DEPARTMENT OF ENERGY

10 CFR Parts 429 and 430

[Docket No. EERE–2010–BT–TP–0021]

RIN 1904–AC08

Energy Conservation Program: Test Procedures for Residential Clothes Washers

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

ACTION: Supplemental notice of proposed rulemaking.

SUMMARY: In this supplemental notice of proposed rulemaking (SNOPR), the U.S. Department of Energy (DOE) proposes to revise its test procedure for residential clothes washers established under the Energy Policy and Conservation Act (EPCA). DOE proposes to incorporate provisions of the International Electrotechnical Commission (IEC) Standard 62301, ''Household electrical appliances—Measurement of standby power'' (Second Edition). DOE also proposes to update the provisions for measuring active mode energy and water consumption.

DATES: DOE will accept comments, data, and information regarding this SNOPR no later than September 8, 2011 See section V, ''Public Participation,'' for details.

ADDRESSES: Any comments submitted must identify the SNOPR for Test Procedures for residential clothes washers, and provide docket number EERE–2010–BT–TP–0021 and/or regulatory information number (RIN) number 1904–AC08. Comments may be submitted using any of the following methods:

1. *Federal eRulemaking Portal: http://www.regulations.gov*. Follow the instructions for submitting comments.
2. *E-mail: RES-CW-2010-TP-0021@ee.doe.gov*. Include the docket number and/or RIN in the subject line of the message.
3. *Mail:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121. If possible, please submit all items on a CD. It is not necessary to include printed copies.
4. *Hand Delivery/Courier:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC 20024. *Telephone:* (202) 586–2945. If possible, please submit all items on a CD. It is not necessary to include printed copies.

Written comments regarding the burden-hour estimates or other aspects of the collection-of-information requirements contained in this proposed rule may be submitted to Office of Energy Efficiency and Renewable Energy through the methods listed above and by e-mail to *Christine_J._Kymn@omb.eop.gov*.

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

Docket: The docket is available for review at *http://www.regulations.gov/#!docketDetail;D=EERE-2010-BT-TP-0021,* 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 *regulations.gov* web page contains instructions on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through *regulations.gov.*

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

FOR FURTHER INFORMATION CONTACT: Mr. Stephen L. Witkowski, 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) 586–7463. *E-mail: Stephen.Witkowski@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:

Table of Contents

I. Authority and Background
II. Summary of the Supplemental Notice of Proposed Rulemaking
A. Standby Mode and Off Mode
B. Current Usage Patterns and Capabilities
C. Additional Proposals
III. Discussion
A. Use of Proposed Test Procedure
B. Newly Proposed Standby Mode, Off Mode, and Active Mode Test Procedure Provisions
1. Incorporating by Reference IEC Standard 62301 Edition 2.0 for Measuring Standby Mode and Off Mode Power Consumption
2. Calculation of Energy Use in Low-Power Modes
3. Energy Test Cycle Definition
4. Load Adjustment Factor
5. Wash Time Setting
6. Annual Energy Cost
7. Additional Proposals
C. Compliance With Other EPCA Requirements
1. Test Burden
2. Integration of Standby Mode and Off Mode Energy Consumption Into the Efficiency Metric
3. Commercial Clothes Washers
4. Certification Requirements
D. Impact on EnergyGuide
IV. Procedural Issues and Regulatory Review
A. Review Under Executive Order 12866
B. Review Under the Regulatory Flexibility Act
C. Review Under the Paperwork Reduction Act of 1995
D. Review Under the National Environmental Policy Act of 1969
E. Review Under Executive Order 13132
F. Review Under Executive Order 12988
G. Review Under the Unfunded Mandates Reform Act of 1995
H. Review Under the Treasury and General Government Appropriations Act, 1999
I. Review Under Executive Order 12630
J. Review Under Treasury and General Government Appropriations Act, 2001
K. Review Under Executive Order 13211
L. Review Under Section 32 of the Federal Energy Administration Act of 1974
V. Public Participation
A. Submission of Comments
B. Issues on Which DOE Seeks Comment
VI. Approval of the Office of the Secretary

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), Public Law 110–140 (Dec. 19, 2007)). Part B of title III (42 U.S.C. 6291–6309), which was subsequently redesignated for editorial reasons as Part A on codification in the U.S. Code, establishes the ''Energy Conservation Program for Consumer Products Other Than Automobiles.'' These include residential clothes washers, the subject of today's notice. (42 U.S.C. 6292(a)(7))

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 (1) As the basis for certifying to DOE that their products comply with the applicable energy conservation

standards adopted under EPCA, and (2) 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.

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

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

DOE Test Procedure at Appendix J1

The DOE test procedure for clothes washers currently being manufactured is found at 10 CFR part 430, subpart B, appendix J1. DOE adopted appendix J1 in a 1997 final rule (hereinafter referred to as the August 1997 Final Rule) to correct for changes in consumer habits that resulted in an overstatement of average annual energy consumption when using the methods specified in appendix J. 62 FR 45508 (Aug. 27, 1997). DOE added appendix J1, rather than amending appendix J, to accommodate continued use of appendix J until DOE amended the residential clothes washer conservation standards to reference the new appendix J1.[1] On January 12, 2001, DOE published a final rule (hereinafter referred to as the January 2001 Final Rule), to amend the energy conservation standards for residential clothes washers. The January 2001 Final Rule references the efficiency metrics as defined in appendix J1. 66 FR 3314. Use of the amended J1 test procedure was required to demonstrate compliance with these amended energy conservation standards as of January 1, 2004. Since 1997, DOE has amended the test procedure in appendix J1 three times, twice substantively to address test cloth correlation procedures, and once to correct the introductory note. 63 FR 16669 (Apr. 6, 1998); 66 FR 3314, 3330 (Jan. 12, 2001); 68 FR 62198, 62204 (Oct. 31, 2003).

The test procedure at appendix J1 includes provisions for determining the modified energy factor (MEF) for clothes washers, which is a function of the total energy used for each cubic foot (ft^3) of clothes washer capacity. The test procedure measures the total energy consumption of the clothes washer and provides for calculation of the remaining moisture content (RMC) of the clothes at the completion of the machine's full cycle. The test procedure at appendix J1 does not address energy use in the standby or off modes.

DOE Test Procedure Updates: Authority and Regulatory Background

EPCA requires DOE to review its test procedures at least once every seven years to determine whether amendments are warranted. (42 U.S.C. 6293(b)(1)) This rulemaking satisfies EPCA's periodic review requirement.

The Energy Independence and Security Act of 2007 (EISA 2007), Public Law No. 110–140 also amended EPCA to require DOE to amend its test procedures to integrate measures of standby mode and off mode energy consumption into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product unless the current test procedure already fully accounts for and incorporates standby and off mode energy consumption or such integration is technically infeasible. If an integrated test procedure is technically infeasible, DOE must 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 and IEC Standard 62087, ''Methods of measurement for the power consumption of audio, video, and related equipment.''[2]

In evaluating amendments to its test procedure for clothes washers, DOE considered input from the public received in its separate rulemaking proceeding to consider amendments to the energy conservation standards applicable to residential clothes washers.[3] On August 28, 2009, DOE published a notice in the **Federal Register** announcing the availability of a framework document in its rulemaking to consider amended energy conservation standards for residential clothes washers (hereafter the August 2009 framework document). 74 FR 44306. In the August 2009 framework document, DOE requested comments on revising the clothes washer test procedure. DOE also held a public meeting on September 21, 2009 (hereinafter referred to as the September 2009 public meeting) to discuss the issues presented in the framework document, including issues related to the test procedure.

DOE received comments in response to the August 2009 framework document stating that it should consider changes to the active mode test procedure for clothes washers. As a result, in addition to proposing amendments to its test procedure to include measures for standby and off mode power consumption, DOE proposed to address issues regarding the active mode provisions of the test procedure. As discussed in more detail below, the proposals were set forth in a notice of proposed rulemaking issued on September 21, 2010 (75 FR 57556) (hereinafter referred to as the September 2010 NOPR) and are being refined in this SNOPR.

In the September 2010 NOPR, DOE proposed a number of revisions and additions to the test procedure at appendix J1, including: (1) Incorporating standby and off mode power consumption into a combined energy metric; (2) addressing technologies not covered by the appendix J1 test procedure, such as steam wash cycles and self-clean cycles; (3) revising the number of annual wash cycles; (4) updating use factors; (5) revising the procedures and specifications for test cloth; (6) redefining the appropriate water fill

[1] Because appendix J applies only to clothes washers manufactured before January 1, 2004, appendix J is now obsolete. 10 CFR 430 appendix J1.

[2] IEC standards are available online at *http://www.iec.ch.*

[3] EISA 2007 also amended EPCA, in relevant part, to revise the energy conservation standards for residential clothes washers. The revised standards established a maximum water consumption factor (WF) of 9.5, effective January 1, 2011. EISA 2007 further required that DOE publish a final rule no later than December 31, 2011 determining whether to amend the standards in effect for clothes washers manufactured on or after January 1, 2015. (42 U.S.C. 6295(g)(9)) DOE is also required to consider standby and off mode standards for residential clothes washers. (42 U.S.C. 6295(gg)(2)(C).

level for the capacity measurement method; (7) establishing a new measure of water consumption; and (8) revising the definition of the energy test cycle. DOE requested comment on the proposals in the September 2010 NOPR and held a public meeting on October 28, 2010 (hereinafter referred to as the October 2010 public meeting) to discuss the issues presented.

The principal test procedure issues on which interested parties commented included: (1) The referenced version of IEC Standard 62301; (2) mode definitions; (3) inclusion of steam and self-clean cycles; (4) measurement of delay start and cycle finished mode; (5) calculation of annual energy use; (6) test cloth specifications; (7) usage patterns, in particular annual use cycles, wash temperatures, and load sizes, including a potential bias in favor of large-capacity clothes washers; and (8) test burden.

II. Summary of the Supplemental Notice of Proposed Rulemaking

The following paragraphs summarize the changes and additions to the September 2010 NOPR that DOE proposes in today's SNOPR. In the regulatory text set forth at the end of this SNOPR, DOE sets forth the proposed regulatory text from the September 2010 NOPR, as amended by today's proposals. DOE's supporting analysis and discussion for the portions of the proposed regulatory text not affected by this SNOPR may be found in the September 2010 NOPR. 75 FR 57556 (Sept. 21, 2010).

A. Standby Mode and Off Mode

In the September 2010 NOPR, DOE proposed amendments to its clothes washer test procedure including incorporating by reference specific provisions from IEC Standard 62301, 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 57556, 57560 (Sept. 21, 2010). DOE also proposed to incorporate the definitions of ''active mode,'' ''standby mode,'' and ''off mode'' that were based on the definitions for those terms provided in the most current draft at that time of an updated version of IEC Standard 62301 (the Committee Draft for Vote, or ''CDV'' version). *Id.* at 57560–62. Further, DOE proposed to include additional language that would clarify the application of clauses from IEC Standard 62301 (First Edition) for measuring standby mode and off mode power consumption.[4] *Id.* at 57562–63.

In response to the September 2010 NOPR, commenters suggested that the draft updated version of IEC Standard 62301 would improve the mode definitions and testing methodology. The IEC published IEC Standard 62301, Edition 2.0 2011–01 (''IEC Standard 62301 (Second Edition)'' or ''Second Edition'') on January 27, 2011. DOE has reviewed this updated test procedure and believes that it improves some measurements of standby mode and off mode energy use. Accordingly, DOE proposes in today's SNOPR to incorporate certain provisions of the IEC Standard 62301 (Second Edition), along with clarifying language, into the new clothes washer test procedure. DOE also proposes to incorporate into the new test procedure definitions of ''active mode,'' ''standby mode,'' and ''off mode'' based on the definitions provided in IEC Standard 62301 Second Edition. In addition, DOE proposes to incorporate measures of energy consumption associated with delay start and cycle finished modes. Although these modes would be considered part of active mode, the proposed measurements and calculations for standby and off mode power consumption would include the energy use in such modes in a simplified approach to account for energy use associated with all low-power modes by means of a single power measurement.

Finally, DOE proposes in today's SNOPR to revise the calculations for per-cycle energy use and annual energy cost to incorporate non-active washing mode energy consumption. (42 U.S.C. 6293(b)(3); 42 U.S.C. 6291(4), (7).

B. Current Usage Patterns and Capabilities

The proposed test procedure would update certain values from the existing test procedure to reflect current usage patterns and capabilities. DOE received multiple comments on this issue in response to the August 2009 framework document, and reviewed current consumer data from surveys conducted in 2004 and 2005 to propose updates in the September 2010 NOPR. Based on this information and comments received in response to the September 2010 NOPR, DOE is proposing additional amendments to the load adjustment factor in today's SNOPR. DOE is also proposing in this SNOPR to update the test load sizes specified in appendix J1 to reflect the same test load sizes previously proposed for appendix J2, allowing for testing of large-capacity clothes washers to demonstrate compliance with existing energy conservation standards.

C. Additional Proposals

The revised clothes washer test procedure amendments DOE is proposing in today's SNOPR would update the procedure to clarify the existing methods for determining the energy test cycle, setting the wash time for certain clothes washers, using the most current AHAM Standard detergent, and clarifying the definition of ''cold wash'' for clothes washers that offer both ''cold wash'' and ''tap cold wash'' settings. DOE is also proposing the following amendments in today's SNOPR: Correcting the definition of cold rinse in appendix J1; deleting the redundant sections 2.6.1.1–2.6.1.2.4 in appendix J1; and correcting the calculations proposed in the September 2010 NOPR for per-cycle self-clean water consumption.

III. Discussion

A. Use of Proposed Test Procedure

The amended test procedures in 10 CFR part 430 subpart B appendix J1 and appendix J2 would become effective 30 days after the date of publication in the **Federal Register** of the final rule in this test procedure rulemaking. DOE would clarify in the published amended test procedures, however, that manufacturers would be required to use amended appendix J1 until the compliance date of any final rule establishing amended energy conservation standards that addresses standby and off mode power consumption for these products. 42 U.S.C. 6295(gg)(2)(C). At such time, manufacturers would begin using the test procedures in appendix J2.

B. Newly Proposed Standby Mode, Off Mode, and Active Mode Test Procedure Provisions

1. Incorporating by Reference IEC Standard 62301 Edition 2.0 for Measuring Standby Mode and Off Mode Power Consumption

As noted in the September 2010 NOPR, DOE considered, pursuant to EPCA, the most current versions of IEC Standard 62301 and IEC Standard 62087 for measuring power consumption in standby mode and off mode. (42 U.S.C. 6295(gg)(2)(A)) DOE noted that IEC

[4] 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 has considered IEC Standard 62087, which addresses the methods of measuring the power consumption of audio, video, and related equipment, and determined that it is not relevant to this proposal.

Standard 62301 provides for measuring standby power in electrical appliances, including clothes washers, and therefore, is applicable to the provisions included in the new clothes washer test procedure. 75 FR 57556, 57560 (Sept. 21, 2010). DOE also noted that IEC Standard 62087, which applies to audio, video, and related equipment, is inapplicable to this rulemaking, and did not propose to include any of its provisions in the new test procedure. The Northwest Energy Efficiency Alliance (NEEA) agreed with DOE's determination that IEC Standard 62301 is an appropriate reference standard and that IEC Standard 62087 is not relevant to this rulemaking. (NEEA, No. 12 at p. 2).

DOE proposed in the September 2010 NOPR to incorporate by reference into this test procedure all applicable provisions from Sections 4 and 5 of IEC Standard 62301 (First Edition). Specifically, DOE proposed to incorporate, from section 4, (''General conditions for measurements''), paragraph 4.2, ''Test room;'' paragraph 4.4, ''Supply voltage waveform;'' paragraph 4.5, ''Power measurement accuracy;'' and from section 5, (''Measurements''), paragraph 5.1, ''General,'' Note 1; and paragraph 5.3, ''Procedure.'' 75 FR 57556, 57560 (Sept. 21, 2010). These clauses provide test conditions and test procedures for measuring average standby mode and average off mode power consumption. With respect to test conditions, section 4 of IEC Standard 62301 (First Edition) provides specifications for the test room conditions, supply voltage waveform, and power measurement meter tolerances to ensure repeatable and precise measurements of standby mode and off mode power consumption. With respect to test procedures, section 5 of IEC Standard 62301 (First Edition) provides methods for measuring power consumption when the power measurement is stable and when it is unstable.

DOE also proposed in the September 2010 NOPR to adopt certain provisions from the IEC Standard 62301 Committee Draft for Vote (CDV) version (an earlier draft version of the IEC 62301 revision), as well as the Final Draft International Standard (FDIS) version (the draft version developed just prior to the issuance of the Second Edition). Specifically, DOE proposed to adopt the 30-minute stabilization and 10-minute measurement periods as described in the CDV version and the mode definitions for active, standby and off mode as described in the FDIS version.

DOE noted in the September 2010 NOPR and at the October 2010 public meeting that the IEC was developing an updated version of IEC Standard 62301 (the Second Edition), and interested parties commented on the appropriate version to use for the measurement of standby mode and off mode energy use. Comments made at the public meeting were predicated upon IEC Standard 62301 Final Draft International Standard (FDIS) being the most current (draft) version of the updated standard. Alliance Laundry Systems (ALS); NEEA; Whirlpool Corporation (Whirlpool); the Association of Home Appliance Manufacturers (AHAM); BSH Home Appliances Corporation (BSH); and the Pacific Gas and Electric Company (PG&E), Southern California Gas Company (SCG), San Diego Gas and Electric (SDG&E), and Southern California Edison (SCE) (collectively, the ''California Utilities'') commented that DOE should reference the most current available draft of the Second Edition at the time, IEC Standard 62301 (FDIS). (ALS, No. 10 at p. 1; NEEA, No. 12 at p. 2; Whirlpool, No. 13 at pp. 1–2; AHAM, No. 14 at pp. 2–3; AHAM, Public Meeting Transcript, No. 20 at pp. 21–22; BSH, No. 17 at p. 3; California Utilities, No. 18 at p. 1) Whirlpool commented that the use of IEC Standard 62301 (FDIS) would support international harmonization and reduce manufacturer test burden. (Whirlpool, No. 13 at pp. 1–2) AHAM stated that combining mode definitions based on IEC Standard 62301 (FDIS) with the test methods from IEC Standard 62301 (First Edition) could be confusing to manufacturers, and ignores the intent of IEC Standard 62301 (FDIS). AHAM and Whirlpool further commented that DOE should not choose to reference only certain sections of IEC Standard 62301, and that the document is meant to be used in its entirety. (AHAM, No. 14 at p. 3; Whirlpool, No. 13 at p. 3) BSH agreed with DOE's proposal to use IEC Standard 62301 as the basis for the standby and lower power mode definitions, and noted that the most recent version of the standard (*i.e.,* IEC Standard 62301 (FDIS)) should be considered. (BSH, No. 17 at p. 2)

AHAM also submitted a comment supporting the incorporation by reference of the Second Edition in response to a Request for Information (RFI) issued by DOE to implement Executive Order 13563, ''Improving Regulation and Regulatory Review. (76 FR 6123, Feb. 3, 2011; AHAM, 4) [5] DOE considered this comment in today's SNOPR and, as stated below, is proposing to incorporate by reference relevant portions of the Second Edition.

IEC Standard 62301 (Second Edition) was issued on January 27, 2011 and is now the most current version of IEC Standard 62301. DOE has reviewed the FDIS and Second Edition versions of IEC Standard 62301, and notes that the provisions of the Second Edition are identical in substance to those of the FDIS version. Therefore, DOE interprets comments on IEC Standard 62301 (FDIS) to be equally applicable to IEC Standard 62301 (Second Edition).

DOE notes that IEC Standard 62301 (Second Edition) is an internationally accepted test procedure for measuring standby power in residential appliances, and that this version provides clarification to certain sections as compared to the First Edition, as discussed in the following paragraphs.

Section 4, paragraph 4.4 of the Second Edition revises the power measurement accuracy provisions of the First Edition. A more comprehensive specification of required accuracy is provided in the Second Edition that depends upon the characteristics of the power being measured. Testers using the Second Edition are required to measure the crest factor and power factor of the input power, and calculate a maximum current ratio (MCR). The Second Edition then specifies calculations to determine permitted uncertainty in MCR. DOE notes, however, that the allowable uncertainty is the same or less stringent than the allowable uncertainty specified in the First Edition, depending on the value of MCR and the power level being measured (see Table III.1 for example), so that sufficient accuracy of measurements is achieved under a full range of possible measured power levels without placing undue demands on the instrumentation. These power measurement accuracy requirements were based upon detailed technical submissions to the IEC in the development of IEC Standard 62301 (FDIS), which showed that commonly used power measurement instruments were unable to meet the original requirements for certain types of loads. Therefore, the test burden associated with the additional measurements and calculations is offset by the more reasonable requirements for testing equipment, while maintaining acceptable measurement accuracy. For these reasons, DOE proposes in today's supplemental notice to incorporate by

[5] All comments on the RFI are available at *http://www.gc.energy.gov/1705.htm.*

reference the power equipment specifications in section 4, paragraph 4.4 of IEC Standard 62301 (Second Edition).

TABLE III.1—COMPARISON OF ALLOWABLE UNCERTAINTY IN MEASURED POWER

Measured power *(W)*	Allowable uncertainty *(W)*		
	IEC 62301 (first edition)	IEC 62301 (second edition)	
		MCR = 5	MCR = 15
5.0	0.1	0.1	0.14
2.0	0.04	0.04	0.056
1.0	0.02	0.02	0.028
0.5	0.01	0.02	0.02
0.2	0.01	0.02	0.02

Additionally, IEC Standard 62301 (Second Edition) adds certain clarifications to the installation and setup procedures in section 5, paragraph 5.2 of the First Edition. The First Edition required that the product be installed in accordance with the manufacturer's instructions, except if those instructions conflict with the standby testing, and that if no instructions are given, the factory or default settings shall be used. IEC Standard 62301 (Second Edition) added provisions regarding products equipped with battery recharging circuits, as well as instructions for testing each relevant configuration option identified in the product's instructions for use.

In the September 2010 NOPR, DOE proposed that the clothes washer be installed according to the manufacturer's instructions, but did not propose additional provisions to require the use of default settings for testing standby energy consumption because it did not have information regarding the likelihood that consumers will alter the default display settings. DOE requested comment on the suitability of using the manufacturer's default settings in testing standby energy consumption. 75 FR 57556, 57563 (Sept. 21, 2010). AHAM, ALS, NEEA, and Whirlpool commented that standby energy consumption should be measured at the manufacturer default settings. ALS and AHAM further stated that if no factory default setting is indicated, the clothes washer should be tested with the settings as shipped from the manufacturer. AHAM stated that this approach would yield repeatable, reproducible results among test laboratories. (ALS, No. 10 at p. 1; AHAM, No. 14 at pp. 5–6; NEEA, No. 12 at p. 6; Whirlpool, No. 13 at p. 3)

DOE agrees with commenters that testing a clothes washer for standby mode energy use (and, by extension, the combined low-power mode energy use) at the default setting, or as shipped, if a default setting is not indicated, would ensure consistency of results test-to-test and among test laboratories. Therefore, DOE is proposing in today's SNOPR to incorporate by reference, with qualification as discussed below, the installation instructions in section 5, paragraph 5.2 of IEC Standard 62301 (Second Edition). DOE is not aware of any clothes washers with a battery recharging circuit.

