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Energy Conservation Program for Consumer Products: Test Procedures for Clothes Dryers and Room Air Conditioners; Final Rule

DEPARTMENT OF ENERGY

10 CFR Part 430

[Docket No. EERE–2008–BT–TP–0010]

RIN 1904–AC02

Energy Conservation Program for Consumer Products: Test Procedures for Clothes Dryers and Room Air Conditioners

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

ACTION: Final rule.

SUMMARY: The U.S. Department of Energy (DOE) amends its test procedures for residential clothes dryers and room air conditioners under the Energy Policy and Conservation Act (EPCA). The amendments provide for measurement of standby mode and off mode power use by these products and also amend the active mode test procedures for these products. For standby and off mode energy use, these amendments incorporate into the DOE test procedures relevant provisions from the International Electrotechnical Commission (IEC) Standard 62301, "Household electrical appliances—Measurement of standby power," (first edition June 2005), including language to clarify application of these provisions for measuring standby mode and off mode power consumption in clothes dryers and room air conditioners. In addition, DOE is adopting definitions of modes based on the relevant provisions from IEC Standard 62301 Second Edition Committee Draft for Vote. For active mode energy use, DOE adopts testing methods for ventless clothes dryers, test cloth preconditioning requirements for clothes dryer energy tests, test conditions for gas clothes dryers, test conditions for clothes dryer drum capacity measurement, amendments to clarify current clothes dryer usage patterns and capabilities and to update the references to industry standards in the room air conditioner and clothes dryer test procedures.

DATES: This rule is effective February 7, 2011. The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register on February 7, 2011.

ADDRESSES: You may review copies of all materials related to this rulemaking at the U.S. Department of Energy, Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC, (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Please call Ms. Brenda Edwards at the above telephone number for additional information regarding visiting the Resource Room.

FOR FURTHER INFORMATION CONTACT: Mr. Subid Wagley, 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) 287–1414. *E-mail: Subid.Wagley@ee.doe.gov*.

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SUPPLEMENTARY INFORMATION: This final rule incorporates by reference into part 430 the following industry standards:

(1) AHAM HLD–1–2009 ("AHAM HLD–1"), "Household Tumble Type Clothes Dryers," (2009).

Copies of AHAM HLD–1 are available from the Association of Home Appliance Manufacturers, 1111 19th Street, NW., Suite 402, Washington, DC 20036, (202) 872–5955, or *http://www.aham.org/*.

(2) ANSI/AHAM RAC–1–2008 ("ANSI/AHAM RAC–1"), "Room Air Conditioners," (2008; ANSI approved July 7, 2008).

Copies of ANSI/AHAM RAC–1 are available from the American National Standards Institute, 11 West 42nd Street, New York, New York 10036, (212) 642–4936, or *http://webstore.ansi.org/*.

(3) ANSI/ASHRAE Standard 16–1983 ("ANSI/ASHRAE 16") (RA 2009), (Reaffirmation of ANSI/ASHRAE Standard 16–1983 [RA 1999]), "Method of Testing for Rating Room Air Conditioners and Packaged Terminal Air Conditioners," ASHRAE approved October 18, 1988, and reaffirmed June 20, 2009; ANSI approved October 20, 1998 and reaffirmed June 25, 2009.

Copies of ANSI/ASHRAE 16 are available from the American National Standards Institute, 11 West 42nd Street, New York, New York 10036, (212) 642–4936, or *http://webstore.ansi.org/*.

(4) International Electrotechnical Commission (IEC) Standard 62301 ("IEC 62301"), "Household electrical appliances—Measurement of standby power (first edition June 2005)."

Copies of IEC 62301 are available from the American National Standards Institute, 11 West 42nd Street, New York, New York 10036, (212) 642–4936, or *http://webstore.iec.ch/*.

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I. Background and Authority

Title III of the Energy Policy and Conservation Act of 1975 (42 U.S.C. 6291, *et seq.;* "EPCA" or, in context, "the Act") sets forth a variety of provisions designed to improve energy efficiency. Part B of Title III, Public Law 94–163 (42 U.S.C. 6291–6309, as codified) establishes the "Energy Conservation Program for Consumer Products Other Than Automobiles," a program covering most major household appliances including clothes dryers and room air conditioners (all of which are referred to below as "covered products").[1] (42 U.S.C. 6291(1)–(2) and 6292(a)(2) and (8))

Under the Act, this program consists essentially of four parts: (1) Testing; (2) labeling; (3) the establishment of Federal energy conservation standards; and (4) certification and enforcement procedures. The Federal Trade Commission (FTC) is responsible for labeling, and DOE implements the remainder of the program. The testing requirements consist of test procedures that, pursuant to EPCA, manufacturers of covered products must use as the basis for certifying to DOE that their products comply with applicable energy conservation standards adopted under EPCA and for representations about the efficiency of those products. Similarly, DOE must use these test requirements to determine whether the products comply with EPCA standards. Under 42 U.S.C. 6293, EPCA sets forth criteria and procedures for DOE's adoption and amendment of such test procedures. EPCA provides that any test procedures prescribed or amended under this section shall be reasonably designed to produce test results which measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

In any rulemaking to amend a test procedure, DOE must also 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. In determining the amended energy conservation standard, the Secretary shall measure, pursuant to the amended test procedure, the energy efficiency, energy use, or water use of a representative sample of covered products that minimally comply with the existing standard. The average of such energy efficiency, energy use, or water use levels determined under the amended test procedure shall constitute the amended energy conservation standard for the applicable covered products. (42 U.S.C. 6293(e)(2)) EPCA also states that models of covered products in use before the date on which the amended energy conservation standard becomes effective (or revisions of such models that come into use after such date and have the same energy efficiency, energy use, or water use characteristics) that comply with the energy conservation standard applicable to such covered products on the day before such date shall be deemed to comply with the amended energy conservation standard. (42 U.S.C. 6293(e)(3)) EPCA also states that the Secretary's authority to amend energy conservation standards under 42 U.S.C. 6293(e) shall not affect the Secretary's obligation to issue final rules as described in 42 U.S.C. 6295. (42 U.S.C. 6293(e)(4))

DOE's test procedures for clothes dryers are found at 10 CFR part 430, subpart B, appendix D. DOE established its test procedure for clothes dryers in a final rule published in the **Federal Register** on September 14, 1977 (the September 1977 TP Final Rule). 42 FR 46145. On May 19, 1981 DOE published a final rule (the May 1981 TP Final Rule) to amend the test procedure by establishing a field-use factor for clothes dryers with automatic termination controls, clarifying the test cloth specifications and clothes dryer preconditioning, and making editorial and minor technical changes. 46 FR 27324. The existing clothes dryer test procedure incorporates by reference two industry test standards: (1) The Association of Home Appliance Manufacturers (AHAM) Standard HLD–1–1974, "AHAM Performance Evaluation Procedure for Household Tumble Type Clothes Dryers" (AHAM Standard HLD–1–1974); and (2) AHAM Standard HLD–2EC, "Test Method for Measuring Energy Consumption of Household Tumble Type Clothes Dryers" December 1975 (AHAM Standard HLD–2EC). The test procedure includes provisions for determining the energy factor (EF) for clothes dryers, which is a measure of the total energy required to dry a standard test load of laundry to a "bone dry"[2] state.

DOE's test procedures for room air conditioners are found at 10 CFR part 430, subpart B, appendix F. DOE established its room air conditioner test procedure on June 1, 1977, and redesignated and amended it on June 29, 1979. 42 FR 27898; 44 FR 37938. The existing room air conditioner test procedure incorporates by reference two industry test standards: (1) American National Standard (ANS) (since renamed American National Standards Institute (ANSI)) Z234.1–1972, "Room Air Conditioners;"[3] and (2) American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 16–69, "Method of Testing for Rating Room Air Conditioners."[4] The DOE test procedure includes provisions for determining the energy efficiency ratio (EER) of room air conditioners, which is the ratio of the cooling capacity in British thermal units (Btu) to the power input in watts (W).

As currently drafted, the test procedures for the products at issue in this rulemaking do not account for standby mode and off mode energy consumption, except in one narrow product class. Specifically, for gas clothes dryers with constant burning pilot lights, DOE's current test procedure for clothes dryers addresses the standby energy use of such pilot lights. EPCA, however, states that gas clothes dryers shall not be equipped with a constant burning pilot for

[1] All references to EPCA refer to the statute as amended including through the Energy Independence and Security Act of 2007, Public Law 110–140. For editorial reasons, upon codification in the U.S. Code, Part B was re-designated Part A.

[2] "Bone dry" is defined in the DOE clothes dryer test procedure as "a condition of a load of test clothes 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." (10 CFR subpart B, appendix D, section 1.2)

[3] ANSI standards are available at *http://www.ansi.org.*

[4] ASHRAE standards are available at *http://www.ashrae.org.*

products manufactured on or after January 1, 1988. (42 U.S.C. 6295(g)(3)) As discussed in section III.C.8, DOE amends the clothes dryer test procedure in today's final rule to remove any provisions for measuring constant burning pilot lights.

EPCA directs DOE to amend its test procedures to include measures of standby mode and off mode energy consumption. EPCA further directs DOE to amend the test procedures to integrate such energy consumption into a single energy descriptor for that product. If that is technically infeasible, DOE must prescribe a separate standby mode and off mode energy-use test procedure, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)) Any such amendment must consider the most current versions of the International Electrotechnical Commission (IEC) Standard 62301 ["Household electrical appliances—measurement of standby power," First Edition 2005–06 (IEC Standard 62301)] [5] [6] and IEC Standard 62087 ["Methods of measurement for the power consumption of audio, video, and related equipment," Second Edition 2008–09]. *Id.*

EPCA also provides that amendments to the test procedures to include standby mode and off mode energy consumption will not determine compliance with previously established standards. (U.S.C. 6295(gg)(2)(C)) The test procedure amendments regarding provisions for standby mode and off mode in today's final rule shall become effective 30 days after the publication of the rule in the **Federal Register**. DOE notes, however, that the procedures and calculations for standby mode and off mode energy consumption need not be performed at this time to determine compliance with the current energy conservation standards. Manufacturers would be required to use the amended test procedures' standby mode and off mode provisions starting on the compliance date of any final rule establishing amended energy conservation standards for clothes dryers and room air conditioners that address standby mode and off mode energy consumption. In addition, starting 180 days after publication of today's test procedure final rule, any representations as to the standby mode and off mode energy consumption must be based upon results generated under the applicable provisions of this test procedure. (42 U.S.C. 6293(c)(2))

DOE published a notice of proposed rulemaking (NOPR) on December 9, 2008 (the December 2008 TP NOPR), in which it proposed a number of revisions and additions to its test procedures for clothes dryers and room air conditioners. These consisted largely of provisions to address the new statutory requirement to expand test procedures to incorporate a measure of standby mode and off mode energy consumption. 73 FR 74639. DOE also proposed amendments to correct text describing the EF calculation for clothes dryers and the text referencing room air conditioner industry test standards. 73 FR 74650. The proposals in the NOPR were addressed at a public meeting on December 17, 2008 (the December 2008 Public Meeting). In addition, DOE invited written comments, data, and information on the December 2008 TP NOPR through February 23, 2009.

DOE received oral comments from interested parties at the December 2008 Public Meeting and subsequently received four written comments. The principal test procedure issues on which interested parties commented were: (1) Establishing multiple low power or standby modes for both clothes dryers and room air conditioners; (2) the number of annual hours associated with active, standby, and off modes for the calculation of energy use; (3) considering an additional standby mode (a "network mode"); (4) clarifying the definitions of standby and off mode; (5) harmonizing mode definitions and testing procedures with international standards, in particular IEC Standard 62301 Second Edition, Committee Draft 2 (IEC Standard 62301 CD2); and (6) integrating of standby and off mode energy use and active mode energy use into a single energy-use metric.

DOE determined after the December 2008 TP NOPR was published that it would consider a revised version of IEC Standard 62301, *i.e.,* IEC Standard 62301 Second Edition, which at that time was expected to be published in July 2009. DOE anticipated, based on review of drafts of the updated IEC Standard 62301, that the revisions could include different mode definitions. Subsequently, DOE received information that IEC Standard 62301 Second Edition would not be published until late 2010. To allow for the consideration of standby and off mode power consumption in the concurrent energy conservation standards rulemaking, DOE published a SNOPR on June 29, 2010 (hereafter referred to as the June 2010 TP SNOPR), proposing mode definitions based on the new mode definitions from the most recent draft version of IEC Standard 62301 Second Edition which, at that time, was designated as IEC Standard 62301 Second Edition Committee Draft for Vote (IEC Standard 62301 CDV). 75 FR 37594. The IEC circulated IEC Standard 62301 CDV on August 28, 2009. IEC Standard 62301 CDV contained the most recent proposed amendments to IEC Standard 62301, including new mode definitions, at the time the June 2010 TP SNOPR was issued. IEC Standard 62301 CDV revised the proposed mode definitions from previous draft versions of IEC Standard 62301 and addressed comments received by interested parties in response to those drafts. As a result, DOE stated in the June 2010 TP SNOPR that the mode definitions in IEC Standard 62301 CDV represent the best definitions available for the supporting analysis. *Id.*

DOE also determined after publication of the December 2008 TP NOPR to conduct a rulemaking to amend the active mode test procedure for clothes dryers and room air conditioners. As part of this rulemaking, DOE intended to address issues on which it requested comment in the concurrent energy conservation standards rulemaking, discussed below. In the June 2010 TP SNOPR, DOE proposed the following test procedure amendments for the measurement of active mode energy consumption for clothes dryers and room air conditioners: (1) Procedures for more accurately measuring the effects of different automatic termination technologies in clothes dryers; (2) provisions for ventless clothes dryers, which are being considered under an amended energy conservation standard; (3) updated detergent specifications for clothes dryer test cloth preconditioning; (4) changes to better reflect current usage patterns and capabilities for the covered products; (5) updated references to external test procedures; and (6) clarifications to the test conditions for gas clothes dryers. 75 FR 37594 (June 29, 2010).

The proposals in the SNOPR were addressed at a public meeting on July 14, 2010 (July 2010 Public Meeting). In addition, DOE invited written comments, data, and information on the June 2010 TP SNOPR through August 30, 2010. DOE received oral comments from interested parties at the July 2010 Public Meeting and subsequently received 13 written comments. The principal test procedure issues on which interested parties commented were: (1) The consideration of the most recent draft IEC Standard 62301 Second Edition, Final Draft International

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

[6] Multiple editions of this standard are referenced in this final rule. Unless otherwise indicated, the terms "IEC Standard 62301" or "IEC Standard 62301 First Edition" refer to "Household electrical appliances—measurement of standby power," First Edition 2005–06.

Standard (IEC Standard 62301 FDIS); (2) the settings used for standby and off mode testing; (3) the allocation of hours to different standby and off modes; (4) the clothes dryer cycle settings selected for automatic cycle termination testing methods; (5) the inclusion of the cool-down period for clothes dryer automatic cycle termination tests; (6) revisions to the water temperature for clothes dryer test load preparation; (7) test conditions for ventless clothes dryers; (8) the consideration of the effects of clothes dryers on HVAC energy use; (9) the initial remaining moisture content (RMC) value for clothes dryers; (10) the number of room air conditioner annual operating hours; and (11) the consideration of fan-only active mode for room air conditioners.

Test procedure amendments for the measurement of active mode energy consumption for clothes dryers and room air conditioners will become effective 30 days after the publication of today's final rule in the **Federal Register**. In addition, DOE also notes that as of 180 days after the publication of today's test procedure final rule, any representations with respect to the energy use or efficiency or cost of energy consumed of the products that are the subject of this rulemaking must be based upon results generated under the applicable provisions of these amended test procedures. (42 U.S.C. 6293(c)(2))

This test procedure rulemaking fulfills the 7-year review requirement prescribed by EPCA. At least once every 7 years, the Secretary shall review test procedures for all covered products and amend test procedures with respect to any covered product or publish notice in the **Federal Register** of any determination not to amend a test procedure. (42 U.S.C. 6293(b)(1)(A))

DOE is also conducting a concurrent energy conservation standards rulemaking for residential clothes dryers and room air conditioners. For clothes dryers, EPCA establishes prescriptive standards for clothes dryers, requiring that gas dryers manufactured on or after January 1, 1988 not be equipped with a constant burning pilot and further requiring that DOE conduct two cycles of rulemakings to determine if more stringent standards are justified. (42 U.S.C. 6295(g)(3) and (4)) On May 14, 1991, DOE published a final rule in the **Federal Register** establishing the first set of performance standards for residential clothes dryers (56 FR 22250); the new standards became effective on May 14, 1994. 10 CFR 430.32(h). DOE has initiated the second cycle of clothes dryer standards rulemakings by publishing a notice of availability of a framework document, discussed in more detail below. 72 FR 57254 (October 9, 2007).

For room air conditioners, EPCA establishes performance standards that became effective on January 1, 1990, and directs DOE to conduct two cycles of rulemakings to determine if more stringent standards are justified. (42 U.S.C. 6295(c)(1) and (2)) On March 4, 1994, DOE published a NOPR for several products, including room air conditioners. 59 FR 10464. On September 24, 1997, DOE published a final rule establishing an updated set of performance standards, with an effective date of October 1, 2000. 62 FR 50122; 10 CFR 40.32(b). DOE initiated the second cycle of room air conditioner standards rulemakings concurrent with the clothes dryer rulemaking. 72 FR 57254 (October 9, 2007).

As stated above, DOE initiated the second cycle of residential clothes dryer and room air conditioner energy conservation standards rulemakings by publishing a notice in the **Federal Register** announcing the availability of a framework document to initiate a rulemaking to consider amended energy conservation standards for residential clothes dryers and room air conditioners on October 9, 2007 (hereafter the October 2007 Framework Document). 72 FR 57254. In the October 2007 Framework Document, DOE identified specific ways in which it could revise its test procedures for these two products and requested comment from interested parties on whether it should adopt such revisions. Specifically, DOE sought comment on potential amendments to the clothes dryer test procedure to: (1) Reflect lower remaining moisture content (RMC) [7] in clothes loads; (2) account for fewer annual use cycles; and (3) add the capability to test ventless clothes dryers. (Framework Document, STD No. 1 at pp. 4–6) [8] DOE received comments in response to the October 2007 Framework Document that it should consider changes to the clothes dryer test load size. For room air conditioners, DOE requested input on potential amendments to the test procedure to: (1) Incorporate the most recent ANSI and ASHRAE test standards; (2) reduce the annual operating hours; and (3) measure part-load performance. (Framework Document, STD No. 1 at pp. 6–7) DOE received comments in response to the October 2007 Framework Document that it should consider changes to the ambient test conditions for room air conditioners.

EPCA directs DOE to incorporate standby and off mode energy use into any final rule establishing or revising a standard for a covered product adopted after July 1, 2010. (42 U.S.C. 6295(gg)(3)) DOE is required by consent decree to publish a final rule setting forth any revised efficiency standards for clothes dryers and room air conditioners by June 30, 2011. As result, this final rule must incorporate standby and off mode energy use.

II. Summary of the Proposal

In today's final rule, DOE amends its test procedures for clothes dryers and room air conditioners to: (1) Use in the concurrent development of energy conservation standards that address the energy use of these products when in standby mode and off mode, as well as in the implementation of any amended standards; (2) address the statutory requirement to expand test procedures to incorporate measures of standby mode and off mode power consumption; (3) adopt changes to the water temperature for clothes dryer test load preparation; (4) expand the clothes dryer test procedures to accommodate ventless clothes dryers being considered for coverage under an amended energy conservation standard; (5) adopt technical changes to better reflect current usage patterns and capabilities for the covered products; (6) update detergent specifications for clothes dryer test cloth preconditioning; (7) update the references to external test procedures; (8) clarify the test conditions for gas clothes dryers; and (9) clarify the test conditions for clothes dryer drum capacity measurements. As discussed in this section, DOE is not adopting the technical changes and procedures to more accurately measure the effects of different automatic cycle termination technologies in clothes dryers proposed in the June 2010 TP SNOPR. The following paragraphs summarize the amendments.

Standby and Off Mode

In today's final rule, DOE incorporates by reference into both the clothes dryer and room air conditioner test procedures specific clauses from IEC

[7] RMC is the ratio of the weight of water contained by the test load to the bone-dry weight of the test load, expressed as a percent.

[8] A notation in this form provides a reference for information that is in the docket of DOE's rulemaking to develop energy conservation standards for clothes dryers and room air conditioners (Docket No. EERE–2007–BT–STD–0010), which is maintained in the Resource Room of the Building Technologies Program. This notation indicates that the statement preceding the reference was made in DOE's Framework Document, which is document number 1 in the docket for the clothes dryer and room air conditioner energy conservation standards rulemaking, and appears at pages 4–6 of that document.

Standard 62301 regarding test conditions and test procedures for measuring standby mode and off mode power consumption. DOE also incorporates into each test procedure the definitions of "active mode," "standby mode," and "off mode" based on the definitions provided in IEC Standard 62301 CDV. Further, DOE adopts additional language in each test procedure to clarify how clauses from IEC Standard 62301 and the mode definitions from IEC Standard 62301 CDV are to be applied when measuring standby mode and off mode power consumption.[9]

For reasons discussed in section III.B.2 for clothes dryers, DOE adopts a definition and testing procedures for a single standby mode, rather than the multiple standby modes—"inactive" mode, "cycle finished" mode, and "delay start" mode—as proposed in the December 2008 TP NOPR. 73 FR 74639, 74645 (December 9, 2008). DOE also adopts new methods to calculate clothes dryer standby mode and off mode energy use, as well as a new measure of energy efficiency—Combined Energy Factor (CEF)—that includes energy use in standby mode and off mode. The standby mode and off mode amendments do not change the method to calculate the existing clothes dryer energy efficiency metric for active mode, the energy factor (EF).

Similarly, for reasons discussed in section III.B.2 for room air conditioners, DOE adopts a definition and testing procedures for a single standby mode, rather than the multiple standby modes—"inactive" mode, "delay start" mode, and "off-cycle" mode—as proposed in the December 2008 TP NOPR. 73 FR 74639, 74645. DOE also adopts new methods to calculate room air conditioner standby mode and off mode energy use and a new measure of energy efficiency—Combined Energy Efficiency Ratio (CEER)—that includes energy use in the standby mode and the off mode. The standby mode and off mode amendments do not change the method used to calculate the existing room air conditioner energy efficiency metric for active mode, the energy efficiency ratio (EER).

In the December 2008 TP NOPR, DOE also proposed that standby mode and off mode testing be conducted with room-side air temperature at 74 ± 2 degrees Fahrenheit (°F), with a temperature control setting of 79 °F. 73 FR 74639, 74646. Upon further consideration, however, DOE determined that, because the proposed test procedure would be limited to measuring a single standby mode and an off mode, the proposed close tolerance on ambient temperature and the proposed temperature setting of 79 °F, which were relevant only for an off-cycle standby mode measurement, would not be required. Therefore, DOE is not adopting those requirements for testing conditions in today's final rule.

In the June 2010 TP SNOPR, DOE proposed that standby mode and off mode testing for both clothes dryers and room air conditioners be conducted at the settings that produce the highest power consumption level, consistent with the particular mode definition under test. 75 FR 37594, 37604 (June 29, 2010). Upon further consideration, however, DOE believes that provisions for testing in the settings that produce the highest power consumption level would not be representative of consumer usage. For the reasons discussed in section III.B.2, DOE believes the provisions in section 5.2 of IEC Standard 62301 that specify the appliance be installed and set up in accordance with manufacturers' instructions, or if no instructions are given, the appliance be tested at factory or "default" settings, is more representative of consumer usage. Therefore, DOE amends the test procedure in today's final rule to incorporate by reference section 5.2 of IEC Standard 62301 for standby and off mode testing for both clothes dryers and room air conditioners in today's final rule.

For the reasons discussed in section III.B.5, DOE revises the estimated annual operating cost calculation for both clothes dryers and room air conditioners (Estimated Annual Operating Cost and Annual Energy Cost, respectively) to integrate the cost of energy use in the standby mode and off mode.

Amendments to the Water Temperature for Clothes Dryer Test Load Preparation

The existing DOE clothes dryer test procedure requires that the test load be agitated in water whose temperature is 100 °F ± 5 °F. In the June 2010 TP SNOPR, DOE stated that it did not have data indicating whether a different water temperature for clothes dryer test load preparation would be more representative of current consumer usage, but that if consumer usage data is made available that indicates a 60 °F ± 5 °F water temperature is more representative of consumer use, DOE may adopt this alternate approach. 75 FR 37594, 37615 (June 29, 2010). As discussed in section III.C.2, DOE believes that the cold water rinse cycle is more representative of typical consumer use based on the rinse temperature use factors in the DOE clothes washer test procedure and the Energy Information Administration (EIA) 2005 "Residential Energy Consumption Survey" (RECS)[10] [11] data reporting the percentage of clothes washer cycles for which consumers use cold water for the rinse cycle. Therefore, DOE amends the clothes dryer test procedure in today's final rule to change the water temperature for clothes dryer test load preparation to 60 °F ± 5 °F. This temperature is more representative of the clothes load temperature after a cold rinse cycle at the end of the wash cycle.

Provisions for Testing Ventless Clothes Dryers

In today's final rule, DOE amends the current clothes dryer test procedure to include provisions for testing ventless clothes dryers. These provisions are based upon an alternate test procedure developed by DOE and proposed in the June 2010 TP SNOPR that provide separate definitions for a "conventional clothes dryer" and a "condensing clothes dryer." These provisions also qualify the requirement for an exhaust simulator so that it would apply only to conventional clothes dryers. Further, DOE includes in the test procedure additional language based on provisions from European Standard EN 61121, "Tumble dryers for household use—Methods for measuring the performance," Edition 3 2005 (the EN Standard 61121). These provisions clarify the alternate test procedure developed by DOE. EN Standard 61121 is an internationally-accepted test standard that specifies methods for testing ventless clothes dryers. The clarifications require that if a ventless clothes dryer is equipped with a condensation box, the clothes dryer shall be tested with such condensation box installed as specified by the manufacturer. A condensation box stores condensed moisture removed from the air exiting the drum. The box is later emptied by the user. In addition, the clarifications also state that if the clothes dryer stops the test cycle because the condensation box is full, the

[9] 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). As explained subsequently in this notice, because IEC Standard 62087 addresses the methods of measuring the power consumption of audio, video, and related equipment, it is inapplicable to the products at issue in this rulemaking.

[10] U.S. Department of Energy-Energy Information Administration. *Residential Energy Consumption Survey* 2005 Public Use Data Files, 2005. Washington, DC. Available online at: *http://www.eia.doe.gov/emeu/recs/*.

[11] EIA's 2005 RECS is the latest available version of this survey.

test is not valid because the unit would not be operating as intended by the manufacturer to condense moisture in the air exiting the clothes dryer drum. In such cases, the condensation box must be emptied and the test re-run from the beginning. The clarifications also state that the condenser heat exchanger cannot be taken out of the clothes dryer between tests to clarify the test procedure and ensures that all manufacturers are testing products under the same conditions. Finally, DOE adopts clarifications that address clothes dryer preconditioning for ventless clothes dryers, as discussed in section III.C.3.

Amendments To Reflect Current Usage Patterns and Capabilities

DOE amends the test procedure for clothes dryers to reflect current usage patterns and capabilities. These amendments are based on DOE's analysis of consumer usage patterns data. As proposed in the June 2010 SNOPR, DOE revises the number of annual use cycles from the 416 cycles per year currently specified by the DOE test procedure to 283 cycles per year for all types (that is, product classes) of clothes dryers. This revision is based on DOE's analysis of data from the 2005 RECS for the number of laundry loads (clothes washer cycles) washed per week and the frequency of clothes dryer use. In addition, as proposed in the 2010 SNOPR, DOE changes the 7-pound (lb) clothes dryer test load size specified by the current test procedure for standard-size clothes dryers to 8.45 lb. This revision is based on the historical trends of clothes washer tub volumes and the corresponding percentage increase in clothes washer test load sizes (as specified by the DOE clothes washer test procedure). DOE assumes these historical trends proportionally impact clothes dryer load sizes. DOE believes most compact clothes dryers are used in conjunction with compact-size clothes washers, however, and DOE does not have any information to suggest that the tub volume of such clothes washers has changed significantly. Therefore, DOE is not changing the 3-lb test load size currently specified in its clothes dryer test procedure for compact clothes dryers in today's final rule.

In the June 2010 TP SNOPR, DOE also proposed to revise the 70-percent initial RMC required by the test procedure to 47 percent so as to accurately represent the condition of a laundry load after a wash cycle. This proposal was based on analysis of shipment-weighted RMC data for clothes washers submitted by AHAM and a distribution analysis of RMC data for clothes washer models listed in the December 22, 2008 California Energy Commission (CEC) directory. 75 FR 37594, 37599 (June 29, 2010). In response to comments from interested parties on the June 2010 TP SNOPR, DOE determined that an initial clothes dryer RMC of 57.5 percent more accurately represents the moisture content of laundry loads after a wash cycle for the purposes of clothes dryer testing. As discussed in section III.5.b, this RMC is derived from the 47-percent shipment-weighted RMC for clothes washers, but was derived without applying an RMC correction factor as required by the DOE clothes washer test procedure. For these reasons, DOE revises the initial clothes dryer RMC from 70 percent to 57.5 percent in today's final rule.

Clothes Dryer Automatic Cycle Termination

In the June 2010 TP SNOPR, DOE proposed to revise its clothes dryer test procedure to include definitions of and provisions for testing both timer dryers and automatic termination control dryers using methodology provided in Australia/New Zealand (AS/NZS) Standard 2442.1: 1996, "Performance of household electrical appliances—Rotary clothes dryers, Part 1: Energy consumption and performance" (AS/NZS Standard 2442.1) and AS/NZS Standard 2442.2: 2000, "Performance of household electrical appliances—Rotary clothes dryers, Part 2: Energy labeling requirements" (AS/NZS Standard 2442.2). 75 FR 37594, 37598 (June 29, 2010). DOE proposed to incorporate the testing methods from these international test standards, along with a number of clarifications, to measure the energy consumption for both timer dryers and automatic termination control dryers. The measurement would account for the amount of over-drying energy consumption, that is, the energy consumed by the clothes dryer after the load reaches an RMC of 5 percent. 75 FR 37594, 37599 (June 29, 2010).

DOE conducted testing of representative clothes dryers using the automatic cycle termination test procedure proposed in the June 2010 TP SNOPR; however, the test results showed that all of the clothes dryers tested significantly over-dried the DOE test load to near bone dry. In addition, the measured EF values were significantly lower than EF values obtained using the existing DOE test procedure, and the test data indicated that clothes dryers equipped with automatic termination controls were less efficient than timer dryers. DOE believes the test procedure amendments for automatic cycle termination proposed in the June 2010 TP SNOPR do not adequately measure the energy consumption of clothes dryers equipped with such systems using the test load specified in the DOE test procedure. DOE believes that clothes dryers with automatic termination sensing control systems, which infer the RMC of the load from the properties of the exhaust air such as temprature and humidity, may be designed to stop the cycle when the consumer load has a higher RMC than the RMC obtained using the proposed automatic cycle termination test procedure in conjunction with the existing test load.[12] Manufacturers have indicated, however, that test load types and test cloth materials different than those specified in the DOE test procedure do not produce results as repeatable as those obtained using the test load as currenty specified. In addition, DOE presented data in the May 1981 TP Final Rule from a field use survey conducted by AHAM as well as an analysis conducted by the National Bureau of Standards (now known as the National Institute of Standards and Technology (NIST)) of field test data on automatic termination control dryers. Analysis of this data showed that clothes dryers equipped with an automatic cycle termination feature consume less energy than timer dryers by reducing over-drying. 46 FR 27324 (May 19, 1981).

For the reasons discussed above, DOE believes the test procedure amendments for automatic cycle termination proposed in the June 2010 TP SNOPR do not adequately measure the energy consumption of clothes dryers equipped with such systems. As a result, DOE is not adopting the amendments for automatic cycle termination proposed in the June 2010 TP SNOPR. 75 FR 37594, 37598–99 (June 29, 2010). If data is made available to develop a test procedure that accurately measures the energy consumption of clothes dryers equipped with automatic termination controls, DOE may consider revised amendments in a future rulemaking.

[12] To investigate this, DOE conducted additional testing using a test load similar to that specified in AHAM Standard HLD–1–2009, which consists of cotton bed sheets, towels, and pillow cases. For tests using the same automatic cycle termination settings as were used in the testing described earlier (*i.e.,* normal cycle setting and highest temperature setting, the alternate test load was dried to 1.7 to 2.2 percent final RMC, with an average RMC of 2.0 percent. In comparison, the same clothes dryer under the same cycle settings dried the DOE test load to 0.3 to 1.2 percent RMC, with an average RMC of 0.7 percent. Thus, DOE concluded that the proposed automatic cycle termination control test procedures may not stop at an appropriate RMC when used with the current test load.

DOE received comments in response to the June 2010 TP SNOPR that it should revise the definition of "automatic termination control" in the current clothes dryer test procedure. Commenters felt the definition should more clearly account for electronic controls by specifying that a preferred automatic termination control setting can also be indicated by any other visual indicator (in addition to a mark or detent). DOE agrees this clarification should be added and is amending the definition of "automatic termination control" in the clothes dryer test procedure to include it.

DOE also received comments stating that the field-use factor for clothes dryers with automatic cycle termination applied in the per-cycle energy consumption calculation excludes sensing technologies that do not meet the definitions of "temperature sensing control" or "moisture sensing control," which are narrowly defined to require that the control system use either a temperature sensor that monitors the exhaust air or a moisture sensor contained within the drum. DOE believes the definition of "automatic termination control" more broadly applies to any sensing system that monitors either the dryer load temperature or its moisture content and that this definition would not limit the emergence of any new sensor technologies that monitor the moisture content or temperature in other ways from applying the field use factor for automatic cycle termination. For these reasons, DOE amends the test procedure to specify that the field use factor applies to clothes dryers that meet the requirements for the definitions of "automatic termination control."

Other Changes

For clothes dryers, DOE also revises the detergent specifications for test cloth preconditioning to update the detergent specified in the test procedure, eliminates an unnecessary reference to an obsolete industry clothes dryer test standard, and amends the test conditions for gas clothes dryers to specify the required gas supply pressure.

