

$E_D = (E_{Dhr} + E_{Dmr} + E_{Dlr})/3$

where,

E_{Dhr} = energy consumed using the power-dry feature after the termination of the last rinse option of the sensor heavy response, expressed in kilowatt-hours per cycle,

E_{Dmr} = energy consumed using the power-dry feature after the termination of the last rinse option of the sensor medium response, expressed in kilowatt-hours per cycle,

E_{Dlr} = energy consumed using the power-dry feature after the termination of the last rinse option of the sensor light response, expressed in kilowatt-hours per cycle,

5.4 Water consumption.

5.4.1 Water consumption for non-soil-sensing electric dishwashers using electrically heated, gas-heated, or oil-heated water. Take the value recorded in section 4.1.3 of this appendix as the per-cycle water consumption. Express the value, V, in gallons per cycle.

5.4.2 Water consumption for soil-sensing electric dishwashers using electrically heated, gas-heated, or oil-heated water. The water consumption for the sensor normal cycle, V, is defined as:

$V = (V_{hr} \times F_{hr}) + (V_{mr} \times F_{mr}) + (V_{lr} \times F_{lr})$

where,

V_{hr} = the value recorded in section 4.1.3 of this appendix for the test of the sensor heavy response, expressed in gallons per cycle,

V_{mr} = the value recorded in section 4.1.3 of this appendix for the test of the sensor medium response, expressed in gallons per cycle,

V_{lr} = the value recorded in section 4.1.3 of this appendix for the test of the sensor light response, expressed in gallons per cycle,

F_{hr} = the weighting factor based on consumer use of heavy response = 0.05,

F_{mr} = the weighting factor based on consumer use of medium response = 0.33, and

F_{lr} = the weighting factor based on consumer use of light response = 0.62.

5.4.3 Water consumption during water softener regeneration for water-softening dishwashers using electrically heated, gas-heated, or oil-heated water. The water consumption for water softener regeneration, V_{WS}, is defined as:

$V_{WS} = V_{WScycle} \times N_{WS}/N$

where,

$V_{WScycle}$ = the reported value of the additional water consumption required for water softener regeneration during a cycle including water softener regeneration, expressed in gallons per cycle,

N_{WS} = the reported representative average number of water softener regeneration cycles per year, and

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

5.5 Water energy consumption for non-soil-sensing or soil-sensing dishwashers using electrically heated water.

5.5.1 Dishwashers that operate with a nominal 140 °F inlet water temperature, only.

5.5.1.1 Calculate the water energy consumption, W, expressed in kilowatt-hours per cycle and defined as:

$W = V \times T \times K$

where,

V = water consumption in gallons per cycle, as determined in section 5.4.1 of this appendix for non-soil-sensing dishwashers and section 5.4.2 of this appendix for soil-sensing dishwashers,

T = nominal water heater temperature rise = 90 °F, and

K = specific heat of water in kilowatt-hours per gallon per degree Fahrenheit = 0.0024.

5.5.1.2 For water-softening dishwashers, calculate the water softener regeneration water energy consumption, W_{WS}, expressed in kilowatt-hours per cycle and defined as:

$W_{WS} = V_{WS} \times T \times K$

where,

V_{WS} = water consumption during water softener regeneration in gallons per cycle which includes regeneration, as determined in section 5.4.3 of this appendix,

T = nominal water heater temperature rise = 90 °F, and

K = specific heat of water in kilowatt-hours per gallon per degree Fahrenheit = 0.0024.

5.5.2 Dishwashers that operate with a nominal inlet water temperature of 120 °F.

5.5.2.1 Calculate the water energy consumption, W, expressed in kilowatt-hours per cycle and defined as:

$W = V \times T \times K$

where,

V = water consumption in gallons per cycle, as determined in section 5.4.1 of this appendix for non-soil-sensing dishwashers and section 5.4.2 of this appendix for soil-sensing dishwashers,

T = nominal water heater temperature rise = 70 °F, and

K = specific heat of water in kilowatt-hours per gallon per degree Fahrenheit = 0.0024,

5.5.2.2 For water-softening dishwashers, calculate the water softener regeneration water energy consumption, W_{WS}, expressed in kilowatt-hours per cycle and defined as:

$W_{WS} = V_{WS} \times T \times K$

where,

V_{WS} = water consumption during water softener regeneration in gallons per cycle which includes regeneration, as determined in section 5.4.3 of this appendix,

T = nominal water heater temperature rise = 70 °F, and

K = specific heat of water in kilowatt-hours per gallon per degree Fahrenheit = 0.0024.