Section 5, paragraph 5.2 of IEC Standard 62301 (Second Edition) also states that, where instructions for use provide configuration options, each relevant option should be separately tested. DOE believes that this requirement to separately test each configuration option could substantially increase test burden and potentially conflicts with the requirement within the same section to set up the product in accordance with the instructions for use or, if no such instructions are available, to use the factory or default settings. Therefore, DOE tentatively concludes that the portions of the installation instructions in section 5, paragraph 5.2 of IEC Standard 62301 (Second Edition) pertaining to batteries and the determination, classification, and testing of relevant modes are not appropriate for the clothes washer test procedure. Accordingly, DOE is proposing qualifying language in the test procedure amendments in today's SNOPR to disregard those portions of the installation instructions.

The Second Edition also contains provisions for the power supply (section 4.3) and power-measuring instruments (section 4.4). Paragraph 4.3.2 requires that the value of the harmonic content of the voltage supply be recorded during the test and reported. As described previously, Paragraph 4.4.1 requires the instrument to measure the crest factor and maximum current ratio. Paragraph 4.4.3 requires the instrument to be capable of measuring the average power or integrated total energy consumption over any operated-selected time interval. DOE is aware of commercially available power measurement instruments that can perform each of these required measurements individually. However, DOE is aware that certain industry-standard instruments, such as the Yokogawa WT210/WT230 digital power meter and possibly others, are unable to measure harmonic content or crest factor while measuring average power or total integrated energy consumption. DOE is concerned that laboratories currently using power-measuring instruments without this capability would be required to purchase, at potentially significant expense, additional power-measuring instruments that are able to perform all these measurements simultaneously. Therefore, DOE proposes that it would be acceptable to measure the total harmonic content, crest factor, and maximum current ratio before and after the actual test measurement if the power measuring instrument is unable to perform these measurements during the actual test measurement. DOE requests comment on whether this represents an acceptable interpretation of the power measurement requirements of the Second Edition.

The other changes in the Second Edition that relate to the measurement of standby mode and off mode power consumption involve the measurement techniques and specification of the stability criteria required to measure that power. The Second Edition contains more detailed techniques to evaluate the stability of the power consumption and to measure the power consumption for loads with different stability characteristics. The user is given a choice of measurement procedures, including sampling methods, average reading methods, and a direct meter reading method. DOE evaluated these new methods in terms of test burden and improvement in results as compared to those methods proposed in the September 2010 NOPR, which were based on IEC Standard

62301 (First Edition), and also to identify the most consistent and repeatable method for use in the DOE clothes washer test procedure.

In the September 2010 NOPR, DOE proposed 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 for cycle finished mode, inactive mode, and off mode. 75 FR 57556, 57562–63 (Sept. 21, 2010). For delay start mode, the September 2010 NOPR proposed to require the delay start time to be set to 5 hours, allowing at least a 5-minute stabilization period followed by a 60-minute measurement period. *Id.* at p. 57563. Further, for any clothes washer in which the power varies over a cycle, as described in section 5, paragraph 5.3.2 of the First Edition, the September 2010 NOPR proposed to require the use of the average power approach in section 5, paragraph 5.3.2(a). *Id.*

For today's supplemental notice, DOE compared the provisions of each edition under different scenarios of power consumption stability to determine the potential impacts of referencing the methodology from IEC Standard 62301 (Second Edition) rather than from the First Edition. Based on this analysis, DOE is proposing in today's SNOPR that the power measurement be made using a sampling method described in IEC Standard 62301 (Second Edition). Because, for the reasons discussed in section III.B.2, DOE is not proposing to require separate measurement of power consumption in cycle finished mode and delay start mode, the analysis presented in the following sections is limited to measurements made in inactive mode and off mode.

a. Stable Power Consumption

According to section 5, paragraph 5.3.1 of IEC Standard 62301 (First Edition), power consumption is defined as stable if it varies by less than 5 percent over 5 minutes. In such a case, a direct reading may be made at the end of the measurement period. With the proposed clarifications in the September 2010 NOPR, the total test time for inactive mode or off mode would be a minimum of 40 minutes (comprised of a minimum 30-minute stabilization period, followed by a minimum 10-minute period during which the stability criterion could be evaluated and a direct power reading taken). Alternatively, the tester may select an average power or accumulated energy approach, again with a minimum 30-minute stabilization period and a minimum 10-minute measurement period. The average power approach would simply require a different reading to be taken from the instrument (true average power instead of a direct reading of instantaneous power), while the accumulated energy approach would require the calculation of power by dividing accumulated energy by the duration of the measurement period.

In comparison, section 5, paragraph 5.3.2 of IEC Standard 62301 (Second Edition) identifies a sampling method as the preferred means for all power consumption measurements and the fastest test method when the power is stable. For any non-cyclic power consumption, power readings are initially recorded over a period of at least 15 minutes after energizing the product. Data from the first third of the measurement period are discarded, and stability is evaluated by a linear regression through all power readings in the second two-thirds of the data. If the slope of the linear regression is less than 10 milliwatts per hour (mW/h) for input power less than or equal to 1.0 W, or less than 1 percent of the input power per hour for input power greater than 1.0 W, the power consumption is calculated as the average of the power readings during the second two-thirds of the measurement period. If the slope of the linear regression does not meet these stability criteria, the total period is continuously extended until the stability criteria are met for the second two-thirds of the data. In some cases, this is a more stringent requirement than the stability criteria of IEC Standard 62301 (First Edition). The lack of a definitive test period means that the test duration could extend past 15 minutes for certain products—up to 3 hours is allowed in the Second Edition—and could introduce added test burden as compared to the First Edition. In addition, performing the continuous linear regression analysis required by the Second Edition would require the use of data-acquisition software with the capability of performing real-time statistical analysis, whereas the First Edition requires only simple data logging capabilities. DOE requests comment on the potential test burden for a laboratory that would be required to upgrade its data acquisition system to enable real-time statistical analysis capabilities.

IEC Standard 62301 (Second Edition) additionally provides an alternative measurement method which may be used when the power consumption is stable. Section 5, paragraph 5.3.4 of IEC Standard 62301 (Second Edition) specifies a direct reading method in which a minimum 30-minute stabilization period must be observed, followed by a first power measurement. After an additional period of 10 minutes, a second power measurement is taken. If the average of the two measurements divided by the time interval between them meets certain threshold criteria, then the power consumption is considered to be the average of the two power measurements. Thus, the total test period would still be a minimum of 40 minutes. DOE agrees that this method likely improves the validity of the test results as compared to the First Edition, since it is a more stringent measure of the stability of the power consumption over a longer period of time than the First Edition requires. However, if the threshold criteria are not met at the end of the test, a different measurement method must be used. Further, the Second Edition specifies that the direct reading method shall not be used for verification purposes. Both of these qualifications potentially increase test burden as compared to the First Edition, possibly requiring the tester to conduct the more complex methodology of the methods available under the Second Edition.

b. Unstable, Non-Cyclic Power Consumption

Section 5, paragraph 5.3.2 from IEC Standard 62301 (First Edition), which DOE proposed in the September 2010 NOPR to incorporate by reference with clarification, specifies that either the average power method or accumulated energy approach could be used for measuring unstable, non-cyclic power consumption (described in the Second Edition as non-cyclic and ''varying'' power consumption). As described previously, the clarifications proposed in the September 2010 NOPR would limit total test duration to 40 minutes for inactive mode and off mode.

In contrast, paragraph 5.3 of the Second Edition requires the use of either a sampling method or average reading method for measuring unstable, non-cyclic power consumption in standby mode or off mode. As noted previously, DOE is proposing to require the use of the sampling method, based on the following analysis.

The sampling method in paragraph 5.3.2 is the same as described previously, but the measurement period must be at least 60 minutes, and the cumulative average of all data points recorded during the second two-thirds of the total period must fall within a band of ± 0.2 percent. The test procedure does not provide an upper time limit for testing, possibly resulting in significantly increased measurement

time if the cumulative average criteria cannot be achieved after 60 minutes.

The average reading method in section 5, paragraph 5.3.3 in IEC Standard 62301 (Second Edition) describes both an average power method and accumulated energy method, either of which may be selected for unstable, non-cyclic power. For both types of the average reading method, a 30-minute stabilization period is specified, followed by two comparison measurement periods of not less than 10 minutes each. The average power values, which are either measured directly or calculated from accumulated energy during each period, are compared to determine whether they agree to within certain threshold criteria. If the threshold is not achieved, the comparison periods are each extended in approximately equal increments until the threshold is met. If agreement is not achieved after reaching 30 minutes for each comparison period, the sampling method must then be used. Therefore, the minimum test period is 50 minutes, but may extend up to 90 minutes, at which time an additional test may be required.

DOE believes that the stability criteria in either method improves the accuracy and representativeness of the measurement as compared to the First Edition, but would cause the required test time to increase, with a corresponding increase in manufacturer burden due to the additional time and complexity of the test conduct. Additionally, DOE believes that manufacturers could face the risk of significant additional test burden if the average reading method is initially chosen but the power measurements do not meet the threshold criteria with the allowable 90-minute maximum test time, requiring a subsequent test using the sampling method.

c. Cyclic Power Consumption

As noted previously, DOE proposed in the September 2010 NOPR to use the average power approach of section 5, paragraph 5.3.2(a) in IEC Standard 62301 (First Edition), with a minimum 30-minute stabilization period and 10-minute measurement period. The First Edition also requires that at least one or more complete cycles be measured.

In the Second Edition, cyclic power must be measured according to the sampling method in section 5, paragraph 5.3.2, but this method requires a measurement period of at least four complete cycles (for a total of at least 40 minutes) divided into two comparison periods, with stability criteria evaluated by calculating the difference in average power measured in each comparison period divided by the time difference of the mid-point of each comparison period. This ''slope'' must be less than 10 mW/h for input powers less than or equal to 1 W, and less than 1 percent of the input power per hour for input powers greater than 1 W. If the appropriate stability criterion is not met, additional cycles are added to each comparison period until the criterion is achieved. Once stability has been reached, the power consumption is calculated as the average of all readings from both comparison periods. DOE believes that this methodology produces an improved measurement over the methodology from the First Edition, but the test duration could be extended, again potentially introducing issues of test burden.

Conclusions on Incorporation of IEC Standard 62301 (Second Edition)

In evaluating IEC Standard 62301 (Second Edition) and comparing it to the First Edition, DOE recognizes the considerable body of comments on and input to the provisions and methodology that IEC developed as part of its latest revision process. DOE recognizes that, in some cases, test burden and complexity would be increased by requiring the use of the power supply, power measuring equipment, and test methods specified in the Second Edition. However, DOE believes that in most cases for residential clothes washers this added burden on manufacturers is outweighed by the improved accuracy and representativeness of the resulting power consumption measurement. Furthermore, manufacturers supported DOE's use of the Second Edition. Therefore, DOE concludes provisionally that the application of the provisions of the Second Edition to all power measurements in standby mode and off mode for clothes washers would be an improvement over the First Edition and would not be unduly burdensome to conduct. Therefore, DOE is proposing incorporation by reference of the relevant paragraphs of section 4 and section 5 of IEC Standard 62301 (Second Edition) in the clothes washer test procedure.

To this end, DOE is also proposing to amend the reference in 10 CFR 430.3 to add a reference to IEC Standard 62301 (Second Edition). DOE is not proposing to replace the reference to the First Edition in 10 CFR 430.3 because several test procedures for other covered products not addressed in today's SNOPR incorporate provisions from it. There are also certain section numbering differences between the First Edition and Second Edition of IEC Standard 62301 that impact the text of the measurement provisions proposed for the clothes washer test procedure in appendix J2. DOE further notes that the mode definitions that were proposed in the September 2010 NOPR would not be affected by the reference to IEC Standard 62301 (Second Edition) because the definitions were based on IEC Standard 62301 (FDIS), which is identical in substance to the Second Edition.

Further, DOE observes that although the Second Edition allows the choice of multiple test methods for both stable and unstable non-cyclic power consumption, the sampling method provides for a test duration that is approximately the same or shorter than the allowable 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. The average reading method in the Second Edition allows the use of either the average power method or accumulated energy method, at the discretion of the test laboratory, which could result in inconsistent test results among different test laboratories. Furthermore, for cyclic power consumption, the Second Edition requires the use of the sampling method. For these reasons, DOE proposes in today's SNOPR to specify the use of the sampling method in IEC Standard 62301 (Second Edition) section 5.3.2 for all measures of standby mode and off mode power consumption.

2. Calculation of Energy Use in Low-Power Modes

In the September 2010 NOPR, DOE proposed two possible approaches for measuring energy consumption in modes other than active washing mode; *i.e.,* inactive (standby) mode, off mode, delay start mode, and cycle finished mode [6] (hereafter, collectively referred to as low-power modes).

For the first approach, DOE proposed allocating 295 hours per year to the active washing mode, 16 hours to self-clean mode (if applicable), 25 hours per year to delay start mode (if applicable), 15 hours per year to cycle finished mode (if applicable), and the remainder to off and/or inactive mode. 75 FR 57556, 57564–65 (Sept. 21, 2010). Using this approach, the energy use per cycle associated with inactive, off, delay start, and cycle finished modes would be calculated by (1) Calculating the product of wattage and allocated hours for all possible inactive, off, delay start and cycle finished modes; (2) summing

[6] Delay start and cycle finished modes are considered part of the active mode.

the results; (3) dividing the sum by 1,000 to convert from Wh to kWh; and (4) dividing by the proposed 295 use cycles per year.

For the second ''alternate approach,'' DOE 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, separate measurements of delay start and cycle finished mode energy consumption would not be required; instead, all the hours not associated with active washing mode or self-clean mode (8,465 hours total) would be allocated to the inactive and off modes. DOE noted that delay start and cycle finished modes represent a relatively small number of hours at low power consumption levels. For clothes washers currently on the market, these levels are comparable to those for off/inactive modes. *Id.*

In evaluating the best approach for measuring energy use in low-power modes, DOE considered comments from interested parties regarding the allocation of hours to modes other than active washing mode. A number of these comments related to the estimates DOE provided of the number of hours associated with each low-power mode.

NEEA objected to DOE's proposed allocation of the time spent in cycle finished mode, based on an estimate of 3 minutes per cycle. NEEA stated that DOE relied on anecdotal data from Australia to determine its estimates. NEEA also noted that DOE was aware of units capable of operating up to 10 hours in cycle finished mode, but had no field data to support an assumption about what fraction of the 10 hours were used, nor any data that would allow an estimate of the typical cycle finished mode duration. NEEA recommended that DOE acquire data to provide a statistically valid basis for assumptions about the duration of cycle finished mode. NEEA further commented that there is no reason to exclude the measurement of the energy use of fans and motors in the cycle finished mode, or to arbitrarily curtail the time period for their measurement. (NEEA, No. 12 at pp. 3, 7; NEEA, Public Meeting Transcript, No. 20 at pp. 75–76)

NEEA also commented that recent field measurements conducted for the California Public Utility Commission (CPUC) indicate that inactive mode energy use can be significant, equivalent to the energy consumption of an additional wash load per week (not including hot water energy consumption). (NEEA, No. 12 at p. 3) NEEA stated that DOE's estimates for the time spent in the inactive mode call into question the need for the specified accuracy in measuring the power use in the inactive mode. (NEEA, No. 12 at p. 7)

The California Utilities commented that DOE should increase the length of time allocated to cycle finished mode in the test procedure calculations. The California Utilities further noted that the Australian study on which DOE relied for other estimates in the proposed test procedure showed that 20 percent of the total use time not allocated to active washing or delay start mode would be associated with the cycle finished mode. Additionally, the California Utilities noted that DOE's estimates were based on internal testing, although it is not clear if the proposed cycle finished mode duration was based on all machines tested, or only those having a cycle finished mode, and requested either a clarification or correction to this calculation. The California Utilities stated that it also was not clear whether DOE's test sample included machines providing periodic air flow or tumbling in the cycle finished mode, or if it only tested machines with an extended display operation. The California Utilities recommended that DOE test machines with these additional features to determine their typical cycle finished mode duration, which for some machines may be hours after completion of the wash cycle. (California Utilities, No. 18 at pp. 2–3)

ALS did not agree that cycle finished mode energy consumption should be accounted for separately from the active washing mode. (ALS, No. 10 at p. 1) Whirlpool commented that DOE should not measure or include in the test procedure cycle finished energy consumed by air movement fans or by periodic tumbling, as these are very limited application features where the measurement burden would substantially outweigh the value of the energy measurement. (Whirlpool, No. 13 at p. 2) Whirlpool commented further that the significant test burden associated with measuring cycle finished mode results in virtually no consumer benefit, and these values should be dropped from the test procedure's calculations. (Whirlpool, No. 13 at p. 4)

AHAM also commented in response to the RFI issued by DOE to implement Executive Order 13563, ''Improving Regulation and Regulatory Review, opposing any test procedure requirement to measure separately the energy use of delay start and cycle finished modes. AHAM stated that the additional burden that would be required to measure a de minimis amount of energy would not be justified. (76 FR 6123, Feb. 3, 2011; AHAM, 5–6)

DOE also received multiple comments from interested parties regarding the proposed ''alternate approach,'' which would allocate all the hours not associated with active washing mode to the inactive and off modes.

ALS, AHAM, and BSH support the alternative calculation proposed in the September 2010 NOPR. (ALS, No. 10 at p. 2; AHAM, No. 14 at p. 8; AHAM, Public Meeting Transcript, No. 20 at pp. 87–88; BSH, No. 17 at p. 3) ALS and AHAM generally oppose the proposed method of separately allocating annual hours to delay start mode, cycle finished mode, and self-clean mode because they believe that DOE does not have reliable consumer use data for these modes. In addition, as stated above, ALS and AHAM stated that these modes represent insignificant energy consumption to justify measuring them separately. (ALS, No. 10 at p. 2; AHAM, No. 14 at p. 7; AHAM, Public Meeting Transcript, No. 20 at pp. 55–56, 73, 93) Whirlpool also commented that the test procedure should not include delay start mode, cycle finished mode, or off mode because these modes represent insignificant energy consumption. (Whirlpool, No. 13 at p. 4).

NEEA opposed the proposed alternative calculation method, stating that it would be inappropriate to ignore the delay start and cycle finished modes with almost no data on the actual duration and energy use for these modes. (NEEA, No. 12 at p. 8) NEEA believes that the energy use in delay start mode and cycle finished mode is not insignificant, and should be included in the energy use calculations. According to NEEA, manufacturers would have no incentive to minimize energy used in these modes if they were not included in the calculations. (NEEA, No. 12 at p. 8) NEEA further commented that the proposed calculation method for measuring each mode is sound, but could be simplified if the calculation simply involved active mode, with delay start mode and cycle finished mode folded in, and inactive mode, as measured for each model tested. (NEEA, No. 12 at p. 7) NEEA did, however, comment that it might support the alternative approach if the active wash mode is defined for each machine to include any cycle finished mode, including machines with cycle finished modes with intermittent tumbling that can last as long as 10 hours. (NEEA, Public Meeting Transcript, No. 20 at p. 88)

The Appliance Standards Awareness Project (ASAP), American Council for an Energy-Efficient Economy (ACEEE), and NRDC (hereafter referred to as the ''Joint Comment'') expressed support for

NEEA's proposal to fold delay start and cycle finished modes into a single energy test cycle that would also include the active wash cycle. The Joint Comment stated that this approach would seem to simplify the test, and it would ensure that any energy and/or water consumption that occurs after the final spin, such as the addition of steam, would be captured by the test procedure. (Joint Comment, No. 16 at p. 4)

DOE acknowledges that certain clothes washers provide optional tumbling or air circulation features in cycle finished mode. As noted in the September 2010 NOPR, the number of residential clothes washers equipped with a periodic tumbling or air circulation feature during cycle finished mode represents less than 10 percent of the models produced by manufacturers comprising over 90 percent of the market. 75 FR 57556, 57561 (Sept. 21, 2010). In addition, review of product literature for the clothes washers equipped with such features shows that these functions are typically consumer-selected options.

To further support the proposal in today's SNOPR, DOE performed additional laboratory testing to quantify the energy consumption in cycle finished mode. DOE tested the residential clothes washer model that it identified as having the longest-duration and most energy-intensive cycle finished feature on the market. This clothes washer includes a user-selectable option that provides periodic tumbling and air circulation for up to 10 hours following the completion of the wash cycle. For the duration of this cycle finished mode, the cycle finished indicator on the control panel remains activated, the door remains locked, and an additional feature indicator light on the control panel flashes.

DOE measured the energy consumption of this cycle finished feature for the maximum possible 10 hour duration, using the warm wash/cold rinse energy test cycle and the average test load size as indicated by Table 5.1 in appendix J1, extended linearly as discussed in section III.B.7.a. These test parameters were chosen because they correspond to the highest usage factors according to the appendix J1 test procedure. DOE also measured the clothes washer's standby energy consumption. Figure III.1 shows the power consumption in W during the active washing mode followed by the first 45 minutes of cycle-finished mode. The shaded portion of the figure indicates cycle finished mode.

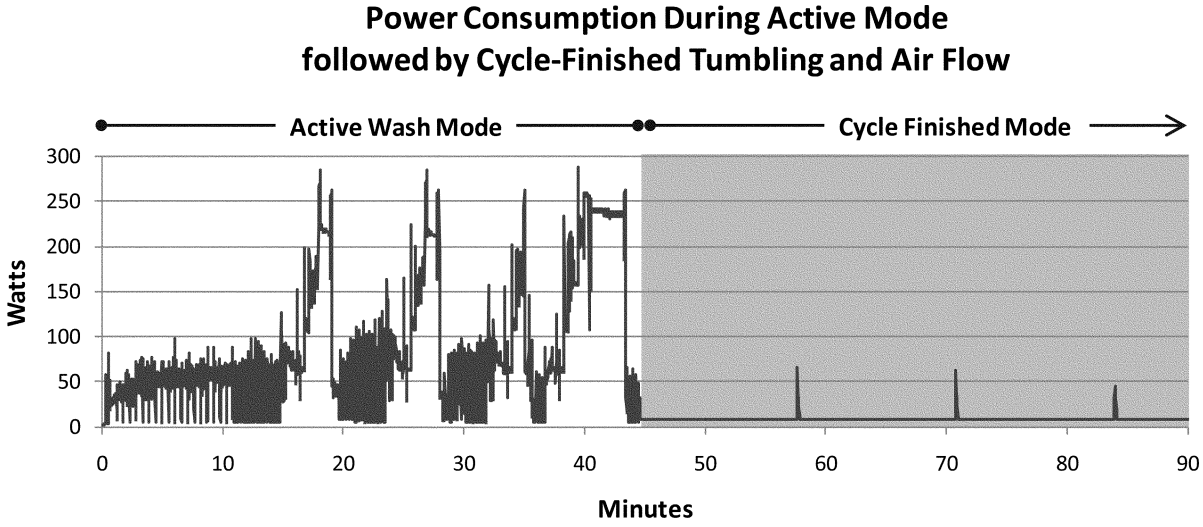

Figure III.1 Example Power Consumption During Active Washing Mode and Cycle Finished Mode

Table III.2 shows the cycle finished mode energy consumption for the test clothes washer along with the other factors that the proposed Integrated Modified Energy Factor (IMEF) metric incorporates: (1) Machine electrical energy use in active washing mode, (2) hot water energy use in active washing mode, (3) energy associated with moisture removal (*i.e.,* drying energy), and (4) standby (inactive) mode energy use.