DOE also received comments related to clothes dryers from interested parties on issues not addressed in the June 2010 TP SNOPR. Commenters suggested that DOE clarify the provisions for the measurement of drum capacity to specify that the clothes dryer's rear drum surface be supported on a platform scale to "prevent deflection of the drum surface * * *" instead of "prevent deflection of the dryer." As discussed in section III.C.10.e, DOE agrees with these comments and adopts that provision in today's final rule. In addition, DOE received comments in response to the June 2010 TP SNOPR that it should expressly state the equations for EF and CEF in the test procedure to provide optimal clarity for the regulated industry. DOE agrees with comments that the equations for EF and CEF should be included in 10 CFR part 430, subpart B, appendix D1 for completeness. Therefore, DOE amends the clothes dryer test procedure in today's final rule to include those calculations and to clarify in 10 CFR part 430.23(d)(2) and (3) that the EF and CEF must be determined in accordance with the appropriate sections in 10 CFR part 430, subpart B, appendix D1.

For room air conditioners, DOE updates the references in its current room air conditioner test procedure to incorporate the most recent ANSI and ASHRAE test standards—ANSI/AHAM RAC–1–R2008, "Room Air Conditioners," (ANSI/AHAM RAC–1–R2008) and ANSI/ASHRAE Standard 16–1983 (RA 2009) "Method of Testing for Rating Room Air Conditioners and Packaged Terminal Air Conditioners" (ANSI/ASHRAE Standard 16–1983 (RA 2009)). DOE has also determined that the 750 annual operating hours specified by the current DOE test procedure is representative of current usage patterns, based upon its interpretation of data from the 2005 RECS. Therefore, DOE is not amending the annual usage hours specified by the current DOE test procedure for room air conditioners.

As noted in section I, EPCA requires that DOE determine to what extent, if any, test procedure amendments 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. In determining the amended energy conservation standard, DOE must measure, pursuant to the amended test procedure, the energy efficiency, energy use, or water use (as applicable) of a representative sample of covered products that minimally comply with the existing standard. (42 U.S.C. 6293(e)(2)) Under 42 U.S.C. 6295(gg)(2)(C), EPCA provides that amendments to the test procedures that include standby mode and off mode energy consumption will not determine compliance with previously established standards. (U.S.C. 6295(gg)(2)(C))

These amended clothes dryer and room air conditioner test procedures are effective 30 days after the publication of today's final rule in the **Federal Register**. Because the amendments to the test procedures for measuring standby mode and off mode energy consumption do not alter the existing measures of energy consumption or efficiency for clothes dryers and room air conditioners, the amendments do not affect a manufacturer's ability to comply with current energy conservation standards. Manufacturers will not be required to use the amended test procedures' standby mode and off mode provisions until the mandatory compliance date of any amended clothes dryer and room air conditioner energy conservation standards. All representations related to standby mode and off mode energy consumption of both clothes dryers and room air conditioners made 180 days after the publication of today's final rule must be based upon the standby and off mode requirements of the amended test procedures. (42 U.S.C. 6293(c)(2)) DOE examines how each of the amendments to the active mode provisions in its clothes dryer and room air conditioner test procedures in today's final rule will affect the measured efficiency of products in section IV.

III. Discussion

A. Products Covered by the Test Procedure Changes

Today's amendments to DOE's clothes dryer test procedure cover both electric and gas clothes dryers, DOE defines a clothes dryer to mean a cabinet-like appliance designed to dry fabrics in a tumble-type drum with forced air circulation, with blower(s) driven by an electric motor(s) and either gas or electricity as the heat source.

Porticos Inc. (Porticos) commented in response to the June 2010 TP SNOPR that DOE's definition for an electric clothes dryer excludes every possible alternative from consideration. Porticos stated that any alternate innovative clothes dryer technology, such as microwave, radio-frequency, vacuum, desiccant, and vapor-compression, would not meet the current electric clothes dryer definition, and direct comparisons would not be possible. Porticos commented that a better definition would be "an electrical appliance for drying clothes" and that any more limiting verbiage serves only to exclude new entrants from the marketplace. (Porticos, No. 23 at p. 1) Porticos also commented that DOE should reexamine the test procedures to remove any explicit or implicit reference to a particular technology or

approach to clothes drying. (Porticos, No. 23 at p. 2)

DOE notes that the definition of a clothes dryer in the CFR does not prohibit other products (that is, those that do not fall under the definition of a clothes dryer) from being introduced to the market. For example, spin dryers or drying cabinets that do not use a heat source, forced air circulation, or a tumble-type drum are currently commercially available. Under the product definition suggested by Porticos, DOE notes that blow dryers, fans, or heat lamps could be considered covered products. DOE is also not aware of any commercially available microwave, radio-frequency, vacuum, desiccant, or vapor-compression clothes dryers. As a result, no data is available by which DOE could develop standards for such dryers. For these reasons, DOE is not revising the definition of a clothes dryer in today's final rule.

DOE's regulations define a room air conditioner as a consumer product which is powered by a single-phase electric current and which is an encased assembly designed as a unit for mounting in a window or through the wall for the purpose of providing delivery of conditioned air to an enclosed space. It includes a prime source of refrigeration and may include a means for ventilating and heating. It does not include packaged terminal air conditioners.[13] This definition and the amendments discussed below cover room air conditioners designed for single- or double-hung windows with or without louvered sides and with or without reverse cycle, as well as casement-slider and casement-only window-type room air conditioners. DOE is not changing the definition for room air conditioners in today's final rule.

B. Clothes Dryer and Room Air Conditioner Standby Mode and Off Mode Test Procedures

1. Incorporating by Reference IEC Standard 62301 for Measuring Standby Mode and Off Mode Power in Clothes Dryers and Room Air Conditioners

As noted in the December 2008 TP 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)) 73 FR 74639, 74643–44 (December 9, 2008).[14] DOE noted that IEC Standard 62301 provides for measuring standby power in electrical appliances, including clothes dryers and room air conditioners, and, therefore, is applicable to the proposed amendments to the clothes dryer and room air conditioner test procedures. 73 FR 74643–44 (December 9, 2008).

DOE proposed in the December 2008 TP NOPR to incorporate by reference into the DOE test procedures for clothes dryers and room air conditioners specific clauses from IEC Standard 62301 for measuring standby mode and off mode power: from section 4 ("General conditions for measurements"); paragraph 4.2, "Test room"; paragraph 4.4, "Supply voltage waveform"; and paragraph 4.5, "Power measurement accuracy"; as well as from section 5 ("Measurements"); paragraph 5.1, "General"; and paragraph 5.3, "Procedure." DOE also proposed to reference these same provisions in the DOE test procedure for room air conditioners, as well as section 4, paragraph 4.3, "Power supply." 73 FR 74639, 74644 (December 9, 2008).

In the December 2008 TP NOPR, DOE noted that EPCA (42 U.S.C. 6295(gg)(2)(A)) requires that in developing any amended test procedures, DOE consider the most current version of IEC Standard 62301. The IEC is currently developing an updated version of this standard, IEC Standard 62301 Second Edition. 73 FR 74639, 74644 (December 9, 2008). At the time of publication of the December 2008 TP NOPR, however, IEC Standard 62301 was the "current version, which DOE was required by EPCA to consider. DOE incorporated sections from IEC Standard 62301 in the proposed amendments to the test procedure in the December 2008 TP NOPR. 73 FR 74639, 74644 (December 9, 2008).

DOE did not receive any objections to the proposed testing methods and procedures referenced in IEC Standard 62301 in response to the December 2008 TP NOPR. As a result, the June 2010 TP SNOPR did not affect DOE's proposal in the December 2008 TP NOPR to incorporate by reference the clauses presented above from IEC Standard 62301. 75 FR 37594, 37602 (June 29, 2010).

DOE anticipated, based on review of draft versions of IEC Standard 62301 Second Edition, that the revisions to IEC Standard 62301 could include different mode definitions. DOE received information, however, that IEC Standard 62301 Second Edition would not be available until late 2010. To allow for consideration of standby and off mode power consumption in the concurrent energy conservation standards rulemaking, DOE proposed in the June 2010 TP SNOPR the new mode definitions from the most recent draft version of IEC Standard 62301 Second Edition, IEC Standard 62301 CDV. The definitions of standby mode, off mode, and active mode in IEC Standard 62301 CDV expand upon the EPCA mode definitions and provide additional guidance as to which functions are associated with each mode. 75 FR 37594, 37602 (June 29, 2010). The comments received by IEC on IEC Standard 62301 CD2, and the resulting amended mode definitions proposed in IEC Standard 62301 CDV, demonstrate significant participation of interested parties in the development of definitions that represent a substantial improvement over those in IEC Standard 62301. *Id.* These definitions are discussed in detail in Section III.B.2.

In response to the June 2010 TP SNOPR, AHAM, Alliance Laundry Systems (ALS), and Whirlpool Corporation (Whirlpool) commented in support of referencing the most recent draft version of IEC Standard 62301 Second Edition, designated as IEC Standard 62301 FDIS, for test methods and mode definitions rather than IEC Standard 62301 First Edition and IEC Standard 62301 CDV. (AHAM, Public Meeting Transcript, No. 20 at pp. 18, 26–27; AHAM, No. 27 at p. 2; ALS, No. 24 at p. 1; Whirlpool, No. 27 at p. 1)

AHAM and Whirlpool commented that IEC Standard 62301 FDIS will soon be formally adopted by IEC, and it contains a number of clarifications to the definitions and test procedures not present in IEC Standard 62301 CDV. According to AHAM and Whirlpool, this will allow for optimum international harmonization, giving clarity and consistency to the regulated community and decreasing testing burden. (AHAM, No. 31 at p. 2; Whirlpool, No. 27 at p. 1) Additionally, AHAM commented that no technical edits can be made to the standard after the FDIS version, so most countries allow a legal reference to this version. (AHAM, Public Meeting Transcript, No. 20 at pp. 14–15)

AHAM commented that IEC Standard 62031 FDIS incorporates comments from energy efficiency advocates,

[13] DOE's regulations define a packaged terminal air conditioner as a wall sleeve and a separate encased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability energy.

[14] DOE notes that IEC Standard 62087 specifies methods of measuring the power consumption of TV receivers, videocassette recorders (VCRs), set top boxes, audio equipment, and multi-function equipment for consumer use. IEC Standard 62087 does not include measurement for the power consumption of electrical appliances such as clothes dryers and room air conditioners. Therefore, IEC Standard 62087 is not applicable to the amendments to the clothes dryer and room air conditioner test procedures.

including the addition of an uncertainty power measurement section that would limit the possibility for different measurement results from different test labs. (AHAM, Public Meeting Transcript, No. 20 at pp. 16, 18, 26–27) AHAM also noted that IEC Standard 62301 FDIS includes a new sampling measurement method and an average reading measurement method. (AHAM, Public Meeting Transcript, No. 20 at pp. 13–18) AHAM commented that if DOE chooses not to adopt the IEC Standard 62301 FDIS, AHAM supports the use of IEC Standard 62301 CDV as the main referenced document. (AHAM, No. 31 at p. 2) Pacific Gas and Electric Company (PG&E), Southern California Gas Company (SCGC), Southern California Edison (SCE), and Natural Resources Defense Council (NRDC) (hereafter "the California Utilities/NRDC"), stated in a jointly filed comment that they support harmonization with international standards and support the use of the definitions and test procedures in IEC Standard 62301 CDV. (California Utilities/NRDC, No. 33 at p. 2)

According to publicly available information, the IEC currently anticipates that the final version of IEC Standard 62301 Second Edition will likely be published in early 2011. Therefore, the second edition is not available for DOE's consideration or incorporation by reference. DOE is aware that there are significant differences between IEC Standard 62301 First Edition and IEC Standard 62301 FDIS, which is the latest draft version of IEC Standard 62301 Second Edition. DOE notes that these changes in methodology were first introduced only at the IEC Standard 62301 FDIS stage. These changes have not been the subject of significant comment from interested parties, nor has DOE had the opportunity to conduct a thorough analysis of those provisions. Consequently, the merits of these latest changes have not been fully vetted to demonstrate that they are preferable to the existing methodological provisions in the current version of the IEC standard. For these reasons, DOE has decided to base the test procedure amendments (other than the mode definitions, which are discussed in Section III.B.2) on the provisions of IEC Standard 62301 First Edition. DOE based the mode definitions on the language from IEC Standard 62301 CDV to address specific concerns raised by interested parties, as discussed above in this section. As discussed in section III.B.2, DOE notes that the mode definitions in IEC Standard 62301 CDV are essentially the same as the definitions provided in IEC Standard 62301 FDIS, with only minor editorial changes.

For the reasons discussed above and in the December 2008 NOPR and June 2010 SNOPR, DOE amends its test procedures for clothes dryers and room air conditioners in today's final rule to incorporate by reference the clauses from IEC Standard 62301 First Edition and the mode definitions from IEC Standard 62301 CDV. 73 FR 74639 (December 9, 2008); 75 FR 37594, 37602 (June 29, 2010). DOE may consider incorporating by reference clauses from IEC Standard 62301 Second Edition when that version has been published.

2. Determination of Modes To Be Incorporated

December 2008 TP NOPR

In the December 2008 TP NOPR, DOE proposed to incorporate into the clothes dryer and room air conditioner test procedure the definitions of "active mode," "standby mode," and "off mode" specified by EPCA. 73 FR 74639, 74644 (December 9, 2008). EPCA defines "active mode" as "the condition in which an energy-using product —

(I) Is connected to a main power source;

(II) has been activated; and

(III) provides 1 or more main functions."

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

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

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

(II) offers 1 or more of the following user-oriented or protective functions:

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

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

(42 U.S.C. 6295(gg)(1)(A)(iii)) This definition differs from IEC Standard 62301 First Edition, which defines standby mode as the "lowest power consumption mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when an appliance is connected to the main electricity supply and used in accordance with the manufacturer's instructions." The EPCA definition permits the inclusion of multiple standby modes.

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

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

(II) is not providing any standby mode or active mode function." [15]

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

DOE recognized, however, that the EPCA definitions for "active mode," "standby mode," and "off mode" were developed to be broadly applicable for many energy-using products. For specific products with multiple functions, these broad definitions could lead to certain features being considered part of standby mode or off mode instead of active mode depending on the interpretation of the meaning of "main functions." 73 FR 74639, 74644–45 (December 9, 2008). As a result, DOE further proposed in the December 2008 TP NOPR to amend the clothes dryer and room air conditioner test procedures to clarify the range of main functions that would be classified as active mode functions and clarify standby and off mode definitions as follows:

For clothes dryers—

"Active mode" means a mode in which the clothes dryer is performing the main function of tumbling the clothing with or without heated or unheated forced air circulation to remove moisture from the clothing and/or remove or prevent wrinkling of the clothing;

"Inactive mode" means a standby mode other than delay start mode or cycle finished mode that facilitates the activation of active mode by remote switch (including remote control), internal sensor, or timer, or provides continuous status display;

"Cycle finished mode" means a standby mode that provides continuous status display following operation in active mode;

"Delay start mode" means a standby mode that facilitates the activation of active mode by timer; and

[15] DOE notes that some features that provide consumer utility, such as displays and remote controls, are associated with standby mode and not off mode. A clothes dryer or room air conditioner is considered to be in "off mode" if it is plugged in to a main power source, is not being used for an active function such as drying clothing or providing cooling, and is consuming power for features other than a display, controls (including a remote control), or sensors required to reactivate it from a low power state. For example, a clothes dryer with mechanical controls and no display or continuously-energized moisture sensor, but that consumes power for components such as a power supply when the unit was not activated, would be considered to be in off mode when not providing an active function. For room air conditioners, a unit with mechanical controls and no display or remote control but with a power supply that consumes energy could be considered to be in off mode while not providing an active function.

"Off mode" means a mode in which the clothes dryer is not performing any active or standby function. 73 FR 74645.

For room air conditioners—

"Active mode" means a mode in which the room air conditioner is performing the main function of cooling or heating the conditioned space, or circulating air through activation of its fan or blower, with or without energizing active air-cleaning components or devices such as ultraviolet (UV) radiation, electrostatic filters, ozone generators, or other air-cleaning devices;

"Inactive mode" means a standby mode other than delay start mode or off-cycle mode that facilitates the activation of active mode by remote switch (including remote control) or internal sensor or provides continuous status display;

"Delay start mode" means a standby mode in which activation of an active mode is facilitated by a timer;

"Off-cycle mode" means a standby mode in which the room air conditioner: (1) Has cycled off its main function by thermostat or temperature sensor; (2) does not have its fan or blower operating; and (3) will reactivate the main function according to the thermostat or temperature sensor signal; and

"Off mode" means a mode in which a room air conditioner is not performing any active or standby function. 73 FR 74645.

June 2010 TP SNOPR and Today's Final Rule—Active Mode.

As discussed in section III.B.1, DOE proposed in the June 2010 TP SNOPR to amend the DOE clothes dryer and room air conditioner test procedures to define active mode as a mode that "includes product modes where the energy using product is connected to a mains power source, has been activated and provides one or more main functions" 75 FR 37594, 37603 (June 29, 2010). The definition of active mode proposed in the June 2010 TP SNOPR is the same as the definition proposed for the December 2008 TP NOPR, with minor editorial changes to conform with the definition in IEC Standard 62301 CDV. 73 FR 74639, 74644 (December 9, 2008). DOE noted that IEC Standard 62301 CD2 provided additional clarification that "delay start mode is a one off user initiated short duration function that is associated with an active mode." (IEC Standard 62301 CD2, section 3.8) IEC Standard 62301 CDV removed this clarification; however, in response to comments on IEC Standard 62301 CD2 that led to IEC Standard 62301 CDV, IEC states that delay start mode is a one off function of limited duration.[16] DOE inferred this to mean that delay start mode would not be considered a standby mode, although no conclusion is made as to whether it would be considered part of active mode. 75 FR 37594, 37603 (June 29, 2010). Delay start mode is discussed later in this section.

As discussed above in section III.B.1, the California Utilities/NRDC commented that it supports the use of the mode definitions in IEC Standard 62301 CDV. (California Utilities/NRDC, No. 33 at p. 2) Also discussed above in section III.B.1, AHAM and Whirlpool supported the use of the mode definitions in IEC Standard 62301 FDIS. (AHAM, Public Meeting Transcript, No. 20 at p. 18; AHAM, No. 31 at p. 2; Whirlpool, No. 27 at p. 1) DOE notes that the definition of active mode in IEC Standard 62301 FDIS is essentially the same as the definition provided in IEC Standard 62301 CDV, with only minor editorial changes. For the reasons stated above, DOE is adopting in today's final rule the active mode definition proposed in the June 2010 TP SNOPR.

In the June 2010 TP SNOPR, DOE did not change the additional clarifications discussed above for the range of main functions that would be classified as active mode functions, which were proposed in the December 2008 TP NOPR. 75 FR 37594, 37603 (June 29, 2010). DOE did not receive any comments objecting to the clarifications for the range of main functions that would be classified as active mode functions for each product. Therefore, for the reasons stated above, DOE adopts the amendments to clarify the range of main functions that would be classified as active mode functions as proposed in the December 2008 TP NOPR. *Id.*

For clothes dryers, DOE also investigated in the June 2010 TP SNOPR whether certain operating cycles providing a steam function should be covered under active mode, and whether measurement of energy consumption for such cycles should be incorporated into the DOE clothes dryer test procedure. 75 FR 37594, 37603 (June 29, 2010). The current DOE test procedure does not contain any provisions that would account for the energy and water use of steam cycles. DOE's analysis of a preliminary market survey of products available on the market conducted for the June 2010 TP SNOPR suggests that, at this time, steam cycles represent a very small fraction of overall product use nationwide. DOE also stated that it is unaware of energy and water consumption or consumer usage data with respect to steam. For these reasons, DOE did not propose amendments to include measurement of steam cycles for clothes dryers in the June 2010 TP SNOPR. *Id.* DOE did not receive any comments regarding the determination to not include measurement of steam cycles for clothes dryers. For these reasons, DOE is not amending its clothes dryer test procedure to include measurement of steam cycles.

June 2010 TP SNOPR and Today's Final Rule—Standby Mode

As discussed in section III.B.1, DOE proposed in the June 2010 SNOPR to amend the DOE test procedure for clothes dryers and room air conditioners to define standby mode based on the definitions provided in IEC Standard 62301 CDV. 75 FR 37604. DOE proposed to define standby mode as a mode that "includes any product modes where the energy using product is connected to a mains power source and offers one or more of the following user oriented or protective functions which may persist for an indefinite time:[17]

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

DOE also proposed an additional clarifiction that "a timer is a continuous clock function (which may or may not be associated with a display) that provides regular scheduled tasks (*e.g.,* switching) and that operates on a continuous basis." *Id.* This defintion was developed based on the definitions provided in IEC Standard 62301 CDV, and expands upon the EPCA mode definitions to provide additional clarifications as to which functions are associated with each mode.

ALS supported DOE's proposed definition of standby mode. (ALS, No.

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

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

24 at p. 1) Whirlpool commented that DOE should reference IEC 62301 FDIS for the standby mode definition. (Whirlpool, No. 27 at p. 1) AHAM commented that DOE should define a timer function under the standby mode definition to exclude limited duration situations where the appliance is in a higher power state, for example in delay start mode. (AHAM, Public Meeting Transcript, No. 20 at pp. 35–36) DOE notes that the definition of standby mode in IEC Standard 62301 FDIS is essentially the same as the definition provided in IEC Standard 62301 CDV, with only minor editorial changes. DOE also notes the definition of standby mode specifies that it must be a mode that may persist for an indefinite time, which would exclude limited duration situations. Therefore, DOE does not believe that any additional clarification in the definition of standby mode is necessary. For these reasons, DOE is adopting in today's final rule the standby mode definition proposed in the June 2010 TP SNOPR. 75 FR 37594, 37604 (June 29, 2010).

DOE stated in the June 2010 TP SNOPR that given these proposed definitions, delay start mode and cycle-finished mode for clothes dryers and delay start mode and off-cycle mode for room air conditioners are not modes that persist for an indefinite time, and would therefore not be considered as part of a standby mode. 75 FR 37604. DOE's analysis of annual energy use in specific clothes dryer and room air conditioner modes presented in the December 2008 TP NOPR showed that delay start mode and cycle-finished mode for clothes dryers, and delay start mode and off-cycle mode for room air conditioners, each represent a negligible portion (0.1 percent or less) of the annual energy use for those products. 73 FR 74639, 74647, 74649 (December 9, 2008). Therefore, an integrated energy efficiency metric for either clothes dryers or room air conditioners would not be measurably affected by the exclusion of the energy use in any of these modes. Further, DOE stated in the June 2010 TP SNOPR that the benefit of incorporating the energy use of these modes into the overall energy efficiency metric is outweighed by the burden that would be placed on the manufacturers to measure power consumption in each of these modes. For these reasons, DOE did not propose amendments to the test procedures to define delay start, cycle finished, and off-cycle modes or to measure power consumption in delay start mode for either product, cycle finished mode for clothes dryers, and off-cycle mode for room air conditioners in the June 2010 TP SNOPR. DOE included in the proposed clothes dryer and room air conditioner test procedures amendments in the June 2010 TP SNOPR provisions for measuring energy consumption only in the inactive mode and off mode. 75 FR 37594, 37604 (June 29, 2010).

The California Utilities/NRDC, AHAM, ALS, and Whirlpool agreed that delay start and cycle finished modes for clothes dryers would not be considered standby modes. (California Utilities/NRDC, No. 33 at p. 2; AHAM, No. 31 at p. 3; Whirlpool, No. 27 at p. 1; ALS, No. 24 at p. 1) AHAM and Whirlpool added that delay start and cycle finished modes should instead be considered part of active mode. (AHAM, No. 31 at p. 3; Whirlpool, No. 27 at p. 1) Whirlpool also commented that any function begun by the user when initiating the operating mode includes all power consumed until the full conclusion of that operation. (Whirlpool, No. 27 at p. 1)

DOE continues to believe that delay start, cycle finished, and off-cycle modes for clothes dryers and room air conditioners are not modes that persist for an indefinite time and, therefore, would not be considered standby modes. For the reasons discussed above, DOE continues to believe that the benefit of incorporating the energy use of these modes into the overall energy efficiency is outweighed by the burden that would be placed on the manufacturers to measure power consumption in each of these modes. As discussed in section III.B.4, however, DOE determined that the power consumption of clothes dryers and room air conditioners operating in such modes approximates the power levels in inactive/off modes. Therefore, DOE amends the test procedure in today's final rule to specify that all non-active mode hours be allocated to the inactive and off modes for both clothes dryers and room air conditioners. Thus, the amended test procedure accounts for the energy use in delay start, cycle finished, and off-cycle modes. For these reasons, DOE is not adopting amendments to the test procedures to define delay start, cycle finished, and off-cycle modes or to measure power consumption in delay start mode for either product, cycle finished mode for clothes dryers, and off-cycle mode for room air conditioners.

In the June 2010 TP SNOPR, DOE noted that it received comments from interested parties in response to the December 2008 TP NOPR that the as-shipped factory or "default" settings should be used for standby and off mode testing. 75 FR 37594, 37605 (June 29, 2010). DOE stated in the June 2010 TP SNOPR that provisions for setting up the appliance for standby mode and off mode testing should be specified in the test procedure. However, DOE stated that setting up the appliance in accordance with manufacturer's instructions or in the as-shipped factory or "default" settings would allow manufacturers to ship appliances set in a low power mode that consumers may switch out of during typical standby or off mode use. Therefore, DOE proposed in the June 2010 TP SNOPR that the appliance be set up with the settings that produce the highest power consumption level, consistent with the particular mode definition under test, for standby and off mode testing. *Id.*

AHAM, Whirlpool, and ALS objected to the proposal that the clothes dryer be set up at the highest energy consumption level consistent with the particular standby or off mode. They felt such an approach does not reflect consumer use, increases test burden to determine such settings, and lacks conformity, consistency, and repeatability across manufacturers. AHAM, Whirlpool, and ALS commented that the clothes dryer should instead be set up in factory or "default" cycle settings, and that this procedure is consistent with consumer usage and will result in repeatable, reproducible results. AHAM and Whirlpool stated that should there be no indicators for the default settings, the appliance should be tested as shipped. AHAM, Whirlpool, and ALS stated that such an approach would ensure uniformity among the different laboratories that may run the test. They also stated that DOE's proposal would introduce unnecessary variability into the test and add to the test burden because manufacturers would need to run several tests on every model to determine which cycle is the highest-energy cycle. (AHAM, No. 31 at pp. 4–5; Whirlpool, No. 27 at p. 1; ALS, No. 24 at pp. 1–2) Whirlpool added that repeatable results are of increasing importance for verification processes. (Whirlpool, No. 27 at p. 1)

AHAM commented that incentivizing manufacturers to ship products with the lowest power settings is a better way to save energy than shipping with the highest power settings, because most consumers do not change the settings. (AHAM, Public Meeting Transcript, No. 20 at p. 56) AHAM stated that products may have provisions for the consumer to add or delete product functions that alter the as-shipped standby energy mode, and that the power consumption in these user-selected modes may exceed the power consumption in the

lowest-power consumption mode. AHAM stated that the user must be informed as to how to make these selections and that the selection(s) will override the lowest-power consumption mode. According to AHAM, testing the appliance in the factory settings or "default" settings provides a clear and simple way to define standby mode and allow new functions that may be developed to be added to the appropriate mode without requiring the test procedure be revised. (AHAM, No. 31 at p. 3)

The California Utilities/NRDC supported DOE's proposed approach to use the settings that produce the highest power consumption for standby and off mode testing. They felt this approach would remove a potential opportunity for "gaming" appliance testing and would ensure that the standby mode and off mode testing would measure the highest energy-consuming combination of modes. The California Utilities/NRDC stated that there is no data that indicates that the factory default settings are uniform, or that they are typically used by consumers. In addition, the California Utilities/NRDC stated that DOE's proposed approach would standardize the standby mode and off mode testing among manufacturers, because how a factory default setting is used during testing may not be consistent from manufacturer to manufacturer. (California Utilities/NRDC, No. 33 at p. 2) Appliance Standards Awareness Project (ASAP) also commented that using the default settings for testing would give manufacturers an incentive to ship products in a very low-power mode that consumers may never use because they can easily adjust the settings. (ASAP, Public Meeting Transcript, No. 20 at p. 55)

DOE agrees with AHAM, Whirlpool, and ALS that the proposed provisions for testing standby and off mode using the settings that produce the highest power consumption level consistent with the particular mode definition under test would not be representative of consumer use. If manufacturers were to ship products in a very low-power mode, DOE does not believe that consumers would likely modify the settings so that the product is in the highest power settings, but would instead use what would have been the as-shipped factory or "default" settings during typical standby or off mode use. DOE agrees that, because newer products offer more consumer related features and thus more display or settings configurations, requiring laboratories to determine the settings that produce the highest power consumption levels would make it more difficult to ensure that test results are repeatable. DOE notes that section 5.2 of IEC Standard 62301, "Selection and preparation of appliance or equipment," includes provisions for installing and setting up the appliance as specified by manufacturers instructions. Section 5.2 of IEC Standard 62301 also specifies that if no instructions are given, the appliance shall be tested at factory or default settings, and where there are no indications for such settings, the appliance shall be tested as supplied. DOE believes that section 5.2 of IEC Standard 62301 clarifies the installation requirements for standby mode and off mode energy consumption testing and provides additional guidance regarding specifications for test setup that would result in a measure of standby and off mode energy consumption that best replicates actual consumer usage. For these reasons, DOE is incorporating by reference section 5.2 of IEC Standard 62301 for standby and off mode testing in today's final rule.

June 2010 TP SNOPR and Today's Final Rule—Standby Mode or Active Mode, Network Mode

For the June 2010 TP SNOPR, DOE also considered whether it should adopt amendments for network mode. 75 FR 37594, 37605 (June 29, 2010). Section 3.7 of IEC Standard 62301 CDV defines network mode as a mode category that "includes any product modes where the energy using product is connected to a main power source and at least one network function is activated (such as reactivation via network command or network integrity communication) but where the primary function is not active." Section 3.7 of IEC Standard 62301 CDV also provides a note stating, "Where a network function is provided but is not active and/or not connected to a network, then this mode is not applicable. A network function could become active intermittently according to a fixed schedule or in response to a network requirement. A 'network' in this context includes communication between two or more separate independently powered devices or pieces of equipment. A network does not include one or more controls, which are dedicated to a single piece of equipment. Network mode may include one or more standby functions." However, DOE stated in the June 2010 TP SNOPR that it is unaware of any clothes dryers or room air conditioners currently available on the market that incorporate a networking function. Further, DOE stated that it is unaware of any data regarding network mode that would enable it to determine appropriate testing procedures and mode definitions for clothes dryers and room air conditioners. In particular, DOE stated that it is unaware of data and methods for the appropriate configuration of networks; whether network connection speed or the number and type of network connections affects power consumption; or whether wireless network devices may consume power differently when the device is looking for a connection as opposed to when the network connection is actually established. DOE stated that it is also unaware of how the energy consumption for clothes dryers and room air conditioners in a network environment might be affected by their product design, user interaction, or network interaction. For example, DOE is unaware of what affects might result should the network function become active intermittently according to a fixed schedule or in response to a network requirement. For these reasons, the proposed amendments in the June 2010 TP SNOPR did not include network mode. *Id.*

AHAM commented that there are not enough products currently available on the market from which to gather data regarding network mode. AHAM stated that, in the event DOE decides to address network mode, AHAM does not support including network mode in standby or off mode. AHAM commented that network mode and the energy use associated with "Smart Appliances" [18] should be treated as a distinctive energy use that enhances electrical grid system efficiencies that save energy and reduce carbon emissions, adding that this is consistent with IEC Standard 62301 FDIS. AHAM also commented that when sufficient data exists, AHAM would be willing to work with DOE to define where and how to address network mode. (AHAM, No. 31 at p. 4) AHAM also added that if network mode is considered part of standby mode, it would be a major difficulty in the development of "Smart Appliances" and the "Smart Grid." [19] (AHAM, Public Meeting Transcript, No. 20 at pp. 38–39)

Whirlpool commented that network mode will become a vital mode in the future development of appliances capable of interacting with the Smart Grid, but that such products do not exist today outside of development laboratories. Whirlpool urged DOE to

[18] A "Smart Appliance" is a product equipped with network mode capabilities.

[19] A "Smart Grid" is an automated electric power system that monitors and controls electrical grid activities and is capable of real-time two-way digital communications between utilities and consumers. Information on Smart Grid is available online at *http://www.oe.energy.gov/smartgrid.htm.*

retain network mode as a separate mode as distinct from any other mode. Whirlpool urged that no standard or test procedure be adopted for this mode until manufacturers have sufficient quantities of Smart Grid models in production that comprehensive testing and measurement can take place. (Whirlpool, No. 27 at pp. 1–2)

The American Council for an Energy-Efficient Economy (ACEEE), ASAP, and NRDC stated in a jointly filed comment (hereafter the "Joint Efficiency Advocates Comment") that if network mode is a mode the appliance would be in at all times, it should be classified as standby; if it is an intermittent or user-activated condition, it should be considered active mode. The Joint Efficiency Advocates Comment suggested that DOE's definition of network mode be aligned with the IEC definition and recommended creating a test method for network mode. This test method would be similar to the standby test method, but network connectivity would be enabled. The Joint Efficiency Advocates Comment stated that units could be tested without actually connecting to a network; simply enabling the network capabilities should be enough to test energy consumption while in a simulated networking state. The Joint Efficiency Advocates Comment recommended that DOE consider incorporating network mode into energy consumption ratings as the market for network-enabled devices developed. In the meantime, network mode should be tested on available appliances, and that research and analysis should be conducted on predicted or actual consumer usage in advance of a future revision to the test procedure. (Joint Efficiency Advocates Comment, No. 28 at p. 3)

DOE notes that, in the absence of data on the operation and functionality of network mode, it is unable to define appropriate testing conditions and procedures for accurately measuring the energy use of clothes dryers and room air conditioners capable of functioning in network mode. This lack of data also prevents DOE from evaluating how these products will develop in the future. Also, because DOE does not have sufficient data on the operation and functionality of network mode, it is not making a determination as to whether network mode would be included as part of standby or active mode. DOE may consider amendments to the clothes dryer and room air conditioner test procedures when products capable of functioning in network mode are in production and commercially available. At that time, comprehensive analysis can determine appropriate testing conditions and procedures for accurately measuring network mode energy use.