5.6 Water energy consumption per cycle using gas-heated or oil-heated water.

5.6.1 Dishwashers that operate with a nominal 140 °F inlet water temperature, only.

5.6.1.1 Calculate the water energy consumption using gas-heated or oil-heated water, W_g, expressed in Btu's per cycle and defined as:

$W_g = V \times T \times C/e$

where,

V = water consumption in gallons per cycle, as determined in section 5.4.1 of this appendix for non-soil-sensing dishwashers and section 5.4.2 of this appendix for soil-sensing dishwashers,

T = nominal water heater temperature rise = 90 °F,

C = specific heat of water in Btu's per gallon per degree Fahrenheit = 8.2, and

e = nominal gas or oil water heater recovery efficiency = 0.75,

5.6.1.2 For water-softening dishwashers, calculate the water softener regeneration water energy consumption, W_{WSg}, expressed in kilowatt-hours per cycle and defined as:

$W_{WSg} = V_{WS} \times T \times C/e$

where,

V_{WS} = water consumption during water softener regeneration in gallons per cycle which includes regeneration, as determined in section 5.4.3 of this appendix,

T = nominal water heater temperature rise = 90 °F,

C = specific heat of water in Btu's per gallon per degree Fahrenheit = 8.2, and

e = nominal gas or oil water heater recovery efficiency = 0.75.

5.6.2 Dishwashers that operate with a nominal 120 °F inlet water temperature, only.

5.6.2.1 Calculate the water energy consumption using gas-heated or oil-heated water, W_g, expressed in Btu's per cycle and defined as:

$W_g = V \times T \times C/e$

where,

V = water consumption in gallons per cycle, as determined in section 5.4.1 of this appendix for non-soil-sensing dishwashers and section 5.4.2 of this appendix for soil-sensing dishwashers,

T = nominal water heater temperature rise = 70 °F,

C = specific heat of water in Btu's per gallon per degree Fahrenheit = 8.2, and

e = nominal gas or oil water heater recovery efficiency = 0.75.

5.6.2.2 For water-softening dishwashers, calculate the water softener regeneration water energy consumption, W_{WSg}, expressed in kilowatt-hours per cycle and defined as:

$W_{WSg} = V_{WS} \times T \times C/e$

where,

V_{WS} = water consumption during water softener regeneration in gallons per cycle which includes regeneration, as determined in section 5.4.3 of this appendix,

T = nominal water heater temperature rise = 70 °F,

C = specific heat of water in Btu's per gallon per degree Fahrenheit = 8.2, and

e = nominal gas or oil water heater recovery efficiency = 0.75.

5.7 Annual combined low-power mode energy consumption. Calculate the annual combined low-power mode energy consumption for dishwashers, E_{TLP}, expressed in kilowatt-hours per year, according to the following:

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

where:

P_{IA} = dishwasher inactive mode power, in watts, as measured in section 4.2.1 of this appendix for dishwashers capable of operating in inactive mode; otherwise, $P_{IA}=0$,

P_{OM} = dishwasher off mode power, in watts, as measured in section 4.2.2 of this appendix for

dishwashers capable of operating in off mode; otherwise, P_{OM}=0,

S_{IA} = annual hours in inactive mode as defined as S_{LP} if no off mode is possible, [S_{LP}/ 2] if both inactive mode and off mode are possible, and 0 if no inactive mode is possible,

S_{OM} = annual hours in off mode as defined as S_{LP} if no inactive mode is possible, [S_{LP}/ 2] if both inactive mode and off mode are possible, and 0 if no off mode is possible,

S_{LP} = combined low-power annual hours for all available modes other than active mode as defined as [$H - (N \times (L + L_F))$] for dishwashers capable of operating in fan-only mode; otherwise, S_{LP}=8,465,

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,

L_F = the duration of the fan-only mode for the normal cycle for non-soil-sensing dishwashers; the average duration of the fan-only mode for sensor light response, sensor medium response, and sensor heavy response for soil-sensing dishwashers, and

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

Appendix I to Subpart B of Part 430–[Amended]

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

a. Revising the Note after the appendix heading;

b. Revising section 1. Definitions;

c. In section 2. Test Conditions, by:

1. Revising sections 2.1, 2.1.1, 2.1.2, 2.1.3, 2.2.1.2, 2.5.2, 2.6, 2.9.1.1, 2.9.1.3, and 2.9.2.1;

2. Removing section 2.9.2.2;

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

1. Revising sections 3.1.1, 3.1.1.1, 3.1.1.2, 3.1.2, and 3.1.2.1;

2. Adding sections 3.1.1.2.1, 3.1.1.2.2, 3.1.2.1.1, and 3.1.2.1.2;

3. Redesignating sections 3.1.3 and 3.1.3.1 as 3.1.4 and 3.1.4.1 and revising newly redesignated section 3.1.4.1;

4. Adding 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, 3.2.1.3, and 3.2.1.4;

6. Revising section 3.2.2 and 3.2.2.1 and adding section 3.2.2.2;

7. Redesignating section 3.2.3 as 3.2.4 and revising newly redesignated section 3.2.4;

8. Adding new section 3.2.3;

9. Revising sections 3.3.7 through 3.3.11; and

10. Removing sections 3.3.12 and 3.3.13;

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

1. Revising sections 4.1.1 and 4.1.1.1;

2. Removing section 4.1.2.2;

3. Redesignating sections 4.1.2.3, 4.1.2.3.1, 4.1.2.3.2, 4.1.2.4, 4.2.1.5, 4.1.2.5.1, 4.1.2.5.2, 4.1.2.6, 4.1.2.6.1, and 4.1.2.6.2 as 4.1.2.2, 4.1.2.2.1, 4.1.2.2.2, 4.1.2.3, 4.1.2.4, 4.1.2.4.1, 4.1.2.4.3, 4.1.2.5, 4.1.2.5.1, and 4.1.2.5.3;