TABLE III.2—EXAMPLE COMPARISON OF TOTAL PER-CYCLE ENERGY CONSUMPTION WITH AND WITHOUT CYCLE FINISHED MODE

Mode	Per-cycle energy consumption contributors (kWh/cycle)	
	Standby mode only	Cycle-finished mode included
Active washing mode—Machine electrical energy	0.16	0.16
Active washing mode—Hot water energy	0.23	0.23
Active washing mode—Drying energy	1.58	1.58
Standby mode (23 hours)	0.06	N/A

TABLE III.2—EXAMPLE COMPARISON OF TOTAL PER-CYCLE ENERGY CONSUMPTION WITH AND WITHOUT CYCLE FINISHED MODE—Continued

Mode	Per-cycle energy consumption contributors (kWh/cycle)	
	Standby mode only	Cycle-finished mode included
Cycle finished mode (10 hours)	N/A	0.08
Standby mode (13 hours)	N/A	0.04
Total per-cycle energy consumption (kWh)	2.03	2.09
IMEF (ft^3/kWh/cycle)	1.91	1.85

Figure III.2 shows the relative magnitude of each of the contributors to total per-cycle energy consumption for both scenarios.

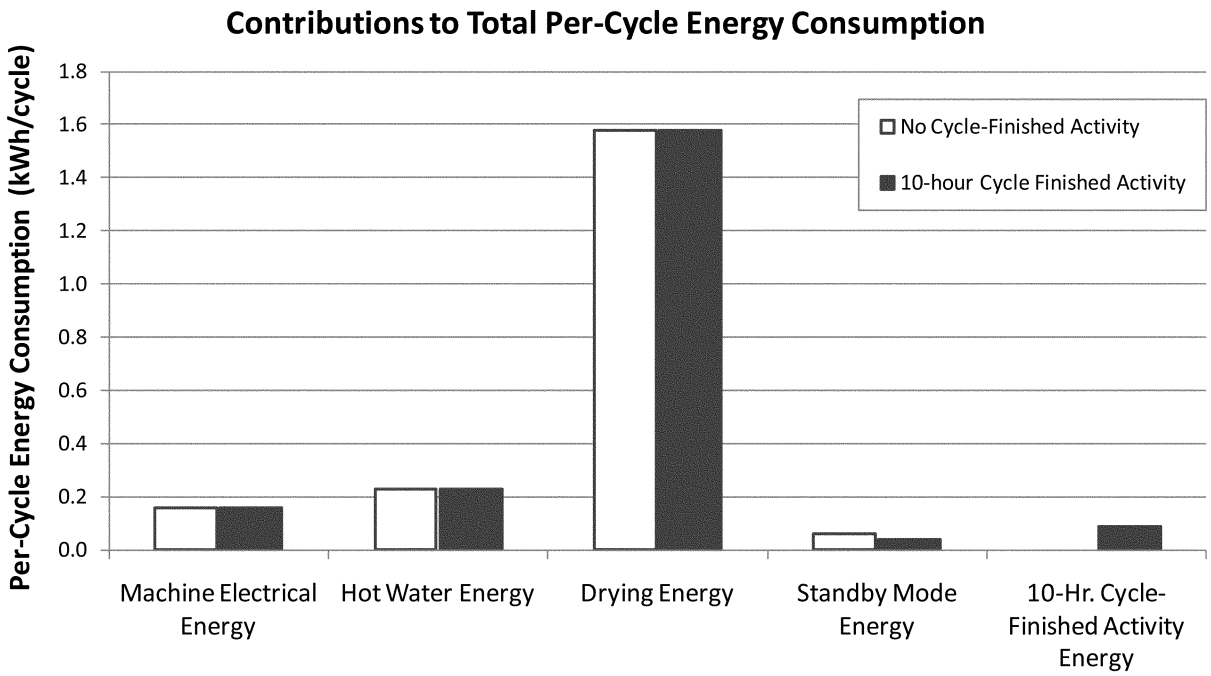

Figure III.2 Example Components of Total Per-Cycle Energy Consumption

The cycle finished feature of this clothes washer consumes 0.08 kWh over the maximum 10-hour duration. After accounting for the 10 fewer hours in inactive mode, the cycle finished feature with intermittent tumbling and air circulation would add a net 0.06 kWh to the total per-cycle energy consumption of this clothes washer, an increase of 3.0 percent. If consumers were to select this feature for all wash cycles, IMEF would decrease by 3.0 percent.

DOE recognizes that the 3.0 percent decrease in IMEF represents a worst-case scenario. A 3-percent increase in annual energy consumption would occur only if a consumer activated this feature on 100 percent of laundry cycles and if the cycle-finished activity persisted for the full 10 hours after every cycle. While DOE lacks consumer usage data of this cycle finished feature, DOE believes it is reasonable that consumers would activate this feature less than 100 percent of the time, and that, on average, the cycle finished activity would persist for less than the full 10 hours. For illustrative purposes, if a consumer selected the cycle finished option on 50 percent of all wash cycles, and, on average, the cycle finished activity persisted for 50 percent of the maximum allowable time (*i.e.,* for 5 hours), total annual energy consumption would increase by only 0.75 percent.

Based on the results of the data presented here, DOE believes that including a specific measurement of energy use of a cycle finished feature that incorporates intermittent tumbling and air circulation would not significantly impact the total annual energy consumption. Furthermore, measuring the energy use over the entire duration of cycle finished mode would increase the test duration by up to 10 hours, depending on the maximum duration of cycle finished mode provided on the clothes washer under test. DOE believes this would represent a significant increase in test burden that would not be warranted by the minimal additional energy use captured by measuring cycle finished mode separately or as part of the active washing mode.

Therefore, in consideration of the data and estimates previously presented in the September 2010 NOPR, the

additional energy consumption estimates presented in this SNOPR, the uncertainty regarding consumer usage patterns, and the additional test burden required, DOE is not proposing to adopt provisions to measure cycle finished mode separately or as part of the active washing mode. In the absence of a compelling reason to treat cycle finished mode separately, DOE believes that its assumption set forth in the September 2010 NOPR that the power consumption in each low-power mode is similar remains valid, 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. Therefore, DOE is proposing in today's SNOPR to adopt the ''alternate approach'' for measuring total energy consumption, in which all low-power mode hours are allocated to the inactive and off modes, and the low-power mode power consumption is measured only in the inactive and off modes, depending on which of these modes is present.

3. Energy Test Cycle Definition

The energy test cycle is the cycle currently used in determining the modified energy factor (MEF) and water factor (WF) for a clothes washer, and proposed to be used for determining integrated modified energy factor (IMEF) and integrated water consumption factor (IWF). The energy test cycle is defined in section 1.7 of the current clothes washer test procedure based on (A) The cycle recommended by the manufacturer for washing cotton or linen clothes, which includes all wash/rinse temperature selections and water levels offered in that cycle; and (B) other cycles that may include other temperature or water level options if they contribute to an accurate representation of energy consumption. In the September 2010 NOPR, DOE proposed to amend part (B) of the energy test cycle definition to provide clarity in determining whether to test temperature options available only on cycle settings other than that defined in part (A) of the definition. Specifically, DOE proposed modifying part (B) as follows:

''* * * (B) if the cycle described in (A) does not include all wash/rinse temperature settings available on the clothes washer and required for testing as described in this test procedure, the energy test cycle shall also include the portions of a cycle setting offering these wash/rinse temperature settings with agitation/tumble operation, spin speed(s), wash times, and rinse times that are largely comparable to those for the cycle recommended by the manufacturer for washing cotton or linen clothes. Any cycle under (A) or (B) shall include the default agitation/tumble operation, soil level, spin speed(s), wash times, and rinse times applicable to that cycle, including water heating time for water heating clothes washers.'' 75 FR 57556, 57575–76 (Sept. 21, 2010).

In testing conducted since the September 2010 NOPR, DOE has observed that some clothes washers retain in memory the most recent options selected for a cycle setting the next time that cycle is run. To ensure repeatability of test results, particularly for cycles under part (B) of the energy test cycle definition, DOE proposes in today's SNOPR to further clarify that the manufacturer default conditions for each cycle setting shall be used, except for the temperature selection, if necessary. For example, if the extra hot temperature selection was only available on the ''whites'' cycle, the manufacturer would use the whites cycle to test that temperature setting. Because the default temperature setting for the whites cycle may be warm or hot, however, the manufacturer would have to manually adjust the temperature to get to extra hot. For certification testing in such cases, the manufacturer would use the default settings on the whites cycle for all options except the temperature setting, which would be manually adjusted to achieve the desired temperature.

In addition, DOE proposes to delete ''and required for testing as described in this test procedure'' from part (B) as redundant and unnecessary.

AHAM commented that DOE's proposal in the September 2010 NOPR to amend Part B of the energy test cycle definition was vague, undefined, and included a significant amount of variability. AHAM noted that variability in a test procedure has substantial consequences for manufacturers, and that the test procedure must be clear and be uniformly understood to avoid serious consequences in variations in testing across laboratories or technicians. (AHAM, No. 14 at p. 15) DOE believes that the proposed modification to part (B) provides additional specificity on the wash cycle settings (*i.e.,* agitation/tumble operation, spin speed(s), wash times, and rinse times) that, if comparable to those for the cycle recommended by the manufacturer for washing cotton or linen clothes, must be considered under part (B) of the energy test cycle definition.

4. Load Adjustment Factor

The clothes washer test procedure relies on use factors to weight different consumer behaviors in the overall energy and water consumption calculations. The factors are based on consumer use data and represent the fraction of all cycles that are run with certain settings or characteristics. The Load Adjustment Factor (LAF) represents the ratio of maximum load size to average load size. This ratio is used in the calculation of the energy required to remove moisture from the test load (*i.e.,* drying energy). The RMC value used in this calculation is based only on tests using the maximum test load—the LAF is used to scale this value down to the average load size. In the September 2010 NOPR, DOE noted that it lacked information warranting adjusting this value or changing it from a fixed value to one that varies as a function of average load size, and therefore did not propose to amend the LAF in the test procedure. 75 FR 57556, 57572 (Sept. 21, 2010).

AHAM and ALS support DOE's proposal to retain the existing LAF in the test procedure. (AHAM, No. 14 at p. 13; ALS, No. 10 at p. 4) BSH, The California Utilities, Energy Solutions (ES), NEEA, Natural Resources Defense Council (NRDC), and the Joint Comment stated that it is an inconsistency in the test procedure to have a single LAF that does not correlate with the load usage factors. (BSH, Public Meeting Transcript, No. 20 at pp. 149–150; California Utilities, No. 18 at p. 4; ES, Public Meeting Transcript, No. 20 at p. 150; Joint Comment, No. 16 at pp. 5–6; NEEA, Public Meeting Transcript, No. 20 at p. 149) ASAP commented that an average load size value that depends on capacity does not represent consumer usage. (ASAP, Public Meeting Transcript, No. 20 at pp. 151–152) ES stated that the ratio of average load size to maximum load size is 70–75 percent for small clothes washers but is closer to 50–55 percent for larger clothes washers. (ES, Public Meeting Transcript, No. 20 at p. 150) The California Utilities recommended that RMC be measured by testing with minimum, average, and maximum test load sizes, with the average test load size calculated as 65 percent of the maximum load size. The California Utilities further commented that the results from each test load size should be weighted using the same load usage factors as those used for the energy test cycle. (California Utilities, No. 18 at p. 4) NRDC stated that a single LAF could be calculated from the three weighting values assigned to the load usage factors. (NRDC, Public Meeting Transcript, No. 20 at pp. 142–145, 148–149) NEEA and the Joint Comment doubted that the relationship between

tested RMC values and load size is linear for most clothes washers. According to the Joint Comment, the Bern Clothes Washer Study found that RMC decreases with increasing load size and that this effect is more significant for top-loaders than for front-loaders. Due to this finding, the Joint Comment believes that measuring RMC at a maximum load size and assuming that the same RMC would apply to an ''average'' load size likely underestimates actual RMC and therefore dryer energy consumption for an ''average'' load size. Instead, the Joint Comment suggested that RMC be measured for minimum, maximum, and average load sizes and that dryer energy consumption be calculated for each load size using the corresponding measured RMC. A weighted-average dryer energy consumption could then be calculated using the load usage factors. The Joint Comment stated that, although this approach would slightly increase test burden, it believes the increased burden would be insignificant because tests with the different load sizes are already required to be run in the current test procedure. Therefore, the Joint Comment stated that the only addition would be an RMC measurement for each of the different load size test cycles rather than just for the maximum load test cycle. (Joint Comment, No. 16 at pp. 7–8) NEEA also noted that there is no average test load size for manual fill models, but three different load sizes for adaptive fill models. According to NEEA, a weighted-average value for LAF is more appropriate, but even better would be to conduct RMC tests at various load sizes, and use the load usage factors to obtain weighted-average results. (NEEA, No. 12 at pp. 12–13)

DOE notes that both the LAF and load usage factors are intended to adjust test results measured at discrete load sizes to values that are representative of real-world consumer use. The LAF, however, is also intended to capture the dependence of RMC on load size because the RMC test is conducted using only the maximum load size.

As observed by the California Utilities, data collected as part of the Bern Clothes Washer Study suggest that an RMC test conducted at maximum load size would produce a different RMC than a test conducted at the average load size. Because the LAF must account for two effects—the percentage of times that users select different load sizes and the variation of measured RMC with load size—it would be expected to differ somewhat from any of the load usage factors, which capture only the consumer load size selection effect. For the August 1997 Final Rule, however, DOE obtained information that, when averaged with data provided by interested parties, showed that the relationship between load size and RMC was almost non-existent. For this reason, DOE concluded in the August 1997 Final Rule that it was acceptable to test RMC using only the maximum load size. DOE does not believe that conducting multiple RMC measurements at different load sizes would improve the calculation of drying energy use. Additionally, DOE believes that the Bern Study is inconclusive with respect to the LAF because (1) The relationship between RMC and load size was not demonstrated for individual machines, and (2) the test load composition was not controlled.

In light of the available data suggesting that load size does not affect the RMC measurement, the remaining trend that the LAF is intended to capture is the pattern of consumer selection of load size, which is already incorporated in the test procedure via the load usage factors. This suggests that the LAF is duplicative of, yet inconsistent with, the load usage factors. Therefore, DOE proposes in today's SNOPR that, for consistency with the rest of the test procedure, the representative load size calculation in the equation for drying energy should incorporate the load usage factors rather than a separate LAF. In the current drying energy calculation, the representative load size is calculated by multiplying the fixed value of LAF by the maximum load size. DOE proposes that this representative load size be replaced by a weighted-average load size calculated by multiplying the minimum, average, and maximum load usage factors by the minimum, average, and maximum load sizes, respectively, and summing the products.

5. Wash Time Setting

The current test procedure specifies the wash time setting to be used in the energy test cycle. If only one wash time is prescribed in the energy test cycle, that wash setting is to be used; otherwise, the wash time setting is required to be the higher of either the minimum wash time or 70 percent of the maximum wash time available in the energy test cycle. DOE has recently become aware that, for certain clothes washers equipped with an electromechanical dial to control wash time, the dial may yield different results for the same setting depending on the direction in which the dial is turned to reach the desired setting. DOE believes that consistency in setting the wash time in such cases may be achieved by resetting the dial to the minimum wash time and then turning it in the direction of increasing wash time to reach the desired setting. If the desired setting is passed, the dial should not be turned in the direction of decreasing wash time to reach the setting. Instead, the dial should be returned to the minimum wash time and then turned in the direction of increasing wash time until the desired setting is reached. DOE, therefore, proposes to add these clarifications to the wash time setting provisions in both appendix J1 and appendix J2. DOE believes that this clarification would not affect the energy and water use measurements, but would help ensure consistency when determining compliance with energy conservation standards. To provide further consistency, DOE also proposes the further clarification that the conditions stated in the case of more than one wash time setting—that the wash time setting shall be the higher of either the minimum, or 70 percent of the maximum wash time available in the energy test cycle—shall apply regardless of the labeling of suggested dial locations.

6. Annual Energy Cost

In the September 2010 NOPR, DOE considered whether to amend the estimated annual operating cost calculation in 10 CFR 430.23 to include the cost of energy consumed in the non-active washing modes, but did not propose such amendments for the following reasons:

- DOE believed that the cost of energy consumed in self-clean, standby, off, delay start, and cycle finished modes is small relative to the total annual energy cost for clothes washers, and therefore, would make little difference in the estimated annual operating cost calculation.
- The Federal Trade Commission's (FTC's) EnergyGuide Label for clothes washers uses the estimated annual operating cost as its primary indicator of product energy efficiency, compared to a range of annual operating costs of similar products. Appendix F1 to 16 CFR part 305. An estimated annual operating cost incorporating self-clean, standby, off, delay start, and cycle finished mode energy use would no longer be directly comparable to the minimum and maximum energy costs prescribed for the EnergyGuide label.

75 FR 57556, 57567 (Sept. 21, 2010).

ALS and AHAM supported DOE's proposal to maintain the existing energy cost calculation. (ALS, No. 10 at p. 3; AHAM, No. 14 at p. 9) AHAM and Whirlpool commented, however, that DOE's proposal to exclude non-active

washing modes from the annual energy cost calculation is inconsistent with the proposal to include these modes in the IMEF calculation. (Whirlpool, No. 13 at p.5; AHAM, No. 14 at p. 9).

NEEA disagreed with DOE's assertion that the cost of energy consumed in non-active washing modes would make little difference in the estimated annual operating cost calculation. NEEA noted that no publicly available data exists on which to base such an assertion, but that end-use data from the field suggests that standby energy could constitute as much as 5 to 10 percent of total clothes washer energy use, not including drying energy use. (NEEA, No. 12 at p. 8)

EPCA requires that 180 days after the amended test procedure is prescribed, all representations related to the energy use, efficiency, or cost of energy consumed for residential clothes washers must reflect the results of testing according to the amended test procedure, which will include provisions for measuring standby and off mode energy use. (42 U.S.C. 6293(c)(2)) Additionally, EPCA requires that any revisions to the labels for residential clothes washers include disclosure of the estimated annual operation cost (determined in accordance with DOE's test procedures prescribed under section 6293 of EPCA), unless the Secretary determines that disclosure of annual operating cost is not technologically feasible, or if the FTC determines that such disclosure is not likely to assist consumers in making purchasing decisions or is not economically feasible. (42 U.S.C. 6294(c)(1))

For these reasons, DOE agrees that the annual energy cost calculations in 10 CFR 430.23 for residential clothes washers should be amended to include the cost of energy consumed in non-active washing modes. Therefore, DOE proposes to amend the clothes washer test procedure to revise the estimated annual operating cost calculation to integrate energy use in standby, off and self-clean modes. The estimated annual operating cost would be obtained by multiplying the 295 average number of annual use cycles by: (1) When electrically heated water is used: (total per-cycle machine electrical energy consumption + per-cycle hot water energy consumption + per-cycle self-clean energy consumption + per-cycle ''combined low-power'' mode energy consumption) × (the representative average unit cost in dollars per kWh, as provided by the Secretary); or (2) when gas-heated or oil-heated water is used: [(per-cycle machine electrical energy consumption + per-cycle self-clean machine electrical energy consumption + per-cycle combined low-power mode energy consumption) × (the representative average unit cost in dollars per kWh, as provided by the Secretary)] + [(per-cycle water energy consumption for gas-heated or oil-heated water + per-cycle self-clean water energy consumption for gas-heated or oil-heated water) × (representative average unit cost in dollars per Btu for oil or gas, as appropriate, as provided by the Secretary)]. The estimated annual operating cost would be rounded off to the nearest dollar per year. To provide for the appropriate per-cycle electrical and water heating measures used in the annual energy cost calculation, DOE proposes new calculations of per-cycle self-clean electrical, hot water, and overall energy consumption in today's SNOPR.

7. Additional Proposals

a. Extension of Test Load Size Table

The clothes washer test procedure at appendix J1 specifies test load size for the active washing mode energy tests based on the clothes washer's container volume. The table specifying the test load sizes, Table 5.1, currently covers clothes washer container volumes up to only 3.8 ft^3. DOE stated in the September 2010 NOPR that it was aware of multiple clothes washers available on the market that have clothes container volumes exceeding 3.8 ft^3, and proposed to revise Table 5.1 in the amended test procedure in appendix J2 to establish test load size specifications for clothes washer container volumes up to 6.0 ft^3. The proposed extension was based on a continuation of the linear relationship between test load size and clothes washer container volume in the DOE clothes washer test procedure at appendix J1. 75 FR 57556, 57570–71 (Sept. 21, 2010).

DOE also received petitions for waiver from the current clothes washer test procedure from a number of manufacturers for clothes washers that they produce with clothes container volumes greater than 3.8 ft^3. DOE granted waivers to these manufacturers, all of which contained alternate test procedures based on similar linear extensions of Table 5.1.

DOE proposes to extend Table 5.1 in appendices J1 and J2 based on the extended version of Table 5.1 proposed in the September 2010 NOPR for appendix J2, with some minor adjustments. In the September 2010 NOPR, DOE presented inconsistent decimal places in the minimum, average, and maximum load sizes in Table 5.1. This subsequently affected the calculation of some of the average load size values in the table. In today's SNOPR, DOE proposes to amend the extension to Table 5.1 in appendices J1 and J2 by specifying each load size value to the hundredths decimal place.

b. Correction to Cold Rinse Definition

After the publication of the September 2010 NOPR, DOE became aware of an error in the definition of cold rinse in the test procedure at appendix J1. Specifically, cold rinse is defined in section 1.22 of appendix J1 as ''the coldest rinse temperature available on the machine (and should be the same rinse temperature selection tested in 3.7 of this appendix).'' However, section 3.7 of appendix J1 contains provisions for testing warm rinse, which instruct that such tests be conducted with the hottest rinse temperature available. Thus, section 3.7 is inapplicable to the definition of cold rinse in section 1.22. DOE proposes in today's SNOPR to remove reference to section 3.7 in the definition of cold rinse in both section 1.22 of appendix J1 and proposed section 1.7 of appendix J2.

c. Deletion of Redundant Test Cloth Specifications

In the September 2010 NOPR, DOE proposed deleting the redundant sections 2.6.1.1–2.6.1.2.4 from appendix J2. These sections pertain to test cloth specifications and preconditioning and were made obsolete in the 2001 Final Rule, which added sections 2.6.3 through 2.6.7.2 into appendix J1. 66 FR 3314. In today's SNOPR, DOE proposes to remove these redundant sections from appendix J1 as well. Consistent with the proposal in the September 2010 NOPR, DOE proposes to use in section 2.6.4.3 the thread count specification from deleted section 2.6.1.1(A), of 65 × 57 per inch (warp × fill), based on supplier data. Additionally, DOE proposes to maintain a shrinkage limit, relocated from section 2.6.1.1(B) to new section 2.6.4.7, but to increase the current 4 percent limit to 5 percent. DOE also proposes to require the cloth shrinkage to be measured as per the American Association of Textile Chemists and Colorists (AATCC) Test Method 135–2010, ''Dimensional Changes of Fabrics after Home Laundering.'' These revisions are also supported by supplier data, according to AHAM. (AHAM, No. 15 at p. 15).

d. Detergent Specifications for Test Cloth Preconditioning

In the September 2010 NOPR, DOE proposed amending the clothes washer test procedure to specify the use of AHAM standard test detergent Formula

3 in test cloth preconditioning, at a dosing of 27.0 g + 4.0 g/lb. DOE proposed incorporating this amendment into the proposed appendix J2 test procedure.