June 2010 TP SNOPR and Today's Final Rule—Off Mode

As discussed in section III.B.1, DOE proposed in the June 2010 TP SNOPR to amend the DOE test procedure for clothes dryers and room air conditioners to define off mode based upon the definition in IEC Standard 62301 CDV. DOE proposed to define off mode as a mode category which "includes any product modes where the energy using product is connected to a mains power source and is not providing any standby mode or active mode function and where the mode may persist for an indefinite time.[20] An indicator that only shows the user that the product is in the off position is included within the clasification of off mode." This defintion was developed based on the definitions provided in IEC Standard 62301 CDV, and expands upon the EPCA mode definitions to provide additional clarifications as to which functions are associated with each mode. 75 FR 37594, 37605 (June 29, 2010).

AHAM commented that the off mode definition proposed in the June 2010 TP SNOPR, which is based on IEC Standard 62301 CDV, is identical to the definition included in IEC Standard 62301 FDIS. (AHAM, Public Meeting Transcript, No. 20 at p. 41) For the reasons stated above, DOE is adopting in today's final rule the off mode definition proposed in the June 2010 TP SNOPR. 75 FR 37594, 37605 (June 29, 2010).

DOE also stated in the June 2010 TP SNOPR that under the proposed mode definitions, a clothes dryer or room air conditioner equipped with a mechanical on/off switch that can disconnect power to the display, control components, or both would be considered as operating in the off mode when the switch is in the "off" position, provided that no other standby or active mode functions are energized. DOE also stated that an energized LED or other indication that only shows the user the product is in the off position would be considered part of off mode under the proposed definition, provided that no other standby or active mode functions were energized. If energy is consumed by the appliance in the presence of a one-way remote control, however, the unit would be operating in standby mode pursuant to EPCA (42 U.S.C. 6295(gg)(1)(A)(iii)). DOE clarified that the unit would be operating in standby mode if energy is consumed in the presence of a remote control that facilitates the activation or deactivation of other functions (including active mode). 75 FR 37594, 37605–06 (June 29, 2010).

AHAM and Whirlpool commented that they do not support including one-way remote control energy in the definition of standby mode. AHAM and Whirlpool stated that although EPCA defines standby mode to include activation by remote control, one-way remotes do not meet the intent of the statute. AHAM and Whirlpool further commented that when a standard remote powers a product "off," the remote actually powers the product down, not off, such that it can be turned on again via remote control, and that this would be classified as a standby mode under the EPCA standby mode definition. According to AHAM and Whirlpool, a one-way remote turns the product completely off such that it cannot be turned on again by the remote. Therefore, a one-way remote does not put the product into a standby mode and should not be incorporated into standby mode. (AHAM, No. 31 at p. 3; AHAM, Public Meeting Transcript, No. 20 at pp. 32–33; Whirlpool, No. 27 at p. 1) AHAM added that there are currently few, if any, one-way remotes in the United States. AHAM stated that including one-way remotes in the off mode instead of in the standby mode will encourage manufacturers to design products with one-way remotes, which could result in decreased energy use. (AHAM, No. 31 at p. 3) AHAM also noted that a number of other governments and organizations consider one-way remotes as exempt from standby mode because such remotes save power. AHAM stated that DOE should take the same approach. (AHAM, Public Meeting Transcript, No. 20 at pp. 33–34)

DOE notes the definition of standby mode proposed in the June 2010 TP SNOPR states that standby mode includes user-oriented or protective functions to facilitate the activation of other modes (including activation or deactivation of active mode) by remote switch (including remote control), internal sensor, or timer. DOE believes that if the product is consuming energy to power an infrared sensor used to receive signals from a remote control (while not operating in the active mode), such a function would be considered part of standby mode, regardless of whether the remote is classified as "one-way" or "two-way." This is because the function to facilitate the deactivation of another mode by

[20] As with the definition for standby mode, IEC Standard 62301 CDV qualifies off mode as one that "* * * usually persists" rather than one that "* * * may persist for an indefinite time." For the same reasons as discussed for standby mode, DOE is proposing the latter definition.

remote switch (including remote control), internal sensor, or timer is still active. However, if a "one-way" remote control powers the product down, including turning off any infrared sensors to receive signals from a remote control, the product would be operating in the off mode once it is powered down, given that no other standby mode functions within the product are energized. Depending on whether the product is capable of operating in both a standby mode and off mode or just the off mode, the annual hours associated would be allocated as appropriate, as discussed in section III.B.4.

DOE also notes that section 3.9 of IEC Standard 62301 CDV provides a definition of "disconnected mode," which is "the status in which all connections to mains power sources of the energy using product are removed or interrupted." IEC Standard 62301 CDV also adds a note that common terms such as "unplugged" or "cut off from mains" also describe this mode and that this mode is not part of the low power mode category. DOE believes there would be no energy use in a "disconnected mode" and therefore is not adopting a definition or testing methods for such a mode in the DOE test procedure for clothes dryers or room air conditioners in today's final rule.

3. Adding Specifications for the Test Methods and Measurements for Clothes Dryer and Room Air Conditioner Standby Mode and Off Mode Testing

DOE proposed in the December 2008 TP NOPR to establish test procedures for measuring all standby and off modes associated with clothes dryers and room air conditioners. 73 FR 74639, 74645 (December 9, 2008). As discussed in section III.B.2, DOE believes that the mode identified as inactive mode in the December 2008 TP NOPR is the only significant standby mode for clothes dryers and room air conditioners. This section discusses product-specific clarifications of the procedures of IEC Standard 62301 when used to measure standby and off mode energy use for clothes dryers and room air conditioners.

a. Clothes Dryers

DOE understands that displays on clothes dryers may reduce power consumption by automatically dimming or powering down after a certain period of user inactivity. For those clothes dryers for which the power input in inactive mode varies in this fashion during testing, DOE proposed in the December 2008 TP NOPR that that the test be conducted after the power level has dropped to its lower-power state. 73 FR 74639, 74645 (December 9, 2008).

As part of the residential clothes dryer energy conservation standards rulemaking preliminary analyses, DOE conducted standby mode and off mode testing on 11 representative residential clothes dryers. All of the units with electronic controls automatically dimmed or powered down after a period of user inactivity. Table III.1 shows the measured duration of the higher-power state for clothes dryers in DOE's test sample. DOE observed during this testing that the higher-power state in inactive mode may persist for approximately 5–7 minutes of user inactivity after the user interface display has been energized for all products tested.

TABLE III.1—CLOTHES DRYER STANDBY MODE TESTING: DURATION OF HIGHER-POWER STATE

Product class	Test unit	Control type	Automatic power-down?	Duration of higher-power state (min)
Vented Electric, Standard	1	Electromechanical	N	
	2	Electromechanical	N	
	3	Electronic	Y	5
	4	Electromechanical	N	
	5	Electromechanical	N	
Vented Electric, Compact (120 V)	6	Electromechanical	N	
Vented Gas	7	Electromechanical	N	
	8	Electronic	Y	5
	9	Electronic	Y	5
	10	Electronic	Y	7
	11	Electronic	Y	7

Paragraph 5.3.1 of section 5.3 of IEC Standard 62301 specifies, for products in which the power varies by not more than 5 percent from a maximum level during a period of 5 minutes, that the user wait at least 5 minutes for the product to stabilize and then measure the power at the end of an additional time period of not less than 5 minutes. Paragraph 5.3.2 of IEC Standard 62301 contains provisions for measuring average power in cases where the power is not stable. In such cases, it requires a measurement period of no less than 5 minutes, or one or more complete operating cycles of several minutes or hours. Based on its testing results shown in Table III.1, however, DOE noted that some clothes dryers may remain in the higher-power state for the duration of a 5-minute stabilization period and 5-minute measurement period, and then drop to the lower-power state that is more representative of inactive mode. In contrast to IEC Standard 62301, IEC Standard 62301 CDV specifies for each testing method that the product be allowed to stabilize for at least 30 minutes prior to a measurement period of not less than 10 minutes. DOE stated in the June 2010 TP SNOPR that this clarification would allow sufficient time for displays that automatically dim or power down after a period of user inactivity to reach the lower-power state prior to measurement. DOE stated that based on its observation of the automatic power-down time periods during its testing, the 30-minute stabilization and 10-minute measurement periods provide a clearer and more consistent testing procedure than the corresponding times specified in IEC Standard 62301. A testing procedure using these stabilization and measurement periods would result in representative measurements among products that may have varying times before the power drops to a low level. 75 FR 37594, 37607 (June 29, 2010).

DOE also noted in the June 2010 TP SNOPR that allowing a test period of "not less than" or "at least" a specified amount of time, as provided in both IEC

Standard 62301 and IEC Standard 62301 CDV, may result in different test technicians testing the same product for different periods of time. To ensure the testing procedures for standby and off mode are clear and consistent such that different test technicians test the product using the same procedures, DOE proposed the stabilization period be 30 to 40 minutes, and the test period be 10 minutes. *Id.*

ALS and AHAM supported DOE's proposal to require a stabilization period of 30 minutes and a test period of 10 minutes for clothes dryers. (ALS, No. 24 at p. 1; AHAM, No. 31 at p. 4) AHAM commented that the purpose of the stabilization period is to reach a steady-state condition with a power state that may last for an indefinite period of time. AHAM stated that IEC Standard 62301 includes provisions to wait to reach the lowest power state without specifying a time to allow an accurate measurement for all products, so that all products are tested in the same manner. AHAM noted that this will result in some power consumption in the higher energy state not being measured, but this amount is likely to be small due to the small amount of time products spend in this mode. (AHAM, Public Meeting Transcript, No. 20 at pp. 45–48) AHAM also commented that a note in section 3.4 of IEC Standard 62301 FDIS states that a transition between modes would not be considered a mode, and that none of the 123 countries involved with the IEC process commented on this note. (AHAM, Public Meeting Transcript, No. 20 at pp. 48–49)

DOE agrees with AHAM's comments that any transition between modes would not be considered a mode. Therefore, DOE does not intend to include the measurement of energy consumption for any stabilization or transition phases when the product is powering down to a lower-power state. For the reasons stated above, DOE adopts in today's final rule the requirement that the stabilization period be 30 to 40 minutes and the test period be 10 minutes, as proposed in the June 2010 TP SNOPR. 75 FR 37594, 37607 (June 29, 2010).

DOE proposed in the December 2008 TP NOPR to adopt the test room ambient temperature of 73.4 ± 9 °F specified by IEC Standard 62301 for standby mode and off mode testing. 73 FR 74639, 74645–46 (December 9, 2008). This test room ambient temperature is slightly different from the ambient temperature currently specified for DOE's drying performance tests of clothes dryers (75 ± 3 °F). However, the proposed test room ambient temperature conditions would permit manufacturers who opt to test active, standby, and off modes in the same test room to use the current ambient temperature requirements for drying tests, because the latter temperatures are within the limits specified by IEC Standard 62301. Alternatively, the proposed temperature specifications would allow a manufacturer who opts to conduct standby mode and off mode testing separately from drying tests more flexibility in ambient temperature.

In comments submitted on the June 2010 TP SNOPR, AHAM, ALS, and Whirlpool supported the proposed test room ambient temperature for clothes dryer standby and off mode testing. (AHAM, No. 31 at p. 4; ALS, No. 24 at p. 1; Whirlpool, No. 27 at p. 2) For the reasons stated above, and in the absence of any comments on this proposal, DOE adopts the test room ambient temperature of 73.4 ± 9 °F specified by IEC Standard 62301 for standby mode and off mode testing.

b. Room Air Conditioners

A room air conditioner with a temperature display may use varying amounts of standby power depending on the digit(s) being displayed. DOE proposed in the December 2008 TP NOPR to require that test room temperature be maintained at 74 ± 2 °F, and that the temperature control setting be 79 °F. 73 FR 74639, 74646 (December 9, 2008). These conditions differ from the cooling performance testing conditions in the current DOE room air conditioner test procedure. The cooling performance test conditions are specified as 80 °F on the indoor side of the test chamber and 95 °F on the outdoor side. In addition, the cooling performance test conditions do not specify a temperature control setting. DOE proposed the different test room conditions in the December 2008 TP NOPR because such conditions would assure a consistent display configuration, and thus a representative power consumption, for all room air conditioners under test, particularly during the off-cycle operation defined in the December 2008 TP NOPR as a standby mode. 73 FR 74646.

As part of the room air conditioner energy conservation standards rulemaking preliminary analyses, DOE conducted standby mode and off mode testing on representative room air conditioners. During its preliminary tests, DOE determined that room air conditioner displays among the units it tested do not provide any user information in inactive mode. In addition, DOE determined that the displays among the units it tested provide indication of time delay or time until start rather than temperature when the air conditioners are in delay start mode. As a result, DOE stated in the June 2010 TP SNOPR that the proposed test chamber ambient conditions would be relevant only for off-cycle mode. DOE also stated that if the test procedure were limited to measurement of inactive mode as the single standby mode and an off mode as discussed in section III.B.2, the proposed close tolerance on ambient temperature would not be required. 75 FR 37594, 37608 (June 29, 2010). DOE therefore proposed in the June 2010 TP SNOPR to provide flexibility in the room air conditioner test procedure amendments by allowing standby mode and off mode testing either in a test chamber used for measurement of cooling performance or in a separate test room that meets the specified standby mode and off mode test conditions. The proposed amendments to the room air conditioner test procedure in the June 2010 TP SNOPR specify maintaining the indoor test conditions at the temperature required by section 4.2 of IEC Standard 62301 if tested in a cooling performance test chamber. The proposed amendments also specify maintaining the room ambient test conditions at the temperature required by section 4.2 of IEC Standard 62301 if tested in a separate test room. Further, if the unit is tested in the cooling performance test chamber, the proposed amendments in the June 2010 TP SNOPR allow the manufacturer to maintain the outdoor test conditions either as specified for the DOE cooling test procedure or according to section 4.2 of IEC Standard 62301 for standby and off mode testing. DOE also noted that the indoor temperature conditions required by the DOE cooling performance test procedure fall within the temperature range specified by section 4.2 of IEC Standard 62301. *Id.*

AHAM supported DOE's proposed test room ambient temperature for room air conditioner standby and off mode testing. (AHAM, No. 31 at p. 4) ASAP questioned whether DOE has conducted any testing to determine if there are any differences in the power measurements between the two temperature conditions. (ASAP, Public Meeting Transcript, No. 20 at p. 60) DOE is not aware of any data indicating that the ambient temperature would affect the measured standby or off mode power. For the reasons stated above, DOE is adopting in today's final rule the test room ambient temperature proposed in the June 2010 TP SNOPR for room air conditioner standby and off mode

testing. 75 FR 37594, 37608 (June 29, 2010).

Similar to clothes dryers, DOE proposed in the December 2008 TP NOPR (73 FR 74639, 74646 (December 9, 2008)) that standby and off modes for room air conditioners, other than delay start mode, be tested with a stabilization period of no less than 5 minutes and a measurement period of no less than 5 minutes for units with stable power, consistent with paragraph 5.3.1 of section 5.3 of IEC Standard 62301. In cases where the power was unstable, the provisions of paragraph 5.3.2 would apply, in which the measurement period would be no less than 5 minutes or one or more complete operating cycles. DOE stated in the June 2010 TP SNOPR that it does not have any information or data that would suggest that a 30-minute stabilization period followed by a 10-minute measurement period would produce more representative or consistent standby and off mode power measurements than the times proposed in the December 2008 TP NOPR. 75 FR 37594, 37608 (June 29, 2010).

DOE also noted, however, that allowing a test period of "not less than" or "at least" a specified amount of time, as provided in IEC Standard 62301, may result in different test technicians testing the same product for different periods of time. To ensure that the testing procedures for standby and off mode are clear and consistent, such that different test technicians are testing the product using the same procedures, DOE proposed in the June 2010 TP SNOPR to require that the stabilization period be 5 to 10 minutes, and the test period be 5 minutes. 75 FR 37594, 37608 (June 29, 2010).

AHAM supported DOE's proposed stabilization period for room air conditioners. (AHAM, No. 31 at p. 4) For the reasons stated above, DOE adopts the requirement that the stabilization period be 5 to 10 minutes and the test period be 5 minutes, as proposed in the June 2010 TP SNOPR. 75 FR 37594, 37608 (June 29, 2010).

4. Calculation of Energy Use Associated With Standby Modes and Off Mode

Measurements of power consumption associated with each standby and off mode for clothes dryers and room air conditioners are expressed in W. The annual energy consumption in each of these modes for a clothes dryer or room air conditioner is the product of the power consumption in W and the time spent in that particular mode.

a. Clothes Dryers

Energy use for clothes dryers is expressed in terms of total energy use per drying cycle. As discussed in section III.D.3, DOE has determined that it is technically feasible to incorporate measures of standby and off mode energy use into the overall energy-use metric. (42 U.S.C. 6295(gg)(2)(A)) Therefore, DOE has examined standby and off mode energy consumption in terms of annual energy use apportioned on a per-cycle basis. Energy used during a drying cycle (active mode) is directly measured in the DOE test procedure, although adjustments are made to the directly measured energy to account for differences between test and field conditions.

DOE proposed in the December 2008 TP NOPR to adopt a similar approach for measuring energy consumption during standby and off modes for clothes dryers. Specifically, to measure energy consumption during standby and off modes for clothes dryers, DOE proposed in the December 2008 TP NOPR to adopt the current 140 hours associated with drying (that is, the active mode) and to associate the remaining 8,620 hours of the year with the standby and off modes. Table III.2 presents the comparison of the approximate wattages and annual energy use associated with all modes that DOE proposed in the December 2008 TP NOPR. 73 FR 74639, 74647–48 (December 9, 2008).

TABLE III.2—DOE ESTIMATE OF ANNUAL ENERGY USE OF CLOTHES DRYER MODES

Mode	Hours	Typical power *W*	Annual energy use *kilowatt-hours (kWh)*
Active	140	6,907	967.
Delay Start	* 34	3	0.1.
Cycle Finished	** 429	3	1.
Off and Inactive	† 8,157	0.5 to 3	4 to 24.

* 5 minutes per cycle × 416 cycles per year.
** 5 percent of remaining time (0.05 × (8,760 − 140 − 34) = 429).
† 95 percent of remaining time (0.95 × (8,760 −140 − 34) = 8,157).

DOE reviewed comments from interested parties on the December 2008 TP NOPR and stated in the June 2010 TP SNOPR that under the proposed definitions of standby and off modes, the allocation of annual hours to inactive and off modes is appropriate. DOE also stated that the June 2010 TP SNOPR did not affect DOE's proposal in the December 2008 TP NOPR for this allocation of hours. 75 FR 37594, 37609 (June 29, 2010).

In the December 2008 TP NOPR, DOE also proposed an alternative simplified methodology for allocating annual hours. 73 FR 74639, 74648 (December 9, 2008). The comparison of annual energy use of different clothes dryer modes shows that delay start and cycle finished modes represent a negligible percentage of total annual energy consumption. In addition, for clothes dryers currently on the market, power levels in these modes are similar to those for off/inactive modes. Therefore, DOE proposed that all of the non-active hours (which total 8,620) would be allocated to the inactive and off modes. 73 FR 74648. As discussed in section III.B.2, DOE determined in the June 2010 TP SNOPR that delay start and cycle finished modes are not standby modes according to the proposed definitions. Because the power consumption of clothes dryers operating in such modes approximates the power levels in off/inactive modes, DOE stated in the June 2010 TP SNOPR that it would be more appropriate under a simplified approach to allocate the hours associated with delay start and cycle finished modes to off/inactive modes. Therefore, and because DOE did not propose amendments to the clothes dryer test procedure to measure delay start and cycle finished power consumption given the negligible power consumption in these modes, DOE proposed in the June 2010 TP SNOPR to maintain the estimate of 8,620 hours as the non-active hours that would be allocated to inactive and off modes for clothes dryers. 75 FR 37594, 37601 (June 29, 2010).

ALS objected to retaining the allocation of clothes dryer hours proposed in the June 2010 TP SNOPR. ALS stated that the estimates were based on 416 cycles per year and supported a revision to the hours so that they are consistent with DOE's proposed 283 cycles per year and other proposed cycle definition changes. (ALS, No. 24 at p. 2) DOE notes that the estimate of delay start mode hours developed in the December 2008 TP NOPR was based on the number of cycles per year in the existing test procedure (that is, 416 cycles per year). DOE estimated in the December 2008 TP NOPR that 5 minutes per cycle are spent in delay start mode. 73 FR 74639, 74647 (December 9, 2008). Under the amended test procedure in today's final rule, the number of cycles per year is revised from 416 to 283 cycles per year. Thus, DOE now estimates that clothes dryers would be in delay start mode approximately 24 hours per year. DOE also notes that the estimate for active mode hours presented in the December 2008 TP NOPR was fixed based on the number of such hours specified in the existing test procedure (140 hours). 73 FR 74646–7. DOE acknowledges that its estimate of the number of cycles per year has decreased. As discussed later in this section, DOE notes that other proposed amendments in today's final rule, including the changes to the initial RMC, test load size, and specified water temperature for test load preparation, may also affect cycle time and the number of active mode hours per year. DOE is not aware, however, of any data indicating that the number of active mode hours has changed and, if so, what a more accurate number might be. Therefore, DOE is not proposing amendments to the number of active mode hours. In the December 2008 TP NOPR DOE estimated 5 percent of the remaining hours (that is, not including active mode hours and delay start mode hours) would be associated with cycle finished mode and 95 percent associated with inactive/off modes (73 FR 74647). This would result in revised values of 430 hours for cycle finished mode and 8,166 hours for inactive/off modes. DOE acknowledges that the estimates for hours in each standby and off mode would change based on the number of annual clothes dryer cycles. Because DOE is not proposing to measure delay start and cycle finished modes for clothes dryers, however, and is instead allocating those hours to inactive/off modes (as discussed in section III.B.2), the aforementioned revisions to the standby and off mode hours would not change the total hours allocated to inactive/off mode because the number of active mode hours is fixed.

ALS commented that DOE must also take into account the active mode cycle length change if DOE accepts commenters' support for testing the complete cycle including cool-down in the automatic termination test cycle. DOE's studies indicated that the cool-down in the automatic termination test cycle would be required to be tested on 100 percent of clothes dryers on the market. ALS commented that the Whirlpool-supplied estimate presented in the June 2010 TP SNOPR indicates an active drying cycle length of 20 minutes, which ALS stated is far too short if cool-down period is included. (ALS, No. 24 at p. 2) AHAM also questioned whether including the cool-down period would change the number of hours allocated to each mode in the calculations. (AHAM, Public Meeting Transcript, No. 20 at pp. 99–100) AHAM further commented that it could be difficult to assign a typical time to cool-down mode because there are significant differences between clothes dryers in the amount of time spent in this mode. (AHAM, Public Meeting Transcript, No. 20 at pp. 100–101) AHAM also commented, however, that cycle times are very dependent on the initial RMC used and that reducing the initial RMC value and accounting for cool-down may end up equaling out to the current 140 hours. (AHAM, Public Meeting Transcript, No. 20 at pp. 103–104)

As discussed in section III.C.2, DOE is not adopting the amendments to the clothes dryer test procedure to better account for automatic cycle termination that were proposed in the June 2010 TP SNOPR. Therefore, DOE is not amending the test procedure to include the cool-down period as part of any automatic cycle termination tests. For this reason, DOE does not believe the estimates for the annual hours spent in each mode should be revised on the basis of the inclusion of a cool-down period. With regard to AHAM's comments concerning the reduction in initial RMC and the effect on cycle times, DOE addresses how that amendment, along with the other amendments in today's final rule, affect the clothes dryer cycle time later in this section.

ALS objected to DOE's proposal of 429 hours of "cycle finished" mode. ALS commented that while clothes dryers may include an option alerting the user that the cycle has finished via an alert signal emitting periodically for up to an hour, ALS does not believe a user would avoid responding to the alert for an hour each and every cycle. According to ALS, most users will attend their dried garments within only a few minutes after the end of the drying cycle, because users want to complete their laundry chores as quickly as they can. Additionally, ALS commented that users would utilize this feature for only one third of clothes dryer cycles if cycle finished mode is an option. Therefore, ALS stated that "cycle finished mode" hours should be no more than one third of the "active mode" hours. ALS further suggested that DOE conduct consumer studies on user habits for "cycle finished" mode. (ALS, No. 24 at p. 2)

DOE analysis suggests that a cycle finished mode feature (that is, a status display following operation in active mode indicating to the user that the cycle is complete) is activated by default at the end of the drying cycle for most clothes dryers. For this reason, DOE believes consumers use the cycle finished mode feature for more than one third of clothes dryer cycles. In addition, DOE does not have any consumer usage data suggesting that most consumers attend to their laundry within only a few minutes after the end of the drying cycle. In the absence of such data, DOE maintains for today's final rule its estimate from the December 2008 TP NOPR that cycle finished mode represents 5 percent of the remaining time outside of active mode and delay start mode. This estimate was based on a household survey conducted in 2000 in Australia. 73 FR 74639, 74647 (December 9, 2008). DOE is not aware of any other consumer usage data regarding cycle finished mode hours. DOE also notes it is not proposing to measure delay start and cycle finished modes for clothes dryers and is instead allocating those hours to inactive/off modes, as discussed in section III.B.2. Therefore, any revisions to the number of cycle finished mode hours would not change the total hours allocated to inactive/off mode.

In the December 2008 TP NOPR, DOE proposed to allocate the number of hours for the combined off and inactive modes entirely to either off mode or standby mode, as appropriate, if only one of these modes is possible for the clothes dryer. DOE noted in the October 2008 TP NOPR that information to guide allocation of the hours for clothes dryers that have both inactive and off modes is currently unavailable. DOE is aware of two operational scenarios: (1) A clothes dryer reverts to an off mode after a specified time in inactive mode; or (2) a clothes dryer stays in inactive mode unless the user switches the appliance back to off mode. DOE does not have information regarding the percentage of clothes dryers being sold

that fall into these categories. Because of this limitation, DOE proposed in the October 2008 TP NOPR to allocate half of the hours determined for off/inactive modes to each of the two modes. 73 FR 74648. Because DOE did not receive any comments or additional data regarding allocation of hours in response to the December 2008 TP NOPR, the SNOPR did not affect DOE's proposal in the December 2008 TP NOPR for the allocation of hours between inactive mode and off mode.

The Joint Efficiency Advocates Comment suggested that DOE conduct research to determine how inactive and off mode hours are commonly divided up in practice for clothes dryers. The Comment stated that off mode usage may differ depending on the mode's "user-friendliness," but that this is not accounted for in the current test procedure. According to the Joint Efficiency Advocates Comment, very few consumers would take advantage of a "hidden" feature such as a small switch on the back of the unit. Therefore, crediting 50 percent of non-active mode hours to off mode would allow manufacturers to take advantage of the energy rating benefit simply by providing the off-mode option, regardless of how apparent or user-friendly the option was to the consumer. (Joint Efficiency Advocates Comment, No. 28 at p. 3)

DOE is unaware of any available data for the allocation of those hours. DOE requested data on the annual hours for various modes, including the split between standby and off modes in the NOPR (73 FR 74639, 74654) and the June 2010 TP SNOPR (75 FR 37594, 37643), but it did not receive any information. Therefore, in the absence of data indicating otherwise, DOE is amending the test procedure in today's final rule to allocate half of the hours determined for off/inactive modes to each of the two modes, for those products capable of functioning in both modes. If data is made available that indicates a different allocation of hours between inactive and off mode, DOE may consider revising this allocation.

DOE recognizes that the analysis of the number of annual hours allocated to each clothes dryer mode is based, in part, on the number of annual use cycles. As discussed in section III.C.5.a, DOE believes that the average number of annual cycles is currently 283 rather than the 416 cycles specified in the current DOE clothes dryer test procedure. DOE stated in the June 2010 TP SNOPR, however, that it does not have any information on whether active mode cycle times may have changed accordingly. 75 FR 37594, 37610 (June 29, 2010). It is possible that the smaller number of use cycles may correspond to the same amount of clothing being dried in larger load sizes and thus, potentially, longer drying times. In the absence of any data supporting this assumption, however, DOE proposed in the June 2010 TP SNOPR the same allocation of hours for inactive mode and off mode that were proposed in the December 2008 TP NOPR, even though DOE proposed fewer annual use cycles in the June 2010 TP SNOPR. *Id.*

The California Utilities/NRDC generally supported DOE's calculation method for standby and off mode for clothes dryers and method of allocation of yearly clothes dryer hours to standby and off modes proposed in the June 2010 TP SNOPR. However, the California Utilities/NRDC urged DOE to reconsider its allocation of 140 hours to active mode for clothes dryers, particularly in light of DOE's proposed adoption of 283 annual use cycles. The California Utilities/NRDC stated that if DOE assumes 140 active mode hours per year and 283 cycles per year, this translates to an average cycle time of about 30 minutes, but that DOE has not provided any data to support such an assumption. (California Utilities/NRDC, No. 33 at p. 2)

The California Utilities/NRDC also stated that if DOE relies on Whirlpool's value of 20 minutes per cycle, then under the new test procedure, the number of active mode hours would be 94 hours per year (283 cycles/year × 20 minutes/cycle). The California Utilities/NRDC stated that there is also evidence to indicate the average length of a clothes dryer cycle may be higher than 20 minutes, and that therefore the assumption of 140 hours should be adjusted upwards. The California Utilities/NRDC added that the report by Ecos Consulting (ECOS) (prepared for NRDC) summarizes results for four clothes dryers tested under a variety of cycles, which showed an average recorded cycle length of 46.5 minutes, corresponding to 219 annual hours (assuming 283 cycles per year). The California Utilities/NRDC noted that these cycles do not all represent the typical DOE load, but they represent a wide variety of potential consumer loads and modes of operation which may be indicative of in-field conditions. (California Utilities/NRDC, No. 33 at pp. 2–3) The Joint Efficiency Advocates Comment similarly stated that according to the ECOS report for NRDC, the average cycle length is 49.5 minutes for clothes dryers with automatic termination controls, which corresponds to 233 hours spent in active mode per year. The Joint Efficiency Advocates Comment recommended basing the number of hours spent in active mode annually on the cycle length multiplied by the average number of cycles per year. (Joint Efficiency Advocates Comment, No. 28 at p. 4)

The Joint Efficiency Advocates Comment and the California Utilities/NRDC both commented that DOE should try to obtain data from AHAM or manufacturers on average clothes dryer cycle length and average yearly hours. (Joint Efficiency Advocates Comment, No. 28 at p. 4; California Utilities/NRDC, No. 33 at p. 3) The Joint Efficiency Advocates Comment also added that DOE should test a representative sample of clothes dryers to develop an accurate estimate of average cycle length, which could then be multiplied by the revised number of cycles per year to calculate the annual active mode hours. (Joint Efficiency Advocates Comment, No. 28 at p. 4)

Whirlpool commented that 140 active mode hours is reasonably consistent with consumer use and practices, and was not opposed to the continuing with this known and well-understood estimate. (Whirlpool, No. 27 at p. 2)

DOE first notes that it is not relying on the 20 minutes per cycle estimate provided by Whirlpool, for which the testing procedure is not specified, to estimate the annual active mode hours. DOE notes that the estimate of 46.5 minutes per cycle, as suggested by the California Utilities/NRDC and based on data from the ECOS report, uses automatic termination cycles with clothes loads composed of cotton towels with initial RMCs ranging from 70 to 100 percent. As discussed below in section III.C.5.b, DOE amends the test procedure to change the initial RMC to 57.5 percent, which will result in a cycle time shorter than that estimated by the California Utilities/NRDC because less moisture must be removed during the drying cycle. DOE also notes that the Joint Efficiency Advocates Comment's estimate of 49.5 minutes per cycle was also based on data from the ECOS report. The estimate differs from the California Utilities/NRDC's estimate because it included data from an air dry cycle with a length of 120 minutes, which would not be appropriate for developing an estimate of clothes dryer cycle time. This is because an air dry cycle would not be representative of consumer use. Based on the amendment to the number of annual use cycles, DOE notes that the cycle length would be approximately 30 minutes (140 annual active mode hours/283 active mode cycles per year). DOE is unaware, however, of consumer usage data

indicating that the annual active mode hours have changed. For these reasons, DOE is not amending the test procedure in today's final rule to revise the number of active mode hours per year.

In summary, DOE is amending the clothes dryer test procedure in today's final rule to calculate clothes dryer energy use per cycle associated with inactive and off modes by: (1) Calculating the product of wattage and allocated hours for inactive and off modes, depending on which of these modes are possible; (2) summing the results; (3) dividing the sum by 1,000 to convert from watt-hours (Wh) to kilowatt-hours (kWh); and (4) dividing by 283 cycles per year. The 8,620 hours for off/inactive modes shall be allocated entirely to either off mode or inactive mode, as appropriate, if only one of these modes is possible for the clothes dryer. If both modes are possible, the hours shall be allocated to each mode equally as discussed in this section, and each shall be allocated 4,310 hours.

b. Room Air Conditioners

In the December 2008 TP NOPR, DOE stated it was not aware of reliable data for hours spent in different standby and off modes in room air conditioners. Therefore, DOE estimated the annual hours for standby and off modes and the relative magnitude of annual energy use in standby and off modes in an example for a representative 8,000 Btu/hour (Btu/h), 9 EER unit that has delay start, off-cycle, and inactive modes. 73 FR 74639, 74648–49 (December 9, 2008). DOE's estimates of annual energy use in each mode are shown in Table III.3.

TABLE III.3—DOE ESTIMATE OF ANNUAL ENERGY USE OF ROOM AIR CONDITIONER MODES FOR A REPRESENTATIVE UNIT WITH 8,000 BTU/H CAPACITY AND 9 EER

Mode	Hours	Typical power *(W)*	Annual energy use *(kWh)*
Active Cooling	750	889	667.
Delay Start	90	2	0.2.
Off-Cycle	440	2	0.9.
Off and Standby	4,850	0.5 to 2	2.5 to 10.