4. Revising newly redesignated sections 4.1.2.2.1, 4.1.2.2.2, 4.1.2.3, 4.1.2.4.1, 4.1.2.4.3, 4.1.2.5.1, and 4.1.2.5.3;

5. Adding sections 4.1.2.4.2 and 4.1.2.5.2;

6. Revising section 4.1.4;

7. Adding sections 4.1.4.1 and 4.1.4.2;

8. Revising sections 4.2.1.1 and 4.2.1.2;

9. Revising section 4.2.2.1;

10. Adding sections 4.2.2.1.1 and 4.2.2.1.2;

11. Revising section 4.2.2.2.2;

12. Removing section 4.2.2.2.3;

13. Revising section 4.2.3;

14. Adding sections 4.2.3.1 and 4.2.3.2; and

15. 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,

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, conventional ovens, and microwave ovens at this time. However, any representation made after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] related to standby mode and off mode energy consumption of conventional ranges, conventional cooking tops, and conventional ovens, and any representation made after September 6, 2011 related to standby mode and off mode energy consumption of microwave ovens, must be based upon results generated under this test procedure, consistent with the requirements of 42 U.S.C. 6293(c)(2). Upon the compliance date of any energy conservation standard that incorporates standby mode and off mode energy consumption, compliance with the applicable provisions of this test procedure will also be required. Future revisions may add relevant provisions for measuring active mode in microwave ovens.

1. Definitions

1.1 Active mode means a mode in which the product is connected to a mains power source, has been activated, and is performing the main functions of producing heat by means of a gas flame, electric resistance heating, or microwave energy, or circulating air internally or externally to the cooking product. Delay start mode is a one-off, user-initiated, short-duration function that is associated with an active mode.

1.2 Built-in means the product is supported by surrounding cabinetry, walls, or other similar structures.

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

1.4 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.

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

1.6 Fan-only mode means an active mode that is not user-selectable and in which a fan circulates air internally or externally to the cooking product for a finite period of time after the end of the heating function, where the end of the heating function is indicated to the consumer by means of a display, indicator light, or audible signal.

1.7 Forced convection means a mode of conventional oven operation in which a fan is used to circulate the heated air within the oven compartment during cooking.

1.8 Freestanding means the product is not supported by surrounding cabinetry, walls, or other similar structures.

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

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

1.11 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.

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

1.13 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.

1.14 Primary energy consumption means either the electrical energy consumption of a conventional electric oven or the gas energy consumption of a conventional gas oven.

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

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

1.17 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.

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

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

A—Number of Hours in a Year

C—Specific Heat

E—Energy Consumed

Eff—Cooking Efficiency

H—Heating Value of Gas

K—Conversion for Watt-hours to Kilowatt-hours

K_e—3.412 Btu/Wh, Conversion for Watt-hours to Btu's

M—Mass

n—Number of Units

O—Annual Useful Cooking Energy Output

P—Power

Q—Gas Flow Rate

R—Energy Factor, Ratio of Useful Cooking Energy Output to Total Energy Input

S—Number of Self-Cleaning Operations per Year

T—Temperature

t—Time

V—Volume of Gas Consumed

W—Weight of Test Block

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 of this appendix with a watt-hour meter installed in the circuit. The watt-hour meter shall be as described in section 2.9.1.1 of this appendix. For standby mode and off mode testing, these products shall also be installed in accordance with Section 5, Paragraph 5.2 of IEC 62301 (Second Edition) (incorporated by reference; see §430.3), disregarding the provisions regarding batteries and the determination, classification, and testing of relevant modes.

2.1.2 Conventional gas 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 of this appendix. 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 of this appendix. For standby mode and off mode testing, these products shall also be installed in accordance with Section 5, Paragraph 5.2 of IEC 62301 (Second Edition) (incorporated by reference; see §430.3), disregarding the provisions regarding batteries and the determination, classification, and testing of relevant modes.

2.1.3 Microwave ovens. Install the microwave oven in accordance with the manufacturer's instructions and connect to an electrical supply circuit with voltage as specified in section 2.2.1 of this appendix. The microwave oven shall also be installed in accordance with Section 5, Paragraph 5.2 of IEC 62301 (First Edition) (incorporated by reference; see §430.3). A watt meter shall be installed in the circuit and shall be as described in section 2.9.1.3 of this appendix.

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2.2.1.2 Supply voltage waveform. For conventional range, conventional cooking top, and conventional oven standby mode and off mode testing, maintain the electrical supply voltage waveform indicated in Section 4, Paragraph 4.3.2 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3). For microwave oven standby mode and off mode testing, maintain the electrical supply voltage waveform indicated in Section 4, Paragraph 4.4 of IEC 62301 (First Edition) (incorporated by reference; see § 430.3).

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

4, Paragraph 4.2 of IEC 62301 (First Edition) (incorporated by reference; see § 430.3).