ALS supported DOE's proposal to specify the use of AHAM standard detergent Formula 3 in test cloth preconditioning as well as the proposal to follow the instructions included with the detergent, because it is makes the dosing common with the Dryer Test Load preconditioning procedure. (ALS, No. 10 at p. 5) NEEA stated that it foresees no problem with, and some benefit from, adopting the AHAM detergent specification. (NEEA, No. 12 at p. 14) Whirlpool stated that the proposed detergent formulation and dosage changes are consistent with AHAM Standard HLD–1–2009, which Whirlpool supports. (Whirlpool, No. 13 at p. 14) AHAM supported DOE's proposal to amend the test procedure to specify the use of AHAM standard test detergent Formula 3 in test cloth preconditioning at a dosing of 27.0g +4.0g/lb (AHAM, No. 14 at p. 15; Public Meeting Transcript, No. 20 at pp. 194–195).

In today's SNOPR, DOE proposes to amend the appendix J1 and J2 test procedures to require the use of the current AHAM standard test detergent formula for test cloth preconditioning, at a dosing of 27.0g +4.0g/lb. The current AHAM standard test detergent is Formula 3.

e. Cold Wash Temperature Selection

DOE has observed multiple clothes washer models that offer a ''tap cold'' wash temperature setting in addition to a ''cold'' wash temperature setting. DOE proposes to clarify how to classify these temperature selections in appendix J1 and appendix J2.

Section 3.6 of appendix J1 defines the cold wash selection as ''the coldest wash temperature selection available.'' Additionally, section 1.18 of Appendix J1 defines ''warm wash'' as ''all wash temperature selections below the hottest hot, less than 135 °F, and above the coldest cold temperature selection.'' In some cases with these models, DOE has observed that the ''cold'' setting mixes in hot water to raise the temperature above the cold water supply temperature, as defined in section 2.3 of Appendix J1. In such cases, DOE proposes that the manufacturer specified ''cold'' setting should be considered a warm wash, as defined in section 1.18; and that the ''tap cold'' setting should be considered the cold wash, as defined in section 3.6. In cases where the ''cold'' setting does not add any hot water for any of the test loads required for the energy test cycle, the ''cold'' setting should be considered the cold wash; and the ''tap cold'' setting would not be required for testing. DOE requests comment on the appropriateness of this clarification.

f. Correction to Per-Cycle Self-Clean Water Consumption Calculation

In the September 2010 NOPR, DOE proposed incorporating per-cycle self-clean hot water energy consumption (section 4.1.8) into the calculation for IMEF, as well as total per-cycle self-clean water consumption (section 4.2.14) into the calculation for IWF in appendix J2. The proposed calculations in section 4.1.8 and section 4.2.14 did not contain the numeric multipliers required to apportion the total annual self-clean water consumption over the 295 representative average number of clothes washer cycles in a year. In today's SNOPR, DOE proposes to adjust the calculations in section 4.1.8 and 4.2.14 by including a multiplier of 12/295, where 12 represents the average number of clothes washer self-clean cycles in a year, and 295 represents the average number of clothes washer cycles in a year.

C. 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 that measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use. Test procedures must also not be unduly burdensome to conduct.'' (42 U.S.C. 6293(b)(3)).

In the September 2010 NOPR, DOE noted that the proposed amendments to the residential clothes washer test procedure 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 clothes washer test procedure would produce standby mode and off mode average power consumption measurements that are 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 test. 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 September 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 57556, 57578 (Sept. 21, 2010).

DOE also noted in the September 2010 NOPR that the proposed active mode amendments may require some manufacturers to incur equipment purchases on the order of hundreds of dollars, and would require testing additional cycles that could increase the total test time for certain clothes washers by approximately 25 percent. DOE tentatively concluded, however, that including these additional cycles in the test procedure would provide for a more representative measurement of machine energy efficiency and water use, and that the time commitment required to test these additional cycles would not represent a significant burden on manufacturers since the current test procedure already requires multiple energy test cycles. *Id.*

Today's supplemental proposed amendments to the DOE test procedures are based on an updated version of IEC Standard 62301, IEC Standard 62301 (Second Edition). As discussed in section III.B.1 of this notice, DOE believes that the provisions of IEC Standard 62301 (Second Edition) that it proposes to incorporate by reference in today's SNOPR 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 concludes that today's supplemental proposed amendments would also provide measurements representative of average consumer use of the residential clothes washer under test. DOE further believes these new provisions in the applicable sections of IEC Standard 62301 (Second Edition) improve test results without undue testing burden. DOE also believes that the potential for increased test burden for certain power consumption measurements is offset by more reasonable requirements for testing equipment, while maintaining acceptable measurement accuracy.

Thus, DOE tentatively concludes that the amended test procedures newly proposed in today's 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.

The active mode provisions newly proposed in today's SNOPR consist of clarifications to test conduct and revised calculations, and would not require any additional investment, equipment purchases, or test time beyond those described in the September 2010 NOPR. Therefore, DOE's retains its tentative conclusion that the proposed active mode amendments would not impose a significant burden on manufacturers.

2. Integration of Standby Mode and Off Mode Energy Consumption Into the Efficiency Metric

Section 325(gg)(2)(A) of EPCA requires that standby mode and off mode energy consumption be integrated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product unless the current test procedures already fully account for the standby mode and off mode energy consumption or if an integrated test procedure is technically infeasible. (42 U.S.C. 6295(gg)(2)(A))

Today's SNOPR incorporates the clothes washer standby and off mode energy consumption into a ''combined low-power mode'' energy consumption, expressed in kWh, and converted into an IMEF, as discussed in section III.B.2 of this notice.

EPCA provides that test procedure amendments adopted to comply with the new EPCA requirements for standby and off mode energy consumption will not determine compliance with previously established standards. (42 U.S.C. 6295(gg)(2)(C)) Because DOE is incorporating these changes in a new appendix J2 to 10 CFR part 430 subpart B that manufacturers would not be required to use until the compliance date of amended energy conservation standards for residential clothes washers, the test procedure amendments pertaining to standby mode and off mode energy consumption that DOE proposes to adopt in this rulemaking would not apply to, and would have no effect on, existing standards.

3. Commercial Clothes Washers

The test procedure for commercial clothes washers is required to be the same test procedure established for residential clothes washers. (42 U.S.C. 6314(a)(8)) Thus, the test procedure set forth in appendix J1 of subpart B of 10 CFR part 430 is also currently used to test commercial clothes washers. (10 CFR part 431.154)

DOE noted in the September 2010 NOPR that the impacts to testing commercial clothes washers would be limited to the proposed amendments associated with active washing mode because commercial clothes washer standards are based on MEF and WF. Among others, these include proposed changes to the test load size specification, temperature use factors, dryer usage factor (DUF), capacity measurement, and water supply pressure specification, all of which could affect the measured energy and water efficiencies of a commercial clothes washer. DOE believed that the most significant impacts could be associated with the proposed amendments for capacity measurement and usage factors, but did not have information to evaluate any impacts for commercial clothes washers. 75 FR 57556, 57578 (Sept. 21, 2010).

In response, DOE received several comments on potential impacts of an amended clothes washer test procedure on commercial clothes washers. In today's SNOPR, DOE addresses those comments that pertain to the revised proposal.

ALS commented that the most significant impact of the proposed amended test procedure on commercial clothes washers is the standby power measurement, because unlike most residential clothes washers, commercial clothes washers are vended and have lighted displays to invite customers to use them and provide instructions for use. According to ALS, the inclusion of standby power would significantly impact the ability for existing commercial clothes washers to meet more stringent minimum energy conservation standards without requiring a ready-to-use vended clothes washer to power down the display. ALS stated that a powered-down display would cause a potential customer to think the washer is not operational or ready to use, and thus discourage its use. (ALS, No. 10 at pp. 5–6).

ALS also commented that the next most significant impact of the proposed amended test procedure would be the clothes container capacity measurement method, which would reduce the existing capacity rating. This would significantly reduce an already smaller tub used in commercial markets to even less volume measured, making it more difficult to achieve the minimum required energy efficiency standard. (ALS, No. 10 at p. 6)

Whirlpool commented that the nature of use for commercial clothes washers would preclude the existence of delay start mode, cycle finished mode, and steam cycles. Whirlpool stated that the clothes washer test procedure should ignore those features if they are not on the unit under test. Whirlpool also expressed concern regarding the capacity measurement and modified temperature use factors. Whirlpool stated that the proposed IMEF and IWF calculations are suitable for commercial clothes washers. (Whirlpool, No. 13 at p. 14).

In response to these comments, and as stated above, the impacts to testing commercial clothes washers would be limited to the proposed amendments associated with active washing mode because commercial clothes washer standards are based on MEF and WF. Because commercial clothes washer standards do not include standby and off mode, the addition of procedures to measure the energy use in standby and off modes would be inapplicable to and would not affect the standards for commercial clothes washers pursuant to 42 U.S.C. 6293(e). For the active mode provisions of the proposed test procedure that could affect the measured energy and water efficiencies of a commercial clothes washer, DOE notes that 42 U.S.C. 6293(e)(3) provides the following: models of covered products in use before the date on which an amended energy conservation standard (developed using the amended test procedure pursuant to 42 U.S.C. 6293(e)(2)) becomes effective that comply with the energy conservation standard applicable to such covered products on the day before such date are deemed to comply with the amended standard. The same is true of revisions of such models that come into use after such date and have the same energy efficiency, energy use or water use characteristics.

DOE concurs that commercial clothes washers would not be affected by any provisions for measuring delay start mode, cycle finished mode, or steam cycles. Under the proposal in today's SNOPR, the energy use for delay start and cycle finished modes would be included in the test results pursuant to the ''alternate method'' for measuring standby mode and off mode energy use, described in section III.B.2, and any such energy use is not included in the MEF and WF metrics used for commercial clothes washers.

4. Certification Requirements

Sections 6299–6305 and 6316 of EPCA authorize DOE to enforce compliance with the energy and water

conservation standards established for certain consumer products and commercial equipment. (42 U.S.C. 6299–6305 (consumer products), 6316 (commercial equipment)) On March 7, 2011, the Department revised, consolidated, and streamlined its existing certification, compliance, and enforcement regulations for certain consumer products and commercial and industrial equipment covered under EPCA, including residential clothes washers. 76 FR 12422. These regulations for residential clothes washers are codified in 10 CFR part 429.20.

The certification requirements for residential clothes washers consist of a sampling plan for selection of units for testing and requirements for certification reports. Because the proposed amendments to the test procedure would not revise the current energy conservation standards, DOE is not proposing any amendments to the certification reporting requirements for these products. However, because DOE proposes in today's SNOPR to introduce two new metrics (IMEF and IWF), DOE proposes amended provisions in the sampling plan in 10 CFR part 429.20(a)(2) that would include IMEF along with the existing measure of MEF, and IWF along with the existing measure of WF.

D. Impact on EnergyGuide

In the September 2010 NOPR, DOE determined that the proposed test procedure amendments would not affect the FTC EnergyGuide labeling program because DOE did not propose to amend the estimated annual operating cost calculation in 10 CFR 430.23.

NEEA commented that the energy use and annual energy cost information on the Energy Guide label is supposed to represent a reasonably accurate estimate of the annual energy use and energy cost associated with the use of the labeled product. NEEA stated that it would be nearly impossible to justify any rules associated with the accuracy of such representations if whole categories of annual energy use and cost are ignored. NEEA stated that Congress intended to account for the energy use of every appliance in its inactive mode and to make the results known to consumers. (NEEA, No.12 at p. 8)

NEEA also noted that the ratings of many models may change as a result of the revised test procedure. NEEA commented that the EnergyGuide labels for individual models tested under appendix J1 and appendix J2 will exist in the marketplace together for a short time, raising the likelihood of consumer confusion when this happens. According to NEEA, there has been considerable consumer confusion in the past when new models arrive with energy use and annual cost numbers that are lower (or higher) than the lowest (or highest) numbers in the range on the EnergyGuide label. (NEEA, No. 12 at pp.15–16).

The Joint Comment stated that the EnergyGuide label is designed to communicate to consumers the estimated average annual operating cost of a given product. Since the annual operating cost for a washer that a consumer will incur includes the cost of energy consumed in all modes including self-clean, standby, off, delay start, and cycle finished modes, the operating costs of all modes should be included in the annual operating cost calculation. (Joint Comment, No. 16 at p. 2).

In addition, the Joint Comment stated that the cost of energy consumed in the additional non-active modes for many products will likely be significant compared to the total energy cost, which DOE estimates could consume as much as 48 kWh/year. The Joint Commenters noted that the EnergyGuide label includes only the cost of the machine energy and the water heating energy, and does not include the cost of the energy required to remove the remaining moisture from the clothes, which makes the cost of energy consumed in non-active-washing modes more significant. According to the Joint Comment, the most efficient washers listed by the FTC with a capacity greater than 3 cubic feet only use about 110–130 kWh/year, and, therefore, the energy consumed in modes other than the active washing mode could represent up to about 40 percent of total annual energy use, which is significant. (Joint Comment, No. 16 at pp. 2–3).

Whirlpool objected to measuring additional energy use in non-active modes but not reporting them on the EnergyGuide tag, stating that this would be inconsistent. (Whirlpool, Public Meeting Transcript, No. 20 at pp. 95–96).

ASAP commented that when the new standards go into effect, the minimum and maximum operating costs on the EnergyGuide label would have to be revised anyway to take into account the new standards, and that the additional annual operating costs could be incorporated at that point. ASAP stated that it supports incorporating all energy use, including energy use in non-active modes. (ASAP, Public Meeting Transcript, No. 20 at p. 96).

As discussed in section III.B.6, DOE proposes in today's SNOPR to amend the estimated annual operating cost by incorporating the cost of energy consumed in the non-active washing modes. DOE also proposed in the September 2010 NOPR to update the number of annual use cycles. This will affect the estimated annual operating cost disclosed on the EnergyGuide label. Pursuant to 42 U.S.C. 6294, the FTC may revise the EnergyGuide label for residential clothes washers when the amended test procedure becomes effective.

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 an initial regulatory flexibility analysis (IFRA) 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 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's Web site: *http://www.gc.doe.gov.*

DOE reviewed today's supplemental proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. DOE tentatively concluded that the September 2010 NOPR would not have a significant impact on a substantial number of small entities, and today's SNOPR contains no revisions to that proposal that would result 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 335224, which applies to household laundry equipment manufacturers and includes clothes washer manufacturers, is 1,000 employees. Searches of the SBA Web site [7] to identify clothes washer manufacturers within these NAICS codes identified, out of approximately 17 manufacturers supplying clothes washers in the United States, only one small business. This small business manufactures laundry appliances, including clothes washers. The other manufacturers supplying clothes washers are large multinational corporations.

The proposed rule would amend DOE's test procedure by incorporating testing provisions to address active mode, standby mode, and off mode energy and water consumption that will be used to demonstrate compliance with energy conservation standards. The proposed test procedure amendments for measuring standby and off mode power consumption using the ''alternative method'' involve measuring power input when the clothes washer is in inactive mode or off mode, or both if both modes are available on the clothes washer under test, as a proxy for measuring power consumption in all low power modes. These tests can be conducted in the same facilities used for the current energy testing of these products, so it is anticipated that manufacturers would not incur any additional facilities costs as a result of the proposed test procedure amendments. The power meter required for these tests might require greater accuracy than the power meter used for current energy testing, but the investment required for a possible instrumentation upgrade is expected to be approximately a few thousand dollars. The duration of each non-active washing mode test period is expected to be roughly 30–45 minutes, depending on stability of the power consumption, using the alternative approach described previously. This is comparable to approximately one-half to two-thirds the time required to conduct a single energy test cycle. Each clothes washer tested requires, on average, approximately 15 test cycles for energy testing, which equates to about 3 days of testing. Using the alternative approach proposed in today's SNOPR, DOE estimates roughly a 3-percent increase in total test period duration. This represents a significant reduction compared to the 11 percent increase DOE estimated in the September 2010 NOPR, which was based on the proposal to measure inactive, off, delay start, and cycle finished modes separately. DOE notes that the provisions from IEC Standard 62301 (Second Edition) proposed to incorporate by reference in today's SNOPR would require longer test durations in the event that the threshold stability criteria of the power measurement are not met. DOE believes that the likelihood of such a longer test being required is very small, based on the observations during testing for the September 2010 NOPR.

DOE also estimates that it costs a manufacturer approximately $2300 on average, including the cost of consumables, to conduct energy testing for a particular clothes washer. DOE further estimates that the cost of additional testing for non-active washing modes using the proposed alternative approach would average $75 per machine, a 3-percent increase over current test costs. This represents a significant reduction compared to the 9 percent increase ($200) DOE estimated in the September 2010 NOPR, which was based on the proposal to measure inactive, off, delay start, and cycle finished modes separately. For the same reason as discussed above, DOE does not believe it is likely that these test costs will be higher due to extended test times required by IEC Standard 62301 (Second Edition) in the event that the threshold stability criteria of the power measurement are not met.

DOE believes these additional requirements for equipment and time and additional cost to conduct the proposed non-active washing mode test would not be expected to impose a significant economic burden on entities subject to the applicable testing requirements. Although the small business has significantly lower sales than other manufacturers over which to amortize these additional costs, it produces only a single platform which would be subject to the proposed non-active washing mode tests.

DOE does not believe that the proposed test procedure amendments for the active washing mode discussed in today's SNOPR would increase test burden because they comprise revisions to calculations rather than additional, longer, or more complex methodology. For standby mode and off mode, as described in section III.B.1, certain provisions in section 5 of IEC Standard 62301 Second Edition could require additional testing time compared to the First Edition. However, DOE expects the large majority of clothes washers to require less than one hour of testing time to perform the standby power test under the proposed alternative approach. Therefore, DOE does not believe these proposed amendments would have a significant impact on a substantial number of small entities.

For these reasons, DOE tentatively concludes and certifies that the September 2010 NOPR, as modified by today's SNOPR, would not have a significant economic impact on a substantial number of small entities. Accordingly, DOE has not prepared a regulatory flexibility analysis for this rulemaking. DOE has previously 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). DOE seeks comment on the updated certification set forth above.

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of residential clothes washers 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 clothes washers, 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 clothes washers. 76 FR 12422 (March 7, 2011). The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (PRA). This requirement has been approved by OMB under OMB control number 1910–1400. 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.

[7] A searchable database of certified small businesses is available online at: *http://dsbs.sba.gov/dsbs/search/dsp_dsbs.cfm.*

D. Review Under the National Environmental Policy Act of 1969

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

E. Review Under Executive Order 13132

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

F. Review Under Executive Order 12988

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

G. Review Under the Unfunded Mandates Reform Act of 1995

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

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

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

I. Review Under Executive Order 12630

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

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

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

K. Review Under Executive Order 13211

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

Today's regulatory action to amend the test procedure for measuring the energy efficiency of residential clothes washers 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 FTC concerning the impact of the commercial or industry standards on competition.

The proposed modifications to the test procedure addressed by this action incorporate testing methods contained in the commercial standard, IEC Standard 62301, Edition 2.0 2011–01, ''Household electrical appliances—Measurement of standby power.'' DOE has evaluated this standard and is unable to conclude whether it fully complies with the requirements of section 32(b) of the FEAA (*i.e.,* whether it was developed in a manner that fully provides for public participation, comment, and review.) DOE will consult with the Attorney General and the Chairman of the FTC about the impact on competition of using the methods contained in this standard, before prescribing a final rule.

V. Public Participation

A. Submission of Comments

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

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

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

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

DOE processes submissions made through *regulations.gov* before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that *regulations.gov* provides after you have successfully uploaded your comment.

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

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

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

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

Confidential Business Information. According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via e-mail, postal mail, or hand delivery two well-marked copies: one copy of the document marked confidential including all the

information believed to be confidential, and one copy of the document marked non-confidential with the information believed to be confidential deleted. Submit these documents via e-mail or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

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

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

B. Issues on Which DOE Seeks Comment

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

(1) Incorporation by reference of certain provisions of IEC 62301 (Second Edition), and the accompanying impacts on measurement improvement and test burden (see section III.B.1);

(2) The acceptability of measuring the total harmonic content, crest factor, and maximum current ratio before and after the actual test measurement if the power measuring instrument is unable to perform these measurements during the actual test measurement;

(3) The potential test burden that would be required for a laboratory to upgrade its data acquisition system to enable real-time statistical analysis capabilities;

(4) The alternate method for measuring energy use in low-power modes by means of measuring power consumption only in the inactive mode and off mode (see section III.B.2);

(5) The proposed clarification of the energy test cycle definition (see section III.B.3);

(6) The proposed use of a weighted-average load size based on the load usage factors and the minimum, average, and maximum load sizes rather than the product of the LAF and maximum load size in the drying energy calculation (see section III.B.4); and

(7) The proposed clarification of how to classify the wash temperature settings for clothes washers with both a ''cold'' wash setting and a ''tap cold'' wash setting.

(8) DOE's tentative conclusion and certification that the September 2010 NOPR, as modified by today's SNOPR, would not have a significant economic impact on a substantial number of small entities.

VI. Approval of the Office of the Secretary

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

List of Subjects

10 CFR Part 429

Energy conservation, Household appliances, Reporting and recordkeeping requirements.

10 CFR Part 430

Administrative practice and procedure, Energy conservation, Household appliances, Incorporation by reference, Small businesses.

Issued in Washington, DC, on July 26, 2011.

Kathleen Hogan,

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

For the reasons stated in the preamble, DOE proposes to amend 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 429.20 is amended by revising paragraphs (a)(2)(i) introductory text and (a)(2)(ii) introductory text to read as follows:

§ 429.20 Residential clothes washers.

(a) * * *

(2) * * *

(i) Any represented value of the water factor, integrated water factor, the estimated annual operating cost, the energy or water consumption, or other measure of energy or water consumption of a basic model for which consumers would favor lower values shall be greater than or equal to the higher of:

* * * * *

(ii) Any represented value of the modified energy factor, integrated modified energy factor, or other measure of energy or water 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

3. The authority citation for Part 430 continues to read as follows:

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

4. Section 430.3 is amended by:

a. Redesignating paragraphs (c) through (o) as paragraphs(d) through (p);

b. Adding new paragraph (c);

c. Revising newly designated paragraph (m)(2).

The additions read as follows:

§ 430.3 Materials incorporated by reference.

* * * * *

(c) *AATCC.* American Association of Textile Chemists and Colorists, P.O. Box 1215, Research Triangle Park, NC 27709, 919–549–8141, or go to *http://www.aatcc.org.*

(1) AATCC Test Method 79–2010, Absorbency of Bleached Textiles,, IBR approved for Appendix J1 and Appendix J2.

(2) AATCC Test Method 118–2007, Oil Repellency: Hydrocarbon Resistance Test,, IBR approved for Appendix J1 and Appendix J2.

(3) AATCC Test Method 135–2010, Dimensional Changes of Fabrics after Home Laundering, IBR approved for Appendix J1 and Appendix J2.