In the December 2008 TP NOPR, DOE also proposed an alternative simplified methodology. Similar to the analysis for clothes dryers, comparing annual energy use of different room air conditioner modes shows that delay start and off-cycle modes represent a small percentage of annual energy use in the active mode, and that the power consumption in those standby modes is distinct from but comparable to those for off/inactive modes. Thus, DOE proposed adopting an alternative approach allocating the non-active hours as if the room air conditioner has only the inactive standby mode. A total of 5,115 hours would be allocated to the standby and off modes ($8{,}760 \times 0.75 - 750 - 705 = 5{,}115$).[21] 73 FR 74639, 74649 (December 9, 2008). For these reasons, and because DOE did not propose amendments to the room air conditioner test procedure to measure delay start and off-cycle power consumption given the negligible power consumption in these modes, DOE proposed in the June 2010 TP SNOPR allocating 5,115 non-active hours to inactive and off modes for room air conditioners. In addition, for the same reasons as discussed for delay start and cycle finished modes for clothes dryers, DOE stated in the June 2010 TP SNOPR that the delay start and off-cycle hours for room air conditioners should be allocated to inactive and off modes even though it has determined that delay start and off-cycle modes are not standby modes. 75 FR 37594, 37610–11 (June 29, 2010).

The California Utilities/NRDC supported DOE's proposed calculation method for standby mode and off mode annual hours for room air conditioners. They added that lacking new data on typical room air conditioner operation in standby and off modes, DOE's proposed method of allocating hours to standby and off modes is appropriate. (California Utilities/NRDC, No. 33 at p. 3)

The Joint Efficiency Advocates Comment and ACEEE both commented that the 705 fan-only mode hours presented in the June 2010 TP SNOPR should be accounted for in the energy consumption calculations. (Joint Efficiency Advocates Comment, No. 28 at pp. 2–3; ACEEE, Public Meeting Transcript, No. 20 at pp. 73–74) The Joint Efficiency Advocates Comment stated that fan-only active mode could be tested by duplicating the existing cooling-mode test method with the exception of running the compressor. The Joint Efficiency Advocates Comment further stated that there is no data to support the assumption that consumers generally run their room air conditioners in fan-only mode for 705 hours a year. Although the Joint Efficiency Advocates cannot find any data on the number of hours typically used in fan-only mode, they commented that the lack of data indicates that this mode is not used as commonly as assumed in the June 2010 TP SNOPR. The Joint Efficiency Advocates Comment stated that because of DOE's allocation, their second recommendation is that the 705 hours be reallocated in such a way as to represent the current consumer usage of fan-only mode. The Joint Efficiency Advocates Comment also noted that due to the lack of data on the use of this mode, DOE should perform additional research and data collection. If no data collection is able to be performed, DOE should reallocate these hours to active cooling and/or inactive modes, which would reflect the lack of data supporting the average consumer use of any fan-only mode. (Joint Efficiency Advocates Comment, No. 28 at pp. 2–3)

The California Utilities/NRDC stated that fan-only operation should be included in active mode, but that it is not clear whether fan-only mode is accounted for in the proposed active mode test procedure. The California Utilities/NRDC stated that if fan-only mode is considered a portion of active mode, and if energy use in fan-only mode is measured in the current test procedure, then the number of hours in active mode should be revised to include fan-only mode. The California Utilities/NRDC stated that if fan-only mode is considered separate from active mode, and DOE allocates a portion of yearly hours to fan-only mode, then DOE must account for the energy use in this mode and incorporate it into its

[21] Multiplying by 0.75 eliminates hours associated with unplugged hours, assumed for half of the hours of the year for half of room air conditioners as described in the December 2008 TP NOPR (73 FR 74639, 74648 (Dec. 9, 2008)); 750 = Cooling (active mode) hours; 705 = Fan-only (active mode) hours.

calculation of CEER. The California Utilities/NRDC requested that DOE clarify its approach towards fan-only mode, provide a test procedure to measure or otherwise account for fan-only energy use, and incorporate the energy use of this mode in the CEER. (California Utilities/NRDC, No. 33, at pp. 3–4)

Earth Justice (EJ) commented that not measuring energy consumption when operating in fan-only mode would violate EPCA's minimum standards for test procedures (42 U.S.C. § 6293(b)(3)) EJ commented that by proposing to ignore energy consumption in fan-only mode, DOE has proposed to ignore nearly half the active mode operating hours of room air conditioner units. EJ added that because fan-only mode accounts for such a large percentage of total active mode operating hours, a test procedure that ignores fan-only operation would not depict "a representative average use cycle or period of use" for room air conditioners. (EJ, No. FDMS D0039 at p. 2)

DOE understands that a fan-only active mode could include two different kinds of modes: (1) A mode in which the room air conditioner does not turn off the fan when the thermostat automatically cycles the compressor off during cooling mode; and (2) a user-selected "ventilation" mode that does not include the cooling. DOE recognizes that the energy use associated with fan-only mode is not insignificant. As noted in the December 2008 TP NOPR, however, DOE is not aware of any reliable consumer usage data for hours spent in different room air conditioner modes, including fan-only mode. 73 FR 74639, 74648 (December 9, 2008). DOE requested data in the December 2008 TP NOPR on the estimate of hours for different room air conditioner modes, but did not receive any such data. DOE notes that developing a test procedure to accurately measure the contribution of fan-only active mode would require additional testing and analysis to determine appropriate testing conditions and measurement methods for both types of fan-only modes described above. In addition, field use surveys of consumer usage patterns over multiple cooling seasons and a climate-based load analysis to develop an estimate of fan-only mode hours that is representative of consumer use would need to be conducted. DOE may consider amendments to address fan-only active mode in a future rulemaking as data becomes available. DOE welcomes information on appropriate testing procedures for accurately measuring fan-only active mode and data on consumer usage habits.

Typically, room air conditioners with remote control can be controlled whenever they are plugged in; hence, these units do not have provision for an off mode in addition to inactive mode. However, if a room air conditioner allows the user to switch off remote control operation, such a product would be capable of both off and inactive modes. DOE notes that information to guide allocation of the hours for room air conditioners that have both inactive and off modes is currently unavailable. For these units, DOE proposed in the December 2008 TP NOPR that the off/inactive hours be allocated equally to the off and inactive modes for such a product. Otherwise, for units that are capable of operation in only off or inactive mode, DOE proposed that all of the hours be allocated to the appropriate mode. 73 FR 74649. In the absence of comments on or additional data regarding allocation of hours, the June 2010 TP SNOPR did not affect DOE's proposal in the December 2008 TP NOPR for the allocation of hours between inactive mode and off mode. 75 FR 37594, 37611 (June 29, 2010).

Similar to the comment noted above for clothes dryers, the Joint Efficiency Advocates Comment suggested that DOE conduct research to determine how consumers allocate inactive and off mode hours for room air conditioners. The Joint Efficiency Advocates Comment stated they are concerned that off-mode usage may be affected by the mode's "user-friendliness," but that this is not accounted for in the current test procedure. (Joint Efficiency Advocates Comment, No. 28 at p. 3)

DOE requested consumer usage data on the split of hours between inactive mode and off mode if both modes are possible for a product but did not receive any data. In the absence of data indicating that an equal split of hours is not representative of consumer usage habits, DOE adopts in today's final rule the allocation of inactive/off mode hours proposed in the June 2010 TP SNOPR. The number of hours will be allocated equally to the inactive and off modes for a product capable of both modes. If data are made available indicating a different number of hours spent in inactive and off modes, DOE may consider amending the test procedure.

In summary, DOE amends the room air conditioner test procedure in today's final rule to calculate room air conditioner annual energy use associated with inactive and off modes by: (1) Calculating the products of wattage and allocated hours for inactive and off modes, depending on which of these modes is possible; (2) summing the results; and (3) dividing the sum by 1,000 to convert from Wh to kWh. The 5,115 hours for off/inactive modes shall be allocated entirely to either off mode or inactive mode, as appropriate, if only one of these modes is possible for the room air conditioner. If both modes are possible, the hours shall be allocated to each mode equally as discussed in this section, and each shall be allocated 2,557.5 hours.

5. Measures of Energy Consumption

The DOE test procedures for clothes dryers and room air conditioners currently provide for the calculation of several measures of energy consumption. For clothes dryers, the test procedure incorporates various measures of per-cycle energy consumption, including: (1) Total per-cycle electric dryer energy consumption; (2) per-cycle gas dryer electrical energy consumption; (3) per-cycle gas dryer gas energy consumption; and (4) total per-cycle gas dryer energy consumption expressed, which includes both the electrical and gas energy consumption for gas clothes dryers. 10 CFR part 430, subpart B, appendix D, sections 4.1–4.6 The test procedure also provides an EF, which is equal to the clothes load in pounds divided either by the total per-cycle electric dryer energy consumption or by the total per-cycle gas dryer energy consumption expressed in kWh. 10 CFR 430.23(d) For room air conditioners, the test procedure calculates annual energy consumption in kWh and an EER. 10 CFR 430.23(f)

Under 42 U.S.C. 6295(gg)(2)(A), EPCA directs that the test procedures for all covered products be amended pursuant to section 323 to include standby mode and off mode energy consumption, with such energy consumption integrated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product, unless DOE determines that—(i) the current test procedures for a covered product already fully account for and incorporate the standby mode and off mode energy consumption of the covered product; or (ii) such an integrated test procedure is technically infeasible for a particular covered product, in which case DOE must prescribe a separate standby mode and off mode energy-use test procedure for the covered product, if technically feasible.

In the December 2008 TP NOPR, DOE explored whether the existing measures of energy consumption for clothes dryers and room air conditioners can be combined with standby mode and off mode energy use to form a single metric. DOE tentatively determined in the

December 2008 TP NOPR that it is technically feasible to integrate standby mode and off mode energy consumption into the overall energy consumption metrics for clothes dryers and room air conditioners. 73 FR 74639, 74650 (December 9, 2008). For the reasons presented in the December 2008 TP NOPR, DOE proposed integrated metrics addressing active, standby, and off modes for clothes dryers and room air conditioners, as discussed below.

a. Clothes Dryers

In the December 2008 TP NOPR, DOE proposed to establish the following measures of energy consumption for clothes dryers that integrate energy use of standby and off modes with active mode energy use of the products. "Per-cycle integrated total energy consumption expressed in kWh" would be defined as the sum of per-cycle standby and off mode energy consumption and either total per-cycle electric dryer energy consumption or total per-cycle gas dryer energy consumption expressed in kWh, depending on which type of clothes dryer is involved. "Integrated energy factor" (IEF) would be defined as the (clothes dryer test load weight in lb)/(per-cycle integrated total energy in kWh). 73 FR 74639, 74650 (December 9, 2008).

b. Room Air Conditioners

In the December 2008 TP NOPR, DOE proposed to establish the following measures of energy consumption for room air conditioners that integrate energy use of standby and off modes with active mode energy use of the products. "Integrated annual energy consumption" would be defined as the sum of annual energy consumption and standby and off mode energy consumption. "Integrated energy efficiency ratio" (IEER) would be defined as (cooling capacity in Btu/hr × 750 hours average time in cooling mode)/(integrated annual energy consumption × 1,000 Wh per kWh). *Id.*

DOE noted in the June 2010 TP SNOPR that the Air-Conditioning, Heating and Refrigeration Institute (AHRI) Standard 340/360–2007, "Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment," (AHRI Standard 340/360) and the ASHRAE Standard 90.1–2007, "Energy Standard for Buildings Except Low-Rise Residential Buildings," (ASHRAE 90.1) both published in 2007, included an IEER metric. This metric, also named "Integrated Energy Efficiency Ratio," is meant to rate the part-load performance of the air-conditioning equipment under test. 75 FR 37594, 37612 (June 29, 2010). Manufacturers of the equipment covered by these standards currently list IEER ratings in their product literature and in the AHRI certified product directory. This IEER metric does not integrate standby mode and off mode energy use, unlike the IEER metric that was proposed in the December 2008 TP NOPR. The IEER metric used in AHRI Standard 340/360 and ASHRAE 90.1 was established prior to the IEER proposed in this rulemaking. Therefore, DOE proposed for the June 2010 TP SNOPR to revise the name of the integrated metrics incorporating standby mode and off mode energy use to "combined" metrics for both clothes dryers and room air conditioners. *Id.*

DOE has received no comments objecting to this proposal. Therefore, for the reasons stated above, DOE incorporates into the DOE test procedures the "per-cycle combined total energy consumption expressed in kWh" and "combined energy factor" (CEF) for clothes dryers and "combined annual energy consumption" and "combined energy efficiency ratio" (CEER) for room air conditioners in today's final rule as proposed in the June 2010 TP SNOPR. *Id.*

In the June 2010 TP SNOPR, DOE did not propose to amend the annual energy cost calculations in 10 CFR 430.23 for clothes dryers and room air conditioners to include the cost of energy consumed in standby and off modes. The Joint Efficiency Advocates Comment stated that DOE should include standby and off mode energy costs in the annual energy cost calculation in order to better represent actual energy costs. The Joint Efficiency Advocates Comment noted that minimum and maximum energy costs prescribed for the EnergyGuide label will need to be revised when new energy conservation standards go into effect. They suggested that the energy consumed in standby and off modes should be able to be incorporated into the revised minimum and maximum energy costs. (Joint Efficiency Advocates Comment, No. 28 at p. 4)

EPCA states that any amended test procedures shall be reasonably designed to produce test results that measure energy efficiency, energy use, water use, or estimated annual operating cost of a covered product. (42 U.S.C. 6293(b)(3)) EPCA also directs DOE to amend its test procedures to include measures of standby mode and off mode energy consumption and to integrate such energy consumption into a single energy descriptor for that product. If that is technically infeasible, DOE must prescribe a separate standby mode and off mode energy-use test procedure, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)) As discussed in section I, EPCA requires that all representations related to standby mode and off mode energy use or efficiency or cost of energy consumed of both clothes dryers and room air conditioners made 180 days after today's final rule be based upon the standby and off mode requirements of the amended test procedures. (42 U.S.C. 6293(c)(2)) Additionally, EPCA requires that any revisions to the labels for room air conditioners include disclosure of the estimated annual operating cost (determined in accordance with DOE's test procedures prescribed under section 6293 of EPCA), unless the Secretary determines that disclosure of estimated annual operating cost is not technologically feasible, or 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)) DOE understands that the FTC would develop any revised labeling requirements for referencing a revised annual energy cost calculation that integrates the cost of energy consumed in standby and off modes.

For these reasons, DOE agrees with interested parties that the annual energy cost calculations in 10 CFR 430.23 for clothes dryers and room air conditioners should be amended to include the cost of energy consumed in standby and off modes. Therefore, DOE amends the clothes dryer test procedure to revise the estimated annual operating cost calculation to integrate standby and off mode energy use, and to require that the estimated annual operating cost be obtained by multiplying the average number of annual use cycles by the sum of the per-cycle active mode energy consumption and the per-cycle standby and off mode energy consumption and by the representative average unit cost of electrical energy, natural gas, or propane, as appropriate, in dollars per kWh or Btu, as provided by DOE. Similarly, DOE amends the room air conditioner test procedure to revise the annual energy cost calculation to integrate standby and off mode energy use, and to require that the annual energy cost be obtained by multiplying the combined annual energy consumption by the representative average unit cost of electrical energy in dollars per kWh, as provided by DOE.

C. Clothes Dryer and Room Air Conditioner Active Mode Test Procedures

1. Correction of Text Describing Energy Factor Calculation for Clothes Dryers

DOE proposed in the December 2008 TP NOPR to correct errors in specific references used in the current DOE test procedure. 73 FR 74639, 74650 (December 9, 2008). In particular, the reference to sections 2.6.1 and 2.6.2 of 10 CFR part 430, subpart B, appendix D in the calculation of EF for clothes dryers found at section 430.23(d)(2) should refer instead to sections 2.7.1 and 2.7.2. Section 2.6 provides instructions for the test clothes to be used in energy testing of clothes dryers, whereas section 2.7 provides instructions on test loads. The EF of clothes dryers is measured in lb of clothes per kWh. Because the EF calculation requires the weight of the test load, DOE proposed in the December 2008 TP NOPR to correct these references in 10 CFR 430.23(d)(2). DOE did not receive any comments opposing this correction. Therefore, for the reasons stated above, DOE adopts the correction as proposed in the December 2008 TP NOPR.

2. Automatic Cycle Termination for Clothes Dryers

DOE considered amendments to the clothes dryer test procedure to accurately measure the benefits of automatic cycle termination. DOE considered industry and international clothes dryer test procedures and conducted testing and analysis to develop proposed amendments to the definitions of product types, test load preparation, the test measurement cycle and settings, and the calculation of results.

October 2007 Framework Document

In the October 2007 Framework Document, DOE stated that it believes that the clothes dryer test procedure may not adequately measure the benefits of automatic cycle termination, in which a sensor monitors either the exhaust air temperature or moisture in the drum to determine the length of the drying cycle. (Framework Document, STD No. 1 at p. 5) The calculation of EF in the current clothes dryer test includes a field use scaling factor applied to the per-cycle drying energy consumption to account for the over-drying energy consumption associated with different termination technologies. Gas or electric clothes dryers with time termination control (in other words, those clothes dryers equipped with only a timer to determine the end of a drying cycle) are assigned an field use of 1.18. Clothes dryers with automatic termination are assigned an field use of 1.04. DOE established the 1.18 field use factor for clothes dryers with time termination control in the September 1977 TP Final Rule based on analysis of data from a field use survey conducted by Oklahoma Gas and Electric Company involving 64 homes as well as data provided by AHAM on the measured energy consumption per-cycle under the DOE test procedure to account for the differences between the energy consumption measurements derived from laboratory test procedures and those obtained from actual consumer use. 42 FR 46145, 46146 (September 14, 1977). DOE established the field use factor of 1.04 for clothes dryers with automatic termination in the May 1981 TP Final Rule based on analysis of data from a field use survey conducted by AHAM involving 72 homes as well as an analysis conducted by NIST of field test data on automatic termination control dryers. Analysis of this data showed that clothes dryers equipped with an automatic cycle termination feature consume less energy than timer dryers by reducing over-drying. 46 FR 27324 (May 19, 1981). Based on these field use factors, clothes dryers with automatic cycle termination control are determined to reduce energy consumption by 12 percent compared to a similar clothes dryer with time termination control, which consume more energy due to over- or under-drying. (Under-drying can result in consumers running an additional drying cycle.) Currently, the test procedure specifies a single field use factor for clothes dryers equipped with automatic termination. However, it does not distinguish between the type of sensing control system (for example, temperature-sensing or moisture-sensing controls) and the sophistication and accuracy of the control system.

Consideration of Industry and International Clothes Dryer Test Procedures

DOE proposed in the June 2010 TP SNOPR that the benefit of automatic cycle termination should be accurately measured to account for any over- or under-drying. Therefore, DOE considered potential amendments to the DOE test procedure to account for automatic cycle termination. For the June 2010 TP SNOPR, DOE investigated industry and international clothes dryer test procedures for measuring the effectiveness of automatic cycle termination and conducted limited testing to analyze over-drying energy consumption and the applicability of such procedures to the DOE clothes dryer test procedure. 75 FR 37594, 37613 (June 29, 2010). DOE reviewed AHAM's most recently update to its industry test standard, AHAM HLD–1–2009, "Household Tumble Type Clothes Dryers" (AHAM Standard HLD–1–2009). The update contains provisions for measuring the over-drying energy consumption for clothes dryers that use automatic cycle termination and provides separate testing procedures timer dryers. DOE also reviewed the international test standards EN Standard 61121 [22] and AS/NZS Standard 2442.1, both of which address methods for testing clothes dryers with automatic termination sensor technologies. 75 FR 37594, 37613 (June 29, 2010).

DOE stated in the June 2010 TP SNOPR that it believes that AHAM Standard HLD–1–2009 does not provide an appropriate method for comparing the amount of over-drying for a timer dryer to that of an automatic termination-sensing dryer. This is because the timer dryer test allows only for drying the test load to as low as 4-percent RMC, whereas the automatic cycle termination test allows for drying the test load to any value below 6-percent RMC, including lower than 4-percent RMC. 75 FR 37613–14. If the automatic termination control dryer were to dry the test load to a value lower than 4-percent, the measured energy consumption may be greater than the energy consumption measured for the same clothes dryer using the timer dryer test cycle which only measures the energy required to dry the load to 4-percent RMC. However, as discussed above in this section, DOE believes that automatic termination control dryers reduce energy consumption compared to timer dryers based on analysis of data from the AHAM field use survey and analysis of field test data conducted by NIST. 46 FR 27324 (May 19, 1981).

DOE also stated in the June 2010 NOPR that although EN Standard 61121 provides test methods to use for both timer dryers and automatic termination control dryers, it does not provide any methodology to measure the energy consumed over- or under-drying the test load beyond a certain RMC for each type of clothes dryer. The provisions in EN Standard 61121 require the test load be dried to the same allowable range for both timer dryers and automatic termination dryers. According to the test procedures in EN Standard 61121, if the

[22] EN Standard 61121 is used by European Union (EU) member countries. DOE believes this test standard is functionally equivalent to IEC Standard 61121, which is used by China, among other countries. Both test procedures contain identical testing methods and procedures.

test load for either a timer dryer or an automatic termination control dryer is dried to the same RMC, the clothes dryers consume the same amount of energy and would be rated as using the same amount of energy in real-world use. 75 FR 37594, 37614 (June 29, 2010). However, for the same reasons discussed above in this section, DOE believes that automatic termination control dryers reduce energy consumption compared to timer dryers.

DOE stated in the June 2010 TP SNOPR that AS/NZS Standard 2442 provides testing methods and procedures that account for the amount of over-drying beyond a specified RMC associated with automatic termination control dryers by measuring any additional energy consumed drying the test load beyond the specified RMC. DOE also stated that AS/NZS Standard 2442 effectively takes into consideration the accuracy of different automatic termination sensor technologies by not providing a fixed field use factor in the energy consumption calculation for automatic cycle termination. Because the test procedure measures the energy consumed drying the test load beyond the specified RMC, a clothes dryer with an accurate automatic termination sensor technology that dries the clothes load to close to the specified RMC would consume less energy than a clothes dryer with a sensor technology that dries the load well beyond the specified RMC (that is, close to bone dry). DOE also stated that it believes that the testing methods provide an accurate and representative method for comparing the energy consumption between timer dryers and automatic termination control dryers by providing methods for measuring energy use that account for over-drying for both types of clothes dryers. For these reasons, DOE proposed to amend the DOE test procedure for clothes dryers to incorporate the individual test procedures for timer dryers and automatic termination control dryers in AS/NZS Standard 2442, with modifications as appropriate for the DOE test procedure. 75 FR 37594, 37615 (June 29, 2010).

After the June 2010 TP SNOPR was published, AHAM, ACEEE, NRDC, Alliance to Save Energy (ASE), Alliance for Water Efficiency (AWE), ASAP, Northwest Power and Conservation Council (NPCC), Northeast Energy Efficiency Partnerships (NEEP), Consumer Federation of America (CFA), and National Consumer Law Center (NCLC) (hereafter the "Joint Petitioners") jointly submitted the "Agreement on Minimum Federal Efficiency Standards, Smart Appliances, Federal Incentives and Related Matters for Specified Appliances," (Joint Petitioners, No. 25, hereinafter the "Joint Petition") and the "Joint Stakeholders Comments On The Supplementary Notice Of Proposed Rulemaking On Test Procedures For Clothes Dryers And Room Air Conditioners" (Joint Petitioners, No. 30). The Joint Petitioners, AHAM, the Joint Efficiency Advocates Comment, and the California Utilities/NRDC supported DOE's proposal to account for the effectiveness of automatic termination controls. (Joint Petitioners, No. 25 at p. 14; Joint Petitioners, No. 30 at p. 5; AHAM, No. 31 at p. 5; Joint Efficiency Advocates Comment, No. 28 at p. 1; California Utilities/NRDC, No. 33 at p. 4) The Consumers Union (CU) concurred with this comment. (CU, No. 29 at pp. 1–2, 3) The Joint Efficiency Advocates Comment added that data presented by DOE show that over-drying energy consumption can be significant (as much as 0.6 kWh per cycle). (Joint Efficiency Advocates Comment, No. 28 at p. 1; California Utilities/NRDC, No. 33 at p. 4) The Joint Petitioners and AHAM commented that if DOE decides to adopt the AS/NZS Standard 2442 as proposed, they request that DOE identify the specific sections it is adopting. (Joint Petitioners, No. 30 at p. 6; AHAM, No. 31 at p. 6)

Product Definitions

Based on the definitions in EN Standard 61121 and AS/NZS Standard 2442, DOE proposed in the June 2010 TP SNOPR to define "timer dryer" as "a dryer which can be preset to carry out at least one sequence of operations to be terminated by a timer, but may also be manually controlled." It also proposed to define "automatic termination control dryer" as "a dryer which can be preset to carry out at least one sequence of operations to be terminated by means of a system assessing, directly or indirectly, the moisture content of the load. An automatic termination control dryer with supplementary timer shall be tested as an automatic termination control dryer." 75 FR 37594, 37615 (June 29, 2010).

AHAM suggested that the definition of a timer dryer may need to specify that it is a clothes dryer that "does not include any automatic termination function." AHAM commented that almost any automatic termination dryer is also going to have a timer function because of consumer demands, and this extra explanation would make it clear that it refers to only a timer dryer. (AHAM, Public Meeting Transcript, No. 20 at pp. 84, 85–86) AHAM also commented that the last sentence of the automatic termination dryer definition should be modified and used to clarify the timer dryer definition. (AHAM, Public Meeting Transcript, No. 20 at p. 86) ALS also commented that it offers a product with both an automatic termination function and a timer function that uses only electromechanical controls. (ALS, Public Meeting Transcript, No. 20 at p. 81)

As discussed later in this section, DOE is not adopting in today's final rule the amendments for automatic cycle termination proposed in the June 2010 TP SNOPR. Therefore it is not adopting the definitions for timer dryer and automatic termination dryer presented above. DOE agrees, however, that the reference to timer dryers in the test procedure (in the application of field use factors in section 4, "Calculation of Derived Results From Test Measurements") should clarify that clothes dryers with time termination control systems do not include any automatic termination control functions. DOE also believes the reference to clothes dryers with automatic control systems in the application of the field use factors should clarify that clothes dryers with automatic control systems that also have a supplementary timer control receive the 1.04 field use factor. For these reasons, DOE amends section 4 of the clothes dryer test procedure to specify that the field use factor equals 1.18 for clothes dryers with time termination control systems only, without any automatic termination control functions and 1.04 for clothes dryers with automatic control systems that meet the requirements of the definition for automatic control systems in 1.4, 1.14 and 1.18, including those that also have a supplementary timer control.

The Joint Petitioners and AHAM also commented that DOE should revise section 1.11 of 10 CFR 430 subpart B, appendix D. The amendment would more clearly account for electronic controls by specifying that a preferred automatic termination control setting (that is, a setting recommended by manufacturers) can also be indicated by a visual indicator (in addition to the mark or detent), and would read "* * * mark, visual indicator or detent which indicates a preferred * * *" (Joint Petitioners, No. 25 at p. 14; Joint Petitioners, No. 30 at p. 8; AHAM, No. 31 at p. 11) DOE agrees a clarification should be added to the definition of "automatic termination control" that a mark, detent, or other visual indicator which indicates a preferred automatic termination control setting must be present if the dryer is to be classified as having an automatic termination

control. Therefore, DOE amends this definition in today's final rule to make this revision.

NRDC commented that most new clothes dryers have both automatic and timer termination functions, so the test procedure should test both of these drying modes rather than only the automatic termination mode. (NRDC, Public Meeting Transcript, No. 20 at pp. 86–87) The Joint Petitioners and AHAM commented that for clothes dryers that have both an automatic termination control cycle and a timer cycle, only the auto-termination cycle should be tested. (Joint Petitioners, No. 30 at p. 6; AHAM, No. 31 at p. 5) Whirlpool commented that testing the automatic termination control cycle is most appropriate, as it represents the vast majority of actual consumer use. Although the majority of consumers also want a timed dry cycle, they use it only about 10 percent of the time. (Whirlpool, No. 27 at p. 3) DOE is not aware of any consumer usage data indicating that timed dry cycles on a clothes dryer with automatic termination controls are used by consumers for a significant portion of their annual use cycles. In addition, as discussed below, DOE is not adopting in today's final rule the amendments to better account for automatic cycle termination proposed in the June 2010 TP SNOPR. For these reasons, DOE is not amending the test procedure to measure both automatic termination control and timed dry cycles for products capable of both methods.

Test Load Preparation

In the June 2010 TP SNOPR, DOE proposed to amend sections 2.7.1, "Compact size dryer load," and 2.7.2, "Standard size dryer load" of the DOE test procedure for clothes dryers, which contain provisions for test load preparation. The amendment would add at the end of both sections the following requirement: "Make a final mass adjustment, such that the moisture content is 47 percent ± 0.33 percent by adding water uniformly to the load in a very fine spray." 75 FR 37594, 37615 (June 29, 2010). The ± 0.33 percent allowable RMC range is equivalent to the allowable range specified in AS/NZS Standard 2442.1 (190 percent ± 0.02 kg of the bone dry weight) for a 7-lb test load. DOE believes the specified range produces repeatable EF measurements. Allowing a larger allowable range in RMC would increase the range in the moisture required to be dried during the test cycle and result in increased variability in the measured EF. DOE also proposed that the procedure for dampening and extracting water from the test load specified in the current test procedure be changed. The test procedure would be changed to require that the moisture content of the test load be between 42 and 47 percent of the bone-dry weight of the test load, and would serve as an initial preparation step prior to the final mass adjustments to obtain a test load with an RMC of 47 percent proposed above in this paragraph. DOE noted that it proposed to use a nominal initial RMC of 47 percent based on the proposed amendment to change the initial RMC from 70 percent to 47 percent, as discussed in section III.C.5.b. DOE noted in the June 2010 TP SNOPR that if it does not adopt this proposed amendment to change the nominal initial RMC, it would instead propose an amendment stating to first prepare the test load to 65- to 70-percent RMC and make adjustments to the moisture content to get 70-percent ± 0.33-percent initial RMC. 75 FR 37594, 37615 (June 29, 2010). DOE did not receive any comments on this alternate proposal.

In the June 2010 TP SNOPR, DOE noted that section 2.7 of the existing clothes dryer test procedure regarding test load preparation requires that the test load be agitated in water whose temperature is 100 ° F ± 5 ° F. DOE recognizes that some residential clothes washers may use a default cold rinse cycle at the end of the wash cycle, which sections 2.6.1.2.1 and 2.6.3.1 of the current DOE clothes washer test procedure specify to be 60 ° F ± 5 ° F. DOE stated in the June 2010 TP SNOPR that it does not have any data indicating whether a different water temperature for clothes dryer test load preparation would be more representative of current consumer usage habits, but that if consumer usage data is made available that indicates a 60 ° F ± 5° F water temperature is more representative of consumer usage, DOE may adopt an alternate approach specifying a 60 ° F ± 5 ° F water temperature for test load preparation in section 2.7 of the DOE clothes dryer test procedure. In addition, DOE stated that it is unaware of how changes to the water temperature for clothes dryer test load preparation would affect the measured efficiency as compared to the existing test procedure. *Id.*

ALS, the California Utilities/NRDC, and the Joint Efficiency Advocates Comment all stated that the water temperature for clothes dryer test load preparation should be changed to be representative of existing national consumer usage. (ALS, No. 24 at p. 4; California Utilities/NRDC, No. 33 at p. 5; Joint Efficiency Advocates Comment, No. 28 at pp. 1–2)

ALS commented that the water temperature for clothes dryer test load preparation has been lowered in response to clothes washer energy conservation standard changes. Manufacturers have eliminated most warm rinses and offer the user the option of using all cold rinses. ALS stated that it is reasonable to assume that today, most clothes loads placed in a clothes dryer are from clothes washers that use cold rinse. Therefore, ALS supported revising the clothes dryer test procedure to utilize the 60 ° F ± 5 ° F water temperature specified in the DOE clothes washer test procedure for the cold water supply for the preparation of the clothes dryer test load. (ALS, No. 24 at p. 4; ALS, Public Meeting Transcript, No. 20 at p. 91)

The California Utilities/NRDC also stated that lower rinse temperatures may be more representative of consumer habits based on both anecdotal evidence and consumer data. The California Utilities/NRDC stated that 2003 California Residential Appliance Saturation Survey (RASS) [23] provides data on general consumer preferences on cold, warm, and hot wash cycles (no data was available for rinse cycles). The data show there is a general trend among consumers to prefer warm and cold wash cycles over hot cycles. Data cited by the California Utilities/NRDC from the 2003 California RASS on this topic are presented in Table III.4. According to the California Utilities/NRDC, although the data do not specify cycle temperatures or final rinse temperatures, the data may indicate a consumer preference for cooler wash and rinse cycles. The California Utilities/NRDC also stated that a 60 ° F ± 5 ° F preparation temperature would be better aligned and harmonize with the cool rinse temperature specified by the clothes washer test procedure. (California Utilities/NRDC, No. 33 at pp. 5–6)

[23] KEMA, Inc. *2009 California Residential Appliance Saturation Study.* 2010. California Energy Commission; Sacramento, CA. Publication number: CEC–200–2010–004–ES. For more information visit: *http://www.energy.ca.gov/appliances/rass/.*

TABLE III.4—2003 CALIFORNIA RASS SURVEY DATA ON CLOTHES WASHER CYCLE SELECTIONS (PROVIDED IN COMMENTS BY THE CALIFORNIA UTILITIES/NRDC)

	Cold wash cycles	Warm wash cycles	Hot wash cycles
Cycles per Week (weighted average)	1.80	2.32	0.94
Cycles per Year (weighted average)	93.7	120.8	49.0
Percent of Cycles Chosen	36	46	19

The Joint Efficiency Advocates Comment stated that the 2005 RECS gathered information about the rinse water temperature that consumers usually use. The Joint Efficiency Advocates Comment noted that, of respondents that used a clothes washer in their home, 78.5 percent said they used cold water for the rinse cycle. The Joint Efficiency Advocates Comment also noted that in the current clothes washer test procedure, temperature use factors indicate that warm rinse is assumed to be used only 27 percent of the time. The Joint Efficiency Advocates Comment stated that anecdotal evidence shows that that some clothes washers are now being manufactured without a warm rinse option. In addition, detergent manufacturers support consumers' increasing use of cold wash and cold rinse temperatures, as evidenced by the recent introduction of detergents specifically optimized for these conditions. The Joint Efficiency Advocates Comment encouraged DOE to change the water temperature for test load preparation to reflect these consumer usage indicators. The Joint Efficiency Advocates Comment also stated that, at the very least, the test procedure should align with the temperatures used in the clothes washer test procedure. According to the Joint Efficiency Advocates Comment, the washer test procedure assumes that a cold rinse is used the majority of the time. Therefore, alignment could be achieved by requiring a cold rinse (60 °F ± 5 °F) be used for the clothes dryer test load preparation. (Joint Efficiency Advocates Comment, No. 28 at pp. 1–2)

Whirlpool commented that the current load temperature is well documented and well understood by manufacturers and independent test laboratories. Whirlpool stated that any migration to a different temperature would require time consuming "round-robin" testing to determine the impact that such a new temperature would have on the EF calculation. Whirlpool commented that such testing is not compatible with DOE's timeframe for this rulemaking nor would it add value proportional to the burden required to reformulate EF. (Whirlpool, No. 27 at pp. 2–3)

ALS commented that it does not have any data quantifying what impact a different test load temperature would have on the clothes dryer efficiency test results. ALS stated it is reasonable to expect that a colder temperature test load being placed in a dryer will require additional energy to achieve evaporation for the moisture from the clothes. ALS suggested that DOE test existing clothes dryers to assess the impact of the load preparation water temperature change from 100 °F to 60 °F. (ALS, No. 24 at p. 4; ALS; Public Meeting Transcript, No. 20 at p. 91) The Joint Efficiency Advocates Comment stated that the water temperature adjustment would likely have an effect on measured dryer energy use. This is because warmer rinse water, and hence higher initial load temperature, may result in faster drying times and lower energy use, especially if the dryer is equipped with moisture sensor technology. (Joint Efficiency Advocates Comment, No. 28 at p. 2)

DOE analyzed 2005 RECS data on the rinse water temperatures selected by consumers for clothes washer cycles. The usage data for consumers that use a clothes washer in the home, presented below in Table III.5, shows that 80 percent of wash cycles per year use a cold rinse.