2.6 Normal non-operating temperature. All areas of the appliance to be tested shall attain the normal non-operating temperature, as defined in section 1.12 of this appendix, before any testing begins. The equipment for measuring the applicable normal non-operating temperature shall be as described in sections 2.9.3.1, 2.9.3.2, 2.9.3.3, and 2.9.3.4 of this appendix, as applicable.

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2.9.1.1 Watt-hour meter. The watt-hour meter for measuring the electrical energy consumption of conventional ovens and cooking tops shall have a resolution of 1 watt-hour (3.6 kJ) or less and a maximum error no greater than 1.5 percent of the measured value for any demand greater than 5 watts. The watt-hour meter for measuring the energy consumption of microwave ovens shall have a resolution of 0.1 watt-hour (0.36 kJ) or less and a maximum error no greater than 1.5 percent of the measured value.

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2.9.1.3 Standby mode and off mode watt meter. The watt meter used to measure conventional range, conventional cooking top, and conventional oven standby mode and off mode power consumption shall have a resolution as specified in Section 4, Paragraph 4.4 of IEC 62301 (Second Edition) (incorporated by reference, see § 430.3). The watt meter used to measure microwave oven standby mode and off mode power consumption shall have a resolution as specified in Section 4, Paragraph 4.5 of IEC 62301 (First Edition) (incorporated by reference, see § 430.3), and shall also be able to record a "true" average power as specified in Section 5, Paragraph 5.3.2(a) of IEC 62301 (First Edition).

2.9.2 Gas Measurements.

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

3. Test Methods and Measurements

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3.1.1 Conventional oven. Perform a test by establishing the testing conditions set forth in section 2, Test Conditions, of this appendix 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 non-operating temperature as defined in section 1.12 and described in section 2.6 of this appendix. 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 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. Turn off the gas flow to the conventional cooking top. The temperature of the conventional oven shall be its normal non-operating temperature as defined in section 1.12 and described in section 2.6 of this appendix. 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.

3.1.1.2 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 take some time to enter a stable state from a higher power state as discussed in Section 5, Paragraph 5.1, Note 1 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3), allow sufficient time for the conventional oven to reach the lower power state before proceeding with the test measurement. Follow the test procedure as specified in Section 5, Paragraph 5.3.2 of IEC 62301 (Second Edition) for testing in each possible mode as described in 3.1.1.2.1 and 3.1.1.2.2 of this appendix. For units in which power varies as a function of displayed time in standby mode, set the clock time to 3:23 at the end of the stabilization period specified in Section 5, Paragraph 5.3 of IEC 62301 (First Edition), and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301 (First Edition), but with a single test period of 10 minutes +0/-2 sec after an additional stabilization period until the clock time reaches 3:33.

3.1.1.2.1 If the conventional oven has an inactive mode, as defined in section 1.11 of this appendix, measure and record the average inactive mode power of the conventional oven, P_{IA}, in watts.

3.1.1.2.2 If the conventional oven has an off mode, as defined in section 1.13 of this appendix, measure and record the average off mode power of the conventional oven, P_{OM}, in watts.

3.1.2 Conventional cooking top. Establish the test conditions set forth in section 2, Test Conditions, of this appendix. Turn off the gas flow to the conventional oven(s), if so equipped. The temperature of the conventional cooking top shall be its normal nonoperating temperature as

defined in section 1.12 and described in section 2.6 of this appendix. 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.

3.1.2.1 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 take some time to enter a stable state from a higher power state as discussed in Section 5, Paragraph 5.1, Note 1 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3), allow sufficient time for the conventional cooking top to reach the lower power state before proceeding with the test measurement. Follow the test procedure as specified in Section 5, Paragraph 5.3.2 of IEC 62301 (Second Edition) for testing in each possible mode as described in sections 3.1.2.1.1 and 3.1.2.1.2 of this appendix. For units in which power varies as a function of displayed time in standby mode, set the clock time to 3:23 at the end of the stabilization period specified in Section 5, Paragraph 5.3 of IEC 62301 (First Edition), and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301 (First Edition), but with a single test period of 10 minutes +0/-2 sec after an additional stabilization period until the clock time reaches 3:33.

3.1.2.1.1 If the conventional cooking top has an inactive mode, as defined in section 1.11 of this appendix, measure and record the average inactive mode power of the conventional

cooking top, P_{IA}, in watts.

3.1.2.1.2 If the conventional cooking top has an off mode, as defined in section 1.13 of this appendix, measure and record the average off mode power of the conventional cooking top, P_{OM}, 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 take some time to enter a stable state from a higher power state as discussed in Section 5, Paragraph 5.1, Note 1 of IEC 62301 (Second Edition) (incorporated by reference; see § 430.3), allow sufficient time for the conventional range to reach the lower power state before proceeding with the test measurement. Follow the test procedure as specified in Section 5, Paragraph 5.3.2 of IEC 62301 (Second Edition) for testing in each possible mode as described in sections 3.1.3.1 and 3.1.3.2 of this appendix. For units in which power varies as a function of displayed time in standby mode, set the clock time to 3:23 at the end of the stabilization period specified in Section 5, Paragraph 5.3 of IEC 62301 (First Edition), and use the average power approach described in Section 5, Paragraph 5.3.2(a) of IEC 62301 (First Edition), but with a single test period of 10 minutes +0/-2 sec after an additional stabilization period until the clock time reaches 3:33.