* * * * *

(m) * * *

(2) IEC Standard 62301 (''IEC 62301''), *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011–01), IBR approved for Appendix J2.

* * * * *

5. Section 430.23 is amended by revising paragraph (j) to read as follows:

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

* * * * *

(j) *Clothes washers.* (1) The estimated annual operating cost for automatic and semi-automatic clothes washers must be rounded off to the nearest dollar per year and is defined as follows:

(i) Before use of appendix J2 becomes mandatory,

(A) When electrically heated water is used,

$(N_1 \times E_{TE1} \times C_{KWH})$

Where,

N_1 = the representative average residential clothes washer use of 392 cycles per year according to appendix J1,

E_{TE1} = the total per-cycle energy consumption when electrically heated water is used, in kilowatt-hours per cycle, determined according to section 4.1.7 of appendix J1, and

C_{KWH} = the representative average unit cost, in dollars per kilowatt-hour, as provided by the Secretary.

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

$(N_1 \times ((ME_{T1} \times C_{KWH}) + (HE_{TG1} \times C_{BTU})))$

Where,

N_1 and C_{KWH} are defined in paragraph (j)(1)(i)(A) of this section,

ME_{T1} = the total weighted per-cycle machine electrical energy consumption, in kilowatt-hours per cycle, determined according to section 4.1.6 of appendix J1,

HE_{TG1} = the per-cycle hot water energy consumption using gas-heated or oil-heated water, in Btu per cycle, determined according to section 4.1.4 of appendix J1, and

C_{BTU} = the representative average unit cost, in dollars per Btu for oil or gas, as appropriate, as provided by the Secretary.

(ii) After use of appendix J2 becomes mandatory (see the note at the beginning of appendix J2),

(A) When electrically heated water is used,

$(N_2 \times (E_{TE2} + E_{TSC} + E_{TSO}) \times C_{KWH})$

Where,

N_2 = the representative average residential clothes washer use of 295 cycles per year according to appendix J2,

E_{TE2} = the total per-cycle energy consumption, in kilowatt-hours per cycle, determined according to section 4.1.7 of appendix J2,

E_{TSC} = the per-cycle self-clean energy consumption, in kilowatt-hours per cycle, determined according to section 4.5 of appendix J2,

E_{TSO} = the per-cycle combined low-power mode energy consumption, in kilowatt-hours per cycle, determined according to section 4.4 of appendix J2, and

C_{KWH} is defined in paragraph (j)(1)(i)(A) of this section.

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

$(N_2 \times ((ME_{T2} + ME_{SC} + E_{TSO}) \times C_{KWH}) + ((HE_{TG2} + HE_{SCG}) \times C_{BTU}))$

Where,

N_2 and E_{TSO} are defined in (j)(1)(ii)(A) of this section,

ME_{T2} = the total weighted per-cycle machine electrical energy consumption, in kilowatt-hours per cycle, determined according to section 4.1.6 of appendix J2,

ME_{SC} = the per-cycle self-clean machine electrical energy consumption, in kilowatt-hours per cycle, determined according to section 4.1.10 of appendix J2,

C_{KWH} is defined in (j)(1)(i)(A) of this section,

HE_{TG2} = the per-cycle hot water energy consumption using gas-heated or oil-heated water, in Btu per cycle, determined according to section 4.1.4 of appendix J2,

HE_{SCG} = the per-cycle self-clean hot water energy consumption using gas-heated or oil-heated water, in Btu per cycle, determined according to section 4.1.9 of appendix J2, and

C_{BTU} is defined in (j)(1)(i)(B) of this section.

(2)(i) The modified energy factor for automatic and semi-automatic clothes washers is determined in accordance with section 4.4 of appendix J1 before appendix J2 becomes mandatory and section 4.6 of appendix J2 when appendix J2 becomes mandatory. The result shall be rounded off to the nearest 0.01 cubic foot per kilowatt-hour per cycle.

(ii) The integrated modified energy factor for automatic and semi-automatic clothes washers is determined in accordance with section 4.7 of appendix J2 when appendix J2 becomes mandatory. The result shall be rounded off to the nearest 0.01 cubic foot per kilowatt-hour per cycle.

(3) Other useful measures of energy consumption for automatic or semi-automatic clothes washers 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 J1 before the date that appendix J2 becomes mandatory or appendix J2 upon the date that appendix J2 becomes mandatory. In addition, the annual water consumption of a clothes washer can be determined by the product of:

(i) Before appendix J2 becomes mandatory, the representative average-use of 392 cycles per year and the total weighted per-cycle water consumption for cold wash in gallons per cycle determined according to section 4.2.2 of appendix J1. The water consumption factor can be determined in accordance with section 4.2.3 of appendix J1. The remaining moisture content can be determined in accordance with section 3.8 of appendix J1.

(ii) After appendix J2 becomes mandatory, the representative average-use of 295 cycles per year and the total weighted per-cycle water consumption for all wash cycles in gallons per cycle determined according to section 4.2.13 of appendix J2. The water consumption factor can be determined in accordance with section 4.2.15 of appendix J2. The integrated water consumption factor can be determined in accordance with section 4.2.16 of appendix J2. The remaining moisture content can be determined in accordance with section 3.8 of appendix J2.

* * * * *

Appendix J—[Removed]

6. Appendix J to subpart B of part 430 is removed.

Appendix J1—[Amended]

7. Appendix J1 to subpart B of part 430 is amended by:

a. Revising the introductory text;

b. Revising section 1.22;

c. Removing sections 2.6.1.1 through 2.6.1.2.4;

d. Revising section 2.6.3.1;

e. Revising section 2.10;

f. Revising section 3.6;

g. Revising section 4.1.4, and

h. Revising section 5.

The revisions read as follows:

Appendix J1 to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Automatic and Semi-automatic Clothes Washers

Appendix J1 is effective until the compliance date of any amended standards for residential clothes washers. After this date, all residential clothes washers shall be tested using the provisions of Appendix J2 of this appendix.

* * * * *

1.22 *Cold rinse* means the coldest rinse temperature available on the machine.

* * * * *

2.6.3.1 Perform 5 complete normal wash-rinse-spin cycles, the first two with AHAM Standard detergent Formula 3 and the last three without detergent. Place the test cloth in a clothes washer set at the maximum water level. Wash the load for ten minutes in soft water (17 ppm hardness or less) using 27.0 grams + 4.0 grams per lb of cloth load of AHAM Standard detergent Formula 3. The wash temperature is to be controlled to 135 °F ± 5 °F (57.2 °C ± 2.8 °C) and the rinse temperature is to be controlled to 60 °F ± 5 °F (15.6 °C ± 2.8 °C). Repeat the cycle with detergent and then repeat the cycle three additional times without detergent, bone drying the load between cycles (total of five wash and rinse cycles).

* * * * *

2.10 *Wash time setting.* If one wash time is prescribed in the energy test cycle, that shall be the wash time setting; otherwise, the wash time setting shall be the higher of either the minimum or 70 percent of the maximum wash time available in the energy test cycle, regardless of the labeling of suggested dial locations. If the clothes washer is equipped with an electromechanical dial controlling wash time, reset the dial to the minimum wash time and then turn it in the direction of increasing wash time to reach the

appropriate setting. If the appropriate setting is passed, return the dial to the minimum wash time and then turn in the direction of increasing wash time until the setting is reached.

* * * * *

3.6 *''Cold Wash'' (Minimum Wash Temperature Selection).* Water and electrical energy consumption shall be measured for each water fill level or test load size as specified in sections 3.6.1 through 3.6.3 of this Appendix for the coldest wash temperature selection available. For a clothes washer that offers two or more wash temperature settings labeled as cold, such as ''Cold'' and ''Tap Cold'', the setting with the minimum wash temperature shall be considered the cold wash. If any of the other cold wash temperature settings add hot water to raise the wash temperature above the cold water supply temperature, as defined in section 2.3 of this Appendix, those setting(s) shall be considered warm wash setting(s), as defined in section 1.18 of this Appendix. If none of the cold wash temperature settings add hot water for any of the water fill levels or test load sizes required for the energy test cycle, the wash temperature setting labeled as ''Cold'' shall be considered the cold wash, and the other wash temperature setting(s) labeled as cold shall not be required for testing.

* * * * *

4. Calculation of Derived Results From Test Measurements.

* * * * *

4.1.4 *Total per-cycle hot water energy consumption using gas-heated or oil-heated water.* Calculate for the energy test cycle the per-cycle hot water consumption, HE_{TG}, using gas-heated or oil-heated water, expressed in Btu per cycle (or megajoules per cycle) and defined as:

$HE_{TG} = HE_T \times 1/e \times 3412$ Btu/kWh or

$HE_{TG} = HE_T \times 1/e \times 3.6$ MJ/kWh

where:

e = Nominal gas or oil water heater efficiency = 0.75.

HE_T=As defined in 4.1.3.

* * * * *

5. Test Loads

TABLE 5.1—TEST LOAD SIZES

Container volume		Minimum load		Maximum load		Average load	
Cu. ft.	Liter	Lb	kg	lb	kg	lb	Kg
≥ <	≥ <						
0–0.8	0–22.7	3.00	1.36	3.00	1.36	3.00	1.36
0.80–0.90	22.7–25.5	3.00	1.36	3.50	1.59	3.25	1.47
0.90–1.00	25.5–28.3	3.00	1.36	3.90	1.77	3.45	1.56
1.00–1.10	28.3–31.1	3.00	1.36	4.30	1.95	3.65	1.66
1.10–1.20	31.1–34.0	3.00	1.36	4.70	2.13	3.85	1.75
1.20–1.30	34.0–36.8	3.00	1.36	5.10	2.31	4.05	1.84
1.30–1.40	36.8–39.6	3.00	1.36	5.50	2.49	4.25	1.93
1.40–1.50	39.6–42.5	3.00	1.36	5.90	2.68	4.45	2.02
1.50–1.60	42.5–45.3	3.00	1.36	6.40	2.90	4.70	2.13
1.60–1.70	45.3–48.1	3.00	1.36	6.80	3.08	4.90	2.22
1.70–1.80	48.1–51.0	3.00	1.36	7.20	3.27	5.10	2.31
1.80–1.90	51.0–53.8	3.00	1.36	7.60	3.45	5.30	2.4
1.90–2.00	53.8–56.6	3.00	1.36	8.00	3.63	5.50	2.49
2.00–2.10	56.6–59.5	3.00	1.36	8.40	3.81	5.70	2.59
2.10–2.20	59.5–62.3	3.00	1.36	8.80	3.99	5.90	2.68
2.20–2.30	62.3–65.1	3.00	1.36	9.20	4.17	6.10	2.77
2.30–2.40	65.1–68.0	3.00	1.36	9.60	4.35	6.30	2.86
2.40–2.50	68.0–70.8	3.00	1.36	10.00	4.54	6.50	2.95
2.50–2.60	70.8–73.6	3.00	1.36	10.50	4.76	6.75	3.06
2.60–2.70	73.6–76.5	3.00	1.36	10.90	4.94	6.95	3.15
2.70–2.80	76.5–79.3	3.00	1.36	11.30	5.13	7.15	3.24
2.80–2.90	79.3–82.1	3.00	1.36	11.70	5.31	7.35	3.33
2.90–3.00	82.1–85.0	3.00	1.36	12.10	5.49	7.55	3.42
3.00–3.10	85.0–87.8	3.00	1.36	12.50	5.67	7.75	3.52
3.10–3.20	87.8–90.6	3.00	1.36	12.90	5.85	7.95	3.61
3.20–3.30	90.6–93.4	3.00	1.36	13.30	6.03	8.15	3.7
3.30–3.40	93.4–96.3	3.00	1.36	13.70	6.21	8.35	3.79
3.40–3.50	96.3–99.1	3.00	1.36	14.10	6.40	8.55	3.88
3.50–3.60	99.1–101.9	3.00	1.36	14.60	6.62	8.80	3.99
3.60–3.70	101.9–104.8	3.00	1.36	15.00	6.80	9.00	4.08
3.70–3.80	104.8–107.6	3.00	1.36	15.40	6.99	9.20	4.17
3.80–3.90	107.6–110.4	3.00	1.36	15.80	7.16	9.40	4.26
3.90–4.00	110.4–113.3	3.00	1.36	16.20	7.34	9.60	4.35
4.00–4.10	113.3–116.1	3.00	1.36	16.60	7.53	9.80	4.45
4.10–4.20	116.1–118.9	3.00	1.36	17.00	7.72	10.00	4.54
4.20–4.30	118.9–121.8	3.00	1.36	17.40	7.90	10.20	4.63
4.30–4.40	121.8–124.6	3.00	1.36	17.80	8.09	10.40	4.72
4.40–4.50	124.6–127.4	3.00	1.36	18.20	8.27	10.60	4.82
4.50–4.60	127.4–130.3	3.00	1.36	18.70	8.46	10.85	4.91
4.60–4.70	130.3–133.1	3.00	1.36	19.10	8.65	11.05	5.00
4.70–4.80	133.1–135.9	3.00	1.36	19.50	8.83	11.25	5.10
4.80–4.90	135.9–138.8	3.00	1.36	19.90	9.02	11.45	5.19
4.90–5.00	138.8–141.6	3.00	1.36	20.30	9.20	11.65	5.28
5.00–5.10	141.6–144.4	3.00	1.36	20.70	9.39	11.85	5.38
5.10–5.20	144.4–147.2	3.00	1.36	21.10	9.58	12.05	5.47
5.20–5.30	147.2–150.1	3.00	1.36	21.50	9.76	12.25	5.56
5.30–5.40	150.1–152.9	3.00	1.36	21.90	9.95	12.45	5.65
5.40–5.50	152.9–155.7	3.00	1.36	22.30	10.13	12.65	5.75
5.50–5.60	155.7–158.6	3.00	1.36	22.80	10.32	12.90	5.84

TABLE 5.1—TEST LOAD SIZES—Continued

Container volume		Minimum load		Maximum load		Average load	
Cu. ft.	Liter	Lb	kg	lb	kg	lb	Kg
≥ <	≥ <						
5.60–5.70	158.6–161.4	3.00	1.36	23.20	10.51	13.10	5.93
5.70–5.80	161.4–164.2	3.00	1.36	23.60	10.69	13.30	6.03
5.80–5.90	164.2–167.1	3.00	1.36	24.00	10.88	13.50	6.12
5.90–6.00	167.1–169.9	3.00	1.36	24.40	11.06	13.70	6.21

Notes: (1) All test load weights are bone dry weights.
(2) Allowable tolerance on the test load weights are ±0.10 lbs (0.05 kg).

8. Add a new Appendix J2 to subpart B of part 430 to read as follows:

Appendix J2 to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Automatic and Semi-Automatic Clothes Washers

Appendix J1 is effective until the compliance date of any amended standards for residential clothes washers. After this date, all residential clothes washers shall be tested using the provisions of Appendix J2.

1. Definitions and Symbols

1.1 *Active mode* means a mode in which the clothes washer is connected to a mains power source, has been activated, and is performing one or more of the main functions of washing, soaking, tumbling, agitating, rinsing, and/or removing water from the clothing, or is involved in functions necessary for these main functions, such as admitting water into the washer or pumping water out of the washer. Active mode also includes delay start, cycle finished, and self-clean modes.

1.2 *Active washing mode* means a mode in which the clothes washer is performing any of the operations included in a complete cycle intended for washing a clothing load, including the main functions of washing, soaking, tumbling, agitating, rinsing, and/or removing water from the clothing.

1.3 *Adaptive control system* means a clothes washer control system, other than an adaptive water fill control system, which is capable of automatically adjusting washer operation or washing conditions based on characteristics of the clothes load placed in the clothes container, without allowing or requiring consumer intervention or actions. The automatic adjustments may, for example, include automatic selection, modification, or control of any of the following: Wash water temperature, agitation or tumble cycle time, number of rinse cycles, and spin speed. The characteristics of the clothes load, which could trigger such adjustments, could, for example, consist of or be indicated by the presence of either soil, soap, suds, or any other additive laundering substitute or complementary product.

Note: Appendix J2 does not provide a means for determining the energy consumption of a clothes washer with an adaptive control system. A waiver must be obtained pursuant to 10 CFR 430.27 to establish an acceptable test procedure for each such clothes washer.

1.4 *Adaptive water fill control system* means a clothes washer water fill control system which is capable of automatically adjusting the water fill level based on the size or weight of the clothes load placed in the clothes container, without allowing or requiring consumer intervention or actions.

1.5 *Bone-dry* means a condition of a load of test cloth which has been dried in a dryer at maximum temperature for a minimum of 10 minutes, removed and weighed before cool down, and then dried again for 10 minute periods until the final weight change of the load is 1 percent or less.

1.6 *Clothes container* means the compartment within the clothes washer that holds the clothes during the operation of the machine.

1.7 *Cold rinse* means the coldest rinse temperature available on the machine.

1.8 *Combined low-power mode* means the aggregate of available modes other than active washing mode and self-clean mode, including inactive mode, off mode, delay start mode, and cycle finished mode.

1.9 *Compact* means a clothes washer which has a clothes container capacity of less than 1.6 ft^3 (45 L).

1.10 *Cycle finished mode* means an active mode which provides continuous status display following operation in active washing mode.

1.11 *Deep rinse cycle* means a rinse cycle in which the clothes container is filled with water to a selected level and the clothes load is rinsed by agitating it or tumbling it through the water.

1.12 *Delay start mode* means an active mode in which activation of active washing mode is facilitated by a timer.

1.13 *Energy test cycle* for a basic model means (A) The cycle recommended by the manufacturer for washing cotton or linen clothes, and includes all wash/rinse temperature selections and water levels offered in that cycle, and (B) if the cycle described in (A) does not include all wash/rinse temperature settings available on the clothes washer, the energy test cycle shall also include the portions of a cycle setting offering these wash/rinse temperature settings with agitation/tumble operation, spin speed(s), wash times, and rinse times that are largely comparable to those for the cycle recommended by the manufacturer for washing cotton or linen clothes. Any cycle under (A) or (B) shall include the manufacturer's default agitation/tumble operation, soil level, spin speed(s), wash times, and rinse times applicable to that cycle, including water heating time for water heating clothes washers.

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

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

1.16 *Integrated modified energy factor* means the quotient of the cubic foot (or liter) capacity of the clothes container divided by the total clothes washer energy consumption per cycle, with such energy consumption expressed as the sum of:

(a) The machine electrical energy consumption;

(b) The hot water energy consumption;

(c) The energy required for removal of the remaining moisture in the wash load;

(d) The combined low-power mode energy consumption; and

(e) The self-clean energy consumption, as applicable.

1.17 *Integrated water consumption factor* means the quotient of the total clothes washer water consumption per cycle in gallons, with such water consumption expressed as the sum of the total weighted per-cycle water consumption and the per-cycle self-clean water consumption, divided by the cubic foot (or liter) capacity of the clothes washer.

1.18 *Load use factor* means the percentage of the total number of wash loads that a user would wash a particular size (weight) load.

1.19 *Manual control system* means a clothes washer control system which requires that the consumer make the choices that determine washer operation or washing conditions, such as, for example, wash/rinse temperature selections, and wash time before starting the cycle.

1.20 *Manual water fill control system* means a clothes washer water fill control system which requires the consumer to determine or select the water fill level.

1.21 *Modified energy factor* means the quotient of the cubic foot (or liter) capacity of the clothes container divided by the total clothes washer energy consumption per cycle, with such energy consumption expressed as the sum of the machine electrical energy consumption, the hot water energy consumption, and the energy required for removal of the remaining moisture in the wash load.

1.22 *Non-water-heating clothes washer* means a clothes washer which does not have an internal water heating device to generate hot water.

1.23 *Off mode* means a mode in which the clothes washer is connected to a mains power source and is not providing any active 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.

1.24 *Self-clean mode* means an active clothes washer operating mode that is:

(a) Dedicated to cleaning, deodorizing, or sanitizing the clothes washer by eliminating sources of odor, bacteria, mold, and mildew;

(b) Recommended to be run intermittently by the manufacturer; and

(c) Separate from clothes washing cycles.

1.25 *Spray rinse cycle* means a rinse cycle in which water is sprayed onto the clothes for a period of time without maintaining any specific water level in the clothes container.

1.26 *Standard* means a clothes washer which has a clothes container capacity of 1.6 ft^3 (45 L) or greater.

1.27 *Standby mode* means any modes in which the clothes washer is connected to a mains power source and offers one or more of the following user oriented or protective functions that 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.

1.28 *Steam cycle* means a wash cycle in which steam is injected into the clothes container.

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

E—Electrical Energy Consumption;
H—Hot Water Consumption;
C—Cold Water Consumption;
R—Hot Water Consumed by Warm Rinse;
TUF—Temperature Use Factor;
HE—Hot Water Energy Consumption;
F—Load Usage Factor;
Q—Total Water Consumption;
ME—Machine Electrical Energy Consumption;
RMC—Remaining Moisture Content;
WI—Initial Weight of Dry Test Load;
WC—Weight of Test Load After Extraction;
P—Power;
S—Annual Hours;
s—Steam Wash;
m—Extra Hot Wash (maximum wash temp. > 135 °F (57.2 °C));
h—Hot Wash (maximum wash temp. ≤ 135 °F (57.2 °C));
w—Warm Wash;
c—Cold Wash (minimum wash temp.);
r—Warm Rinse (hottest rinse temp.);
sc—Self Clean;
x or max—Maximum Test Load;
a or avg—Average Test Load;
n or min—Minimum Test Load;
ia—Inactive Mode;
o—Off Mode;
oi—Combined Off and Inactive Modes;
LP—Combined Low-Power Mode.

The following examples are provided to show how the above symbols can be used to define variables:

Em_x = ''Electrical Energy Consumption'' for an ''Extra Hot Wash'' and ''Maximum Test Load''.
R_a = ''Hot Water Consumed by Warm Rinse'' for the ''Average Test Load''.
TUF_m = ''Temperature Use Factor'' for an ''Extra Hot Wash''.
HE_{min} = ''Hot Water Energy Consumption'' for the ''Minimum Test Load''.
Q_{sc} = ''Total Water Consumption'' for ''Self Clean''.
P_{ia} = ''Power'' in ''Inactive Mode''.
S_o = ''Annual Hours'' in ''Off Mode''.

1.30 *Temperature use factor* means, for a particular wash/rinse temperature setting, the percentage of the total number of wash loads that an average user would wash with that setting.

1.31 *Thermostatically controlled water valves* means clothes washer controls that have the ability to sense and adjust the hot and cold supply water.

1.32 *Uniformly distributed warm wash temperature selection(s)* means (A) Multiple warm wash selections for which the warm wash water temperatures have a linear relationship with all discrete warm wash selections when the water temperatures are plotted against equally spaced consecutive warm wash selections between the hottest warm wash and the coldest warm wash. If the warm wash has infinite selections, the warm wash water temperature has a linear relationship with the distance on the selection device (*e.g.* dial angle or slide movement) between the hottest warm wash and the coldest warm wash. The criteria for a linear relationship as specified above is that the difference between the actual water temperature at any warm wash selection and the point where that temperature is depicted on the temperature/selection line formed by connecting the warmest and the coldest warm selections is less than ± 5 percent. In all cases, the mean water temperature of the warmest and the coldest warm selections must coincide with the mean of the ''hot wash'' (maximum wash temperature ≤ 135 °F (57.2 °C)) and ''cold wash'' (minimum wash temperature) water temperatures within ± 3.8 °F (± 2.1 °C); or (B) on a clothes washer with only one warm wash temperature selection, a warm wash temperature selection with a water temperature that coincides with the mean of the ''hot wash'' (maximum wash temperature ≤ 135 °F (57.2 °C)) and ''cold wash'' (minimum wash temperature) water temperatures within ± 3.8 °F (± 2.1 °C).