TABLE III.5—2005 RECS CONSUMER USAGE DATA ON CLOTHES WASHER RINSE CYCLES TEMPERATURE SELECTIONS

	Average cycles per year	Average usage factor
Hot Rinse	5.176	0.018
Warm Rinse	53.638	0.182
Cold Rinse	235.711	0.800

Because the DOE clothes washer test procedure assumes a warm rinse temperature use factor of 27 percent, and the 2005 RECS data shows that 80 percent of clothes washer cycles use cold water for the rinse cycle, DOE believes that the cold water rinse cycle is more representative of typical consumer use. (DOE also notes that it sought comment on the warm rinse temperature use factor in the recent proposal to amend the test procedure for residential clothes washers because it received consumer usage survey data from a manufacturer which indicate that, for one clothes washer model with no cold rinse option on the cycle recommended for cotton clothes and a default cold rinse on all other cycles, users participating in the survey reported using warm rinse for 1.6 percent of all cycles. 75 FR 57556, 57571 (Sept. 21, 2010)) For this reason, DOE amends the clothes dryer test procedure to change the water temperature for clothes dryer test load preparation to 60 °F ± 5 °F.

DOE tested 13 representative clothes dryers to evaluate the repeatability and reproducibility of this amendment to the water temperature for clothes dryer test load preparation. DOE tested these units according to the current DOE clothes dryer test procedure, except that the water temperature for clothes dryer test load preparation was changed to 60° ± 5 °F. For the ventless clothes dryer test units, DOE used the proposed testing method for ventless dryers presented in section III.C.3. As shown below in Table III.6, the test-to-test variation in measured EF with 60 °F ± 5 °F test load water temperature ranged from 0 percent to 4.1 percent, with an average of 1.5 percent. Therefore, DOE believes that the amendments to the water temperature for clothes dryer test load preparation produce repeatable test results.

TABLE III.6—DOE REPEATABILITY TESTING FOR 60° ± 5 °F WATER TEMPERATURE FOR TEST LOAD PREPARATION

Test unit	EF *lb/kWh*			Test-to-test variation %
	Test 1	Test 2	Test 3	
Vented Electric Standard:				
Unit 1	3.00	3.00	3.00	0.0
Unit 2	3.01	3.07	3.06	2.0
Unit 3	3.10	3.10	3.09	0.3
Unit 5	3.18	3.17	.....	0.3
Unit 6	3.04	2.92	.....	4.1
Vented Gas:				
Unit 7	2.74	2.70	.....	1.5
Unit 9	2.68	2.61	.....	2.7
Unit 10	2.81	2.73	.....	2.9
Unit 11	2.77	2.78	2.82	1.8
Vented Electric Compact (240V):				
Unit 12	2.95	2.94	.....	0.3
Unit 13	2.86	2.84	2.82	1.4
Ventless Electric Compact (240V):				
Unit 15	2.22	2.23	.....	0.5
Ventless Electric Combo Washer-Dryer:				
Unit 16	1.94	1.98	1.96	2.1

Test Cycle

In the June 2010 TP SNOPR, DOE also proposed to amend section 3.3, "Test cycle," in the DOE test procedure for clothes dryers to include testing procedures specific to timed dryers and dryers with automatic termination controls.

For timer dryers, the clothes dryer would be operated at the maximum temperature setting and, if equipped with a timer, at the maximum time setting. The load would be dried to 5–6 percent RMC without the dryer advancing into cool-down. The timer would be reset if necessary. If the load is not dried to within the specified range, the test would not be considered valid. The procedure would then be repeated, but instead the test load would be dried to 4–5 percent RMC. As discussed later in this section, DOE proposed to use the results from the two proposed tests cycles (corresponding to 5–6 and 4–5 percent final RMCs) to interpolate the value of the per-cycle energy consumption required to dry the test load to exactly 5-percent RMC. 75 FR 37594, 37615 (June 29, 2010). DOE requested comment in the June 2010 TP SNOPR on whether using the maximum temperature setting is representative of current consumer usage habits. DOE also requested comment on whether multiple temperature settings should be evaluated and averaged, and if so, how testing multiple temperature settings would affect the measured efficiency as compared to the existing DOE clothes dryer test procedure. That procedure measures the clothes dryer only at the maximum temperature setting. *Id.*

AHAM stated that DOE should not adopt amendments to the temperature setting provisions in the current test procedure because there is no justification or evidence to support such a change. (AHAM, No. 31 at p. 6) Whirlpool commented that testing and averaging multiple cycles and settings, while perhaps more reflective of consumer behavior, would dramatically increase the test burden on manufacturers, and that the substantial increase in cost would not be justified by a better result. Whirlpool added that testing and averaging of multiple cycles and settings would introduce opportunities for error and circumvention while reducing repeatability and consistency. (Whirlpool, No. 27 at p. 3) ALS also supported setting the temperature at the "maximum" temperature setting option available on the dryer. (ALS, No. 24 at p. 5) DOE agrees that the benefit of testing multiple temperature settings would be outweighed by the burden on manufacturers to test multiple settings. In addition, DOE agrees that including requirements to test multiple settings could potentially create problems with developing a consistent test procedure that covers all products. This is because various manufacturers offer different settings on their clothes dryers, and test technicians would be required to determine the appropriate settings for testing. For these reasons, DOE is not amending the test procedure in today's final rule to require the testing of multiple temperature settings and averaging results.

ALS stated that, for clothes dryers with only a timed dry cycle, the time should be set at the maximum setting. ALS commented that it has no data regarding what time setting consumers utilize most often. ALS believes, however, that consumers using a timed dry cycle tend to select a maximum amount of time to be assured that their load is dry at end of the cycle. (ALS, No. 24 at p. 4) ALS also commented that the "full time cycle including cool-down period" should be included for timer dryers as well as for automatic cycle termination dryers. According to ALS, the benefits for timer dryers are as follows: (1) Test accuracy is improved because it avoids the variability of technician judgment on when to stop the test; (2) burden is reduced on manufacturers and test labs, because no interpolation or test "re-run" is required; and (3) all the energy consumed in a dryer cycle is accounted for, and is representative of the manner in which consumers utilize the dryer in their homes. (ALS, No. 24 at p. 5)

DOE does not have any data indicating that the maximum time setting would be most representative of consumer usage habits. In addition, some manufacturers offer a wide range of timed dry settings for different types of loads, and these may require varying periods to dry. Therefore, using the maximum time setting could result in energy consumption that may not be representative of consumer use. DOE also does not believe it would be appropriate to include the cool-down period as part of the time dry test cycle because the current clothes dryer test procedure requires a timed dry cycle using the maximum time setting and maximum temperature setting and drying the load to a specified RMC, at which point the test cycle is stopped. DOE believes that to specify a timed dry cycle that includes the cool-down

period to achieve a target final RMC would add significant testing burden on test technicians to determine the appropriate time setting. It would also be very difficult to ensure that testing results are repeatable and reproducible because different timed dry cycle lengths, and thus different lengths of cool-down period, may be selected to dry a test load to the same final RMC. For these reasons, DOE is not amending the timed dry test cycle to include the cool-down period in today's final rule.

For dryers with automatic termination controls, as discussed in the June 2010 TP SNOPR, DOE tested a representative gas clothes dryer to evaluate test methods for automatic termination control dryers as part of the energy conservation standards rulemaking preliminary analyses. DOE conducted this additional testing to determine the effects of proposed amendments that would require the selection of program settings that provide the maximum drying temperature and maximum dryness level (that is, lowest final RMC). Table III.7 below shows the results from this testing compared to the results of testing the same gas clothes dryer according to the current DOE test procedure. 75 FR 37594, 37615–16 (June 29, 2010).

TABLE III.7—DOE AUTOMATIC CYCLE TERMINATION TEST RESULTS

Initial RMC *(%)*	Test	Final RMC %	Per-cycle energy consumption *kWh*
70	Automatic Cycle Termination	0.6	3.018
	Current DOE	*3.3	*2.462
56	Automatic Cycle Termination	0.6	2.559
	Current DOE	*3.7	*2.001
47	Automatic Cycle Termination	0.5	2.252
	Current DOE	*3.4	*1.754

*Current DOE test procedure normalizes the per-cycle energy consumption equation to represent the energy consumption required to dry the test load to 4-percent RMC. In addition, the current DOE test procedure multiplies the per-cycle energy consumption by a fixed field-use factor of 1.04 to account for energy consumption due to over-drying.

DOE noted that for all of the test runs, using the maximum temperature and dryness level settings resulted in the test load being dried to near bone dry (0.4-percent to 0.7-percent RMC). Using the data of the estimated RMC of the test load measured continuously during the test cycle, DOE also observed that for all of the test runs, the estimated RMC of the test load was below 1 percent by the time the heater began cycling on/off.[24] The increased amount of over-drying resulted in per-cycle energy consumption that was higher than the value obtained using the current DOE test procedure, which uses a fixed field use factor to account for over-drying energy consumption. DOE stated that different manufacturers may target different final RMCs for their highest dryness level setting. Based on analysis of the test results for this gas clothes dryer unit, DOE stated that the highest dryness level setting may be intended to dry the clothes load to near bone dry, beyond the target RMC of the DOE test procedure, and would not be appropriate for the proposed test cycle. For this reason, DOE did not propose that the highest dryness level be specified for the test cycle. DOE stated in the June 2010 TP SNOPR that a "normal" drying program would be more representative of consumer usage habits and would more likely dry the clothes load to the target range specified in the DOE clothes dryer test procedure. 75 FR 37616.

Based on the results of this additional testing, DOE proposed in the June 2010 TP SNOPR an approach in which, for automatic termination control dryers, a "normal" program would be selected for the test cycle to be most representative of consumer usage. Where the drying temperature can be chosen independently of the program, it would be set to the maximum to provide a clear and consistent method. DOE notes that "medium" or "low" temperature settings may not be consistent among different manufacturers. When the heater switches off for the final time at the end of the drying cycle (that is, immediately before the cool-down period begins) the dryer would be stopped. If the final RMC is greater than 5 percent, the tests would be invalid and a new run shall be conducted using the highest dryness level setting. Any test cycle in which the final RMC is 5 percent or less would be considered valid. DOE also proposed that for automatic termination control dryers, the cycle setting selected for the test be recorded. This would include settings such as the drying mode, dryness level, and temperature level. DOE also requested comment on whether multiple cycles and settings should be tested and how the results from those multiple tests should be evaluated. *Id.*

Bosch and Siemens Home Appliance Group (BSH) expressed concern over using the phrase "normal program" because no manufacturer offers a program called "normal," and the term "normal" is ambiguous. BSH added that it would be very difficult to achieve reproducibility from test lab to test lab. (BSH, Public Meeting Transcript, No. 20 at pp. 93–94) AHAM agreed with BSH regarding the use of "normal" program, noting that clothes washers have transitioned from a normal cycle to specifying settings based on fabric type. (AHAM, Public Meeting Transcript, No. 20 at pp. 94–95) AHAM also recommended that DOE contact manufacturers of dryer usage materials, such as fabric softeners, who may have some survey data regarding usage factors or the most commonly selected program to avoid the terminology of "normal program." (AHAM, Public Meeting Transcript, No. 20 at p. 95) ALS supported revising the "test cycle" definition to account for the fact that most dryers no longer utilize the term "normal cycle" on their controls. ALS supported using the same test cycle definition the DOE clothes washer test procedure utilizes—"the cycle recommended by the manufacturer for washing cotton or linen clothes"—but modified to specify "for drying" instead of "for washing." (ALS, No. 24 at p. 4)

ALS commented that it supports testing only one cycle (the cycle recommended by the manufacturer for drying cotton and linen clothes) for the following reasons: (1) Manufacturers provide other cycles for consumers, but many of these other cycles are used infrequently because consumers tend to utilize a favorite cycle such as an automatic termination cycle, or a default cycle that they can easily initiate and

[24] Towards the end of an automatic termination cycle, a clothes dryer heater generally turns on and off multiple times to limit the amount of heat applied to the air entering the drum.

that doesn't require further manipulation; (2) it would be difficult if not impossible to develop any data or a consensus for the weighting factors to apply to the other cycles if multiple cycles were tested; (3) the burden on manufacturers and test labs to test multiple cycles out-weighs any benefit; and (4) the test cycle for cotton and linen clothes, at maximum temperature setting, will assess one of the most energy-intensive cycles on clothes dryers, so there is no need to further complicate the test procedure to assess if other cycles are more energy intensive. (ALS, No. 24 at p. 5) ALS also commented that dryers with automatic cycle termination should have the temperature for the test set at the "maximum" temperature setting option available on the dryer. This is because the test cycle should be "the cycle recommended by the manufacturer for drying cotton and linen clothes" and as such would normally be a high-temperature heat setting. (ALS, No. 24 at p. 5) Whirlpool stated that consumers dry a variety of fabrics using a variety of clothes dryer cycles. While no one cycle reflects this diverse consumer behavior, performing the energy test at the maximum temperature on the normal cycle is a straightforward means of representing the highest-cost consumer use of the product. Whirlpool commented that, because of the well-established history with this approach, a change in the test procedure to test multiple cycles would not be warranted. Whirlpool further stated that any change would require extensive round-robin testing to determine the impact of the new test temperatures on the EF calculation. (Whirlpool, No. 27 at p. 3)

The California Utilities/NRDC stated that DOE's proposal to test a "normal" drying program is reasonably appropriate. The California Utilities/NRDC stated that they lack additional consumer information on typical cycles and settings, and being aware of a potentially large testing burden of many different types of dryer tests, they support DOE's proposal to test at "normal" or "default" operation. (California Utilities/NRDC, No. 33 at p. 4) The California Utilities/NRDC noted that manufacturers expressed concern regarding the use of the term "normal" cycle, so it is important that this term be clarified or defined to prevent a possible loophole in the test procedure. The California Utilities/NRDC suggested that DOE collect data from manufacturers concerning the conditions of operation for a "normal" dryer cycle to confirm that such cycles are reasonably consistent among manufacturers. Alternatively, DOE could use that data to define a range of operating conditions for a normal cycle, or request that manufacturers suggest such a definition. (California Utilities/NRDC, No. 33 at p. 4)

Evaluation of Proposed Amendments for Automatic Cycle Termination

As discussed above, DOE conducted testing to evaluate the proposed amendments to the clothes dryer test procedure. As part of this testing, DOE tested nine clothes dryers as specified by the amendments to the test procedure for automatic cycle termination proposed in the June 2010 TP SNOPR. The testing consisted of running the dryer on a "normal" automatic termination setting and stopping the dryer when the heater switches off for the final time (immediately before the cool-down period begins). Three identical tests were conducted for each clothes dryer unit, and the results were averaged. The results of this testing, presented below in Table III.8, showed that the tested clothes dryers had a measured EF between 12.4 percent and 38.8 percent lower than the EF measured according to the current DOE clothes dryer test procedure. DOE also noted that all of tested units dried the test load to final RMCs well below the target RMC of 5 percent, ranging from 0.4 percent to 1.4 percent RMC, with an average of 0.8 percent. DOE also noted that even if the field use factor of 1.18 for a timer dryer is applied to the measured EF for a clothes dryer equipped with automatic cycle termination using the current DOE clothes dryer test procedure, this EF would still be more than the EF measured under the automatic cycle termination test procedure amendments proposed in the June 2010 TP SNOPR. (Applying the field use factor in this way adds the fixed estimate of over-drying energy consumption associated with time termination control dryers.)

TABLE III.8—DOE CLOTHES DRYER AUTOMATIC CYCLE TERMINATION TESTS

Test unit	Current DOE test procedure EF *lb/kWh**	Current DOE test procedure w/modified field use factor**EF *lb/kWh*	Proposed automatic cycle termination test procedure		
			EF *lb/kWh*	Percent change	Final RMC (%)
Vented Electric Standard:					
Unit 3	3.20	2.82	2.59	− 19.1	1.0
Unit 4	3.28	2.89	2.59	− 21.2	0.6
Vented Gas:					
Unit 8	2.83	2.50	2.42	− 14.5	0.4
Unit 9	2.85	2.51	2.38	− 16.3	0.9
Unit 11	2.98	2.63	2.40	− 19.5	0.9
Vented Electric Compact 240V:					
Unit 12	3.19	2.81	2.64	− 17.3	0.5
Unit 13	2.93	2.59	2.27	− 22.7	1.4
Vented Electric Compact 120V:					
Unit 14	3.23	2.85	1.98	− 38.8	0.7
Ventless Electric Compact 240V:					
Unit 15	2.37	2.09	2.07	− 12.4	1.1

*Tests use the appropriate field use factor of 1.04 for clothes dryers with automatic termination.
**Field use factor changed from the nominal 1.04 for clothes dryers with automatic termination to 1.18, which is nominally for timer dryers.

These results showed significantly higher measured energy use for clothes dryers tested under the DOE test procedure with the proposed automatic cycle termination amendments. DOE evaluated possible reasons for this difference, and concluded that given the test load specified in the current DOE test procedure,[25] the proposed automatic cycle termination control procedures may not adequately measure clothes dryer performance. As discussed above in this section, DOE believes that, although automatic termination control dryers may be measured as having a lower efficiency than a comparable dryer with only time termination control if tested according to the proposed test procedure, automatic termination control dryers may in fact be drying the clothing to approximately 5-percent RMC in real world use. DOE believes that automatic termination control dryers reduce energy consumption (by reducing over-drying) compared to timer dryers based on analysis of the AHAM field use survey and analysis of field test data conducted by NIST. 46 FR 27324 (May 19, 1981).

For these reasons, DOE believes the test procedure amendments for automatic cycle termination proposed in the June 2010 TP SNOPR do not adequately measure the energy consumption of clothes dryers equipped with such systems. Therefore, DOE is not adopting in today's final rule the amendments for automatic cycle termination proposed in the June 2010 TP SNOPR. 75 FR 37594, 37616 (June 29, 2010). If data is made available to develop a test procedure that accurately measures the energy consumption of clothes dryers equipped with automatic termination controls, DOE may consider revised amendments in a future rulemaking.

ALS commented that an automatic cycle termination-equipped dryer that produces a final RMC of greater than 5 percent should be required to have additional test cycle runs. The insufficiently dried load would be placed back into the dryer for an extra cycle, and the extra-cycle energy added to the first test cycle results, until the final RMC is 5 percent or less. ALS commented that this extra cycle energy would be a significant penalty and incentive to keep manufacturers from creating automatic cycle termination systems that essentially tried to achieve a low energy consumption value while not achieving consumer-acceptable final RMC levels. ALS also believes that this method represents what consumers tend do when a load is not sufficiently dried at the end of the cycle—put the load back into the dryer and run another dry cycle on the same setting. (ALS, No. 24 at p. 3) The California Utilities/NRDC supported DOE's proposal to require a re-test at the "highest energy consuming setting" in the case of a dryer failing to reach 5-percent RMC or less under a normal drying program. (California Utilities/NRDC, No. 33 at p. 4)

For the reasons discussed above, DOE is not adopting in today's final rule the amendments proposed in the June 2010 TP SNOPR to better account for automatic cycle termination. Therefore, additional specifications for such an approach are not relevant.

Dry Clothes Load Testing

CU commented that an additional test using a dry clothes load should be included as part of the test procedure to assess how well a sensor detects that a clothes load has been dried to terminate the cycle. CU commented that it tested products using a 12-lb dry clothes load (less than 5 percent initial RMC) of mixed cottons with the dryer at normal/cotton, highest heat, and maximum dryness level settings. CU observed notable differences in the performance of different types of dryers (that is, those with thermostatic control and those with moisture sensors). CU noted that units with moisture sensors stopped within a reasonable time, but units with just a thermostat continued running, sometimes 20 times longer than a dryer with a moisture sensor. CU noted that one dryer with the moisture sensor ran an average of 3 minutes before shutting off, and in 3 tests, it averaged 162 Wh per test. Another dryer with a thermostat ran for an average of about 60 minutes, and in 3 tests, it averaged 2,335 Wh per test. In addition, CU observed significant variation among dryers with moisture sensors and those with thermostats, and stated it should not be assumed that these results represent performance for all dryers of either type. (CU, No. 29 at pp. 2–3)

DOE does not believe running a dry clothes load would be representative of consumer usage. It also does not believe that the amount of time a clothes dryer operates with such a clothes load would necessarily be representative of the effectiveness of a sensor system in detecting final RMC for an initially damp clothes load. Further, DOE is not aware of how an energy efficiency metric would be established that considers the energy consumption of a dry clothes load test cycle. Therefore, DOE is not adopting any provisions for measuring the energy consumption of a dry clothes load test cycle in today's final rule.

Evaluation of Automatic Termination Technologies

DOE noted in the June 2010 TP SNOPR that it conducted preliminary automatic cycle termination tests to analyze the various automatic termination technologies found in DOE's sample of selected dryers. DOE selected the AHAM 8-lb test load[26] instead of the 7-lb load specified in the DOE test procedure for standard-size clothes dryers. It did so to lengthen the test cycle times and better evaluate the function of the dryer controls as the test load approached low RMCs. DOE also noted that the independent test lab conducting the clothes dryer tests used a data acquisition system to monitor estimated RMC of the test load continuously during the test cycle. The automatic termination tests conducted by DOE consisted of running the test cycle in a user-programmable automatic termination mode and allowing the dryer to self-terminate the drying cycle using the various automatic termination sensor technologies. DOE monitored the energy consumption and estimated RMC of the test load during the test cycle from the starting time at 70-percent initial RMC to the time when the heater last cycled off (that is, immediately before the cool-down period). The specific focus was on analyzing the amount of over-drying energy consumed drying the test load to less than 5-percent RMC.[27] 75 FR 37594, 37617 (June 29, 2010).

Figure III.1 shows the over-drying energy consumption versus the final RMC for a number of different units tested, and, in some cases, different cycle settings.[28] The data show that over-drying the test load to lower final RMCs requires higher energy consumption, with a slightly exponential trend likely because it becomes more difficult to remove the final small amounts of moisture remaining in the test load. DOE noted in the June 2010 TP SNOPR that it did not observe any relationship between the type of automatic cycle termination

[25] The DOE clothes dryer test load is comprised of 22 in x 34 in pieces of 50/50 cotton/polyester-blend cloth.

[26] The AHAM 8-lb test load is made up of the following mixed cotton items, which are intended to represent clothes items regularly laundered: 2 sheets, 1 table cloth, 2 shirts, 3 bath towels, 2 "T" shirts, 2 pillow cases, 3 shorts, 1 wash cloth, 2 handkerchiefs.

[27] As noted in the June 2010 TP SNOPR, DOE applied a correction factor to the test data to account for the fact that the automatic cycle termination tests used the AHAM 8-lb test load instead of the DOE 7-lb test load.

[28] DOE noted that some of the tested units stopped the test cycle at or higher than 5-percent RMC, thereby not producing over-drying.

sensor technology used and the amount of over-drying. DOE also noted, however, that these tests were conducted using different testing methods than the methods proposed in the June 2010 TP SNOPR (that is, various automatic cycle termination settings). Therefore, DOE was unable to determine whether one type of sensor technology is more accurate, and thus more effective at preventing over-drying. 75 FR 37618.

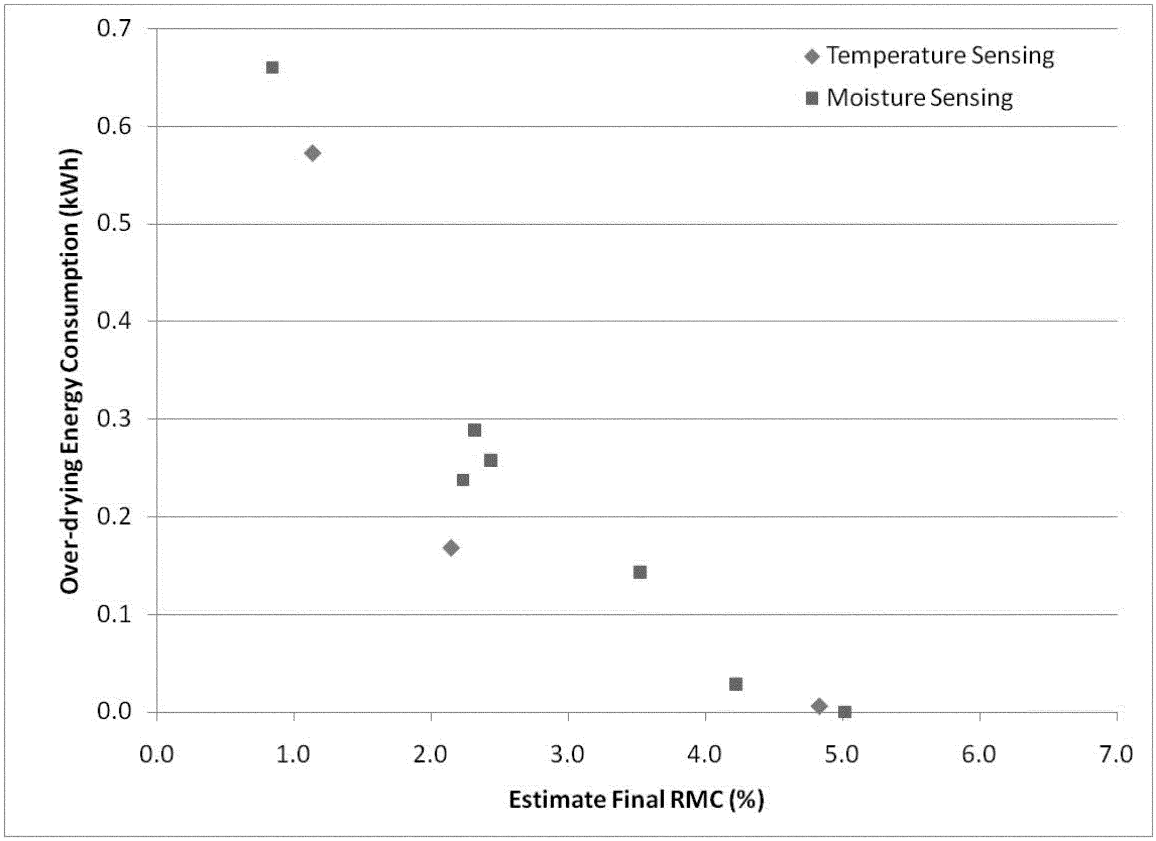

Figure III.1 Automatic Cycle Termination Test Over-Drying Energy Consumption versus Estimated Final RMC

Porticos commented that DOE considered only two possible methods for automatic cycle termination (moisture and temperature sensing). Porticos commented that these may be the only practical alternatives in a vented, forced-convection tumble dryer, but that alternate drying technologies may enable alternate methods of determining when the drying cycle should be terminated. Ignoring this possibility penalizes any appliance that attempts to deploy a different technology. (Porticos, No. 23 at p. 1)

DOE agrees that the test procedure should not exclude alternate sensing technologies used for automatic cycle termination controls. DOE notes section 3.5 of the test procedure, "Test for automatic termination field use factor credits," specifies that the field use factor for automatic cycle termination would apply only to clothes dryers that meet the requirements for the definitions of "temperature sensing control" or "moisture sensing control." The test procedure defines "temperature sensing control" a system that monitors the exhaust air temperature to automatically terminate the dryer cycle. The test procedure also defines "moisture sensing control" as a system that uses a moisture sensing element within the drum that monitors the amount of moisture in the clothes to automatically terminate the dryer cycle. DOE also notes the test procedure defines "automatic termination control" as a control system with a sensor that monitors either the dryer load temperature or its moisture content and with a controller that automatically terminates the drying process. DOE believes that this definition would not limit the emergence of any new sensor technologies that monitor the moisture content or temperature in other ways from applying the field use factor for automatic cycle termination. For these reasons, DOE amends section 3.5 of the test procedure to specify that the field use factor applies to clothes dryers that meet the requirements for the definitions of "automatic termination control."

Target Final RMC

DOE also noted in the June 2010 TP SNOPR that AS/NZS Standard 2442 specifies the maximum allowable final RMC for automatic termination control dryers as 6 percent. DOE, however, stated that it is unaware of any data indicating that a final RMC of 6 percent would be representative of current consumer usage habits. DOE also noted that using 5-percent RMC, as proposed in today's June 2010 TP SNOPR, would remain within the range specified by the current DOE test procedure, which specifies 2.5- to 5-percent final RMC. *Id.*

The Joint Petitioners and AHAM commented that a final RMC of 5 percent is appropriate. (Joint Petitioners, No. 30 at p. 6; AHAM, No. 31 at p. 6)) ALS stated that the test load final RMC should be no greater than 5 percent. ALS stated that if the test cycle continued to measure all of the energy including cool-down, manufacturers

would adopt their own methods to ensure that they do not over-dry the test load. (ALS, No. 24 at p. 3) As discussed above, DOE is not adopting the amendments to better account for automatic cycle termination proposed in the June 2010 TP SNOPR. For these reasons, DOE is not amending the test procedure to revise the final RMC.

Cool-Down Period

DOE also noted in the June 2010 TP SNOPR that there are at least two ways to terminate the drying cycle during the test: (1) Termination before cool-down, or (2) termination at the end of the selected test cycle, including cool-down. 75 FR 37594, 37616 (June 29, 2010). Section 4.2 of AS/NZS Standard 2442.1 requires that, for automatic termination control dryers, the programmed test cycle be run until immediately before the cool-down period begins. Similarly, section 4.5.1 of AHAM–HLD–1–2009 requires that the automatic termination control dryer test cycle not be permitted to advance into the cool-down period. Alternatively, section 9.2.1 of EN Standard 61121 requires that the selected test cycle program be allowed to run until completion, including the cool-down period. In the June 2010 TP SNOPR, DOE proposed amendments for automatic cycle termination based on the provisions in AS/NZS Standard 2442 because it provides a more representative comparison of the energy consumption between automatic termination control dryers and timer dryers than EN Standard 61121. In addition, the proposed amendments to stop the test cycle immediately before the cool-down period would harmonize DOE test methods with AS/NZS Standard 2442 and AHAM–HLD–1–2009. *Id.* DOE stated, however, that it was considering the alternative method of section 9.2.1 of EN Standard 61121. DOE recognizes that manufacturers may design products to use the residual heat during the cool-down period (that is, immediately after the heater has switched off for the final time) to continue to dry the clothes load while slowly spinning the drum to achieve a desired RMC.[29] DOE recognizes that including the cool-down period may make it possible for some manufacturers to design dryers that attain the desired RMC with lower total energy consumption. DOE noted that this potential for energy efficiency improvement would not be captured by the test methods proposed in the June 2010 TP SNOPR. To capture this real-world energy savings potential associated with the additional drying using residual heat during the cool-down period, DOE stated in the June 2010 TP SNOPR that it could adopt an alternate approach to include the measurement of the cool-down period as part of the proposed automatic cycle termination test methodology. Under this alternate approach, section 3.3.2 of the test procedure for automatic termination control dryers, instead of specifying that "when the heater switches off for the final time, immediately before the cool-down period begins, stop the dryer," would specify to "run the clothes dryer until the programmed cycle has terminated." DOE also noted that inclusion of the cool-down period under the proposed test method would not affect the ability to compare energy consumption test results between automatic termination control dryers and timer dryers in DOE's clothes dryer test procedure. DOE further stated in the June 2010 TP SNOPR that it is unaware of data showing the effects of including the cool-down period on the measured efficiency as compared to the existing test procedure. 75 FR 37616–17.