3.1.3.1 If the conventional range has an inactive mode, as defined in section 1.11 of this appendix, 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 1.13 of this appendix, measure and record the average off mode power of the conventional range, P_{OM}, in watts.

3.1.4 Microwave oven.

3.1.4.1 Microwave oven test standby mode and off mode power. Establish the testing conditions set forth in section 2, Test Conditions, of this appendix. For microwave ovens that drop from a higher power state to a lower power state as discussed in Section 5, Paragraph 5.1, Note 1 of IEC 62301 (First Edition) (incorporated by reference; see § 430.3), allow sufficient time for the microwave oven to reach the lower power state before proceeding with the test measurement. Follow the test procedure as specified in Section 5, Paragraph 5.3 of IEC 62301 (First Edition). For units in which power varies as a function of displayed time in standby mode, set the clock time to 3:23 and use the average power approach described in Section 5, Paragraph 5.3.2(a), but with a single test period of 10 minutes +0/-2 sec after an additional stabilization period until the clock time reaches 3:33. If a microwave oven is capable of operation in either standby mode or off mode, as defined in sections 1.17 or 1.13 of this appendix, respectively, or both, test the microwave oven in each mode in which it can operate.

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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 Conventional oven fan-only mode energy consumption. If the conventional oven is capable of operation in fan-only mode, measure the fan-only mode energy consumption, E_{OF}, expressed in kilowatt-hours (kJ) of electricity consumed by the conventional oven for the duration of fan-only mode, using a watt-hour meter as specified in section 2.9.1.1 of this appendix. Alternatively, if the duration of fan-only mode is known, the watt-hours consumed may be measured for a period of 10 minutes in fan-only mode, using a watt-hour meter as specified in section 2.9.1.1 of this appendix. Multiply this value by the time in minutes that the conventional oven remains in fan-only mode, t_{OF}, and divide by 10,000 to obtain E_{OF}. The alternative approach may be used only if the resulting E_{OF} is representative of energy use during the entire fan-only mode.

3.2.1.3 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 3.1.1.2 of this appendix. If the conventional oven is capable of operating in inactive mode, as defined in section 1.11 of this appendix, measure the average inactive mode

power of the conventional oven, P_{IA}, in watts as specified in section 3.1.1.2.1 of this appendix. If the conventional oven is capable of operating in off mode, as defined in section 1.13 of this appendix, measure the average off mode power of the conventional oven, P_{OM}, in watts as specified in section 3.1.1.2.2 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 cooking top in watt-hours (kJ).

3.2.2.2 Conventional surface unit standby mode and off mode energy consumption. Make measurements as specified in section 3.1.2.1 of this appendix. If the conventional surface unit is capable of operating in inactive mode, as defined in section 1.11 of this appendix, measure the average inactive mode power of the conventional surface unit, P_{IA}, in watts as specified in section 3.1.2.1.1 of this appendix. If the conventional surface unit is capable of operating in off mode, as defined in section 1.13 of this appendix, measure the average off mode power of the conventional surface unit, P_{OM}, in watts as specified in section 3.1.2.1.2 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, as defined in section 1.11 of this appendix, 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, as defined in section 1.13 of this appendix, measure the average off mode power of the conventional range, P_{OM}, in watts as specified in section 3.1.3.2 of this appendix.

3.2.4 Microwave oven test standby mode and off mode power. Make measurements as specified in Section 5, Paragraph 5.3 of IEC 62301 (First Edition) (incorporated by reference; see § 430.3). If the microwave oven is capable of operating in standby mode, as defined in section 1.17 of this appendix, measure the average standby mode power of the microwave oven, P_{SB}, in watts as specified in section 3.1.4.1 of this appendix. If the microwave oven is capable of operating in off mode, as defined in section 1.13 of this appendix, measure the average off mode power of the microwave oven, P_{OM}, as specified in section 3.1.4.1 of this appendix.

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3.3.7 For conventional ovens, record the conventional oven standby mode and off mode test measurements P_{IA} and P_{OM}, if applicable. For conventional cooktops, record the conventional cooking top standby mode and off mode test measurements P_{IA} and P_{OM}, if applicable. For conventional ranges, record the conventional range standby mode and off mode test measurements P_{IA} and P_{OM}, if applicable.

3.3.8 For the surface unit under test, record the electric energy consumption, E_{CT}, or the gas volume consumption, V_{CT}, the final test block temperature, T_{CT}, and the total test time, t_{CT}. For a gas cooking top which uses electrical energy for ignition of the burners, also record E_{IC}.

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

3.3.10 Record the heating value, Hp, as determined in section 2.2.2.3 of this appendix for

the propane supply.

3.3.11 Record the average standby mode power, P_{SB}, for the microwave oven standby mode, as determined in section 3.2.4 of this appendix for a microwave oven capable of operating in standby mode. Record the average off mode power, P_{OM}, for the microwave oven off mode power test, as determined in section 3.2.4 of this appendix for a microwave oven capable of operating in off mode.