1.33 *Warm rinse* means the hottest rinse temperature available on the machine.

1.34 *Warm wash* means all wash temperature selections that are below the maximum wash temperature ≤ 135 °F (57.2 °C) and above the minimum wash temperature.

1.35 *Water consumption factor* means the quotient of the total weighted per-cycle water consumption divided by the cubic foot (or liter) capacity of the clothes washer.

1.36 *Water-heating clothes washer* means a clothes washer where some or all of the hot water for clothes washing is generated by a water heating device internal to the clothes washer.

2. Testing Conditions

2.1 *Installation.* Install the clothes washer in accordance with manufacturer's instructions. For combined low-power mode testing, the product 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.

2.2 *Electrical energy supply.*

2.2.1 *Supply voltage and frequency.* Maintain the electrical supply at the clothes washer terminal block within 2 percent of 120, 120/240, or 120/208Y volts as applicable to the particular terminal block wiring system and within 2 percent of the nameplate frequency as specified by the manufacturer. If the clothes washer has a dual voltage conversion capability, conduct test at the highest voltage specified by the manufacturer.

2.2.2 *Supply voltage waveform.* For the combined low-power 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). If the power measuring instrument used for testing is unable to measure and record the total harmonic content during the test measurement period, it is acceptable to measure and record the total harmonic content immediately before and after the test measurement period.

2.3 *Supply Water.*

2.3.1 *Clothes washers in which electrical energy consumption or water energy consumption are affected by the inlet water temperature. (For example, water heating clothes washers or clothes washers with thermostatically controlled water valves.).* The temperature of the hot water supply at the water inlets shall not exceed 135 °F (57.2 °C) and the cold water supply at the water inlets shall not exceed 60 °F (15.6 °C). A water meter shall be installed in both the hot and cold water lines to measure water consumption.

2.3.2 *Clothes washers in which electrical energy consumption and water energy consumption are not affected by the inlet water temperature.* The temperature of the hot water supply shall be maintained at 135 °F ± 5 °F (57.2 °C ± 2.8 °C) and the cold water supply shall be maintained at 60 °F ± 5 °F (15.6 °C ± 2.8 °C). A water meter shall be installed in both the hot and cold water lines to measure water consumption.

2.4 *Water pressure.* The static water pressure at the hot and cold water inlet connection of the clothes washer shall be maintained at 35 pounds per square inch gauge (psig) ±2.5 psig (241.3 kPa ± 17.2 kPa) when the water is flowing. The static water pressure for a single water inlet connection shall be maintained at 35 psig ± 2.5 psig (241.3 kPa ± 17.2 kPa) when the water is flowing. A water pressure gauge shall be installed in both the hot and cold water lines to measure water pressure.

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

2.5.1 *Weighing scales.*

2.5.1.1 *Weighing scale for test cloth.* The scale shall have a resolution of no larger than 0.2 oz (5.7 g) and a maximum error no greater than 0.3 percent of the measured value.

2.5.1.2 *Weighing scale for clothes container capacity measurement.* The scale should have a resolution no larger than 0.50 lbs (0.23 kg) and a maximum error no greater than 0.5 percent of the measured value.

2.5.2 *Watt-hour meter.* The watt-hour meter shall have a resolution no larger than 1 Wh (3.6 kJ) and a maximum error no greater than 2 percent of the measured value for any demand greater than 50 Wh (180.0 kJ).

2.5.3 *Watt meter.* The watt meter used to measure combined low-power mode power consumption shall comply with the requirements specified in Section 4, Paragraph 4.4 of IEC 62301 (incorporated by reference, see § 430.3). If the power measuring instrument used for testing is unable to measure and record the crest factor, power factor, or maximum current ratio during the test measurement period, it is acceptable to measure the crest factor, power factor, and maximum current ratio immediately before and after the test measurement period.

2.5.4 *Temperature measuring device.* The device shall have an error no greater than ± 1 °F (± 0.6 °C) over the range being measured.

2.5.5 *Water meter.* The water meter shall have a resolution no larger than 0.1 gallons (0.4 liters) and a maximum error no greater than 2 percent for the water flow rates being measured.

2.5.6 *Water pressure gauge.* The water pressure gauge shall have a resolution of 1 pound per square inch gauge (psig) (6.9 kPa) and shall have an error no greater than 5 percent of any measured value.

2.6 *Test cloths.*

2.6.1 *Energy Test Cloth.* The energy test cloth shall be made from energy test cloth material, as specified in section 2.6.4 of this Appendix, that is 24 ± ½ inches by 36 ± ½ inches (61.0 ± 1.3 cm by 91.4 ± 1.3 cm) and has been hemmed to 22 ± ½ inches by 34 ± ½ inches (55.9 ± 1.3 cm by 86.4 ± 1.3 cm) before washing. The energy test cloth shall be clean and shall not be used for more than 60 test runs (after preconditioning as specified in 2.6.3 of this appendix). All energy test cloth must be permanently marked identifying the lot number of the material. Mixed lots of material shall not be used for testing the clothes washers.

2.6.2 *Energy Stuffer Cloth.* The energy stuffer cloth shall be made from energy test cloth material, as specified in section 2.6.4 of this Appendix, and shall consist of pieces of material that are 12 ± ¼ inches by 12 ± ¼ inches (30.5 ± 0.6 cm by 30.5 ± 0.6 cm) and have been hemmed to 10 ± ¼ inches by 10 ± ¼ inches (25.4 ± 0.6 cm by 25.4 ± 0.6 cm) before washing. The energy stuffer cloth shall be clean and shall not be used for more than 60 test runs (after preconditioning as specified in section 2.6.3 of this Appendix). All energy stuffer cloth must be permanently marked identifying the lot number of the material. Mixed lots of material shall not be used for testing the clothes washers.

2.6.3 *Preconditioning of Test Cloths.* The new test cloths, including energy test cloths and energy stuffer cloths, shall be pre-conditioned in a clothes washer in the following manner:

2.6.3.1 Perform 5 complete normal wash-rinse-spin cycles, the first two with current AHAM Standard detergent Formula 3 and the last three without detergent. Place the test cloth in a clothes washer set at the maximum water level. Wash the load for ten minutes in soft water (17 ppm hardness or less) using 27.0 grams + 4.0 grams per lb of cloth load of AHAM Standard detergent Formula 3. The wash temperature is to be controlled to 135 °F ± 5 °F (57.2 °C ± 2.8 °C) and the rinse temperature is to be controlled to 60 °F ± 5 °F (15.6 °C ± 2.8 °C). Repeat the cycle with detergent and then repeat the cycle three additional times without detergent, bone drying the load between

cycles (total of five wash and rinse cycles).

2.6.4 *Energy test cloth material.* The energy test cloths and energy stuffer cloths shall be made from fabric meeting the following specifications. The material should come from a roll of material with a width of approximately 63 inches and approximately 500 yards per roll. However, other sizes may be used if they fall within the specifications.

2.6.4.1 *Nominal fabric type.* Pure finished bleached cloth made with a momie or granite weave, which is nominally 50 percent cotton and 50 percent polyester.

2.6.4.2 The fabric weight specification shall be 5.60 ± 0.25 ounces per square yard (190.0 ± 8.4 g/m^2).

2.6.4.3 The thread count shall be 65 x 57 per inch (warp × fill), ±2 percent.

2.6.4.4 The warp yarn and filling yarn shall each have fiber content of 50 percent ± 4 percent cotton, with the balance being polyester, and be open end spun, 15/1 ± 5 percent cotton count blended yarn.

2.6.4.5 Water repellent finishes, such as fluoropolymer stain resistant finishes shall not be applied to the test cloth. The absence of such finishes shall be verified by:

2.6.4.5.1 American Association of Textile Chemists and Colorists (AATCC) Test Method 118–2007, *Oil Repellency: Hydrocarbon Resistance Test* (incorporated by reference; see § 430.3), of each new lot of test cloth (when purchased from the mill) to confirm the absence of Scotchguard™ or other water repellent finish (required scores of ''D'' across the board).

2.6.4.5.2 American Association of Textile Chemists and Colorists (AATCC) Test Method 79–2010, *Absorbency of Bleached Textiles* (incorporated by reference; see § 430.3), of each new lot of test cloth (when purchased from the mill) to confirm the absence of Scotchguard™ or other water repellent finish (time to absorb one drop should be on the order of 1 second).

2.6.4.6 The moisture absorption and retention shall be evaluated for each new lot of test cloth by the Standard Extractor Remaining Moisture Content (RMC) Test specified in section 2.6.5 of this Appendix.

2.6.4.6.1 Repeat the Standard Extractor RMC Test in section 2.6.5 of this Appendix three times.

2.6.4.6.2 An RMC correction curve shall be calculated as specified in section 2.6.6 of this Appendix.

2.6.4.7 The maximum shrinkage after preconditioning shall not be more than 5 percent on the length and width. Measure per AATCC Test Method 135–2010, *Dimensional Changes of Fabrics After Home Laundering* (incorporated by reference; see § 430.3).

2.6.5 *Standard Extractor RMC Test Procedure.* The following procedure is used to evaluate the moisture absorption and retention characteristics of a lot of test cloth by measuring the RMC in a standard extractor at a specified set of conditions. Table 2.6.5 of this Appendix is the matrix of test conditions. When this matrix is repeated 3 times, a total of 60 extractor RMC test runs are required. For the purpose of the extractor RMC test, the test cloths may be used for up to 60 test runs (after preconditioning as specified in section 2.6.3 of this Appendix).

TABLE 2.6.5—MATRIX OF EXTRACTOR RMC TEST CONDITIONS

	Warm soak		Cold soak	
	15 min. spin	4 min. spin	15 min. spin	4 min. spin
100				
200				
350				
500				
650				

2.6.5.1 The standard extractor RMC tests shall be run in a North Star Engineered Products Inc. (formerly Bock) Model 215 extractor (having a basket diameter of 19.5 inches, length of 12 inches, and volume of 2.1 ft^3), with a variable speed drive (North Star Engineered Products, P.O. Box 5127, Toledo, OH 43611) or an equivalent extractor with same basket design (*i.e.,* diameter, length, volume, and hole configuration) and variable speed drive.

2.6.5.2 *Test Load.* Test cloths shall be preconditioned in accordance with section 2.6.3 of this Appendix. The load size shall be 8.4 lbs, consistent with section 3.8.1 of this Appendix.

2.6.5.3 *Procedure.*

2.6.5.3.1 Record the ''bone-dry'' weight of the test load (WI).

2.6.5.3.2 Prepare the test load for soak by grouping four test cloths into loose bundles. Bundles are created by hanging four cloths vertically from one corner and loosely wrapping the test cloth onto itself to form the bundle. Bundles are then placed into the water for soak. Eight to nine bundles will be formed depending on the test load. The ninth bundle may not equal four cloths but can incorporate energy stuffer cloths to help offset the size difference.

2.6.5.3.3 Soak the test load for 20 minutes in 10 gallons of soft (<17 ppm) water. The entire test load shall be submerged. The water temperature shall be 100 °F ± 5°F (38 °C ± 3 °C)

2.6.5.3.4 Remove the test load and allow each of the test cloth bundles to drain over the water bath for a maximum of 5 seconds.

2.6.5.3.5 Manually place the test cloth bundles in the basket of the extractor, distributing them evenly by eye. The draining and loading process should take less than 1 minute. Spin the load at a fixed speed corresponding to the intended centripetal acceleration level (measured in units of the acceleration of gravity, g) ± 1g for the intended time period ± 5 seconds.

2.6.5.3.6 Record the weight of the test load immediately after the completion of the extractor spin cycle (WC).

2.6.5.3.7 Calculate the RMC as (WC–WI)/WI.

2.6.5.3.8 It is not necessary to drain the soak tub if the water bath is corrected for water level and temperature before the next extraction.

2.6.5.3.9 It is not necessary to dry the test load in between extraction runs. However, the bone dry weight shall be checked after every 12 extraction runs to make sure the bone dry weight is within tolerance (8.4 ± 0.1 lb).

2.6.5.3.10 The RMC of the test load shall be measured at five g levels: 100 g, 200 g,
350 g, 500 g, and 650 g, using two different spin times at each g level: 4 minutes and 15 minutes.

2.6.5.4 Repeat section 2.6.5.3 of this Appendix using soft (<17 ppm) water at 60 °F ± 5 °F.

2.6.6 *Calculation of RMC Correction Curve.*

2.6.6.1 Average the values of 3 test runs and fill in Table 2.6.5 of this Appendix. Perform a linear least-squares fit to relate the standard RMC ($RMC_{standard}$) values (shown in Table 2.6.6.1 of this Appendix) to the values measured in section 2.6.5 of this Appendix:

(RMC_{cloth}): $RMC_{standard} - A \times RMC_{cloth} + B$

where A and B are coefficients of the linear least-squares fit.

TABLE 2.6.6.1—STANDARD RMC VALUES

[RMC Standard]

"g Force"	RMC percentage			
	Warm soak		Cold soak	
	15 min. spin	4 min. spin	15 min. spin	4 min. spin
100	45.9	49.9	49.7	52.8
200	35.7	40.4	37.9	43.1
350	29.6	33.1	30.7	35.8
500	24.2	28.7	25.5	30.0
650	23.0	26.4	24.1	28.0

2.6.6.2 Perform an analysis of variance test using two factors, spin speed and lot, to check the interaction of speed and lot. Use the values from Table 2.6.5 and Table 2.6.6.1 of this Appendix in the calculation. The ''P'' value in the variance analysis shall be greater than or equal to 0.1. If the ''P'' value is less than 0.1, the test cloth is unacceptable. ''P'' is a theoretically based probability of interaction based on an analysis of variance.

2.6.7 *Application of the RMC correction curve.*

2.6.7.1 Using the coefficients A and B calculated in section 2.6.6.1 of this Appendix:

$RMC_{corr} = A \times RMC + B$

2.6.7.2 Substitute RMC_{corr} values in calculations in section 3.8 of this Appendix.

2.7 *Test Load Sizes.* Maximum, minimum, and, when required, average test load sizes shall be determined using Table 5.1 of this Appendix and the clothes container capacity as measured in sections 3.1.1 through 3.1.5 of this Appendix. Test loads shall consist of energy test cloths, except that adjustments to the test loads to achieve proper weight can be made by the use of energy stuffer cloths with no more than 5 stuffer cloths per load.

2.8 *Use of Test Loads.* Table 2.8 of this Appendix defines the test load sizes and corresponding water fill settings which are to be used when measuring water and energy consumptions. Adaptive water fill control system and manual water fill control system are defined in section 1 of this Appendix:

TABLE 2.8—TEST LOAD SIZES AND WATER FILL SETTINGS REQUIRED

Manual water fill control system		Adaptive water fill control system	
Test load size	Water fill setting	Test load size	Water fill setting
Max Min	Max Min	Max Avg Min	As determined by the Clothes Washer.

2.8.1 The test load sizes to be used to measure RMC are specified in section 3.8.1 of this Appendix.

2.8.2 Test loads for energy and water consumption measurements shall be bone dry prior to the first cycle of the test, and dried to a maximum of 104 percent of bone dry weight for subsequent testing.

2.8.3 Load the energy test cloths by grasping them in the center, shaking them to hang loosely and then put them into the clothes container prior to activating the clothes washer.

2.9 *Pre-Conditioning.*

2.9.1 *Non-water-heating clothes washer.* If the clothes washer has not been filled with water in the preceding 96 hours, pre-condition it by running it through a cold rinse cycle and then draining it to ensure that the hose, pump, and sump are filled with water.

2.9.2 *Water-heating clothes washer.* If the clothes washer has not been filled with water in the preceding 96 hours, or if it has not been in the test room at the specified ambient conditions for 8 hours, pre-condition it by running it through a cold rinse cycle and then draining it to ensure that the hose, pump, and sump are filled with water.

2.10 *Wash time setting.* If one wash time is prescribed in the energy test cycle, that shall be the wash time setting; otherwise, the wash time setting shall be the higher of either the minimum or 70 percent of the maximum wash time available in the energy test cycle, regardless of the labeling of suggested dial locations. If the clothes washer is equipped with an electromechanical dial controlling wash time, reset the dial to the minimum wash time and then turn it in the direction of increasing wash time to reach the appropriate setting. If the appropriate setting is passed, return the dial to the minimum wash time and then turn in the direction of increasing wash time until the setting is reached.

2.11 *Test room temperature.*

2.11.1 *Non-water-heating clothes washer.* For combined low-power 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).

2.11.2 *Water-heating clothes washer.* Maintain the test room ambient air temperature at 75°F ± 5°F (23.9°C ± 2.8°C). For combined low-power 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).

2.12 *Bone dryer temperature.* The dryer used for bone drying must heat the test cloth and energy stuffer cloths above 210 °F (99 °C).

3. Test Measurements

3.1 *Clothes container capacity.* Measure the entire volume which a dry clothes load could occupy within the clothes container during washer operation according to the following procedures:

3.1.1 Place the clothes washer in such a position that the uppermost edge of the clothes container opening is leveled horizontally, so that the container will hold the maximum amount of water.

3.1.2 Line the inside of the clothes container with 2 mil (0.051 mm) plastic sheet. All clothes washer components which occupy space within the clothes container and which are recommended for use with the energy test cycle shall be in place and shall be lined with 2 mil (0.051 mm) plastic sheet to prevent water from entering any void space.

3.1.3 Record the total weight of the machine before adding water.

3.1.4 Fill the clothes container manually with either 60 °F ± 5 °F (15.6 °C ± 2.8 °C) or 100 °F ± 10 °F (37.8 °C ± 5.5 °C) water, with the door open. For a top-loading, vertical-axis clothes washer, fill the clothes container to the uppermost edge of the rotating portion, including any balance ring. For a front-loading, horizontal-axis clothes washer, fill the clothes container to the uppermost edge that is in contact with the door seal. For all clothes washers, any volume which cannot be occupied by the clothing load during operation must be excluded from the measurement. Measure and record the weight of water, W, in pounds.

3.1.5 The clothes container capacity is calculated as follows:

$C = W/d$

Where:

C = Capacity in cubic feet (liters).

W = Mass of water in pounds (kilograms).

d = Density of water (62.0 lbs/ft^3 for 100 °F (993 kg/m^3 for 37.8 °C) or 62.3 lbs/ft^3 for 60 °F (998 kg/m^3 for 15.6 °C)).

3.2 *Procedure for measuring water and energy consumption values on all automatic and semi-automatic washers.* All energy consumption tests shall be performed under the energy test cycle(s), unless otherwise specified. Table 3.2 of this Appendix defines the sections below which govern tests of particular clothes washers, based on the number of wash/rinse temperature selections available on the model, and also, in some instances, method of water heating. The procedures prescribed are applicable regardless of a clothes washer's washing capacity, loading port location, primary axis of rotation of the clothes container, and type of control system.

3.2.1 *Inlet water temperature and the wash/rinse temperature settings.*

3.2.1.1 For automatic clothes washers set the wash/rinse temperature selection control to obtain the wash water temperature selection control to obtain the wash water temperature desired (extra hot, hot, warm, or cold) and cold rinse, and open both the hot and cold water faucets.

3.2.1.2 For semi-automatic washers:

(1) For hot water temperature, open the hot water faucet completely and close the cold water faucet;

(2) For warm inlet water temperature, open both hot and cold water faucets completely;

(3) For cold water temperature, close the hot water faucet and open the cold water faucet completely.

3.2.1.3 *Determination of warm wash water temperature(s) to decide whether a clothes washer has uniformly distributed warm wash temperature selections.* The wash water temperature, Tw, of each warm water wash selection shall be calculated or measured.

(1) For non-water heating clothes washers, calculate Tw as follows:

$Tw(°F) = ((Hw \times 135\ °F) + (Cw \times 60\ °F))/(Hw+Cw)$

or

$Tw(°C) = ((Hw \times 57.2\ °C) + (Cw \times 15.6\ °C))/(Hw + Cw)$

Where:

Hw = Hot water consumption of a warm wash.

Cw = Cold water consumption of a warm wash.

(2) For water-heating clothes washers, measure and record the temperature of each warm wash selection after fill.

3.2.2 Total water consumption during the energy test cycle shall be measured, including hot and cold water consumption during wash, deep rinse, and spray rinse.

3.2.3 *Clothes washers with adaptive water fill/manual water fill control systems*

3.2.3.1 *Clothes washers with adaptive water fill control system and alternate manual water fill control systems.* If a clothes washer with an adaptive water fill control system allows consumer selection of manual controls as an alternative, then both manual and adaptive modes shall be tested and, for each mode, the energy consumption (HE_T, ME_T, and D_E) and water consumption (Q_T), values shall be calculated as set forth in section 4 of this Appendix. Then the average of the two values (one from each mode, adaptive and manual) for each variable shall be used in section 4 of this Appendix for the clothes washer.

3.2.3.2 *Clothes washers with adaptive water fill control system.*

3.2.3.2.1 Not user adjustable. The maximum, minimum, and average water levels as defined in the following sections shall be interpreted to mean that amount of water fill which is selected by the control system when the respective test loads are used, as defined in Table 2.8 of this Appendix. The load usage factors which shall be used when calculating energy consumption values are defined in Table 4.1.3 of this Appendix.

3.2.3.2.2 User adjustable. Four tests shall be conducted on clothes washers with user adjustable adaptive water fill controls which affect the relative wash water levels. The first test shall be conducted with the maximum test load and with the adaptive water fill control system set in the setting that will give the most energy intensive result. The second test shall be conducted with the minimum test load and with the adaptive water fill control system set in the setting that will give the least energy intensive result. The third test shall be conducted with the average test load and with the adaptive water fill control system set in the setting that will give the most energy intensive result for the given test load. The fourth test shall be conducted with the average test load and with the adaptive water fill control system set in the setting that will give the least energy intensive result for the given test load. The energy and water consumption for the average test load and water level shall be the average of the third and fourth tests.

3.2.3.3 *Clothes washers with manual water fill control system.* In accordance with Table 2.8 of this Appendix, the water fill selector shall be set to the maximum water level available on the clothes washer for the maximum test load size and set to the minimum water level for the minimum test load size. The load usage factors which shall be used when calculating energy consumption values are defined in Table 4.1.3 of this Appendix.

TABLE 3.2—TEST SECTION REFERENCE

Max. Wash Temp. Available	≤135 °F (57.2 °C)			>135 °F (57.2 °C) **	
Number of Wash Temp. Selections	1	2	>2	3	>3
Test Sections Required to be Followed	.....	.....	.....	3.3	3.3
	.....	3.4	3.4	.....	3.4
	.....	.....	3.5	3.5	3.5
	3.6	3.6	3.6	3.6	3.6
	.....	.....	*3.7	*3.7	*3.7
	3.8	3.8	3.8	3.8	3.8
	.....	.....	.....	†3.9	†3.9

* Only applicable to machines with warm rinse.
** Only applicable to water heating clothes washers on which the maximum wash temperature available exceeds 135 °F (57.2 °C).
† Only applicable to machines equipped with a steam cycle.