The Joint Petitioners, AHAM, Whirlpool and ALS commented that, although they generally promote harmonization with international standards, they do not agree that AS/NSZ Standard 2442 provides the best methods and procedures to account for the amount of over-drying associated with automatic termination control dryers beyond a specified RMC. The Joint Petitioners, AHAM, Whirlpool, ALS, the California Utilities/NRDC, and EJ commented that the test procedure should measure the full cycle, including cool-down period, which is more representative of consumer usage because it includes all of the energy use in a cycle. The Joint Petitioners, AHAM, Whirlpool and ALS stated that such an approach is reproducible and repeatable because it does not require any "guesswork" as to when the cool-down will begin. The approach is also less burdensome because it does not require the manufacturers to determine the point immediately before cool-down for each model. (Joint Petitioners, No. 30 at p. 5; AHAM, No. 31 at p. 5; Whirlpool, No. 27 at pp. 2, 3; ALS, No. 24 at p. 3; ALS, Public Meeting Transcript, No. 20 at pp. 97–98; California Utilities/NRDC, No. 33 at pp. 4–5; EJ, No. FDMS D0039 at pp. 1–2)

ALS also commented that the "default" cool-down should be set if the dryer has selectable cool-down time period options. (ALS, No. 24 at p. 6) AHAM commented that the "as-shipped" (that is, "default") cool-down settings should be included in active mode because this approach is more representative of actual consumer usage. (AHAM, No. 31 at p. 6)

The Joint Efficiency Advocates Comment stated that excluding the cool-down period results in a portion of the energy consumed by a drying cycle not being measured by the test procedure. In addition, the Joint Efficiency Advocates Comment stated that including the cool-down period could provide manufacturers with an additional option for reducing energy consumption. (Joint Efficiency Advocates, No. 28 at p. 3) ALS and BSH supported including the cool-down period in the test procedure. They feel manufacturers may optimize the point where the heating is stopped and the residual heat in the load is used during cool-down to complete the drying process to achieve consumer-accepted final moisture retention levels, while avoiding "over drying" loads and potentially wasting energy. (ALS, No. 24 at p. 3; BSH, Public Meeting Transcript, No. 20 at p. 98) EJ commented that a test procedure that ignores the additional drying functionality provided by cool-down mode reduces manufacturers' incentive to provide this energy-saving feature. (EJ, No. FDMS D0039 at pp. 1–2)

Whirlpool requested that DOE complete further analysis to adjust EF within the test procedure to account for the inclusion of the cool-down portion of the cycle. Whirlpool stated that failure to adjust the EF requirements will inadvertently result in requirements becoming too stringent. Whirlpool commented that it can infer that the cool-down portion of the cycle consumes little energy when compared to the drying portion as it is relatively short and uses only motor energy, not heating element energy. (Whirlpool, No. 27 at pp. 2, 3) Whirlpool also commented that the additional energy consumed during cool-down period does not follow linear relationship with the RMC of the test load. Whirlpool stated that it does not have sufficient data to fully address how this would be reflected in total energy consumption. Whirlpool commented that if DOE were to make a specific request to AHAM for such data, Whirlpool would be willing to gather and supply information to AHAM for aggregation and submittal to DOE. (Whirlpool, No. 27 at p. 5) ALS commented that it has no data to submit to DOE at this time on how the proposed added cool-down period energy consumption would impact the measured energy efficiency of existing

[29] The clothes dryer would also consume energy to spin the drum during the cool-down period that is currently not accounted for by the DOE test procedure.

clothes dryers, and suggested that DOE conduct tests to determine the impact. (ALS, No. 24 at p. 6) The California Utilities/NRDC similarly commented that they do not have specific data on the impacts this cool-down period has on dryer per-cycle energy use and calculated EF. However, they stated that although the impacts may be small, DOE should, for the purposes of completeness and reproducibility, consider including the energy use of the cool-down portion of the cycle into the active mode test procedure. The California Utilities/NRDC stated that DOE should revise the energy conservation standards to reflect this test procedure change. (California Utilities/NRDC, No. 33 at pp. 4–5)

As discussed above, DOE is not adopting the amendments to better account for automatic cycle termination proposed in the June 2010 TP SNOPR. For this reason, DOE is not amending the test procedure to include the cool-down period for automatic termination test cycles. If DOE considers potential amendments for automatic cycle termination in a future rulemaking, it may consider provisions that account for the cool-down period.

Calculation of Revised Results From Automatic Cycle Termination Test Measurements

In the June 2010 TP SNOPR, DOE also proposed to revise section 4, "Calculation of Derived Results from Test Measurements," of the DOE test procedure. DOE proposed to revise the field use factors in the current DOE test procedure to more appropriately account for automatic termination control dryers' over-drying energy consumption. DOE proposed that a field use factor of 1.0 (instead of the 1.04 currently provided) would be specified for automatic termination control clothes dryers, so that any over-drying energy consumption would be added directly to the drying energy consumption to decrement EF. If the proposed test methods were used, an automatic termination control dryer that is able minimize over-drying by drying the test load to close to 5-percent RMC would achieve a higher measured efficiency than if it over-dried the test load to an RMC of less than 5 percent. The lower amount of energy consumed over-drying the test load would be included in the per-cycle energy consumption, and would result in a reduction in the measured EF. For timer dryers, DOE proposed to use the per-cycle energy consumption measurements from the two proposed tests cycles discussed above in this section (corresponding to 5–6 and 4–5 percent final RMCs) to interpolate the value of the per-cycle energy consumption required to dry the test load to exactly 5-percent RMC. The 1.18 field use factor in the current DOE test procedure would then be applied to account for the over-drying energy consumption of timer dryers. 75 FR 37594, 37617 (June 29, 2010).

As discussed above in this section, DOE noted in the September 1977 TP Final Rule that the 1.18 field use factor in the calculation of EF for timer dryers was based on analysis of data from a field use survey conducted by Oklahoma Gas and Electric Company involving 64 homes as well as data provided by AHAM on the measured energy consumption per-cycle under the DOE test procedure to account for the differences between the values derived from the laboratory test procedures and those obtained from actual consumer use. 42 FR 46145, 46146 (September 14, 1977). DOE stated in the June 2010 TP SNOPR that it was unaware of any data or studies indicating the 1.18 field use factor for timer dryers used to account for over- or under-drying test loads in real-world use is inaccurate and not currently representative of consumer usage. For this reason, DOE did not propose to revise the 1.18 field use factor for timer dryers in the June 2010 TP SNOPR but requested data and comment on whether this value is appropriate. *Id.*

AHAM, the Joint Petitioners, the California Utilities/NRDC, and ALS supported DOE's proposal to change the field use factor from 1.04 to 1.0 for automatic termination control dryers and not revise the 1.18 field use factor for timer dryers. (AHAM, No. 31 at p. 6; Joint Petitioners, No. 30 at p. 6; California Utilities/NRDC, No. 33 at p. 5; ALS, No. 24 at p. 3)

As discussed above, DOE is not adopting in today's final rule the amendments to better account for automatic cycle termination proposed in the June 2010 TP SNOPR. For the reasons stated above, DOE is not amending the test procedure in today's final rule to include the revisions to the energy use calculations or the field use factors proposed in the June 2010 TP SNOPR. If DOE considers potential amendments for automatic cycler termination in a future rulemaking, it may consider such revisions to the energy use calculations and field use factors.

3. Test Procedure for Ventless Clothes Dryers

DOE noted in the October 2007 Framework Document that a potential limitation of the clothes dryer test procedure had been identified for ventless dryers, which include condensing clothes dryers and combination washer/dryers. (Framework Document, STD No. 1 at p. 5) Ventless clothes dryers do not vent exhaust air to the outside as a conventional clothes dryer does. Instead, they typically use ambient air in a heat exchanger to cool the hot, humid air inside the appliance, thereby condensing out the moisture. Alternatively, cold water can be used in the heat exchanger to condense the moisture from the air in the drum.[30] In either case, the dry air exiting the drum is reheated and recirculated in a closed loop. Thus, rather than moisture-laden exhaust air that vents outside, ventless clothes dryers produce a wastewater stream that can be either collected in an included water container or discharged down the household drain. The process of condensing out the moisture in the recirculated air results in higher energy consumption than a conventional clothes dryer, however, and it can significantly increase the ambient room temperature.

Manufacturers of condensing clothes dryers have, in the past, applied for waivers from the DOE test procedure for these products on the basis that the test procedure did not contain provisions for ventless clothes dryers. See, *e.g.,* 74 FR 66334 (December 15, 2009); 75 FR 13122 (Mar. 18, 2010). The current test procedure requires using an exhaust restrictor to simulate the backpressure effects of a vent tube in an installed condition. Condenser dryers do not have exhaust vents because they recirculate rather than exhaust the process air.

In the October 2007 Framework Document, DOE stated that it intended to analyze ventless clothes dryers as a separate product class, recognizing the unique utility that ventless clothes dryers offers to consumers. That utility is the ability to be installed in conditions in which vented clothes dryers would be precluded due to venting restrictions. DOE considered two product classes for ventless clothes dryers: (1) Ventless electric compact (240V) clothes dryers; and (2) electric combination washer/dryers.

In this final test procedure rule, DOE adopts amendments to measure the energy use of ventless clothes dryers, as discussed in more detail below.

[30] This is a typical approach for combination washer/dryers, which wash and dry a load in the same drum.

Effects of Clothes Dryers on HVAC Energy Use

In response to the October 2007 Framework Document, DOE received comments from AHAM that the energy calculations for ventless clothes dryers should take a more "holistic" approach than those for vented clothes dryers. That is because ventless clothes dryers can have an effect on energy use oustide of their system (that is, impacts on HVAC loads). 75 FR 37594, 37620–21 (June 29, 2010). 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, water use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(3)) DOE stated in the June 2010 TP SNOPR that accounting for the impacts of ventless clothes dryers on HVAC loads and thus on the energy use of a household would be inconsistent with the EPCA requirement that a test procedure measure the energy use of a covered product. DOE also noted that, while the test procedure for heat pump water heaters does not account for impacts to HVAC loads, DOE considered the effects of heat pump water heaters on house heating loads as part of the energy-use characterization in the rulemaking to establish energy conservation standards rulemaking for water heaters. For these reasons, DOE did not propose to amend its clothes dryer test procedure to account for the ambient space conditioning impacts in the June 2010 TP SNOPR, but stated that it would consider such impacts as part of the concurrent energy conservation standards rulemaking. 75 FR 37594, 37621 (June 29, 2010).

In response to the June 2010 TP SNOPR, the California Utilities/NRDC commented that DOE should consider HVAC impacts as part of the concurrent energy conservation standards rulemaking. They added that the ECOS report showed that space conditioning impacts due to clothes dryer intake air may be significant. (California Utilities/NRDC, No. 33 at pp. 8–9) The California Utilities/NRDC and the Super Efficient Dryer Initiative (SEDI) noted that the actual impacts will depend on many factors, such as climate, season, and location of the clothes dryer within the home. They stated DOE should thoroughly assess this aspect of clothes dryer operation and research opportunities for energy reduction. (California Utilities/NRDC, No. 33 at p. 9; SEDI, No. 34 at p. 2)

Porticos commented that the HVAC load from a vented clothes dryer is much higher than that of other household appliances. According to Porticos, a vented clothes dryer induces air infiltration equal to the exhaust airflow (up to 160 cubic feet per minute (cfm)), enough to completely empty a 1200 cubic foot (ft^3) home of all its conditioned air in 1 hour. (Porticos, No. 23 at p. 2) Porticos and SEDI both commented that there would be significant HVAC savings associated with switching from vented to ventless clothes dryers. (Porticos, No. 23 at p. 2; SEDI, No. 34 at p. 2) SEDI added that vented clothes dryers operate by drawing supply air from the volume of conditioned space within a house. The supply air is heated and used to dry the clothes. The air is then exhausted from the home. SEDI stated this process wastes both the heating energy put into that air by the dryer itself, but also the heating or cooling energy put into that air earlier by the home's HVAC system. (SEDI, No. 34 at p. 2) Porticos also added that ventless dryers tend to directly heat the living space rather than inducing air infiltration. (Porticos, No. 23 at p. 2) The California Utilities/NRDC commented that HVAC impacts may be mitigated through increased use of ventless dryers, or other technologies for vented dryers, such as an outside air intake port, which could provide a location to fit an intake air vent. The California Utilities/NRDC stated that it is important that DOE gather data on the HVAC impacts of clothes dryers to accurately assess the costs and savings impacts of such technologies. (California Utilities/NRDC, No. 33 at p. 9)

The California Utilities/NRDC commented that the test procedure would be a simple and convenient means for manufacturers to submit useful data to DOE on clothes dryer operation that impacts HVAC loads (namely intake air). Data on intake air could be gathered by requiring the measurement of intake air via a small sensor in the airstream during the test. The California Utilities/NRDC added that this information would be a valuable indication of the amount of airflow caused by clothes dryers, and could form the basis for subsequent DOE analysis. (California Utilities/NRDC, No. 33 at p. 9) Porticos recommended the following modifications to the test procedure to evaluate the effects of the clothes dryer on building energy consumption:

1. Directly measure the exhaust airflow (defined as zero for ventless appliances);
2. Directly measure the ambient heat-load represented by the appliance during operation (DOE might define this as zero for vented appliances);
3. Calculate the overall HVAC burden due to heat-burden and induced infiltration; and
4. Optionally, modify this figure to account for variations due to regional usage (a vented dryer might work quite well in a moderate climate, but less-so in colder climates). (Porticos, No. 23 at p. 2)

Porticos added that there is a precedent for addressing impacts external to the clothes dryer because existing DOE test procedures penalize clothes washers which do a poor job of spin-drying clothes, thus placing an excessive burden on the clothes dryer. *Id.*

SEDI commented that both the current and proposed clothes dryer test procedures ignore the HVAC impact of vented dryers, and will not provide DOE, or SEDI and other energy efficiency program providers, with the information necessary to estimate HVAC savings. SEDI commented that ideally, testing for all clothes dryers would include measurement of the energy content of the air expelled from the home during the drying cycle, which would be added to the energy directly consumed by the dryer itself. (SEDI, No. 34 at p. 2) SEDI supported the recommended modifications for measuring HVAC impacts submitted by Porticos. SEDI also recognized, however, that it may be extremely difficult to develop HVAC energy consumption algorithms for residential clothes dryers that are applicable across the United States. SEDI also recognized that pursuing this comprehensive approach could move DOE away from harmonization with international standards. SEDI commented that, at a minimum, DOE should adopt at least modifications 1 and 2 suggested by Porticos, presented above, but with the following change: "1. Directly measure the exhaust air volume (defined as zero for ventless appliances) during the entire drying cycle." SEDI commented that this change would enable the energy use of clothes dryers that have different rates of venting at different points during the drying cycle. In addition, if the volume of air vented by a clothes dryer from a home is measured, the HVAC impacts of that clothes dryer on the home could be estimated. (SEDI, No. 34 at p. 2)

DOE reiterates that accounting for the effects of clothes dryers on HVAC energy use is inconsistent with the EPCA requirement that a test procedure measure the energy efficiency, energy

use, or estimated annual operating cost of a covered product. (42 U.S.C. 6293(b)(3)) DOE acknowledges its clothes washer test procedure measures the RMC at the end of the wash cycle, but notes that in this case, the test procedure accounts directly for the additional energy use of a clothes washer to remove moisture from a clothes load. For these reasons, DOE is not revising the test procedure to account for HVAC energy use in today's final rule.[31]

The Joint Petitioners commented that DOE should create a ventless clothes dryer test procedure to define a baseline energy consumption level for this new product category. Such a procedure would include combination washer/dryers. (Joint Petitioners, No. 25 at p. 14; Joint Petitioners, No. 30 at p. 6) ALS also supported the addition of test procedures for ventless clothes dryers. (ALS, No. 24 at p. 6) SEDI also noted the importance of expanding the test procedure to accommodate ventless clothes dryers, such as the energy efficient heat pump clothes dryers now gaining market share in Europe. SEDI stated that DOE should develop a ventless clothes dryer test procedure as soon as possible, while taking care not to inadvertently discourage efforts to increase the energy efficiency of clothes dryers in North America. (SEDI, No. 34 at p. 2)

Ventless Clothes Dryer Test Procedure Amendments

In the June 2010 TP SNOPR, DOE examined an alternate test procedure for ventless clothes dryers that provided definitions for "conventional clothes dryers" and "condensing clothes dryers" and would require the exhaust simulator to be used only for vented clothes dryers. DOE conducted limited tests of ventless clothes dryers at an independent testing laboratory according to those amendments. DOE conducted three tests per unit on one ventless electric compact (240V) clothes dryer and one ventless combination washer/dryer. Table III.9 shows the test results. DOE observed no variation in EF from test to test of the proposed test procedure for the ventless electric compact (240V) dryer, and less than 2-percent variation in EF test-to-test for the ventless combination washer/dryer. Based on this testing, DOE stated in the June 2010 TP SNOPR that the alternate testing procedures appear to produce repeatable results. 75 FR 37594, 37621 (June 29, 2010).

TABLE III.9—DATA FROM DOE TESTING OF VENTLESS CLOTHES DRYERS FOR THE JUNE 2010 TP SNOPR

Test run	EF *(lb/kWh)*	
	Ventless electric compact (240 V)	Ventless combination washer/dryer
1	2.37	1.95
2	2.37	1.96
3	2.37	1.93

DOE also investigated testing conditions and methods for ventless or condensing clothes dryers specified in international test standards, including those used in Europe, China, Australia, and New Zealand. *Id.*

DOE evaluated EN Standard 61121, and identified as relevant the test procedures for condensing (ventless) clothes dryers, as well as certain test conditions that affect all clothes dryers. In particular, DOE noted that section 3 of EN Standard 61121, "Definitions and symbols," provides definitions for "air vented tumble dryer" and "condenser tumble dryer." DOE noted that section 6 of EN Standard 61121, "General," provides general conditions for measurements for both types of dryers, in particular for installation without an exhaust duct, as well as ambient temperature conditions. DOE noted that section 9 of EN Standard 61121, "Performance tests," provides the test procedures for performance tests for both types of dryers. DOE noted in the June 2010 TP SNOPR these test procedures provide greater specificity than the alternate test procedure discussed above. 75 FR 37621–22.

DOE also evaluated AS/NZS Standard 2442.1, which specifically includes condenser clothes dryers and the dryer function of combination washer/dryers. DOE noted that AS/NZS Standard 2442.1 provides definitions for vented and condenser clothes dryers that are essentially the same as those provided in EN Standard 61121. DOE also noted that AS/NZS Standard 2442.1 provides exhaust conditions for installation that are very similar to those provided in EN Standard 61121. 75 FR 37622.

In the June 2010 TP SNOPR, DOE also considered comments that Whirlpool submitted as part of the residential clothes dryer and room air conditioner energy conservation standards rulemaking, providing amendments to the DOE test procedure for clothes dryers to include methods for the testing of condensing dryers.[32] These suggested amendments were largely based on EN Standard 61121. DOE noted that Whirlpool suggested definitions for "exhausted" clothes dryers, "non-exhausted" clothes dryers, and "condensing" clothes dryers. Whirlpool also suggested provisions for the installation conditions for ventless clothes dryers, in particular for installation without an exhaust simulator. Whirlpool also suggested provisions for ventless clothes dryers for pre-conditioning, conditions for a condensation box and the condenser unit, as well as test measurement methods for ventless clothes dryers. 75 FR 37622–23.

DOE reviewed the definitions in EN Standard 61121 (section 3), AS/NZS Standard 2442.1 (section 1.4), and Whirlpool's proposed amendments to the DOE test procedure. DOE concluded that the proposed definitions of "conventional clothes dryer" and "condensing clothes dryer" are essentially the same as the international test standards definitions. DOE proposed to define "conventional clothes dryer" as "a clothes dryer that exhausts the evaporated moisture from the cabinet." It proposed to define "ventless clothes dryer" as "a clothes dryer that uses a closed-loop system with an internal condenser to remove the evaporated moisture from the heated air. The moist air is not discharged from the cabinet." DOE proposed to use the term "ventless" to reflect the actual consumer utility (that is, no external vent required) instead of "condensing" because of the possibility that vented dryers that also condense are also available on the market. 75 FR 37623. AHAM and ALS commented in support of the proposed definitions. (AHAM, No. 31 at p. 6; ALS, No. 24 at p. 6) Whirlpool commented that it supports substituting "ventless" for "condensing". (Whirlpool, No. 27 at p. 3) For the reasons stated above, DOE adopts the definitions of "conventional clothes dryer" and "ventless clothes dryer" proposed in the June 2010 TP SNOPR.

DOE evaluated the installation conditions detailed in EN Standard 61121 (section 6.1), AS/NZS Standard 2442.1 (section 3.4), and Whirlpool's

[31] DOE further notes that to accurately evaluate the HVAC impacts of clothes dryers it would need to determine the amount of heating and cooling being performed by the HVAC system, which would vary by region and time of year. In addition, to determine the amount of induced infiltration and heat-load caused by a clothes dryer, DOE would need to develop provisions for accurate and repeatable measurements, including: test equipment tolerances, position of measurement devices in either the exhaust or other locations, and determination of representative household air leakage rates. Such additional testing provisions for measuring the HVAC impacts would also increase the testing burden on manufacturers.

[32] Whirlpool, 2007. "U.S Department of Energy Test Procedure Change for Condensing Clothes Dryers." September 4, 2007. Docket No. EE–2007–BT–STD–0010, Comment Number 13.

proposed amendments to the DOE test procedure. DOE stated in the June 2010 TP SNOPR that the proposed amendments for the exhaust duct installation requirements, with clarifications added, are appropriate for testing ventless clothes dryers. 75 FR 37594, 37623 (June 29, 2010). DOE noted the proposed exhaust duct installation conditions remove the requirement for installing an exhaust simulator for a clothes dryer without an exhaust duct (that is, a ventless clothes dryer). The international test standards noted above also require that a clothes dryer without an exhaust duct be tested as such. Those standards, however, also provide additional conditions for a clothes dryer with an optional exhaust duct, stating that such a clothes dryer should be tested without the duct installed. DOE believes these installation conditions provide additional clarity and cover all possible clothes dryer configurations, as well as harmonizes with international test standards. Therefore, DOE proposed in the June 2010 TP SNOPR to amend section 2.1 of the DOE test procedure for clothes dryers, which covers installation conditions. The amendments qualify the requirement for an exhaust simulator so that it would apply only to conventional clothes dryers. The amendments added the clarification that ventless clothes dryers be tested without the exhaust simulator installed and, if a dryer is designed to operate with an optional exhaust duct, the dryer shall be tested without the duct installed. *Id.* AHAM, Whirlpool, and ALS supported the proposed exhaust duct installation conditions. (AHAM, No. 31 at p. 7; Whirlpool, No. 27 at p. 3; ALS, No. 24 at p. 6) In the absence of comments objecting to this proposal, DOE adopts the exhaust duct installation conditions proposed in the June 2010 TP SNOPR.

DOE also believes the provisions in EN Standard 61121 regarding a condensation box provides additional clarity that the test procedures are intended to cover all possible ventless clothes dryer configurations. For this reason, DOE proposed in the June 2010 TP SNOPR to revise section 2.1, "Installation," of the DOE test procedure for clothes dryers. The revision would add this requirement to the installation conditions: "if a manufacturer gives the option to use a ventless clothes dryer with or without a condensation box, the clothes dryer shall be tested with the condensation box installed." In addition, DOE proposed to amend the testing cycle measurement in section 3.3 to add that if the dryer automatically stops during a cycle because the condensation box is full of water, the test is stopped, and the test run is invalid. This requirement would ensure efficiency is measured consistently. 75 FR 37594, 37623 (June 29, 2010).

AHAM and Whirlpool both supported the proposed change to section 2.1 of the DOE test procedure. (AHAM, No. 31 at p. 7; Whirlpool, No. 27 at p. 3) For the reasons stated above, and in the absence of comments objecting to this proposal, DOE adopts in today's final rule the revisions to section 2.1, Installation of the DOE clothes dryer test procedure regarding a condensation box as proposed in the June 2010 TP SNOPR. 75 FR 37594, 37623 (June 29, 2010).

AHAM also commented that DOE should clarify that if the condensation box is full and the test is invalid, the re-testing should be conducted under the same installation conditions as the original test. Those conditions should be those provided in the manufacturer's use and care guide so that the test is representative of actual consumer use. (AHAM, No. 31 at p. 8) Whirlpool similarly recommended adding, for clarity, that if the condensation box is full and the test is invalid, that the box is to be emptied and the test re-run from the beginning. (Whirlpool, No. 27 at p. 4) DOE agrees that additional provisions should be included to clarify the procedure for retesting when the condensation box is full of water and the test is considered valid. DOE believes that Whirlpool's suggested revision provided explicit instructions as to the procedure for re-running the test cycle. For these reasons, DOE amends section 3.3 of the DOE clothes dryer test procedure to add that "if the dryer automatically stops during a cycle and because the condensation box is full of water, the test is stopped and the test run is invalid, in which case the condensation box shall be emptied and the test re-run from the beginning."

Also regarding installation conditions, DOE believes that Whirlpool's proposal to add a requirement that the condenser unit of the clothes dryer must remain in place and not be taken out of the clothes dryer for any reason between tests would clarify the test procedure and ensures that all manufacturers are testing products under the same conditions. For this reason, DOE proposed in the June 2010 TP SNOPR to add in section 2.1 of the DOE clothes dryer test procedure the provision that the condenser unit of the dryer must remain in place and not be taken out of the dryer between tests. 75 FR 37594, 37623 (June 29, 2010).

In the June 2010 TP SNOPR, Whirlpool supported the proposed amendment to require that the condenser unit remain in place and not be removed between tests, adding that this is for purposes of repeatability. Whirlpool commented that, if needed, the condenser unit should be cleaned prior to the first test run so it does not need to be cleaned during the test procedure. (Whirlpool, No. 27 at p. 4) ALS also commented in support of DOE's proposed amendments regarding the condenser unit. (ALS, No. 24 at p. 6) AHAM stated that there is no rationale for the proposed amendment requiring the condenser unit to remain in place and not be taken out of the clothes dryer for any reason between tests. AHAM commented that DOE should not include that provision. However, if it is included, it needs to be clarified. For example, the test procedure should state how many test runs are required. (AHAM, No. 31 at p. 7)

DOE agrees that the condenser unit may be cleaned prior to the first test run. DOE also believes that requiring the condenser unit to remain in place between tests ensures repeatability. As discussed later in this section, DOE is not amending the test procedure to require multiple test cycles. Because multiple test cycles may be necessary under certain conditions, however, such as a requirement that if the condensation box is full and must be emptied, the test would be re-run from the beginning. For these reasons, DOE amends section 2.1 of the clothes dryer test procedure regarding installation to add the provision the condenser unit of the dryer must remain in place and not be taken out of the dryer between tests, as proposed in the June 2010 TP SNOPR. 75 FR 37594, 37623 (June 29, 2010).

DOE stated in the June 2010 TP SNOPR that the methodology in the current DOE test procedure for conventional (vented) clothes dryers can be applied to ventless clothes dryers, with a number of clarifications added. Based on starting test conditions detailed in EN Standard 61121 (section 9.1) and Whirlpool's proposed amendments, DOE proposed to revise section 2.8 to provide a consistent and repeatable approach for ventless clothes dryers. 75 FR 37594, 37623 (June 29, 2010). DOE noted that this section, which addresses clothes dryer preconditioning, currently requires that before any test cycle is initiated the clothes dryer must be operated without a test load in the non-heat mode for 15 minutes or until the discharge air temperature varies less than 1 °F during a period of 10 minutes, whichever is longer. Because a ventless clothes dryer

does not have discharge air for which the temperature can be measured, DOE proposed in the June 2010 TP SNOPR to revise this section. The revision would require that, for ventless clothes dryers, the steady-state temperature must be equal to the ambient room temperature specified by section 2.2 of the existing DOE clothes dryer test procedure before the start of all test runs. This could be done by leaving the machine at ambient room conditions for at least 12 hours but not more than 36 hours between tests. DOE also proposed to revise section 2.8, "Test loads," of the DOE clothes dryer test procedure to add a qualification to the procedure for pre-conditioning that it applies only to vented clothes dryers. *Id.*

AHAM commented at the public meeting that DOE should remove the clause specifying a maximum time between tests because it did not have supporting information to define a maximum time between tests. (AHAM, Public Meeting Transcript, No. 20 at p. 120) AHAM later provided written comments revising these initial statements. It stated it supported the revisions to section 2.8 of the DOE test procedure proposed in the June 2010 TP SNOPR, including the specification that steady-state temperature for ventless clothes dryers may be achieved by leaving the machine at ambient room temperature between tests for at least 12 hours, but not more than 36 hours. (AHAM, No. 31 at pp. 7–8) Whirlpool and ALS also supported the revisions to section 2.8 of the DOE test procedure proposed in the June 2010 TP SNOPR. (Whirlpool, No. 27 at p. 4, ALS, No. 24 at p. 6) BSH questioned what method or procedure might be used to get the clothes dryer back to a testable state after a 36-hour break in testing. BSH also commented that, occasionally, there are breaks in testing that are longer than a day and a half; some breaks may last weeks. (BSH, Public Meeting Transcript, No. 20 at p. 119) DOE is not aware of any data providing a rationale for this 36-hour maximum time limit for leaving the machine at ambient room temperature between tests to achieve steady-state temperature. As a result, DOE amends section 2.8 of the clothes dryer test procedure regarding clothes dryer preconditioning to include the revisions proposed in the June 2010 TP SNOPR, as presented above, but without the 36-hour maximum time limit for leaving the machine at room ambient conditions for ventless clothes dryer preconditioning.

AHAM also commented that DOE should to insert the word "machine" before temperature when describing the machine steady-state requirements for ventless clothes dryers. (AHAM, Public Meeting Transcript, No. 20 at pp. 117–118) AHAM stated that for a manufacturer running back-to-back tests, waiting 12 hours between tests is a significant test burden. AHAM suggested replacing the word "can" with "may" regarding the 12-hour requirement to allow manufacturers to reach the ambient room temperature by some other means of cooling the machine, such as a fan or portable air conditioner. (AHAM, Public Meeting Transcript, No. 20 at p. 118) BSH commented that because ventless clothes dryers do not discharge air there needs to be a method for determining steady state other than monitoring the discharge air temperature. (BSH, Public Meeting Transcript, No. 20 at pp. 129–130)

DOE agrees with AHAM's comments and accepts the clarifications that the steady-state "machine" temperature must be equal to ambient room temperature. It also agrees that an additional note should clarify that this "may" be done by leaving the machine at ambient room conditions for at least 12 hours between tests. Thus, using other means to achieve a steady-state machine temperature would be acceptable under the test procedure provisions. In response to the comments by BSH, DOE believes that the steady-state "machine" temperature clarifies that the temperature of the actual machine itself should be monitored. For these reasons, DOE adopts the amendments to section 2.8 of the DOE clothes dryer test procedure for clothes dryer preconditioning proposed in the June 2010 TP SNOPR, with the additional clarifications discussed above.

Relatedly, DOE stated in the June 2010 TP SNOPR that it agrees with the provisions in section 9.2.2 of EN Standard 61121 and Whirlpool's proposed amendments. These specify that the first cycle after a period of non-operation longer than 36 hours shall not be used for evaluation, and that, between test cycles, the door of the clothes dryer shall be closed except for loading (and unloading). DOE noted that the first requirement makes the first test run on an unused (dry) ventless clothes dryer invalid, and the results from it could not be used for the energy efficiency calculations. DOE proposed in the June 2010 TP SNOPR to incorporate these provisions into section 3.3 of the DOE clothes dryer test procedure. 75 FR 37594, 37623–24 (June 29, 2010).

AHAM, Whirlpool, and ALS commented in support of the proposed requirements that after 36 hours of non-operation, the first test run is not valid and that the door remain closed between tests except for loading and unloading. They felt these requirements would enhance repeatability. (AHAM, No. 31 at p. 8; Whirlpool, No. 27 at p. 4; ALS, No. 24 at p. 6) DOE is not aware of any data providing a rationale for why the first test run after a period of non-operation of 36 hours would not be valid. As a result, DOE is not adopting amendments that specify the first cycle after a period of non-operation longer than 36 hours shall not be used for evaluation. In the absence of comments objecting to the latter proposal, DOE adopts the amendment to the clothes dryer test procedure that, between test cycles, the door of the tumble dryer shall be closed except for loading (and unloading), as proposed in the June 2010 TP SNOPR. 75 FR 37594, 37623–24 (June 29, 2010).

DOE noted in the June 2010 TP SNOPR that section 9.2.1 of EN Standard 61121 requires that at least five valid test cycles be performed and the results averaged. DOE's clothes dryer test procedure does not specify multiple test cycles to obtain the representative EF, and DOE is not aware of data suggesting that test-to-test variation is sufficient to warrant a requirement for more than one test cycle. Therefore, DOE did not propose amendments addressing the number of valid test cycles in the June 2010 TP SNOPR. 75 FR 37624.

ALS supported DOE's recommendation to require only one test cycle for a valid clothes dryer test because there is no evidence that additional tests are warranted, and additional tests would add burden to manufacturers and test labs, without any corresponding benefit. (ALS, No. 24 at p. 6) ALS further commented that if condensing clothes dryers have a genuine need to run additional test cycles, ALS could support such a requirement limited to condensing clothes dryers only. (ALS, No. 24 at p. 6) AHAM supported a requirement for more than one clothes dryer test cycle, but stated that the number of test cycles should not be so high as to create a test burden. AHAM stated that it would offer to assist DOE in determining the appropriate number of cycles. AHAM commented that increasing the number of test cycles would increase the repeatability and reproducibility of the test. AHAM stated that the age of the test cloth during any given test was a source of inherent variability that could be accounted for by introducing a standard deviation into the related energy use calculations. AHAM

commented that accounting for variability is especially critical as regulatory bodies move toward requiring third-party verification, as the various test labs must be capable of reproducing results. (AHAM, No. 31 at p. 8) Whirlpool recommended that each unit or model be tested three times and the results averaged to account for test-to-test variation. (Whirlpool, No. 27 at p. 4) The California Utilities/NRDC also commented that it would be more accurate, and good practice, to require multiple clothes dryer tests, but that they cannot provide any data at this time to indicate that doing so would greatly reduce test-to-test variation. (California Utilities/NRDC, No. 33 at p. 4)

As discussed above, DOE is not aware of any data indicating that the test-to-test variation is sufficient to warrant a requirement for more than one test cycle and the averaging of results. DOE is also unaware of any data suggesting that variability in the age of the test cloth increases the test-to-test variation of measured results for the clothes dryer test procedure. In addition, DOE conducted limited testing to evaluate the repeatability and reproducibility of the amended test procedure in today's final rule. As shown below in Table III.10, the test-to-test variation ranged from 0 percent to 2.7 percent, with an average of 0.9 percent. For these reasons, DOE is not amending the test procedure in today's final rule to require multiple test cycles. DOE would be open to considering such amendments in a future rulemaking if such data is made available showing that test-to-test variation is large enough to warrant multiple test cycles.