4. Calculation of Derived Results From Test Measurements

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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 Btus (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 Btus per standard cubic foot (kJ/L).

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

and,

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

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

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

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 Btus (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 Btus (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 Btus (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.

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4.1.2.2.1 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 Btus (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 3.2.1.3 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 3.2.1.3 of this appendix.

H= H_n or H_p, the heating value of the gas used in the test as specified in sections 2.2.2.2 and 2.2.2.3 of this appendix in Btus 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.

4.1.2.2.2 Annual secondary energy consumption for self-cleaning operation of gas ovens. Calculate the annual secondary energy consumption for self-cleaning operations of a gas oven, E_{SS}, expressed in kilowatt-hours (kJ) per year and defined as:

$E_{SS} = E_{IS} \times S_g \times K$,

Where:

E_{IS}= electrical energy consumed during the self-cleaning operation of a conventional gas oven, as measured in section 3.2.1.3 of this appendix.

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

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

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

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

Where:

P_{IA}= conventional oven inactive mode power, in watts, as measured in section 3.2.1.4 of this appendix.

P_{OM} = conventional oven off mode power, in watts, as measured in section 3.2.1.4 of this appendix.

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

If the conventional oven has fan-only mode, S_{TOT} equals (8,540.1 – (t_{OF}/60)) hours, where t_{OF} is the conventional oven fan-only mode duration, in minutes, as measured in section 3.2.1.2 of this appendix, and 60 is the conversion factor for minutes to hours; otherwise, S_{TOT} is equal to 8,540.1 hours.

If the conventional oven has both inactive mode and off mode, S_{IA} and S_{OM} 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_{OM}, is equal to 0;

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

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

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4.1.2.4.1 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 4.1.2.2.1 of this appendix.

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

$IE_{AO} = E_{CO} + E_{SC} + E_{OTLP}$,+ $(E_{OF} \times N_{OE})$,

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

4.1.2.2.1 of this appendix.

E_{OTLP}= annual combined low-power mode energy consumption as determined in section 4.1.2.3 of this appendix.

E_{OF}= fan-only mode energy consumption as measured in section 3.2.1.2 of this appendix.

N_{OE}= representative number of annual conventional electric oven cooking cycles per year, which is equal to 219 cycles for a conventional electric oven without self-clean capability and 204 cycles for a conventional electric oven with self-clean capability.

4.1.2.4.3 Conventional gas oven energy consumption. Calculate the total annual gas energy consumption of a conventional gas oven, E_{AOG}, expressed in Btus (kJ) per year and defined as:

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

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 4.1.2.2.1 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 4.1.2.2.2 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:

$IE_{AOE} = E_{SO} + E_{SS} + E_{OTLP} + (E_{OF} \times N_{OG})$,

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 4.1.2.2.2 of this appendix.

E_{OTLP}= annual combined low-power mode energy consumption as determined in section 4.1.2.3 of this appendix.

E_{OF}= fan-only mode energy consumption as measured in section 3.2.1.2 of this appendix.

N_{OG}= representative number of annual conventional gas oven cooking cycles per year, which is equal to 183 cycles for a conventional gas oven without self-clean capability and 197 cycles for a conventional gas oven with self-clean capability.

* * * * *

4.1.2.5.1 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:

$$E_{ACO} = \frac{1}{n}\sum_{i=1}^{n} E_{CO,i},$$

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.

$$E_{ASC} = \frac{1}{n}\sum_{i=1}^{n} E_{SC\,i},$$

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 4.1.2.2.1 of this appendix.

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

$IE_{TO} = E_{ACO} + E_{ASC} + E_{OTLP} + (E_{OF} \times N_{OE})$,

Where:

$$E_{ACO} = \frac{1}{n}\sum_{i=1}^{n} E_{CO\,i},$$

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.

$$E_{ASC} = \frac{1}{n}\sum_{i=1}^{n} E_{SC,i},$$

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 4.1.2.2.1 of this appendix.

E_{OTLP} = annual combined low-power mode energy consumption for the cooking appliance as determined in section 4.1.2.3 of this appendix.

E_{OF} = fan-only mode energy consumption as measured in section 3.2.1.2 of this appendix.

N_{OE} = representative number of annual conventional electric oven cooking cycles per year, which is equal to 219 cycles for a conventional electric oven without self-clean capability and 204 cycles for a conventional electric oven with self-clean capability.

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

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

Where:

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

$$E_{ACO} = \frac{1}{n}\sum_{i=1}^{n} E_{CO,i},$$

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 Btus (kJ) per year and is calculated as:

$$E_{ASC} = \frac{1}{n}\sum_{i=1}^{n} E_{SC},$$

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 4.1.2.2.1 of this appendix.

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:

$$E_{ASO} = \frac{1}{n}\sum_{i=1}^{n} E_{SO},$$

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.

$$E_{AAS} = \frac{1}{n}\sum_{i=1}^{n} E_{SS\,i},$$

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 4.1.2.2.2 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:

$IE_{TOE} = E_{ASO} + E_{AAS} + E_{OTLP} + (E_{OF} \times N_{OG})$,

Where:

$$E_{ASO} = \frac{1}{n}\sum_{i=1}^{n} E_{SO\,i},$$

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.

$$E_{AAS} = \frac{1}{n}\sum_{i=1}^{n} E_{SS\,i},$$

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 4.1.2.2.2 of this appendix.