3.3 *''Extra Hot Wash'' (Max Wash Temp > 135 °F (57.2 °C)) for water heating clothes washers only.* Water and electrical energy consumption shall be measured for each water fill level and/or test load size as specified in sections 3.3.1 through 3.3.3 of this Appendix for the hottest wash setting available.

3.3.1 *Maximum test load and water fill.* Hot water consumption (Hm_x), cold water consumption (Cm_x), and electrical energy consumption (Em_x) shall be measured for an extra hot wash/cold rinse energy test cycle, with the controls set for the maximum water fill level. The maximum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.3.2 *Minimum test load and water fill.* Hot water consumption (Hm_n), cold water consumption (Cm_n), and electrical energy consumption (Em_n) shall be measured for an extra hot wash/cold rinse energy test cycle, with the controls set for the minimum water fill level. The minimum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.3.3 *Average test load and water fill.* For clothes washers with an adaptive water fill control system, measure the values for hot water consumption (Hm_a), cold water consumption (Cm_a), and electrical energy consumption (Em_a) for an extra hot wash/cold rinse energy test cycle, with an average test load size as determined per Table 5.1 of this Appendix.

3.4 *''Hot Wash'' (Max Wash Temp ≤ 135 °F (57.2 °C)).* Water and electrical energy consumption shall be measured for each water fill level or test load size as specified in sections 3.4.1 through 3.4.3 of this Appendix for a *135 °F (57.2 °C)* wash, if available, or for the hottest selection less than *135 °F (57.2 °C).*

3.4.1 *Maximum test load and water fill.* Hot water consumption (Hh_x), cold water consumption (Ch_x), and electrical energy consumption (Eh_x) shall be measured for a hot wash/cold rinse energy test cycle, with the controls set for the maximum water fill level. The maximum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.4.2 *Minimum test load and water fill.* Hot water consumption (Hh_n), cold water consumption (Ch_n), and electrical energy consumption (Eh_n) shall be measured for a hot wash/cold rinse energy test cycle, with the controls set for the minimum water fill level. The minimum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.4.3 *Average test load and water fill.* For clothes washers with an adaptive water fill control system, measure the values for hot water consumption (Hh_a), cold water consumption (Ch_a), and electrical energy consumption (Eh_a) for a hot wash/cold rinse energy test cycle, with an average test load size as determined per Table 5.1 of this Appendix.

3.5 *''Warm Wash.''* Water and electrical energy consumption shall be determined for each water fill level and/or test load size as specified in sections 3.5.1 through 3.5.2.3 of this Appendix for the applicable warm water wash temperature(s) with a cold rinse.

3.5.1 *Clothes washers with uniformly distributed warm wash temperature selection(s).* The reportable values to be used for the warm water wash setting shall be the arithmetic average of the measurements for the hot and cold wash selections. This is a calculation only, no testing is required.

3.5.2 *Clothes washers that lack uniformly distributed warm wash temperature selections.* For a clothes washer with fewer than four discrete warm wash selections, test all warm wash temperature selections. For a clothes washer that offers four or more warm wash selections, test at all discrete selections, or test at 25 percent, 50 percent, and 75 percent positions of the temperature selection device between the hottest hot (≤ 135 °F (57.2 °C)) wash and the coldest cold wash. If a selection is not available at the 25, 50 or 75 percent position, in place of each such unavailable selection use the next warmer setting. Each reportable value to be used for the warm water wash setting shall be the arithmetic average of all tests conducted pursuant to this section.

3.5.2.1 *Maximum test load and water fill.* Hot water consumption (Hw_x), cold water consumption (Cw_x), and electrical energy consumption (Ew_x) shall be measured with the controls set for the maximum water fill level. The maximum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.5.2.2 *Minimum test load and water fill.* Hot water consumption (Hw_n), cold water consumption (Cw_n), and electrical energy consumption (Ew_n) shall be measured with the controls set for the minimum water fill level. The minimum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.5.2.3 *Average test load and water fill.* For clothes washers with an adaptive water fill control system, measure the values for hot water consumption (Hw_a), cold water consumption (Cw_a), and electrical energy consumption (Ew_a) with an average test load size as determined per Table 5.1 of this Appendix.

3.6 *''Cold Wash'' (Minimum Wash Temperature Selection).* Water and electrical energy consumption shall be measured for each water fill level or test load size as specified in sections 3.6.1 through 3.6.3 of this Appendix for the coldest wash temperature selection available. For a clothes washer that offers two or more wash temperature settings labeled as cold, such as ''Cold'' and ''Tap Cold'', the setting with the minimum wash temperature shall be considered the cold wash. If any of the other cold wash temperature settings add hot water to raise the wash temperature above the cold water supply temperature, as defined in

section 2.3 of this Appendix, those setting(s) shall be considered warm wash setting(s), as defined in section 1.34 of this Appendix. If none of the cold wash temperature settings add hot water for any of the water fill levels or test load sizes required for the energy test cycle, the wash temperature setting labeled as ''Cold'' shall be considered the cold wash, and the other wash temperature setting(s) labeled as cold shall not be required for testing.

3.6.1 *Maximum test load and water fill.* Hot water consumption (Hc_x), cold water consumption (Cc_x), and electrical energy consumption (Ec_x) shall be measured for a cold wash/cold rinse energy test cycle, with the controls set for the maximum water fill level. The maximum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.6.2 *Minimum test load and water fill.* Hot water consumption (Hc_n), cold water consumption (Cc_n), and electrical energy consumption (Ec_n) shall be measured for a cold wash/cold rinse energy test cycle, with the controls set for the minimum water fill level. The minimum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.6.3 *Average test load and water fill.* For clothes washers with an adaptive water fill control system, measure the values for hot water consumption (Hc_a), cold water consumption (Cc_a), and electrical energy consumption (Ec_a) for a cold wash/cold rinse energy test cycle, with an average test load size as determined per Table 5.1 of this Appendix.

3.7 *''Warm Wash/Warm Rinse.''* Water and electrical energy consumption shall be determined for each water fill level and/or test load size as specified in sections 3.7.2.1 through 3.7.2.3 of this Appendix for the applicable warm wash temperature selection as described in section 3.7.1 or 3.7.2 of this Appendix and the hottest available rinse temperature selection.

3.7.1 *Clothes washers with uniformly distributed warm wash temperature selection(s).* Test the warm wash/warm rinse cycle at the wash temperature selection with the temperature selection device at the 50 percent position between the hottest hot (≤ 135 °F (57.2 °C)) wash and the coldest cold wash.

3.7.2 *Clothes washers that lack uniformly distributed warm wash temperature selections.* For a clothes washer with fewer than four discrete warm wash selections, test all warm wash temperature selections. For a clothes washer that offers four or more warm wash selections, test at all discrete selections, or test at 25 percent, 50 percent, and 75 percent positions of the temperature selection device between the hottest hot (≤ 135 °F (57.2 °C)) wash and the coldest cold wash. If a selection is not available at the 25, 50, or 75 percent position, in place of each such unavailable selection use the next warmer setting. Each reportable value to be used for the warm water wash setting shall be the arithmetic average of all tests conducted pursuant to this section.

3.7.2.1 *Maximum test load and water fill.* Hot water consumption (Hww_x), cold water consumption (Cww_x), and electrical energy consumption (Eww_x) shall be measured with the controls set for the maximum water fill level. The maximum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.7.2.2 *Minimum test load and water fill.* Hot water consumption (Hww_n), cold water consumption (Cww_n), and electrical energy consumption (Eww_n) shall be measured with the controls set for the minimum water fill level. The minimum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.7.2.3 *Average test load and water fill.* For clothes washers with an adaptive water fill control system, measure the values for hot water consumption (Hww_a), cold water consumption (Cww_a), and electrical energy consumption (Eww_a) with an average test load size as determined per Table 5.1 of this Appendix.

3.8 *Remaining Moisture Content:*

3.8.1 The wash temperature will be the same as the rinse temperature for all testing. Use the maximum test load as defined in Table 5.1 and section 3.1 of this Appendix for testing.

3.8.2 *For clothes washers with cold rinse only:*

3.8.2.1 Record the actual ''bone dry'' weight of the test load (WI_{max}), then place the test load in the clothes washer.

3.8.2.2 Set water level selector to maximum fill.

3.8.2.3 Run the energy test cycle.

3.8.2.4 Record the weight of the test load immediately after completion of the energy test cycle (WC_{max}).

3.8.2.5 Calculate the remaining moisture content of the maximum test load, RMC_{max}, expressed as a percentage and defined as:

$$RMC_{max} = ((WC_{max} - WI_{max})/WI_{max}) \times 100\%$$

3.8.3 *For clothes washers with cold and warm rinse options:*

3.8.3.1 Complete sections 3.8.2.1 through 3.8.2.4 of this Appendix for cold rinse. Calculate the remaining moisture content of the maximum test load for cold rinse, RMC_{COLD}, expressed as a percentage and defined as:

$$RMC_{COLD} = ((WC_{max} - WI_{max})/WI_{max}) \times 100\%$$

3.8.3.2 Complete sections 3.8.2.1 through 3.8.2.4 of this Appendix for warm rinse. Calculate the remaining moisture content of the maximum test load for warm rinse, RMC_{WARM}, expressed as a percentage and defined as:

$$RMC_{WARM} = ((WC_{max} - WI_{max})/WI_{max}) \times 100\%$$

3.8.3.3 Calculate the remaining moisture content of the maximum test load, RMC_{max}, expressed as a percentage and defined as:

$$RMC_{max} = RMC_{COLD} \times (1 - TUF_r) + RMC_{WARM} \times (TUF_r)$$

where:

TUF_r is the temperature use factor for warm rinse as defined in Table 4.1.1 of this Appendix.

3.8.4 Clothes washers that have options such as multiple selections of spin speeds or spin times that result in different RMC values and that are available in the energy test cycle, shall be tested at the maximum and minimum extremes of the available options, excluding any ''no spin'' (zero spin speed) settings, in accordance with requirements in section 3.8.2 or 3.8.3 of this Appendix. The calculated $RMC_{max,max\ extraction}$ and $RMC_{max,min\ extraction}$ at the maximum and minimum settings, respectively, shall be combined as follows and the final RMC to be used in section 4.3 of this Appendix shall be:

$$RMC = 0.75 \times RMC_{max,max\ extraction} + 0.25 \times RMC_{max,min\ extraction}$$

3.9 *''Steam Wash'' for clothes washers equipped with a steam cycle.* Water and electrical energy consumption shall be measured for each water fill level and/or test load size as specified in sections 3.9.1 through 3.9.3 of this Appendix for the hottest wash setting available with steam.

3.9.1 *Maximum test load and water fill.* Hot water consumption (Hs_x), cold water consumption (Cs_x), and electrical energy consumption (Es_x) shall be measured for a steam energy test cycle, with the controls set for the maximum water fill level. The maximum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.9.2 *Minimum test load and water fill.* Hot water consumption (Hs_n), cold water consumption (Cs_n), and electrical energy consumption (Es_n) shall be measured for a steam energy test cycle, with the controls set for the minimum

water fill level. The minimum test load size is to be used and shall be determined per Table 5.1 of this Appendix.

3.9.3 *Average test load and water fill.* For clothes washers with an adaptive water fill control system, measure the values for hot water consumption (Hs_a), cold water consumption (Cs_a), and electrical energy consumption (Es_a) for a steam energy test cycle using an average test load size as determined per Table 5.1 of this Appendix.

3.10 *Self-clean.* Set the controls to obtain the self-clean cycle. Hot water consumption (H_{sc}), cold water consumption (C_{sc}), and electric energy consumption (E_{sc}) shall be measured for the self-clean cycle. Do not use a test load.

3.11 *Combined low-power mode power.* Connect the clothes washer to a watt meter as specified in section 2.5.3 of this Appendix. Establish the testing conditions set forth in sections 2.1, 2.2 and 2.11 of this Appendix. For clothes washers 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 clothes washer to reach the lower power state before proceeding with the test measurement. Follow the test procedure for the sampling method specified in Section 5, Paragraph 5.3.2 of IEC 62301 for testing in each possible mode as described in sections 3.11.1 and 3.11.2 of this Appendix.

3.11.1 If a clothes washer has an inactive mode as defined in section 1.15 of this Appendix, measure and record the average inactive mode power of the clothes washer, P_{ia}, in watts.

3.11.2 If a clothes washer has an off mode as defined in section 1.23 of this Appendix, measure and record its average off mode power, P_o, in watts.

4. Calculation of Derived Results From Test Measurements

4.1 *Hot water and machine electrical energy consumption of clothes washers.*

4.1.1 *Per-cycle temperature-weighted hot water consumption for maximum, average, and minimum water fill levels using each appropriate load size as defined in section 2.8 and Table 5.1 of this Appendix.* Calculate for the cycle under test the per-cycle temperature weighted hot water consumption for the maximum water fill level, Vh_x, the average water fill level, Vh_a, and the minimum water fill level, Vh_n, expressed in gallons per cycle (or liters per cycle) and defined as:

(a) $Vh_x = [Hs_x \times TUF_s] + [Hm_x \times TUF_m] + [Hh_x \times TUF_h] + [Hw_x \times TUF_w] + [Hww_x \times TUF_{ww}] + [Hc_x \times TUF_c]$

(b) $Vh_a = [Hs_a \times TUF_s] + [Hm_a \times TUF_m] + [Hh_a \times TUF_h] + [Hw_a \times TUF_w] + [Hww_a \times TUF_{ww}] + [Hc_a \times TUF_c]$

(c) $Vh_n = [Hs_n \times TUF_s] + [Hm_n \times TUF_m] + [Hh_n \times TUF_h] + [Hw_n \times TUF_w] + [Hww_n \times TUF_{ww}] + [Hc_n \times TUF_c]$

Where:

Hs_x, Hs_a, and Hs_n, are reported hot water consumption values, in gallons per cycle (or liters per cycle), at maximum, average, and minimum water fill, respectively, for the steam cycle with the appropriate test loads as defined in section 2.8 of this Appendix.

Hm_x, Hm_a, and Hm_n, are reported hot water consumption values, in gallons per-cycle (or liters per cycle), at maximum, average, and minimum water fill, respectively, for the extra hot wash cycle with the appropriate test loads as defined in section 2.8 of this Appendix.

Hh_x, Hh_a, and Hh_n, are reported hot water consumption values, in gallons per-cycle (or liters per cycle), at maximum, average, and minimum water fill, respectively, for the hot wash cycle with the appropriate test loads as defined in section 2.8 of this Appendix.

Hw_x, Hw_a, and Hw_n, are reported hot water consumption values, in gallons per-cycle (or liters per cycle), at maximum, average, and minimum water fill, respectively, for the warm wash cycle with the appropriate test loads as defined in section 2.8 of this Appendix.

Hww_x, Hww_a, and Hww_n, are reported hot water consumption values, in gallons per-cycle (or liters per cycle), at maximum, average, and minimum water fill, respectively, for the warm wash/warm rinse cycle with the appropriate test loads as defined in section 2.8 of this Appendix.

Hc_x, Hc_a, and Hc_n, are reported hot water consumption values, in gallons per-cycle (or liters per cycle), at maximum, average, and minimum water fill, respectively, for the cold wash cycle with the appropriate test loads as defined in section 2.8 of this Appendix.

TUF_s, TUF_m, TUF_h, TUF_w, TUF_{ww}, and TUF_c are temperature use factors for steam wash, extra hot wash, hot wash, warm wash, warm wash/warm rinse, and cold wash temperature selections, respectively, and are as defined in Table 4.1.1 of this Appendix.

TABLE 4.1.1—TEMPERATURE USE FACTORS

Max wash temp available	≤135 (57.2 °C)	≤135 °F (57.2 °C)	≤135 °F (57.2 °C)	>135 °F (57.2 °C)	>135 °F (57.2 °C)	Steam	Steam
No. Wash Temp Selections	Single	2 Temps	>2 Temps	3 Temps	>3 Temps	3 Temps	>3 Temps
TUF_s (steam)	NA	NA	NA	NA	NA	0.02	0.02
TUF_m (extra hot)	NA	NA	NA	0.14	0.05	0.12	0.03
TUF_h (hot)	NA	0.63	0.14	NA	0.09	NA	0.09
TUF_{ww} (warm/warm)	NA	NA	*0.27	*0.27	*0.27	*0.27	*0.27
TUF_w (warm)	NA	NA	0.22	0.22	0.22	0.22	0.22
TUF_c (cold)	1.00	0.37	0.37	0.37	0.37	0.37	0.37

* Only applicable to machines offering a warm/warm cycle. For machines with no warm/warm cycle, this value should be zero and TUF_w (warm) should be 0.49.

4.1.2 *Total per-cycle hot water energy consumption for all maximum, average, and minimum water fill levels tested.* Calculate the total per-cycle hot water energy consumption for the maximum water fill level, HE_{max}, the minimum water fill level, HE_{min}, and the average water fill level, HE_{avg}, expressed in kilowatt-hours per cycle and defined as:

(a) $HE_{max} = [Vh_x \times T \times K]$ = Total energy when a maximum load is tested.

(b) $HE_{avg} = [Vh_a \times T \times K]$ = Total energy when an average load is tested.

(c) $HE_{min} = [Vh_n \times T \times K]$ = Total energy when a minimum load is tested.

Where:

T = Temperature rise = 75 °F (41.7 °C).

K = Water specific heat in kilowatt-hours per gallon degree F = 0.00240 (0.00114 kWh/L-°C).

Vh_x, Vh_a, and Vh_n are as defined in section 4.1.1 of this Appendix.

4.1.3 *Total weighted per-cycle hot water energy consumption.* Calculate the total weighted per-cycle hot water energy consumption, HE_T, expressed in kilowatt-hours per cycle and defined as:

$HE_T = [HE_{max} \times F_{max}] + [HE_{avg} \times F_{avg}] + HE_{min} \times F_{min}]$

Where:

HE_{max}, HE_{avg}, and HE_{min} are as defined in section 4.1.2 of this Appendix.

F_{max}, F_{avg}, and F_{min} are the load usage factors for the maximum, average, and minimum test loads based on the size and type of the control system on the washer being tested. The values are as shown in Table 4.1.3 of this Appendix.

TABLE 4.1.3—LOAD USAGE FACTORS

Water fill control system	Manual	Adaptive
F_{max} = ...	[1] 0.72	[2] 0.12
F_{avg} = ...	.....	[2] 0.74
F_{min} = ...	[1] 0.28	[2] 0.14

[1] Reference 3.2.3.3.
[2] Reference 3.2.3.2.

4.1.4 *Total per-cycle hot water energy consumption using gas-heated or oil-heated water.* Calculate for the energy test cycle the per-cycle hot water consumption, HE_{TG}, using gas-heated or oil-heated water, expressed in Btu per cycle (or megajoules per cycle) and defined as:

$HE_{TG} = HE_T \times 1/e \times 3412$ Btu/kWh or $HE_{TG} = HE_T \times 1/e \times 3.6$ MJ/kWh

Where:

e = Nominal gas or oil water heater efficiency = 0.75.

HE_T = As defined in section 4.1.3 of this Appendix.

4.1.5 *Per-cycle machine electrical energy consumption for all maximum, average, and minimum test load sizes.* Calculate the total per-cycle machine electrical energy consumption for the maximum water fill level, ME_{max}, the average water fill level, ME_{avg}, and the minimum water fill level, ME_{min}, expressed in kilowatt-hours per cycle and defined as:

(a) $ME_{max} = [Es_x \times TUF_s] + [Em_x \times TUF_m] + [Eh_x \times TUF_h] + [Ew_x \times TUF_w] + [Eww_x \times TUF_{ww}] + [Ec_x \times TUF_c]$

(b) $ME_{avg} = [Es_a \times TUF_s] + [Em_a \times TUF_m] + [Eh_a \times TUF_h] + [Ew_a \times TUF_w] + [Eww_a \times TUF_{ww}] + [Ec_a \times TUF_c]$

(c) $ME_{min} = [Es_n \times TUF_s] + [Em_n \times TUF_m] + [Eh_n \times TUF_h] + [Ew_n \times TUF_w] + [Eww_n \times TUF_{ww}] + [Ec_n \times TUF_c]$

Where:

Es_x, Es_a, and Es_n, are reported electrical energy consumption values, in kilowatt-hours per cycle, at maximum, average, and minimum test loads, respectively, for the steam cycle.

Em_x, Em_a, and Em_n, are reported electrical energy consumption values, in kilowatt-hours per cycle, at maximum, average, and minimum test loads, respectively, for the extra hot wash cycle.

Eh_x, Eh_a, and Eh_n, are reported electrical energy consumption values, in kilowatt-hours per cycle, at maximum, average, and minimum test loads, respectively, for the hot wash cycle.

Ew_x, Ew_a, and Ew_n, are reported electrical energy consumption values, in kilowatt-hours per cycle, at maximum, average, and minimum test loads, respectively, for the warm wash cycle.

Eww_x, Eww_a, and Eww_n, are reported electrical energy consumption values, in kilowatt-hours per cycle, at maximum, average, and minimum test loads, respectively, for the warm wash/warm rinse cycle.

Ec_x, Ec_a, and Ec_n, are reported electrical energy consumption values, in kilowatt-hours per cycle, at maximum, average, and minimum test loads, respectively, for the cold wash cycle.

TUF_s, TUF_m, TUF_h, TUF_w, TUF_{ww}, and TUF_c are as defined in Table 4.1.1 of this Appendix.

4.1.6 *Total weighted per-cycle machine electrical energy consumption.* Calculate the total per-cycle load size weighted energy consumption, ME_T, expressed in kilowatt-hours per cycle and defined as:

$ME_T = [ME_{max} \times F_{max}] + [ME_{avg} \times F_{avg}] + [ME_{min} \times F_{min}]$

Where:

ME_{max}, ME_{avg}, and ME_{min} are as defined in section 4.1.5 of this Appendix.

F_{max}, F_{avg}, and F_{min} are as defined in Table 4.1.3 of this Appendix.

4.1.7 *Total per-cycle energy consumption when electrically heated water is used.* Calculate for the energy test cycle the total per-cycle energy consumption, E_{TE}, using electrically heated water, expressed in kilowatt-hours per cycle and defined as:

$E_{TE} = HE_T + ME_T$

Where:

ME_T = As defined in section 4.1.6 of this Appendix.

HE_T = As defined in section 4.1.3 of this Appendix.

4.1.8 *Per-cycle self-clean hot water energy consumption when electrically heated water is used.* Calculate the per-cycle self-clean hot water energy consumption, HE_{sc}, expressed in kilowatt-hours per cycle, and defined as:

$HE_{sc} = [H_{sc} \times T \times K] \times 12/295$

Where:

H_{sc} = reported hot water consumption value, in gallons per-cycle, for the self-clean cycle as defined in section 3.10 of this Appendix.

T = Temperature rise = 75 °F (41.7 °C).

K = Water specific heat in kilowatt-hours per gallon degree F = 0.00240 (0.00114 kWh/L-°C).

12 = Representative average number of clothes washer self-clean cycles in a year.

295 = Representative average number of clothes washer cycles in a year.