TABLE III.10—DOE REPEATABILITY TESTING FOR AMENDED CLOTHES DRYER TEST PROCEDURE

Test unit	Average EF *lb/kWh*			Test-to-test variation %
	Test 1	Test 2	Test 3	
Vented Electric Standard:				
Unit 1	3.67	3.70	3.71	1.1
Unit 2	3.77	3.77	.....	0.0
Unit 3	3.84	3.81	.....	0.8
Unit 4	3.92	3.92	.....	0.0
Unit 5	4.01	3.95	3.93	2.0
Unit 6	3.74	3.71	3.71	0.8
Vented Gas:				
Unit 7	3.36	3.36	.....	0.0
Unit 8	3.38	3.42	.....	1.2
Unit 9	3.47	3.38	.....	2.7
Unit 11	3.52	3.49	.....	0.9
Vented Electric Compact (240V):				
Unit 13	3.36	3.35	3.35	0.3
Vented Electric Compact (120V):				
Unit 14	3.74	3.74	.....	0.0
Ventless Electric Compact (240V):				
Unit 15	2.71	2.66	2.70	1.9
Ventless Electric Combo Washer-Dryer:				
Unit 16	2.26	2.27	.....	0.4
Unit 17	2.76	2.74	2.78	1.5

BSH commented that if DOE is proposing single tests rather than multiple tests with results averaged, many of the multiple test requirements, such as those for not removing a condenser or specifying a time period between tests, are irrelevant. BSH commented that if DOE decides to require multiple tests, it must define a set of test runs, and the condenser must be allowed to be removed and cleaned. Otherwise, the total number of test runs on a particular clothes dryer would be limited. (BSH, Public Meeting Transcript, No. 20 at p. 122) ACEEE commented that it is possible that if only one test cycle is required and the unit fails that test, more tests would need to be run on that unit. Therefore, provisions concerning multiple cycles would be needed. (ACEEE, Public Meeting Transcript, No. 20 at pp. 122–123) AHAM commented that the DOE test procedure does not have particular requirements for multiple test cycles, but in the general CFR there are requirements for the manufacturer to obtain repeatable and verifiable results. AHAM commented that DOE does not want to specify a minimum number of tests required, but a manufacturer may need to modify the condenser if they want or need to run multiple tests. (AHAM, Public Meeting Transcript, No. 20 at pp. 123–124) BSH further commented that if a manufacturer decides it is only comfortable running 5 or 10 tests, it would be reasonable to leave the condenser in place for that number of tests. (BSH, Public Meeting Transcript, No. 20 at p. 124)

As discussed above, multiple test runs may be necessary in cases when a test run is considered invalid, such as when the drying cycle stops because the condensation box is full of water and the test must be re-run. Because there are cases in which multiple test cycles may be required, DOE adopts the amendments discussed above related to multiple test requirements (that is, that the condenser not be removed and that the door be kept closed between tests).

DOE did not propose to measure the water consumption of ventless clothes dryers in the June 2010 TP SNOPR. 75 FR 37594, 37624 (June 29, 2010). ALS objected to DOE's proposal to not measure the water consumption of ventless "condensing" clothes dryers. ALS believes that if all clothes washers are required to meet strict standards regarding the amount of water consumed in a product that requires water to provide consumers with adequate utility, then a condensing clothes dryer must account for its water consumption as well. ALS commented that DOE needs to at least require that water consumption be measured and reported so that data is available for any future consideration of minimum standards for the water consumption of a condensing clothes dryer. (ALS, No. 24 at p. 6) General Electric (GE) commented that it does not have data on how much water is consumed by

ventless clothes dryers that utilize an external water source to condense moisture from the dryer steam air. GE believes, however, that water consumption could be easily measured by placing a calibrated flow meter on the water source. GE believes it would not be burdensome to perform the measurement and that such measurements would provide a more meaningful, robust measure of water use. (GE, No. 32 at p. 1) Whirlpool commented that it is not aware of any ventless clothes dryers in the United States that utilize water in the condensing process, and that should such products exist, their market share would be so small as to be immeasurable. Whirlpool commented that it does not believe that measuring water consumption is relevant or necessary. (Whirlpool, No. 27 at p. 4)

DOE notes that EPCA allows the establishment of water use metrics, but only for certain products. EPCA defines "energy conservation standard" in relevant part as:

(A) A performance standard which prescribes a minimum level of energy efficiency or a maximum quantity of energy use, or, in the case of showerheads, faucets, water closets, and urinals, water use, for a covered product, determined in accordance with test procedures prescribed under section 6293 of this title; (42 U.S.C. 6291(6)(A))

In addition, DOE regulates the water use of clothes washers based on the water conservation standards set by Congress in 42 U.S.C. 6295(g)(9).

Clothes dryers do not belong to the group of products specified by EPCA for which DOE can set a water use standard. As a result, DOE is not amending the clothes dryer test procedure in today's final rule to establish a water use metric or to include a requirement to measure the water consumption for ventless condensing clothes dryers.

DOE also stated that the results from DOE's tests at an independent laboratory are representative of the repeatability of results that would be observed using the testing procedures proposed in the June 2010 TP SNOPR. 75 FR 37594, 37624 (June 29, 2010). Although DOE's tests were conducted using the alternate test procedure that provided separate definitions for a "conventional clothes dryer" and a "condensing clothes dryer" and that simply required use of the exhaust simulator only for vented clothes dryers, DOE stated that the additional clarifications proposed in the June 2010 TP SNOPR would not significantly affect these testing results because they do not affect the the test cycle measurement method. Therefore, DOE stated that the amendments to the test procedure for ventless clothes dryers proposed in the June 2010 TP SNOPR would produce accurate and repeatable measurements of EF. *Id.*

To further support its assertion, after issuance of the June 2010 TP SNOPR, DOE conducted three identical tests on one ventless electric compact (240V) clothes dryer and two identical tests on one ventless electric combination washer/dryer to evaluate the repeatability of the proposed test procedure for ventless clothes dryers. Testing results, presented in Table III.11, showed 0.8-percent and 3.5-percent variation in EF from test to test for the ventless electric compact (240V) and ventless electric combination washer-dryer, respectively. The test-to-test variation shown below is comparable to the test-to-test variation shown in Table III.10 (conducted according to the alternate test procedure that provided separate definitions for a "conventional clothes dryer" and a "condensing clothes dryer" and that simply required use of the exhaust simulator only for vented clothes dryers). The slightly greater test-to-test variation observed in Table III.11 may be attributed to other test procedure tolerances, such as the allowable ranges in ambient temperature and relative humidity. DOE continues to believe that the amendments adopting in today's final rule for ventless clothes dryers produce accurate and repeatable measurements of EF.

TABLE III.11—DOE REPEATABILITY TESTING FOR VENTLESS CLOTHES DRYER AMENDMENTS

Test unit	EF *lb/kWh*			Test-to-test variation %
	Test 1	Test 2	Test 3	
Ventless Electric Compact (240V) (Unit 15)	2.36	2.38	2.37	0.8
Ventless Electric Combo Washer-Dryer (Unit 16)	2.05	1.98	.....	3.5

4. Detergent Specifications for Clothes Dryer Test Cloth Preconditioning

Section 2.6.3 of the current DOE clothes dryer test procedure specifies that the test cloth be preconditioned by performing a 10-minute wash cycle in a standard clothes washer using AHAM Standard Test Detergent IIA. 10 CFR part 430, subpart B, appendix D, section 2.6.3. This detergent is obsolete and no longer available from AHAM or other suppliers. The current AHAM standard detergent is identified as AHAM standard test detergent Formula 3. Because AHAM Standard detergent IIA is no longer available to manufacturers, DOE proposed in the June 2010 TP SNOPR to amend section 2.6.3 of the clothes dryer test procedure to specify the use of AHAM standard test detergent Formula 3 in test cloth preconditioning. 75 FR 37594, 37624 (June 29, 2010).

Clothes washer tests that DOE conducted with AHAM standard test detergent Formula 3 suggest the dosage specified in section 2.6.3(2) of the DOE clothes dryer test procedure for AHAM Standard detergent IIA (6.0 grams (g) per gallon of water) may no longer be appropriate. This is because at the end of clothes washer test cloth preconditioning, which specifies the same dosage, undissolved clumps of detergent were observed in the cloth load. Further, DOE conducted extractor tests that indicate that detergent dosage impacts RMC measurements by as much as several percent.

AHAM's clothes dryer test procedure, AHAM HLD–1–2009, specifies a standard test detergent Formula 3 dosage of 27 g + 4.0 g/lb of base test load for test cloth pre-treatment. For DOE's clothes dryer test cloth preconditioning, the current test procedure specifies that clothes washer water fill level be set to the maximum level, regardless of test load size. In the June 2010 TP SNOPR, DOE proposed to amend the test load size for standard-size clothes dryers to 8.45 lb ± .085 lb (*see* section III.C.5.c.), which would result in a detergent dosage of AHAM standard test detergent Formula 3 of 60.8 g. DOE stated that the detergent concentration should be set by the pounds of test cloth in this standard-size test load because this load is more closely matched to the maximum water fill level than is the compact-size test load (3.0 lb ± .03 lb). For preconditioning a compact-size test load, DOE proposed that the same

detergent dosage be specified because the water fill level would remain the same as for the larger load, resulting in the same concentration of the water/detergent mixture. 75 FR 37594, 37624 (June 29, 2010).

To address the problems associated with the current dosage specification in the DOE clothes dryer test procedure, DOE proposed in the June 2010 TP SNOPR to amend section 2.6.3 of the clothes dryer test procedure. The amendment would require 60.8 g of AHAM standard test detergent Formula 3 be used to precondition test cloth. *Id.*

AHAM, Whirlpool, and ALS supported DOE's proposed detergent specifications. (AHAM, No. 31 at p. 8; Whirlpool, No. 27 at p. 4; ALS, No. 24 at p. 6) Whirlpool also strongly recommended that the test cloth be preconditioned in the same way when used in tests for both clothes washers and clothes dryers. This would enable test cloth with common characteristics to be interchanged between the two products, which would result in increased repeatability. (Whirlpool, No. 27 at p. 4) For the reasons stated above and in the absence of comments objecting to this proposal, DOE amends its clothes dryer test procedure in today's final rule to revise the detergent specifications for test cloth preconditioning as proposed in the June 2010 TP SNOPR. 75 FR 37594, 37624 (June 29, 2010). DOE will address detergent specifications for test cloth preconditioning for the clothes washer test procedure in the test procedure rulemaking for that product.

5. Changes To Reflect Current Usage Patterns and Capabilities

a. Clothes Dryer Number of Annual Cycles

As noted above, DOE most recently amended its test procedure for residential clothes dryers in a final rule published in the **Federal Register** on May 19, 1981. 46 FR 27324. Although DOE has updated its test procedure for residential clothes washers since that time,[33] it has not updated its residential clothes dryer test procedure. In the revised residential clothes washer test procedure, the average number of annual use cycles was revised to reflect current (at the time) consumer use patterns. DOE noted in the October 2007 Framework Document that the average number of clothes dryer use cycles assumed in the revised clothes washer test procedure is different from the number of use cycles in the clothes dryer test procedure. (Framework Document, STD No. 1 at p. 4)

In the June 2010 TP SNOPR, DOE reviewed available data to determine the number of annual clothes dryer use cycles so that it could amend its test procedure to accurately reflect current consumer usage habits. DOE reviewed the 2004 California Statewide RASS, which surveyed appliance product usage patterns, including clothes dryers.[34] The study surveyed 7,686 households between 2002 and 2003, asking the question "how many loads of clothes do you dry in your clothes dryer during a typical week?" For the 6,790 of these households that said they owned a clothes dryer, average usage was 4.69 loads per week, or approximately 244 loads per year. Because this study provides only a limited dataset, however, DOE stated in the June 2010 TP SNOPR that it did not intend to rely only on this data to determine an appropriate number of annual use cycles for the clothes dryer test procedure. 75 FR 37594, 37625 (June 29, 2010).

In the June 2010 TP SNOPR, DOE also reviewed data from the 2005 RECS to determine the annual usage of clothes dryers. RECS is a national sample survey of housing units that collects statistical information on the consumption of and expenditures for energy in housing units along with data on energy-related characteristics of the housing units and occupants. RECS provides enough information to establish the type (that is, product class) of clothes dryer used in each household, the age of the product, and an estimate of the household's annual energy consumption attributable to clothes dryers. DOE estimated the number of clothes dryer cycles per year for each sample home using data given by RECS on the number of laundry loads (clothes washer cycles) washed per week and the frequency of clothes dryer use. Based on its analysis of RECS data, DOE estimated the clothes dryer usage factor (the percentage of washer loads dried in a clothes dryer) to be 91 percent and the calculated average usage to be 283 cycles per year for all product classes of clothes dryers. DOE also noted that the RECS data shows that the number of clothes washer and clothes dryer cycles has been decreasing steadily for a number of years to the extent that a historical trend has been established. Because this dataset is more extensive than that of the RASS, DOE believes these numbers are more representative of annual usage patterns. Therefore, DOE proposed in the June 2010 TP SNOPR to amend the number of annual use cycles in its test procedure to 283 cycles for all product classes of clothes dryers. 75 FR 37594, 37625 (June 29, 2010).

AHAM supported DOE's proposal to amend the number of annual use cycles to 283 cycles for all product classes of clothes dryers. AHAM stated, however, that it continues to oppose using 2005 RECS data to support this change without verification of the RECS estimates. AHAM commented that the results from a recent survey by Procter & Gamble (P&G) indicated that 5.2 to 5.35 loads per household with a clothes dryer are dried per week, or 279 clothes dryer loads per year. AHAM noted this number is similar to that derived from the 2005 RECS data and therefore, it supported the change in the number of clothes dryer annual use cycles to 283. (AHAM, No. 31 at p. 8; AHAM, Public Meeting Transcript, No. 20 at p. 137)

The California Utilities/NRDC, the Joint Petitioners, Whirlpool, and ALS also commented in support of DOE's proposal of 283 annual use cycles. (California Utilities/NRDC, No. 33 at p. 5; Joint Petitioners, No. 30 at p. 7; Whirlpool, No. 27 at p. 4; ALS, No. 24 at p. 7) The California Utilities/NRDC noted that the California 2005 RASS, which indicates a weighted-average for California of 235 annual use cycles is fairly consistent with DOE's number and with the overall trend of decreasing yearly use cycles. (California Utilities/NRDC, No. 33 at p. 5) Whirlpool also noted that in its April 26, 2010 comments that it recommended 288 cycles per year, which is essentially consistent with DOE's recommendation of 283 cycles per year. (Whirlpool, No. 27 at p. 4)

DOE notes there is close agreement between the estimates provided by interested parties and DOE's estimate based on the data reviewed by DOE, and there were no comments objecting to its proposal. Therefore, DOE amends the clothes dryer test procedure to change the number of annual use cycles to 283 cycles for all product classes of clothes dryers.

b. Clothes Dryer Initial Remaining Moisture Content

In the revised residential clothes washer test procedure, a new parameter, the RMC of the test cloth, was introduced. 68 FR 62198, 62199 (October 31, 2003). The clothes washer RMC is the ratio of the weight of water contained within the test load at the completion of the clothes washer energy test cycle to the bone-dry weight of the

[33] *See* 62 FR 45484, 45498 (Aug. 27, 1997).

[34] KEMA, Inc. *op. cit.* p. 118. For more information visit: *http://www.energy.ca.gov/appliances/rass/.*

test load, expressed as a percent. Correspondingly, the initial RMC of a clothes load being dried is a function of RMC at the end of a clothes washer cycle. The current DOE clothes dryer test procedure specifies an initial RMC of 70 ± 3.5 percent. Similar to the discussion above of the average number of use cycles per year, the RMC of typical clothes loads in the residential clothes washer test procedure should be consistent with values defined in the clothes dryer test procedure. For the reasons explained below, however, DOE believes that the initial RMC in the clothes dryer test procedure may not reflect typical RMCs of actual clothes dryer loads.

DOE notes that the revision to the clothes washer test procedure changed the clothes washer energy conservation standards metric to a modified energy factor (MEF). This established a method for measuring the RMC for clothes washers. This RMC is then used to estimate the energy required by a clothes dryer to dry the clothes load. This estimate is then factored in to the calculation of MEF to account for clothes washers that reduce the estimated energy required to dry the clothes load in a clothes dryer. (10 CFR part 430, subpart B, appendix J1, section 4.3) Since the clothes dryer test procedure was last amended in 1981 (46 FR 27324 (May 19, 1981)), average clothes washer RMC has decreased due to the introduction of higher efficiency models with higher final spin speeds. Therefore, while clothes dryer energy use has decreased with the lower RMC, clothes washer energy use has increased somewhat to achieve the higher spin speeds. This energy use is accounted for in the residential clothes washer energy conservation standards rulemaking. In the clothes washer test procedure final rule published in the **Federal Register** on January 12, 2001, DOE estimated RMCs at specific efficiency levels. 66 FR 3314. For the residential clothes washer standard which became effective January 1, 2007 (1.26 MEF), DOE estimated a weighted-average RMC of 56 percent.

As discussed in section I, the EF for clothes dryers is determined by measuring the total energy required to dry a standard test load of laundry to a "bone dry" state. If today's clothes dryer loads have initial RMCs lower than the nominal 70 percent specified in the existing DOE clothes dryer test procedure, revisions to the test procedure to reflect more realistic (that is, lower) RMCs would result in the current EF rating increasing for a given clothes dryer. This is because the clothes dryer would have less water to remove.

As part of the preliminary analyses for the residential clothes dryer energy conservation standards rulemaking, DOE used a distribution of values for models listed in the December 12, 2008 CEC product database to estimate the RMC of clothes washers. For products for which the RMC was listed, DOE noted in the June 2010 TP SNOPR that the RMC values ranged from 30 percent to 61 percent, with an average of 46 percent. 75 FR 37594, 37626 (June 29, 2010).

As part of the October 2007 Framework Document, DOE requested data from AHAM showing the shipments of residential clothes washers for which RMC was reported, along with shipment-weighted RMC (*See* Table III.12). These data sets, each including disaggregated data for front-loading and top-loading clothes washers, as well as reported overall values for all units, provide insight into what initial clothes dryer RMC would be most representative of current residential clothes washers. As noted above, however, AHAM indicated that the data contain only shipments for which the RMC was reported, and thus the total will not be equal to actual shipments reported for 2000–2008. The data indicate that RMC has been decreasing consistently, from about 54 percent in 2000 to 47 percent in 2008. The data also suggest that the initial RMC of nominally 70 percent in the DOE clothes dryer test procedure is greater than the current shipment-weighted residential clothes washer average RMC.

TABLE III.12—AHAM SHIPMENT-WEIGHTED CLOTHES WASHER RMC DATA SUBMITTAL [35]

Year	Clothes washer shipments for which RMC was reported			Shipment-weighted RMC (%)		
	Front-loading	Top-loading	Total	Front-loading	Top-loading	Total
2000	232,714	686,440	919,154	43.6	57.4	53.9
2001	235,989	473,629	709,618	41.3	57.7	52.2
2002	280,667	529,265	809,932	41.5	58.1	52.3
2003	351,411	1,676,877	2,028,288	43.1	54.5	52.5
2004	1,179,813	5,270,285	6,450,098	42.2	52.8	50.9
2005	1,563,108	5,394,511	6,957,619	40.8	52.7	50.1
2006	1,851,218	5,628,279	7,479,497	39.3	51.4	48.4
2007	1,973,825	5,371,142	7,344,967	38.3	51.4	47.8
2008	2,043,024	4,492,059	6,535,083	38.1	51.0	47.0

Based on its analysis of the shipment-weighted RMC data submitted by AHAM, as well as its own review of the CEC residential clothes washer database, DOE stated in the June 2010 TP SNOPR that an initial RMC of 47 percent is representative of current residential clothes dryer initial test load characteristics. Therefore, DOE proposed to amend section 2.7, "Test loads," of the clothes dryer test procedure to require the initial RMC be changed from 70 ± 3.5 percent to 47 percent. DOE further proposed to eliminate the ± 3.5 percent allowable range in RMC. This is because the proposed amendments to the DOE clothes dryer test procedure for automatic cycle termination, detailed in section III.C.2, would require that the test load be initially prepared to between 42- and 47-percent RMC. The proposed amendments would also require final adjustments be made to the RMC to achieve 47-percent ± 0.33-percent RMC to account for over-drying energy consumption. 75 FR 37594, 37627 (June 29, 2010).

In the June 2010 TP SNOPR, DOE proposed that if it does not adopt the proposed amendments for testing automatic cycle termination, but adopts only these aforementioned proposed

[35] AHAM, 2009. *AHAM Weighted RMC for Front Load and Top Load Units, 2000–2008—DOE Clothes Dryer Rulemaking, Secondary Data Request.* July 7, 2009. Docket No. EE–2007–BT–STD–0010, Comment Number 18.

amendments to change the initial RMC, it could specify an initial RMC of 47 ± 3.5 percent. In that case, the tolerance of ± 3.5 percent on the nominal initial RMC, as currently specified in DOE's test procedure, would allow the same flexibility in test cloth preparation as is currently allowed. 75 FR 37594, 37627 (June 29, 2010).

DOE also noted in the June 2010 TP SNOPR that the current test procedure contains a provision in the calculation of per-cycle energy consumption intended to normalize EF by the reduction in RMC over the course of the drying cycle. A scaling factor of 66 is applied, representative of the percentage change from the nominal initial RMC of 70 percent to the nominal ending RMC of 4 percent. DOE noted, however, that the proposed changes to account for automatic cycle termination, as presented above in section III.C.2, would require amending the calculations for the per-cycle energy consumption to remove the need for this scaling factor. Therefore, DOE did not propose to amend the scaling factor in the June 2010 TP SNOPR. 75 FR 37594, 37627 (June 29, 2010). DOE proposed that if it does not adopt the proposed amendments for testing automatic cycle termination, but adopts only these aforementioned proposed amendments to change the initial RMC, it could change the scaling factor to 43 to reflect a starting RMC of 47 percent. *Id.*

AHAM, the California Utilities/NRDC, and the Joint Petitioners all supported an initial RMC of 47 percent. (AHAM, No. 31 at p. 9; California Utilities/NRDC, No. 33 at p. 5; Joint Petitioners, No. 30, at p. 7) AHAM provided data to support this approach in their April 26, 2010 comments. (AHAM, No. 31 at p. 9) Whirlpool also commented that DOE's proposal of 47 ± 1 percent RMC is consistent with its recommendation from its April 26, 2010 comments. (Whirlpool, No. 27 at p. 4)

ALS objected to DOE's proposal to utilize 47-percent initial RMC. ALS commented that the current clothes dryer test procedure uses "raw" non-correction factored RMC values, unlike the values DOE used to arrive at the national average of 47-percent RMC. The data DOE used was based on shipment-weighted average clothes washer data supplied by AHAM that had a correction factor applied to account for extraction. (ALS, No. 24 at p. 7; ALS, Public Meeting Transcript, No. 20 at p. 141) ALS commented that DOE should be using raw RMC values from the clothes washer, because the current clothes dryer test uses raw values and there is a significant difference between "raw" RMC values and "correction-factored" RMC values. ALS stated that it conducted tests on front-load washers (both its own and those of its competition) that resulted in raw RMC values of around 50 percent, compared to the 41-percent RMC derived when the correction factor is applied. This is a difference of 9 RMC percentage points, which is a 18-percent relative difference. ALS added that it is apparent that if "raw" values of washer RMC were analyzed by DOE, the national average would be closer to 53–55 percent. ALS acknowledged that no database exists of "raw" shipment-weighted average RMC values for clothes washers. ALS suggested DOE perform limited clothes washer tests to confirm the ALS results regarding the "raw" versus "correction-factored" RMC values, and adjust the proposed 47-percent value to align more closely to the ALS-suggested value of 53 percent. (ALS, No. 24 at p. 7) ALS also commented that manufacturers prefer to utilize their own production front-loading clothes washers to prepare test loads per the DOE clothes dryer test procedure. However, they would find it more difficult to achieve DOE's proposed 47-percent RMC when the front-loader in their labs can only achieve raw values at 50-percent RMC in default DOE test program cycles. (ALS, No. 24 at p. 7) ALS did not recommend adding in correction factors to the clothes dryer test procedure to raise the initial RMC higher to reflect the uncorrected value. (ALS, Public Meeting Transcript, No. 20 at p. 143)

DOE first notes that it proposed an initial RMC of 47 percent ± 3.5 percent, not ±1 percent as commented by Whirlpool. DOE agrees with ALS that the clothes dryer test procedure should be using a "raw" uncorrected RMC value and not the corrected RMC values in the data submitted by AHAM. DOE understands that in the clothes washer test procedure, an RMC correction factor curve is applied to account for the different extraction rates of different test cloth lots in order to calculate a corrected RMC value. The correction factor curve uses the following equation: $RMC_{corrected} = A \times RMC_{measured} + B$, where $RMC_{measured}$ is the measured RMC after the clothes washer spin cycle and A and B are coefficients based on extraction testing using a linear least-squares fit to relate the standard RMC to the measured extraction RMC value. (The standard RMC is provided in table 2.6.6.1 of the clothes washer test procedure.) DOE notes that in 2008, the latest year for which shipment-weighted average corrected RMC values were provided in the AHAM data, the most recent test cloth lot was lot 16. DOE acknowledges, however, that manufacturers and testing labs were likely using previous test cloth lots for the RMC values reported in the AHAM data. For this reason, DOE estimated the 2008 uncorrected RMC value by using the RMC correction factor curves from lots 12 through 16 and averaging the results. As shown in Table III.13, the results showed an average uncorrected RMC value of 57.5 percent.

TABLE III.13—DOE CLOTHES WASHER TEST PROCEDURE TEST CLOTH LOT RMC CORRECTION FACTOR DATA

	Lot #	Coefficient A	Coefficient B	2008 Shipment-weighted average uncorrected RMC (percent)
2008 Shipment-Weighted Average Corrected RMC = 47.0%	12	0.7165	0.0505	65.5
	13	0.8828	0.0015	53.2
	14	0.8970	0.0014	52.4
	15	0.89904	-0.04284	52.3
	16	0.73478	0.03174	63.9
	Average	.....	.....	57.5

To validate this estimate, DOE examined the uncorrected RMC data from tests of 17 residential clothes washer (9 front-loading and 8 top-loading units) it conducted for the residential clothes washer energy conservation standards rulemaking preliminary analyses. The results from DOE's testing are shown below in Table III.14. Taking the average RMC for each product class (that is, front-loading and top-loading) and weighting the average

RMCs by the shipments for each product class resulted in a shipment-weighted average uncorrected RMC of 58.1 percent, which is in close agreement with the 57.5-percent uncorrected RMC estimated by DOE using the RMC correction factor curves.

TABLE III.14—DOE CLOTHES WASHER TESTING UNCORRECTED RMC RESULTS

Test unit	Uncorrected RMC %
Front-Loading Clothes Washers (2008 Shipments = 3,022,077):	
Unit 1	43.7
Unit 2	58.9
Unit 3	55.9
Unit 4	49.3
Unit 5	49.5
Unit 6	38.5
Unit 7	50.7
Unit 8	45.3
Unit 9	45.4
Top-Loading Clothes Washers (2008 Shipments = 5,269,625):	
Unit 10	67.7
Unit 11	94.3
Unit 12	48.4
Unit 13	60.5
Unit 14	65.2
Unit 15	67.1
Unit 16	54.2
Unit 17	50.3
Shipment-Weighted Average	58.1

DOE estimated the uncorrected RMC value using shipment-weighted average corrected RMC data submitted by AHAM and the RMC correction factor curves for test cloth lots 12 through 16. Based on that estimate, DOE believes an initial RMC of 57.5 percent more accurately represents the moisture content of a load entering the clothes dryer after the wash cycle for the purposes of clothes dryer testing. As a result, DOE amends the clothes dryer test procedure in today's final rule to change the initial RMC to 57.5 percent ± 3.5 percent. In addition, DOE changes the scaling factor in the calculation of the per-cycle energy consumption that is intended to normalize EF by the reduction in RMC over the course of the drying cycle from a value of 66 to 53.5 (That value is the difference of 57.5-percent initial RMC minus 4-percent nominal final RMC).

DOE tested 13 representative clothes dryers to evaluate the affect of this amendment to the initial RMC for clothes dryer test load preparation on test repeatability. DOE tested these units according to the current DOE clothes dryer test procedure, except that the initial RMC was changed to 57.5 percent ± 3.5 percent. For the ventless clothes dryer test units, DOE additionally used the proposed testing method for ventless dryers presented in section III.C.3. As shown below in Table III.15, the test-to-test variation ranged from 0.3 percent to 1.8 percent, with an average of 0.9 percent. For this reason, DOE believes that the amendments to the initial RMC for clothes dryer test load preparation produce repeatable test results.

TABLE III.15—DOE REPEATABILITY TESTING FOR 57.5 PERCENT INITIAL RMC

Test unit	Average EF *lb/kWh*			Test-to-test variation %
	Test 1	Test 2	Test 3	
Vented Electric Standard:				
Unit 1	3.68	3.67	.....	0.3
Unit 3	3.84	3.81	3.82	0.8
Unit 4	3.79	3.80	3.78	0.5
Unit 5	3.93	3.88	3.92	1.3
Unit 6	3.70	3.71	.....	0.3
Vented Gas:				
Unit 7	3.32	3.32	3.31	0.3
Unit 8	3.41	3.44	.....	0.9
Unit 9	3.23	3.21	3.25	1.2
Unit 10	3.27	3.31	3.28	1.2
Unit 11	3.38	3.41	3.43	1.5
Vented Electric Compact (240V):				
Unit 12	3.61	3.62	3.61	0.3
Unit 13	3.46	3.48	3.42	1.8
Ventless Electric Combo Washer-Dryer:				
Unit 16	2.35	2.31	2.34	1.7

c. Clothes Dryer Test Load Weight

The current DOE clothes dryer test procedure requires a 7.00 lb ± .07 lb test load for standard-size clothes dryers and a 3.00 lb ± .03 lb test load for compact-size clothes dryers. In response to comments it received on the October 2007 Framework Document, DOE investigated in the June 2010 TP SNOPR whether the average test load weight for standard-size clothes dryers is valid for use in light of the capacities of the current generation of clothes washer. 75 FR 37594, 37631 (June 29, 2010).

DOE contacted detergent manufacturers to obtain data on average residential clothes washer load sizes. P&G conducted an internal study in 2003 on household laundry habits on a representative set of the population across the United States, from which P&G provided relevant summary data to DOE for this rulemaking. The clothes washer load weight data, based on a sample size of 3367 loads of laundry from a total of 510 respondents, showed that the average load size for top-loading and front-loading clothes washers was 7.2 lb and 8.4 lb, respectively. (P&G, No. 15 at p. 1) Based on the average shipment-weighted market share for top-loading and front-loading clothes washers between 2000 and 2008 from data submitted by AHAM (shown in Table III.12), the shipment-weighted average clothes washer load size would be approximately 7.5 lb. DOE stated in the June 2010 TP SNOPR, however, that clothes washer capacities were likely to have increased since the survey was conducted in 2003. Therefore, DOE factored into its analysis these capacity changes to estimate a more current

average load size. 75 FR 37594, 37631 (June 29, 2010).

Table III.16 shows the trends of the shipment-weighted average tub volume for residential clothes washers from 1981 to 2008, based on data from the AHAM *Trends in Energy Efficiency 2008*. The shipment-weighted average tub volume has increased from 2.52 ft^3 in 1981 to 3.22 ft^3 in 2008.

TABLE III.16—RESIDENTIAL CLOTHES WASHER SHIPMENT-WEIGHTED AVERAGE TUB VOLUME TRENDS [36]

Year	Shipment-weighted average tub volume (ft^3)	% Change since 1990
1981	2.52	
1990	2.63	
1991	2.72	3.4
1992	2.71	3.0
1993	2.71	3.0
1994	2.69	2.3
1995	2.72	3.4
1996	2.80	6.5
1997	2.83	7.6
1998	2.85	8.4
1999	2.89	9.9
2000	2.92	11.0
2001	2.96	12.5
2002	2.96	12.5
2003	3.01	14.4
2004	3.05	16.0
2005	3.08	17.2
2006	3.13	19.2
2007	3.16	20.3
2008	3.22	22.4

Section 2.7, "Test Load Sizes," in the DOE clothes washer test procedure provides the minimum, maximum, and average test load size requirements for the clothes washer test, which are based on the clothes container capacity. Table III.17 shows the minimum, maximum, and average test load sizes for 2.52 ft^3 and 3.22 ft^3 container capacities according to Table 5.1 in the DOE clothes washer test procedure.