E_{OTLP} =annual combined low-power mode energy consumption as determined in section 4.1.2.3 of this appendix.

E_{OF}= fan-only mode energy consumption as measured in section 3.2.1.2 of this appendix.

N_{OG}= representative number of annual conventional gas oven cooking cycles per year, which is equal to 183 cycles for a conventional gas oven without self-clean capability and 197 cycles for a conventional gas oven with self-clean capability.

* * * * *

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 4.1.2.4.1 of this appendix.

For gas ovens:

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

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 4.1.2.4.3 of this appendix.

E_{AOE}= total annual electrical energy consumption for conventional gas ovens as determined in section 4.1.2.4.3 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 4.1.2.4.2 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 4.1.2.4.3 of this appendix.

IE_{AOE}= total integrated annual electrical energy consumption for conventional gas ovens as determined in section 4.1.2.4.3 of this appendix.

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

* * * * *

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 Btus.

E_{CT}= measured energy consumption, as determined according to section 3.2.2.1 of this appendix, expressed in watt-hours (kJ).

4.2.1.2 Gas surface unit cooking efficiency. Calculate the cooking efficiency, Eff_{SU}, of the gas surface unit under test, defined as:

$$Eff_{SU} = \left(\frac{W_3 \times C_P \times T_{SU}}{E} \right),$$

Where:

W_3= measured weight of test block as measured in section 3.3.2 of this appendix, expressed in

pounds (kg).

C_p and T_{SU} are the same as defined in section 4.2.1.1 of this appendix.

and,

$E = V_{CT} + (E_{IC} \times K_e)$,

Where:

V_{CT}=total gas consumption in standard cubic feet (L) for the gas surface unit test as measured in section 3.2.2.1 of this appendix.

E_{IC}=electrical energy consumed in watt-hours (kJ) by an ignition device of a gas surface unit as measured in section 3.2.2.1 of this appendix.

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

* * * * *

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:

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

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

Where:

P_{IA}= conventional cooking top inactive mode power, in watts, as measured in section 3.1.2.1.1 of this appendix.

P_{OM} = conventional cooking top off mode power, in watts, as measured in section 3.1.2.1.2 of this appendix.

If the conventional cooking top has both inactive mode and off mode annual hours, S_{IA} and S_{OM} both equal 4273.4;

If the conventional cooking top has an inactive mode but no off mode, the inactive mode annual hours, S_{IA}, is equal to 8546.9, and the off mode annual hours, S_{OM}, is equal to 0;

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

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

4.2.2.2.2 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 Btus (kJ) per year, defined as:

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

Where:

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

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

Where:

P_{IA}= conventional cooking top inactive mode power, in watts, as measured in section 3.1.2.1.1 of this appendix.

P_{OM} = conventional cooking top off mode power, in watts, as measured in section 3.1.2.1.2 of this appendix.

If the conventional cooking top has both inactive mode and off mode annual hours, S_{IA} and S_{OM} both equal 4273.4;

If the conventional cooking top has an inactive mode but no off mode, the inactive mode annual hours, S_{IA}, is equal to 8546.9, and the off mode annual hours, S_{OM}, is equal to 0;

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

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

4.2.3 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,

$$R_{CT} = \frac{O_{CT}}{E_{CC}},$$

Where:

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

E_{CC}= energy consumption for cooking as determined in section 4.2.2.2.1 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 integrated annual energy consumption of cooking top determined according to section 4.2.2.2.2 of this appendix.

4.3 Combined components. The annual energy consumption of a kitchen range (e.g., a cooking top 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 total annual fan-only mode energy consumption for the oven component, E_{TOF}, defined as:

$E_{TOF} = E_{OF} \times N_R$,

Where,

E_{OF} = conventional oven fan-only mode energy consumption, in kilowatt-hours, as measured in section 3.2.1.2 of this appendix.

N_R = representative number of annual conventional oven cooking cycles per year, which is equal to 219 cycles for a conventional electric oven without self-clean capability, 204 cycles for a conventional electric oven with self-clean capability, 183 cycles for a conventional gas oven without self-clean capability, and 197 cycles for a conventional gas oven with self-clean capability.

plus the conventional range integrated annual combined low-power mode energy consumption, E_{RTLP}, defined as:

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

Where:

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

P_{OM} = conventional range off mode power, in watts, as measured in section 3.1.3.2 of

this appendix.

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

If the conventional oven component of the conventional range has fan-only mode, S_{TOT} equals (8,329.2 – (t_{OF}/60)) hours, where t_{OF} is the conventional oven fan-only mode duration, in minutes, as measured in section 3.2.1.2 of this appendix, and 60 is the conversion factor for minutes to hours; otherwise, S_{TOT} is equal to 8,329.2 hours.

If the conventional range has both inactive mode and off mode, S_{IA} and S_{OM} 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_{OM}, is equal to 0;

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

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

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.