4.1.9 *Per-cycle self-clean hot water energy consumption using gas-heated or oil-heated water.* Calculate the per-cycle self-clean hot water energy consumption, HE_{SCG}, using gas-heated or oil-heated water, expressed in Btu per cycle (or megajoules per cycle) and defined as:

$HE_{SCG} = [HE_{SC} \times 1/e \times 3412$ Btu/kWh$] \times 12/295$ or $HE_{SCG} = [HE_T \times 1/e \times 3.6$ MJ/kWh$] \times 12/295$

Where:

e = Nominal gas or oil water heater efficiency = 0.75.

HE_{sc} = As defined in section 4.1.8 of this Appendix.

12 = Representative average number of clothes washer self-clean cycles in a year.

295 = Representative average number of clothes washer cycles in a year.

4.1.10 *Per-cycle self-clean machine electrical energy consumption.* Calculate the per-cycle self-clean machine electrical energy consumption, ME_{sc}, expressed in kilowatt-hours per cycle, and defined as:

$ME_{sc} = E_{sc} \times 12/295$

Where:

E_{sc} = Reported electrical energy consumption value, in gallons per-cycle, for the self-clean cycle as defined in section 3.10 of this Appendix.

12 = Representative average number of clothes washer self-clean cycles in a year.

295 = Representative average number of clothes washer cycles in a year.

4.2 *Water consumption of clothes washers.*

4.2.1 *Per-cycle water consumption for steam wash.* Calculate the maximum, average, and minimum total water consumption, expressed in gallons per cycle (or liters per cycle), for the steam cycle and defined as:

$Qs_{max} = [Hs_x + Cs_x]$
$Qs_{avg} = [Hs_a + Cs_a]$
$Qs_{min} = [Hs_n + Cs_n]$

Where:

Hs_x, Cs_x, Hs_a, Cs_a, Hs_n, and Cs_n are defined in section 3.9 of this Appendix.

4.2.2 *Per-cycle water consumption for extra hot wash.* Calculate the maximum, average, and minimum total water consumption, expressed in gallons per cycle (or liters per cycle), for the extra hot wash cycle and defined as:

$Qm_{max} = [Hm_x + Cm_x]$
$Qm_{avg} = [Hm_a + Cm_a]$
$Qm_{min} = [Hm_n + Cm_n]$

Where:

Hm_x, Cm_x, Hm_a, Cm_a, Hm_n, and Cm_n are defined in section 3.3 of this Appendix.

4.2.3 *Per-cycle water consumption for hot wash.* Calculate the maximum, average, and minimum total water consumption, expressed in gallons per cycle (or liters per cycle), for the hot wash cycle and defined as:

$Qh_{max} = [Hh_x + Ch_x]$
$Qh_{avg} = [Hh_a + Ch_a]$
$Qh_{min} = [Hh_n + Ch_n]$

Where:

Hh_x, Ch_x, Hh_a, Ch_a, Hh_n, and Ch_n are defined in section 3.4 of this Appendix.

4.2.4 *Per-cycle water consumption for warm wash with cold rinse.* Calculate the maximum, average, and minimum total water consumption, expressed in gallons per cycle (or liters per cycle), for the warm wash/cold rinse cycle and defined as:

$Qw_{max} = [Hw_x + Cw_x]$
$Qw_{avg} = [Hw_a + Cw_a]$
$Qw_{min} = [Hw_n + Cw_n]$

Where:

Hw_x, Cw_x, Hw_a, Cw_a, Hw_n, and Cw_n are defined in section 3.5 of this Appendix.

4.2.5 *Per-cycle water consumption for warm wash with warm rinse.* Calculate the maximum, average, and minimum total water consumption, expressed in gallons per cycle (or liters per cycle), for the warm wash/warm rinse cycle and defined as:

$Qww_{max} = [Hww_x + Cww_x]$
$Qww_{avg} = [Hww_a + Cww_a]$
$Qww_{min} = [Hww_n + Cww_n]$

Where:

Hww_x, Cww_x, Hww_a, Cww_a, Hww_n, and Cww_n are defined in section 3.7 of this Appendix.

4.2.6 *Per-cycle water consumption for cold wash.* Calculate the maximum, average, and minimum total water consumption, expressed in gallons per cycle (or liters per cycle), for the cold wash cycle and defined as:

$Qc_{max} = [Hc_x + Cc_x]$
$Qc_{avg} = [Hc_a + Cc_a]$
$Qc_{min} = [Hc_n + Cc_n]$

Where:

Hc_x, Cc_x, Hc_a, Cc_a, Hc_n, and Cc_n are defined in section 3.6 of this Appendix.

4.2.7 *Total weighted per-cycle water consumption for steam wash.* Calculate the total weighted per cycle consumption, Qs_T, expressed in gallons per cycle (or liters per cycle) and defined as:

$Qs_T = [Qs_{max} \times F_{max}] + [Qs_{avg} \times F_{avg}] + [Qs_{min} \times F_{min}]$

Where:

Qs_{max}, Qs_{avg}, Qs_{min} are defined in section 4.2.1 of this Appendix.

F_{max}, F_{avg}, F_{min} are defined in Table 4.1.3 of this Appendix.

4.2.8 *Total weighted per-cycle water consumption for extra hot wash.* Calculate the total weighted per cycle consumption, Qm_T, expressed in gallons per cycle (or liters per cycle) and defined as:

$Qm_T = [Qm_{max} \times F_{max}] + [Qm_{avg} \times F_{avg}] + [Qm_{min} \times F_{min}]$

Where:

Qm_{max}, Qm_{avg}, Qm_{min} are defined in section 4.2.2 of this Appendix.

F_{max}, F_{avg}, F_{min} are defined in Table 4.1.3 of this Appendix.

4.2.9 *Total weighted per-cycle water consumption for hot wash.* Calculate the total weighted per cycle consumption, Qh_T, expressed in gallons per cycle (or liters per cycle) and defined as:

$Qh_T = [Qh_{max} \times F_{max}] + [Qh_{avg} \times F_{avg}] + [Qh_{min} \times F_{min}]$

Where:

Qh_{max}, Qh_{avg}, Qh_{min} are defined in section 4.2.3 of this Appendix.

F_{max}, F_{avg}, F_{min} are defined in Table 4.1.3 of this Appendix.

4.2.10 *Total weighted per-cycle water consumption for warm wash with cold rinse.* Calculate the total weighted per cycle consumption, Qw_T, expressed in gallons per cycle (or liters per cycle) and defined as:

$Qw_T = [Qw_{max} \times F_{max}] + [Qw_{avg} \times F_{avg}] + [Qw_{min} \times F_{min}]$

Where:

Qw_{max}, Qw_{avg}, Qw_{min} are defined in section 4.2.4 of this Appendix.

F_{max}, F_{avg}, F_{min} are defined in Table 4.1.3 of this Appendix.

4.2.11 *Total weighted per-cycle water consumption for warm wash with warm rinse.* Calculate the total weighted per cycle consumption, Qw_T, expressed in gallons per cycle (or liters per cycle) and defined as:

$Qww_T = [Qww_{max} \times F_{max}] + [Qww_{avg} \times F_{avg}] + [Qww_{min} \times F_{min}]$

Where:

Qww_{max}, Qww_{avg}, Qww_{min} are defined in section 4.2.5 of this Appendix.

F_{max}, F_{avg}, F_{min} are defined in Table 4.1.3 of this Appendix.

4.2.12 *Total weighted per-cycle water consumption for cold wash.* Calculate the total weighted per cycle consumption, Qc_T, expressed in gallons per cycle (or liters per cycle) and defined as:

$Qc_T = [Qc_{max} \times F_{max}] + [Qc_{avg} \times F_{avg}] + [Qc_{min} \times F_{min}]$

Where:

Qc_{max}, Qc_{avg}, Qc_{min} are defined in section 4.2.6 of this Appendix.

F_{max}, F_{avg}, F_{min} are defined in Table 4.1.3 of this Appendix.

4.2.13 *Total weighted per-cycle water consumption for all wash cycles.* Calculate the total weighted per cycle consumption, Q_T, expressed in gallons per cycle (or liters per cycle) and defined as:

$Q_T = [Qs_T \times TUF_s] + [Qm_T \times TUF_m] + [Qh_T \times TUF_h] + [Qw_T \times TUF_w] + [Qww_T \times TUF_{ww}] + [Qc_T \times TUF_c]$

Where:

Qs_T, Qm_T, Qh_T, Qw_T, Qww_T, and Qc_T are defined in sections 4.2.7 through 4.2.12 of this Appendix.

TUF_s, TUF_m, TUF_h, TUF_w, TUF_{ww}, and TUF_c are defined in Table 4.1.1 of this Appendix.

4.2.14 *Per-cycle self-clean water consumption.* Calculate the total per-cycle self-clean water consumption, Q_{sc}, in gallons per cycle (or liters per cycle) and defined as:

$Q_{sc} = [H_{sc} + C_{sc}] \times 12/295$

Where:

H_{sc} = As defined in section 3.10 of this Appendix.

C_{sc} = As defined in 3.10 of this Appendix.

12 = Representative average number of clothes washer self-clean cycles in a year.

295 = Representative average number of clothes washer cycles in a year.

4.2.15 *Water consumption factor.* Calculate the water consumption factor, WCF, expressed in gallons per cycle per cubic feet (or liter per cycle per liter), as:

$WCF = Qc_T/C$

Where:

Qc_T = As defined in section 4.2.12 of this Appendix.

C = As defined in section 3.1.5 of this Appendix.

4.2.16 *Integrated water consumption factor.* Calculate the integrated water consumption factor, IWF, expressed in gallons per cycle per cubic feet (or liter per cycle per liter), as:

$IWF = [Q_T + Q_{sc}]/C$

Where:

Q_T = As defined in section 4.2.13 of this Appendix.

Q_{sc} = As defined in section 4.2.14 of this Appendix.

C = As defined in section 3.1.5 of this Appendix.

4.3 *Per-cycle energy consumption for removal of moisture from test load.* Calculate the per-cycle energy required to remove the moisture of the test load, D_E, expressed in kilowatt-hours per cycle and defined as:

$D_E = [(F_{max} \times \text{Maximum test load weight}) + (F_{avg} \times \text{Average test load weight}) + (F_{min} \times \text{Minimum test load weight})] \times (RMC - 4\%) \times (DEF) \times (DUF)$

Where:

F_{max}, F_{avg}, and F_{min} are as defined in Table 4.1.3 of this Appendix.

Maximum, average, and minimum test load weights are as defined in Table 5.1 of this Appendix.

RMC = As defined in section 3.8.2.5, 3.8.3.3, or 3.8.4 of this Appendix.

DEF = Nominal energy required for a clothes dryer to remove moisture from clothes = 0.5 kWh/lb (1.1 kWh/kg).

DUF = Dryer usage factor, percentage of washer loads dried in a clothes dryer = 0.91.

4.4 *Per-cycle combined low-power mode energy consumption.* Calculate the clothes washer combined low-power mode energy consumption per cycle, E_{TLP}, expressed in kilowatt-hours per cycle and defined as:

$E_{TLP} = [(P_{ia} \times S_{ia}) + (P_o \times S_o)] \times K_p/295$

Where:

P_{ia} = Washer inactive mode power, in watts, as defined in section 3.11.1 of this Appendix for clothes washers capable of operating in inactive mode; otherwise, $P_{ia} = 0$.

P_o = Washer off mode power, in watts, as defined in section 3.11.2 of this Appendix for clothes washers capable of operating in off mode; otherwise, $P_o = 0$.

S_{ia} = Annual hours in inactive mode as defined as S_{oi} if no off mode is possible, $[S_{oi}/2]$ if both inactive mode and off mode are possible, and 0 if no inactive mode is possible.

S_o = Annual hours in off mode as defined as S_{oi} if no inactive mode is possible, $[S_{oi}/2]$ if both inactive mode and off mode are possible, and 0 if no off mode is possible.

S_{oi} = Combined annual hours for off and inactive mode = 8,465.

K_p = Conversion factor of watt-hours to kilowatt-hours = 0.001.

295 = Representative average number of clothes washer cycles in a year.

4.5 *Per-cycle self-clean energy consumption.* Calculate the clothes washer self-clean energy per cycle, E_{TSC}, expressed in kilowatt-hours per cycle and defined as:

$E_{TSC} = HE_{sc} + ME_{sc}$

Where:

HE_{sc} = As defined in section 4.1.8 of this Appendix.

ME_{sc} = As defined in section 4.1.10 of this Appendix.

4.6 *Modified energy factor.* Calculate the modified energy factor, MEF, expressed in cubic feet per kilowatt-hour per cycle (or liters per kilowatt-hour per cycle) and defined as:

$MEF = C/(E_{TE} + D_E)$

Where:

C = As defined in section 3.1.5 of this Appendix.

E_{TE} = As defined in section 4.1.7 of this Appendix.

D_E = As defined in section 4.3 of this Appendix.

4.7 *Integrated modified energy factor.* Calculate the integrated modified energy factor, IMEF, expressed in cubic feet per kilowatt-hour per cycle (or liters per kilowatt-hour per cycle) and defined as:

$IMEF = C/(E_{TE} + D_E + E_{TLP} + E_{TSC})$

Where:

C = As defined in section 3.1.5 of this Appendix.

E_{TE} = As defined in section 4.1.7 of this Appendix.

D_E = As defined in section 4.3 of this Appendix.

E_{TLP} = As defined in section 4.4 of this Appendix.

E_{TSC} = As defined in section 4.5 of this Appendix.

5. Test Loads

TABLE 5.1—TEST LOAD SIZES

Container volume		Minimum load		Maximum load		Average load	
Cu. ft.	Liter	lb	kg	Lb	kg	lb	Kg
≥ <	≥ <						
0–0.8	0–22.7	3.00	1.36	3.00	1.36	3.00	1.36
0.80–0.90	22.7–25.5	3.00	1.36	3.50	1.59	3.25	1.47
0.90–1.00	25.5–28.3	3.00	1.36	3.90	1.77	3.45	1.56
1.00–1.10	28.3–31.1	3.00	1.36	4.30	1.95	3.65	1.66
1.10–1.20	31.1–34.0	3.00	1.36	4.70	2.13	3.85	1.75
1.20–1.30	34.0–36.8	3.00	1.36	5.10	2.31	4.05	1.84
1.30–1.40	36.8–39.6	3.00	1.36	5.50	2.49	4.25	1.93
1.40–1.50	39.6–42.5	3.00	1.36	5.90	2.68	4.45	2.02
1.50–1.60	42.5–45.3	3.00	1.36	6.40	2.90	4.70	2.13
1.60–1.70	45.3–48.1	3.00	1.36	6.80	3.08	4.90	2.22
1.70–1.80	48.1–51.0	3.00	1.36	7.20	3.27	5.10	2.31
1.80–1.90	51.0–53.8	3.00	1.36	7.60	3.45	5.30	2.4
1.90–2.00	53.8–56.6	3.00	1.36	8.00	3.63	5.50	2.49
2.00–2.10	56.6–59.5	3.00	1.36	8.40	3.81	5.70	2.59
2.10–2.20	59.5–62.3	3.00	1.36	8.80	3.99	5.90	2.68
2.20–2.30	62.3–65.1	3.00	1.36	9.20	4.17	6.10	2.77
2.30–2.40	65.1–68.0	3.00	1.36	9.60	4.35	6.30	2.86
2.40–2.50	68.0–70.8	3.00	1.36	10.00	4.54	6.50	2.95

TABLE 5.1—TEST LOAD SIZES—Continued

Container volume		Minimum load		Maximum load		Average load	
Cu. ft.	Liter	lb	kg	Lb	kg	lb	Kg
≥ <	≥ <						
2.50–2.60	70.8–73.6	3.00	1.36	10.50	4.76	6.75	3.06
2.60–2.70	73.6–76.5	3.00	1.36	10.90	4.94	6.95	3.15
2.70–2.80	76.5–79.3	3.00	1.36	11.30	5.13	7.15	3.24
2.80–2.90	79.3–82.1	3.00	1.36	11.70	5.31	7.35	3.33
2.90–3.00	82.1–85.0	3.00	1.36	12.10	5.49	7.55	3.42
3.00–3.10	85.0–87.8	3.00	1.36	12.50	5.67	7.75	3.52
3.10–3.20	87.8–90.6	3.00	1.36	12.90	5.85	7.95	3.61
3.20–3.30	90.6–93.4	3.00	1.36	13.30	6.03	8.15	3.7
3.30–3.40	93.4–96.3	3.00	1.36	13.70	6.21	8.35	3.79
3.40–3.50	96.3–99.1	3.00	1.36	14.10	6.40	8.55	3.88
3.50–3.60	99.1–101.9	3.00	1.36	14.60	6.62	8.80	3.99
3.60–3.70	101.9–104.8	3.00	1.36	15.00	6.80	9.00	4.08
3.70–3.80	104.8–107.6	3.00	1.36	15.40	6.99	9.20	4.17
3.80–3.90	107.6–110.4	3.00	1.36	15.80	7.16	9.40	4.26
3.90–4.00	110.4–113.3	3.00	1.36	16.20	7.34	9.60	4.35
4.00–4.10	113.3–116.1	3.00	1.36	16.60	7.53	9.80	4.45
4.10–4.20	116.1–118.9	3.00	1.36	17.00	7.72	10.00	4.54
4.20–4.30	118.9–121.8	3.00	1.36	17.40	7.90	10.20	4.63
4.30–4.40	121.8–124.6	3.00	1.36	17.80	8.09	10.40	4.72
4.40–4.50	124.6–127.4	3.00	1.36	18.20	8.27	10.60	4.82
4.50–4.60	127.4–130.3	3.00	1.36	18.70	8.46	10.85	4.91
4.60–4.70	130.3–133.1	3.00	1.36	19.10	8.65	11.05	5.00
4.70–4.80	133.1–135.9	3.00	1.36	19.50	8.83	11.25	5.10
4.80–4.90	135.9–138.8	3.00	1.36	19.90	9.02	11.45	5.19
4.90–5.00	138.8–141.6	3.00	1.36	20.30	9.20	11.65	5.28
5.00–5.10	141.6–144.4	3.00	1.36	20.70	9.39	11.85	5.38
5.10–5.20	144.4–147.2	3.00	1.36	21.10	9.58	12.05	5.47
5.20–5.30	147.2–150.1	3.00	1.36	21.50	9.76	12.25	5.56
5.30–5.40	150.1–152.9	3.00	1.36	21.90	9.95	12.45	5.65
5.40–5.50	152.9–155.7	3.00	1.36	22.30	10.13	12.65	5.75
5.50–5.60	155.7–158.6	3.00	1.36	22.80	10.32	12.90	5.84
5.60–5.70	158.6–161.4	3.00	1.36	23.20	10.51	13.10	5.93
5.70–5.80	161.4–164.2	3.00	1.36	23.60	10.69	13.30	6.03
5.80–5.90	164.2–167.1	3.00	1.36	24.00	10.88	13.50	6.12
5.90–6.00	167.1–169.9	3.00	1.36	24.40	11.06	13.70	6.21

Notes: (1) All test load weights are bone dry weights.
(2) Allowable tolerance on the test load weights are ±0.10 lbs (0.05 kg).

6. Waivers and Field Testing

6.1 *Waivers and Field Testing for Nonconventional Clothes Washers.* Manufacturers of nonconventional clothes washers, such as clothes washers with adaptive control systems, must submit a petition for waiver pursuant to 10 CFR 430.27 to establish an acceptable test procedure for that clothes washer if the washer cannot be tested pursuant to the DOE test procedure or the DOE test procedure yields results that are so unrepresentative of the clothes washer's true energy consumption characteristics as to provide materially inaccurate comparative data. In such cases, field testing may be appropriate for establishing an acceptable test procedure. The following are guidelines for field testing which may be used by manufacturers in support of petitions for waiver. These guidelines are not mandatory and the Department may determine that they do not apply to a particular model. Depending upon a manufacturer's approach for conducting field testing, additional data may be required. Manufacturers are encouraged to communicate with the Department prior to the commencement of field tests which may be used to support a petition for waiver. Section 6.3 of this Appendix provides an example of field testing for a clothes washer with an adaptive water fill control system. Other features, such as the use of various spin speed selections, could be the subject of field tests.

6.2 *Nonconventional Wash System Energy Consumption Test.* (1) The field test may consist of a minimum of 10 of the nonconventional clothes washers (''test clothes washers'') and 10 clothes washers already being distributed in commerce (''base clothes washers''). The tests should include a minimum of 50 energy test cycles per clothes washer. The test clothes washers and base clothes washers should be identical in construction except for the controls or systems being tested. Equal numbers of both the test clothes washer and the base clothes washer should be tested simultaneously in comparable settings to minimize seasonal or consumer laundering conditions or variations. The clothes washers should be monitored in such a way as to accurately record the total energy consumption per cycle. At a minimum, the following should be measured and recorded throughout the test period for each clothes washer: Hot water usage in gallons (or liters), electrical energy usage in kilowatt-hours, and the cycles of usage.

(2) The field test results would be used to determine the best method to correlate the rating of the test clothes washer to the rating of the base clothes washer. If the base clothes washer is rated at A kWh per year, but field tests at B kWh per year, and the test clothes washer field tests at D kWh per year, the test unit would be rated as follows:

$A \times (D/B) = G$ kWh per year

6.3 *Adaptive water fill control system field test.* (1) Section 3.2.3.1 of this Appendix defines the test method for measuring energy consumption for clothes washers which incorporate control systems having both adaptive and alternate cycle selections. Energy consumption calculated by the method defined in section 3.2.3.1 of this Appendix assumes the adaptive cycle will be used 50 percent of the time. This section can be used to develop field test data in support of a petition for waiver when it is believed that the adaptive cycle will be used more than 50 percent of the time. The field test sample size should be a minimum of 10 test clothes washers. The test clothes washers should be representative of the design, construction, and control system that will be placed in commerce. The duration of field testing in the user's house should be a minimum of 50 energy test cycles, for each unit. No special instructions as to cycle selection or product usage should be given to the field test participants, other than inclusion of the product literature pack which would be shipped with all units, and instructions regarding filling out data collection forms, use of data collection equipment, or basic procedural methods. Prior to the test clothes washers being installed in the field test locations, baseline data should be developed for all field test units by conducting laboratory tests as defined by section 1 through section 5 of this Appendix to determine the energy consumption, water consumption, and remaining moisture content values. The following data should be measured and recorded for each wash load during the test period: Wash cycle selected, the mode of the clothes washer (adaptive or manual), clothes load dry weight (measured after the clothes washer and clothes dryer cycles are completed) in pounds, and type of articles in the clothes load (*e.g.,* cottons, linens, permanent press). The wash loads used in calculating the in-home percentage split between adaptive and manual cycle usage should be only those wash loads which conform to the definition of the energy test cycle.

Calculate:

T = The total number of energy test cycles run during the field test.

T_a = The total number of adaptive control energy test cycles.

T_m = The total number of manual control energy test cycles.

The percentage weighting factors:

$P_a = (T_a/T) \times 100$ (the percentage weighting for adaptive control selection)

$P_m = (T_m/T) \times 100$ (the percentage weighting for manual control selection)

(2) Energy consumption (HE_T, ME_T, and D_E) and water consumption (Q_T), values calculated in section 4 of this Appendix for the manual and adaptive modes, should be combined using P_a and P_m as the weighting factors.

[FR Doc. 2011–19440 Filed 8–8–11; 8:45 am]

BILLING CODE 6450–01–P