Appendix X to Subpart B of Part 430—[Amended]

12. Appendix X to subpart B of part 430 is amended by adding a Note after the appendix heading to read as follows:

APPENDIX X TO SUBPART B OF PART 430–UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF DEHUMIDIFIERS

Note: Prior to the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption, manufacturers may use either Appendix X or Appendix X1 to certify compliance with existing DOE energy conservation standards and to make any representations related to energy consumption of dehumidifiers, with the following exception. If the compliance date is after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**], manufacturers that make representations related to standby mode and off mode energy consumption must use Appendix X1 for any representations made after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] of the energy consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

After the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption, all dehumidifiers shall be tested using the provisions of Appendix X1 to certify compliance with amended energy conservation standards and to make any representations related to energy consumption, with the following exception. If the compliance date is before [**INSERT DATE 180 DAYS AFTER DATE OF**

PUBLICATION IN THE FEDERAL REGISTER], manufacturers may use Appendix X for any representations until [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] of energy consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

* * * * *

13. Add a new Appendix X1 to subpart B of part 430 to read as follows:

APPENDIX X1 TO SUBPART B OF PART 430–UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF DEHUMIDIFIERS

Note: Prior to the compliance date for any amended energy conservation standards that incorporate standby mode and off mode energy consumption, manufacturers may use either Appendix X or Appendix X1 to certify compliance with existing DOE energy conservation standards and to make any representations related to energy consumption of dehumidifiers, with the following exception. If the compliance date is after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**], manufacturers that make representations related to standby mode and off mode energy consumption must use Appendix X1 for any representations made after [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] of the energy consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

After the compliance date for any amended energy conservation standards that

incorporate standby mode and off mode energy consumption, all dehumidifiers shall be tested using the provisions of Appendix X1 to certify compliance with amended energy conservation standards and to make any representations related to energy consumption, with the following exception. If the compliance date is before [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**], manufacturers may use Appendix X for any representations until [**INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**] of energy consumption of these products, consistent with the requirements of 42 U.S.C. 6293(c)(2).

1. Scope

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

2. Definitions

2.1 ANSI/AHAM DH-1 means the test standard published by the American National Standards Institute and the Association of Home Appliance Manufacturers, titled "Dehumidifiers," ANSI/AHAM DH-1-2008, (incorporated by reference; see § 430.3).

2.2 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.

2.3 Combined low-power mode means the aggregate of available modes other than active mode.

2.4 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).

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

2.6 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.

2.7 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.

2.8 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.

2.9 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.

2.10 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 3, "Definitions," Section 4, "Instrumentation," and Section 5, "Test Procedure," of ANSI/AHAM DH-1 (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), disregarding the provisions regarding batteries and the determination, classification, and testing of relevant modes.

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 and frequency indicated in Section 7.1.3, "Standard Test Voltage," of ANSI/AHAM DH-1, (incorporated by reference, see § 430.3). The electrical supply frequency shall be maintained ± 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 4.3.2 of IEC 62301, (incorporated by reference; see § 430.3).

3.2.3 Standby mode and off mode watt meter. The watt meter used to measure standby mode and off mode power consumption shall meet the requirements specified in Section 4, Paragraph 4.4 of IEC 62301 (incorporated by reference, see § 430.3).

3.2.4 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).

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 7, "Capacity Test and Energy Consumption Test," of ANSI/AHAM DH-1 (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, ensuring that the dehumidifier does not enter active mode during the test. For dehumidifiers that take some time to enter a stable state from a higher power state as discussed in Section 5, Paragraph 5.1, Note 1 of IEC 62301, (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 5.3.2 of IEC 62301 for testing in each possible mode as described in sections 4.2.1 and 4.2.2 of this appendix.

4.2.1 If the dehumidifier has an inactive mode, as defined in section 2.6 of this appendix, but not an off mode, as defined in section 2.7 of this appendix, measure and record the average inactive mode power of the dehumidifier, P_{IA}, in watts. Otherwise, if the dehumidifier has an off mode, as defined in section 2.7 of this appendix, measure and record the average off mode power of the dehumidifier, P_{OM}, in watts.

4.2.2 If the dehumidifier has an off-cycle mode, as defined in section 2.8 of this appendix, measure and record the average off-cycle mode power of the dehumidifier, P_{OC}, in watts.

5. Calculation of Derived Results From Test Measurements

5.1 Annual combined low-power mode energy consumption. Calculate the annual combined low-power mode energy consumption for dehumidifiers, E_{TLP}, expressed in kilowatt-hours per year, according to the following:

$$E_{TLP} = [(P_{IO} \times S_{IO}) + (P_{OC} \times S_{OC})] \times K$$

Where:

$P_{IO} = P_{IA}$, dehumidifier inactive mode power, or P_{OM}, dehumidifier off 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.

S_{IO} = 1840,5 dehumidifier inactive mode or off mode annual hours.

S_{OC} = 1840,5 dehumidifier off-cycle 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:

$IEF = L_W / (E_{active} + ((E_{TLP} \times 24) / S_{active}))$

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_{TLP} = 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.