TABLE III.17—DOE CLOTHES WASHER TEST LOAD SIZE REQUIREMENTS (FROM TABLE 5.1 OF 10 CFR 430 SUBPART B, APPENDIX J1)

Container volume ft^3	Minimum load *lb.*	Maximum load *lb.*	Average load *lb.*
≥ 2.50 to < 2.60	3.00	10.50	6.75
≥ 3.20 to < 3.30	3.00	13.30	8.15

DOE notes that the average load size in the clothes washer test procedure increases by about 21 percent when the container volume increases in capacity, which DOE believes is the degree to which container volume impacts clothes dryer load sizes. Applying this ratio of average clothes washer test load sizes to the clothes dryer test load size would result in an increase from 7.00 lb to 8.45 lb for standard-size clothes dryers currently available. For these reasons, DOE proposed to amend the clothes dryer test load size to 8.45 lb for standard-size clothes dryers in the June 2010 TP SNOPR. 75 FR 37594, 37632 (June 29, 2010). DOE proposed to amend the test load size based on the change in average load size for clothes washers rather than the maximum load size because data from the 2005 RECS indicates that not all clothes that are washed are machine dried. Therefore, DOE believes that average clothes washer load size would be more representative of clothes dryer load size. DOE also proposed to maintain the 1-percent tolerance in load sizes specified by the current DOE test procedure for standard-size clothes dryers (8.45 lb ± .085 lb). *Id.*

ALS commented that the clothes dryer test procedure amendments are related to the clothes washer test procedure. It stated that if there are any changes to the clothes washer test procedure in an upcoming rulemaking, especially to the average load size or the load size chart, the effect of those changes on the clothes dryer test procedure must be considered. (ALS, Public Meeting Transcript, No. 20 at p. 171) DOE recently published a NOPR proposing amendments to the test procedure for clothes washers and welcomes comments on that proposal as stated in the NOPR. 75 FR 57556 (September 21, 2010). Because DOE has not published a final rule amending the clothes washer test procedure, however, the issue of how any such amendments might influence conditions for the final amended clothes dryer test procedure is not relevant at this time. DOE may consider this issue in a future rulemaking.

AHAM, Whirlpool, ALS, the California Utilities/NRDC, and the Joint Petitioners commented in support of the proposed amendment to change the clothes dryer load size to 8.45 ± 0.085 lb for standard-size clothes dryers. (AHAM, No. 31 at p. 9; Whirlpool, No. 27 at p. 5, ALS, No. 24 at p. 7, California Utilities/NRDC, No. 33 at p. 5, Joint Petitioners, No. 30 at p. 7) For the reasons stated above and in the absence of comment objecting to this proposal, DOE amends the clothes dryer test procedure in today's final rule to change the clothes dryer load size to 8.45 ± 0.085 lb for standard-size clothes dryers.

DOE stated in the June 2010 TP SNOPR that most compact clothes dryers are used with compact-size clothes washers, and that DOE does not have any information to suggest that the tub volume of such clothes washers has changed significantly. Therefore, DOE did not propose to change the 3-lb test load size currently specified in the test procedure for compact clothes dryers in the June 2010 TP SNOPR. DOE sought data on the historical trends of compact-size clothes washer average tub volumes or any other data that would suggest a change in the clothes dryer test load size for compact clothes dryers.

AHAM and the Joint Petitioners commented in support of maintaining the 3-lb load size for compact clothes dryers until there is sufficient data upon which to base a change. (AHAM, No. 31

[36] Association of Home Appliance Manufacturers, *Trends in Energy Efficiency 2008*. p. 3. Washington, DC. Available at: *http://www.aham.org/ht/d/Store.*

at p. 9; Joint Petitioners, No. 30 at p. 7) For these reasons, DOE is not amending the test procedure to change the load size for compact clothes dryers.

DOE tested 8 representative clothes dryers to evaluate the affect of this amendment to the test load weight for standard-size clothes dryers on test repeatability. DOE tested these units according to the current DOE clothes dryer test procedure, except that the test load size was changed to 8.45 lb ± .085 lbs for standard-size clothes dryers. As shown below in Table III.18, the test-to-test variation ranged from 0.0 percent to 2.9 percent, with an average of 1.6 percent. For this reason, DOE believes that the amendments to the test load weight in the clothes dryer test procedure produce repeatable test results.

TABLE III.18—DOE REPEATABILITY TESTING FOR 8.45 LB ± .085 LB TEST LOAD FOR STANDARD-SIZE CLOTHES DRYERS

Test unit	Average EF *lb/kWh*		Test-to-test variation %
	Test 1	Test 2	
Vented Electric Standard:			
Unit 1	3.13	3.13	0.0
Unit 4	3.20	3.27	2.2
Unit 6	3.53	3.47	1.7
Unit 7	3.33	3.34	0.3
Unit 8	3.18	3.09	2.9
Vented Gas:			
Unit 10	2.85	2.86	0.4
Unit 11	2.96	2.89	2.4
Unit 13	2.81	2.73	2.9

d. Room Air Conditioner Annual Operating Hours

The DOE test procedure currently assumes room air conditioners have an average annual use of 750 hours. DOE's technical support document from September 1997, issued in support of the most recent room air conditioner energy conservation standards rulemaking, shows that the average annual operational hours are closer to 500 hours.[37] That average would yield approximately 33-percent lower annual energy consumption than the annual energy consumption determined using the 750 operational hours assumed in the current test procedure.

DOE acknowledged the uncertainty regarding room air conditioner usage patterns and investigated the annual hours of usage from a range of information sources to develop an updated estimate of annual operating hours for the June 2010 TP SNOPR. 75 FR 37594, 37633 (June 29, 2010). DOE's investigation revealed a lack of metered and survey data for the operating hours of individual room air conditioners. DOE found that estimates of the annual operating hours of use were often based on regional climatic data rather than actual room air conditioner use. DOE did find two sources of survey data on room air conditioner use in the EIA's 2005 RECS (and previous versions) and the CEC California Statewide RASS. The CEC survey contained only aggregated residential data, which limited any analysis pertaining to the annual operating hours. EIA's 2005 RECS provides extensive data on individual residences, while providing a more expansive and representative sample of households. Thus, DOE continued its analysis using EIA's 2005 RECS. *Id.*

The 2005 RECS provides enough information to establish the type (that is, product class) of room air conditioner used in each household, the age of the product, and an estimate of the household's annual energy consumption attributable to the room air conditioner. Using this data, DOE developed an estimate of the annual hours of use of a room air conditioner in a household. This estimate was used to calculate a weighted national average of room air conditioner usage hours. The data in the 2005 RECS indicates that the estimated room air conditioner average annual usage is 810 hours. DOE noted in the June 2010 TP SNOPR that this number of hours is higher than the current 750 hours specified in the test procedure. It is also significantly higher than the approximately 500 hours suggested by the previous energy conservation standard rulemaking analysis. *Id.*

An investigation of the 2005 cooling season covered by RECS indicates that there were roughly 12-percent more cooling degree days (CDD) in 2005 than the 30-year 1971 to 2000 average.[38] The Annual Energy Outlook projections of CDD for the future suggest that the higher level of CDD will continue.[39] Hence, the predictions of annual hours based on the 2005 RECS can be considered representative of future usage. Further, DOE stated in the June 2010 TP SNOPR, however, it does not consider the increase of 60 hours from 750 hours to 810 hours to be significant. This is because that increase does not exceed the uncertainty level associated with the RECS-based approach for estimation of this value. Hence, DOE did not propose a change in the annual operating hours used in the test procedure in the June 2010 TP SNOPR. 75 FR 37594, 37633 (June 29, 2010).

AHAM commented that it strongly opposes relying on the RECS data. (AHAM, No. 31 at pp. 9–10) AHAM stated that it is becoming more difficult to get survey data on room air conditioners as more people rely on central air conditioning and because room air conditioners are being used more for space cooling or assistance cooling rather than primary cooling. AHAM also commented that consumers tend to buy room air conditioners that are oversized for the cooling space, resulting in fewer use-hours than if they had purchased a unit that was sized appropriately. (AHAM, Public Meeting Transcript, No. 20 at pp. 151–152) AHAM believes data are available, and that DOE should use such data for its

[37] U.S. Department of Energy—Office of Energy Efficiency and Renewable Energy, *Technical Support Document for Energy Conservation Standards for Room Air Conditioners.* September 1997. Chapter 1, section 1.5. Washington, DC. *http://www.eere.energy.gov/buildings/appliance_standards/residential/room_ac.html.*

[38] CDD is a sum of the difference between ambient temperature in °F and 65 °F for every hour of the year that the ambient temperature is higher than 65 °F for a given location, divided by 24 to convert from hours to days; DOE used data on CDD from the National Solar Radiation Database (NSRDB). National Renewable Energy Laboratory, *National Solar Radiation Database 1991–2005 Update: User's Manual,* 2007. Golden, CO. Available online at: *http://www.nrel.gov/docs/fy07osti/41364.pdf.*

[39] Energy Information Administration, *2006 State Energy Consumption, Price, and Expenditure Estimates (SEDS),* 2006. Washington, DC. Available online at: *http://www.eia.doe.gov/emeu/states/_seds.html.*

analysis. (AHAM, Public Meeting Transcript, No. 20 at pp. 152–154) AHAM also supported maintaining the current 750 annual operating hours used in the test procedure for room air conditioners until or unless additional reliable surveys or testing are completed that determine a more representative number of use hours for room air conditioners exists. (AHAM, No. 31 at pp. 9–10; AHAM, Public Meeting Transcript, No. 20 at p. 150) The California Utilities/NRDC also supported DOE's allocation of 750 hours per year to active cooling, adding that this allocation seems reasonable given available data. However, the California Utilities/NRDC stated that DOE may need to revise this allocation in light of its proposed treatment of fan-only energy. (California Utilities/NRDC, No. 33 at p. 4)

DOE understands the uncertainties associated with RECS data, but believes that the estimates using such data generally support maintaining the current 750 annual operating hours. As discussed in section III.B.4, DOE is not amending the test procedure in today's final rule to account for fan-only active mode energy use, but may consider amendments to address fan-only active mode in a future rulemaking as data become available. For these reasons, DOE maintains the current 750 annual operating hours used in the test procedure for room air conditioners. DOE may consider revising this number of annual operating hours if data are made available indicating that a change in this value is warranted.

e. Room Air Conditioner Part-Load Performance

DOE noted in the October 2007 Framework Document that the current DOE room air conditioner test procedure measures full-load performance and does not assess energy savings associated with technologies that improve part-load performance. DOE concluded in the June 2010 TP SNOPR that widespread use of part-load technology in room air conditioners is not likely to be stimulated by the development of a part-load metric at this time, and therefore, the significant effort required to develop an accurate part-load metric is not likely to be warranted by the expected minimal energy savings. 75 FR 37594, 37633–34 (June 29, 2010). A part-load metric would measure efficiency of a product when operating at conditions other than maximum capacity, with outdoor or indoor conditions cooler than currently used in the DOE active mode energy test, or both. In field use of room air conditioners using currently available technologies, when enough cooling is provided to the space, any number of events can occur to prevent over-cooling. For example, the user may turn off the unit or adjust fan speed; or the controls might turn off the compressor, turn off both the compressor and the fan, or reduce fan speed. Delivery of cooling might be done more efficiently with part-load technologies, such as a compressor that can adjust its capacity rather than cycling on and off, but sufficient information is not available at this time regarding use of room air conditioner features to assess whether those alternative technologies would be cost effective. DOE notes that the key design changes that improve full-load efficiency also improve part-load efficiency, so the existing EER metric is already a strong indication of product efficiency over a wide range of conditions. DOE concludes that development of an additional test for part load, or a change of the room air conditioner metric to a part-load metric is not supported by the information available to DOE at this time. Therefore, DOE did not consider amendments to its room air conditioner test procedure to measure part-load performance in the June 2010 TP SNOPR. 75 FR 37594, 37634 (June 29, 2010). For these reasons and in the absence of comments objecting to this determination, DOE is not amending its room air conditioner test procedure to measure part-load performance at this time. DOE may amend the test procedure to account for part-load performance in a future rulemaking if information becomes available on part-load technologies that are likely to result in significant energy savings during actual use by consumers.

f. Room Air Conditioner Ambient Test Conditions

DOE also considered whether the ambient test conditions in its test procedure for room air conditioners are representative of typical installations. DOE noted in the June 2010 TP SNOPR that it received a comment in response to the October 2007 Framework Document that recommended increasing the ambient temperature of the DOE energy test procedure from 95 °F to 115 °F. The commenters stated that room air conditioners are generally operated when the outdoor temperatures are the highest, and that they are often located on the south or west side of residences where the sun can shine on them during operation. 75 FR 37594, 37634 (June 29, 2010). DOE stated that it did not receive further information to support the specification of the higher temperature, and, therefore, did not consider an amendment to the ambient test conditions specified in the room air conditioner test procedure in the June 2010 TP SNOPR. *Id.*

AHAM supported maintaining the current specifications regarding ambient test conditions for room air conditioners. (AHAM, No. 31 at p. 10; AHAM, Public Meeting Transcript, No. 20 at p. 155) In the absence of data to support a change to the ambient test conditions, DOE is not amending the ambient test conditions specified in the room air conditioner test procedure.

6. Room Air Conditioner Referenced Test Procedures

The room air conditioner test procedure cites two test standards: (1) ANS Z234.1–1972 and (2) ASHRAE Standard 16–69. Both the ANS (since renamed ANSI) and ASHRAE standards have been updated since DOE last revised its room air conditioner test procedure. The current standards are ANSI/AHAM RAC–1–R2008 and ANSI/ASHRAE Standard 16–1983 (RA 2009), respectively. Because it is likely that any manufacturer rating it products is using the most recent test standards, DOE suggested in the October 2007 Framework Document that it consider updating its test procedure to incorporate by reference the most recent test standards.

In the June 2010 TP SNOPR, DOE reviewed the differences between the test standards currently referenced by the DOE test procedure and the latest versions of these standards to determine if amendments to reference the latest ANSI and ASHRAE test standards are appropriate. DOE noted the sections that would be referenced in ANSI/AHAM RAC–1–R2008 by the DOE test procedure do not introduce any new changes in the measurement of cooling capacity or power input. DOE also noted the sections that would be referenced in ANSI/ASHRAE Standard 16–1983 (RA 2009) by the DOE test procedure would introduce changes to the determination of capacity, four new temperature measurements, and changes to the test tolerances. In particular, DOE noted in the June 2010 TP SNOPR that section 6.1.3 of ANSI/ASHRAE Standard 16–1983 (RA 2009) introduces a correction factor based on the test room condition's deviation from the standard barometric pressure of 29.92 inches (in.) of mercury (Hg) (101 kilopascal (kPa)). Section 6.1.3 of ANSI/ASHRAE Standard 16–1983 (RA 2009) states that the cooling capacity may be increased 0.8 percent for each in. Hg below 29.92 in. Hg (0.24 percent for each kPa below 101 kPa). DOE noted the capacity correction factor provides manufacturers with more

flexibility in the test room conditions while normalizing results to standard conditions. On November 26, 2010, 75 FR 72739, DOE published notice of a petition submitted by AHAM concerning use of the proposed correction factor for room air conditioner testing. While DOE seeks comment on the petition until December 27, 2010, DOE believes that the correction factor resolves the issues presented in the AHAM petition. DOE also noted the referenced section numbers from the old and current test standards are identical. 75 FR 37594, 37634–35 (June 29, 2010).

DOE determined that incorporation by reference of these updated versions provides more accurate and repeatable measurements of capacity while providing greater flexibility to manufacturers in selecting equipment and facilities, and does not add any significant testing burden because the time required for testing would not change. Furthermore, these revisions would not impact the measurement of EER for this equipment because the methodology used for this measurement is the same. DOE also stated that it believes that manufacturers may already be using these updated standards in their testing. Therefore, DOE proposed amending the DOE test procedure to reference the relevant sections of ANSI/AHAM RAC–1–R2008 and ANSI/ASHRAE Standard 16–1983 (RA 2009). 75 FR 37634–35.

AHAM agreed that DOE should reference the latest standards for room air conditioners. (AHAM, No. 31 at p. 10) For the reasons stated above and in the absence of comments objecting to amending the DOE test procedure to reference the relevant sections of ANSI/AHAM RAC–1–R2008 and ANSI/ASHRAE Standard 16–1983 (RA 2009), DOE adopts these amendments.

7. Clothes Dryer Referenced Test Procedure

The DOE clothes dryer test procedure currently references the industry test standard AHAM Standard HLD–1–1974. Specifically, the DOE clothes dryer test procedure requires that the clothes dryer under test add the AHAM exhaust simulator described in section 3.3.5 of AHAM Standard HLD–1–1974. The AHAM test standard has been updated since DOE established its clothes dryer test procedure. The current standard is designated as AHAM Standard HLD–1–2009. Because it is likely that any manufacturer rating it products is using the most recent test standard, DOE considered potential amendments to its clothes dryer test procedure to reference AHAM Standard HLD–1–2009 in the June 2010 TP SNOPR. DOE noted that section 3.3.5.1 of AHAM Standard HLD–1–2009 regarding exhausting conditions provides the same requirements for the exhaust simulator as required by AHAM Standard HLD–1–1974. For this reason, DOE proposed to amend the DOE test procedure to reference AHAM Standard HLD–1–2009. DOE stated that because the requirements for the exhaust simulator would be the same, the proposed amendments would not affect the EF rating of residential clothes dryers and would not require that the existing energy conservation standards for these products be revised. 75 FR 37594, 37636 (June 29, 2010).

AHAM, Whirlpool, and ALS commented in support of updating the test procedure to reference AHAM standard HLD–1–2009. (AHAM, No. 31 at p. 10, AHAM, Public Meeting Transcript, No. 20 at p. 158, Whirlpool, No. 27 at p. 5, ALS, No. 24 at p. 8) For these reasons and in the absence of comments objecting to amending the DOE test procedure to reference AHAM Standard HLD–1–2009, DOE adopts these amendments in today's final rule.

DOE also acknowledges that AHAM Standard HLD–1–2009 allows for the optional use of a modified exhaust simulator, which is included as a more convenient option than the exhaust simulator originally specified for testing vented clothes dryers. The requirements for the modified exhaust simulator are presented in section 3.3.5.2 of AHAM Standard HLD–1–2009. The test standard notes that only limited testing has been done to compare results using the two exhaust simulators, and that users are invited to submit results and comments for both options. Because this modified exhaust simulator is recent, and limited data exist to compare the effects of using different exhaust simulators, DOE stated in the June 2010 TP SNOPR that it will continue to require the standard exhaust simulator currently referenced by the DOE clothes dryer test procedure. 75 FR 37594, 37636 (June 29, 2010). However, DOE requested data from manufacturers comparing the effects of the two exhaust simulators on the drying efficiency using the DOE test procedure. DOE also invited comment on whether the test procedure should be amended to allow for the optional modified exhaust simulator.

AHAM commented that there may be more data available concerning the modified exhaust simulator, which gained ANSI approval in 2009. (AHAM, Public Meeting Transcript, No. 20 at pp. 159–160) AHAM stated that DOE should allow for the optional use of a modified exhaust simulator. AHAM added that the AHAM Standard HLD–1–2009 was developed after an extensive standards-making process, which fully vetted issues related to optional use of a modified exhaust simulator, and as such there is no reason for DOE to deviate from that standard. (AHAM, No. 31 at p. 10).

DOE is not aware of any data comparing the effects of the two exhaust simulators on the drying efficiency using the DOE test procedure. DOE notes that it requested such data in the June 2010 TP SNOPR, but did not receive any data. In the absence of such data, DOE will continue to require the standard exhaust simulator currently referenced by the DOE clothes dryer test procedure. If data are made available showing that the test results using the modified exhaust simulator produce repeatable results, as well as comparing the effects of the different exhaust simulators on the measured EF, DOE may consider such revisions to its clothes dryer test procedure in a future rulemaking.

Section 1.8 in the "Definitions" section of the DOE clothes dryer test procedure also references an obsolete AHAM clothes dryer test standard, AHAM Standard HLD–2EC. No provisions of this test standard are currently used in DOE's test procedure, and DOE therefore proposed to remove this reference in the June 2010 TP SNOPR. 75 FR 37594, 37636 (June 29, 2010). AHAM and Whirlpool both commented in support of removing the reference to AHAM Standard HLD–2EC. (AHAM, No. 31 at p. 10, Whirlpool, No. 27 at p. 5) For this reason and in the absence of comments objecting to this proposal, DOE amends the test procedure to remove this reference.

8. Technical Correction for the Per-Cycle Gas Dryer Continuously Burning Pilot Light Gas Energy Consumption

The equation provided under section 4.4 Per-cycle gas dryer continuously burning pilot light gas energy consumption of the current DOE clothes dryer test procedure contains a technical error in the equation for calculation of the per-cycle gas dryer continuously burning pilot light gas energy consumption (E_{up}), in Btus per cycle. E_{up} is the product of the following three factors: (A) The cubic feet of gas consumed by the gas pilot in hour; (B) the total number of hours per year the pilot is consuming gas while the clothes dryer is not operating in active mode (8,760 total hours per year minus 140 hours per year the clothes dryer operates in active mode) divided by the representative average number of

clothes dryer cycles in a year (416); and (C) the corrected gas heat value. Part (B) of this equation is currently incorrect, reading (8760 − 140/416) and missing the appropriate parentheses. The equation should correctly subtract the total number of hours per year the pilot is consuming gas while the clothes dryer is not operating in active mode from the number of hours per year the clothes dryer operates in active mode, before dividing by the average number of clothes dryer cycles in a year. The equation should read ((8760 − 140)/416) to correctly calculate the per-cycle gas dryer continuously burning pilot light gas energy consumption. Therefore, DOE proposed in the June 2010 TP SNOPR to amend the equation to correctly calculate the per-cycle gas dryer continuously burning pilot light gas energy consumption. 75 FR 37594, 37636 (June 29, 2010).

AHAM and Whirlpool supported the technical correction to the per-cycle gas dryer continuously burning pilot light gas energy consumption calculation. (AHAM, No. 31 at p. 10; Whirlpool, No. 27 at p. 5) ALS commented that it supported DOE's proposed technical correction. However, ALS believes this an unnecessary addition to the test procedure. ALS believes the proper way to address the issue is to revise the minimum energy conservation standard during its current standards rulemaking to add back into the minimum standard the design prescription banning constant burning pilot lights. ALS noted that the original 1987 standard included the design prescription, but it was removed in the first review of the standard effective May 14, 1994 because it was perceived that the revised minimum standard of 1994 would continue to effectively eliminate continuously burning pilot lights. ALS noted that no clothes dryer with continuously burning gas pilot lights exists on the market at this time. Therefore, it is a wasted effort to add text to the test procedure for something that does not exist and can be more effectively dealt with by a simple revision to the clothes dryer minimum standard. (ALS, No. 24 at p. 8) AHAM also commented that it is not aware of any clothes dryer on the market that uses a constant burning pilot light, and doubts any such dryers will be introduced soon. (AHAM, Public Meeting Transcript, No. 20 at p. 162)

As discussed in section I, EPCA establishes prescriptive standards for clothes dryers, requiring that gas dryers manufactured on or after January 1, 1988 not be equipped with a constant burning pilot (42 U.S.C. 6295(g)(3)). Because constant burning pilot lights are precluded by EPCA, DOE agrees with ALS that any provisions for measuring constant burning pilot light energy use in gas clothes dryers are no longer necessary. As a result, DOE amends the clothes dryer test procedure to remove all provisions for measuring the constant burning pilot light energy use.

9. Clarification of Gas Supply Test Conditions for Gas Clothes Dryers

Section 2.3.2.1 and 2.3.2.2 of the DOE clothes dryer test procedure specifies maintaining "the gas supply to the clothes dryer at a normal inlet test pressure immediately ahead of all controls at" 7 to 10 inches of water column for natural gas or 11 to 13 inches of water column for propane gas. DOE believes that the references to "normal inlet test pressure" in sections 2.3.2.1 and 2.3.2.2 of its clothes dryer test procedure may be confusing because the term "normal" is not defined. DOE believes that such language is not necessary because the gas supply pressure immediately ahead of all controls is explicitly stated. Therefore, DOE proposed in the June 2010 TP SNOPR to revise the test pressure conditions in sections 2.3.2.1 and 2.3.2.2 of the DOE clothes dryer test procedure to specify maintaining "the gas supply to the clothes dryer immediately ahead of all controls at a pressure of" 7 to 10 inches of water column for natural gas and 11 to 13 inches of water column for propane gas. 75 FR 37594, 37636 (June 29, 2010). AHAM, Whirlpool, and ALS supported DOE's proposed clarification. (AHAM, No. 31 at pp. 10–11; Whirlpool, No. 27 at p. 5; ALS, No. 24 at p. 8) For these reasons and in the absence of comments objecting to this proposal, DOE amends its clothes dryer test procedure to revise the test pressure conditions as discussed above.

DOE also believes the specifications for a gas pressure regulator in sections 2.3.2.1 and 2.3.2.2 of its clothes dryer test procedure should clarify that the outlet pressure for a clothes dryer equipped with a pressure regulator for which the manufacturer specifies an outlet pressure should be approximately that recommended by the manufacturer. DOE proposed in the June 2010 TP SNOPR to make these minor revisions these sections. 75 FR 37594, 37636 (June 29, 2010). In the absence of comments objecting to this proposal, DOE is amending its clothes dryer test procedure to revise the test pressure conditions for clothes dryers equipped with a gas pressure regulator as discussed above.

10. Other Clothes Dryer Active Mode Issues

DOE received a number of comments on issues related to the active mode for clothes dryers not identified in the June 2010 TP SNOPR. The following sections discuss each of these issues.

a. Test Cloth Specifications

ALS commented in response to the June 2010 TP SNOPR that DOE should consider if the number of test runs allowed on test cloth after pre-conditioning should be equal to the number of allowable runs for clothes washer test cloth. ALS commented that, currently, the clothes dryer test cloth can be used for only 25 test runs, while the clothes washer test cloth is allowed to be used for 60 test runs. (ALS, No. 24 at p. 6) Whirlpool commented that both the clothes washer and clothes dryer test procedures should be modified to allow for 50 cycles of test cloth use, because this would be easier to manage and reduce the cost of cloth used in clothes dryers. Whirlpool commented that beyond 50 wash cycles, the load-to-load variability increases significantly, adversely impacting repeatability. (Whirlpool, No. 27 at p. 6) DOE is not aware of any data showing the repeatability of clothes dryer test results for test cloth after 25 runs. DOE is also not aware of any data indicating that the wear on test cloth from a drying cycle is equivalent to that of a washing cycle. Thus, there is no evidence that warrants changing the test procedures to specify the same number of allowable test runs on clothes washer and clothes dryer test cloths. For these reasons, DOE is not amending the clothes dryer test procedure in today's final rule to change the number of test runs allowed on clothes dryer test cloth.

Whirlpool commented that the lot-to-lot test cloth correction factors used in the clothes washer test procedure are not used in the clothes dryer test procedure. Whirlpool stated that it is increasingly the case that clothes dryer test results are not repeatable across test cloth lots. Whirlpool stated its research suggests that adding the washer correction factors to the clothes dryer test procedure would substantially address this problem. (Whirlpool, No. 27 at p. 6) DOE is not aware of any data indicating variations in test results across different test cloth lots is significant enough to warrant amending the clothes dryer test procedure to include correction factors. In addition, DOE notes that the clothes washer RMC correction factor is based on extractor testing (spinning water out of the clothes load). Extractor testing can have

very different moisture removal characteristics than the applied heated air and slower tumbling to evaporate moisture during a clothes dryer cycle. DOE is not aware of any data indicating that the same correction factor from the clothes washer test procedure can be applied to the clothes dryer test procedure. For these reasons, DOE is not amending the clothes dryer test procedure to include a lot-to-lot test cloth correction factor in today's final rule. If data is made available documenting such lot-to-lot variation as well as validating that the RMC correction factor in the clothes washer test procedure can be applied to the clothes dryer test procedure, DOE may consider such amendments.

b. Relative Humidity Measurement Specifications

ALS commented that section 2.4.4 Dry & Wet Bulb Psychrometer of the DOE clothes dryer test procedure should be updated. ALS stated that DOE may want to remove any reference to a dry and wet bulb psychrometer, because electronic digital sensors exist that directly report the relative humidity and test labs should be allowed to utilize them. ALS commented that DOE needs to research humidity measurement electronic digital sensors and propose new limits for their accuracy and reporting. (ALS, No. 24 at p. 9)

DOE notes section 2.2.4 specifies that the dry and wet bulb psychrometer shall have an error no greater than ± 1 °F. DOE acknowledges that the dry and wet bulb psychrometer specifications for determining the relative humidity were developed in 1981 when the clothes dryer test procedure was last amended. Since that time, more advanced digital equipment has been developed for measuring relative humidity. DOE also acknowledges that the DOE test procedure for central air conditioners and heat pumps specifies the allowable error in the measurement of wet bulb temperature for determining the psychrometric state of air (the wet bulb temperature sensor must be accurate within ± 0.2 °F). That test procedure also specifies the allowable error for an alternative option of directly measuring the relative humidity (such a meter must be accurate to within ± 0.7 nominal percent relative humidity). 10 CFR part 430, subpart B, appendix M, § 2.5.6 DOE is not aware of data or information on how the allowable dry and wet bulb psychrometer measurement error of no greater than ± 1 °F would translate to measurement error specifications for relative humidity measurement equipment that could be used to determine an appropriate allowable error for the DOE clothes dryer test procedure. For these reasons, DOE is not adopting amendments to the dry bulb and wet bulb psychrometer specifications for determining the relative humidity. If data are made available indicating an appropriate range for the allowable error for relative humidity measurement equipment, however, DOE may consider amendments to the clothes dryer test procedure.

c. Calculations of EF and CEF

ALS commented that DOE needs to add the calculation for the EF, the newly proposed IEF,[40] or both to the clothes dryer test procedure. According to ALS, the clothes washer test procedure displays the calculation for the minimum energy efficiency descriptor (the modified energy factor). ALS stated the clothes dryer test procedure should likewise show how to calculate the value of clothes dryer minimum energy efficiency descriptor EF and/or IEF. (ALS, No. 24 at p. 9) AHAM also requested that DOE expressly state the equation for EF in the test procedure to provide optimal clarity for the regulated industry. (AHAM, No. 31 at p. 11)

DOE notes that the calculation for EF (and the proposed CEF) for clothes dryers can be found at 10 CFR 430.23(d). However, DOE acknowledges that other test procedures in the appendices of 10 CFR part 430, subpart B also include the calculations of the energy efficiency metric. For example, the clothes washer test procedure (10 CFR part 430, subpart B, appendix J1) includes the calculation, as noted by ALS. Including such calculations would help test technicians find the proper calculation for EF and CEF. For these reasons, DOE believes that the calculation for EF and CEF should be included in 10 CFR part 430, subpart B, appendix D1. Therefore, DOE amends the clothes dryer test procedure in today's final rule to include those calculations. DOE also amends 10 CFR part 430.23(d)(2) and (3) in today's final rule to clarify that the EF and CEF are to be determined in accordance with the appropriate sections in 10 CFR part 430, subpart B, appendix D1.

[40] DOE proposed to use the term Integrated Energy Factor (IEF) in the December 2008 TP NOPR. 73 FR 74639, 74650 (December 9, 2008). However, in the June 2010 TP SNOPR, DOE proposed to revise the name of the metric to Combined Energy Factor (CEF). 75 FR 37594, 37612 (June 29, 2010).

d. Measurement of Kilowatt Electricity Demand

SEDI recommended that kW electricity demand, in addition to kWh energy consumption, also be measured during the test procedure. SEDI added that different clothes dryer technologies can have very different electricity demand profiles. Typical electric clothes dryers available in North America today have powerful heating elements and may significantly contribute to system peak demand. SEDI commented that a more efficient clothes dryer with a lower contribution to peak demand may be even more cost-effective from perspective of electric utilities. (SEDI, No. 34 at p. 3) As discussed previously, EPCA provides that any test procedures prescribed or amended under this section shall be reasonably designed to produce test results which measure energy efficiency, energy use, water use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(3)) DOE believes that measuring the electricity demand profile of a clothes dryer to account for designs options that may reduce utility peak load demand would be inconsistent with the EPCA requirement for a test procedure to measure the energy use of a product. For this reason, DOE is not amending the clothes dryer test procedure to measure the electricity demand profile of a clothes dryer to account for the peak load demand of a clothes dryer.

e. Clarifications to the Measurement of Drum Capacity

The Joint Petitioners and AHAM commented that DOE should clarify section 3.1 of the clothes dryer test procedure regarding the measurement of drum capacity. The clarification would specify that the clothes dryer's rear drum surface be supported on a platform scale to "prevent deflection of the drum surface * * *" instead of "prevent deflection of the dryer." (Joint Petitioners, No. 25 at p. 14; Joint Petitioners, No. 30 at p. 8; AHAM, No. 31 at p. 11) DOE agrees with the comments that the reference to deflection of the "dryer" is unclear and should be clarified to specify that the clothes dryer's rear drum surface should be supported on a platform scale to prevent deflection of the drum surface. For this reason, DOE amends the clothes dryer test procedure to reflect this change.

f. Test Procedure Language

AHAM commented that manufacturers are having a difficult

time using the proposed test procedure because it is not written in a way that can be easily followed when running a test. AHAM commented that the extraneous portions derived from the IEC and Australia/New Zealand procedures create a confusing amalgam of testing situations that makes the procedure extremely difficult to conduct. AHAM stated that the test procedure itself needs to be evaluated, and they would like to see a more sequenced and applicable test procedure. (AHAM, Public Meeting Transcript, No. 20 at pp. 88–89, 126–127) AHAM commented that the AHAM HLD–1 committee will likely consider whether the test procedure amendments should be added as modifications to AHAM HLD–1, which is written in the test procedure format. AHAM stated that it would be helpful for DOE to identify explicitly how the proposed changes to the DOE test procedure could be reflected in AHAM HLD–1. AHAM added that manufacturers could test on a version of AHAM HLD–1 that incorporated the changes DOE identified and report what changes to test results have taken place. AHAM commented that it would also assist the AHAM HLD–1 committee in processing the changes because it is unlikely that the AHAM HLD–1 committee will want to run tests that are different from the DOE test procedure. (AHAM, Public Meeting Transcript, No. 20 at pp. 127–129)

DOE notes that its proposed clothes dryer test procedure is similar in structure to many other DOE test procedures, and DOE is not aware of the particular sections of the test procedure language that may be confusing or difficult to interpret. DOE also notes that it is not adopting the amendments to more accurately account for automatic cycle termination based on the provisions in AS/NZS Standard 2442, as discussed in section III.C.2. For these reasons, DOE does not believe that the test procedure needs to be restructured or re-written and is not including any additional revisions to the test procedure language.

D. Compliance With Other EPCA Requirements

1. Test Burden

Standby Mode and Off Mode

Section 323(b)(3) of EPCA requires that any test procedures prescribed or amended under this section shall be reasonably designed to produce test results which measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

For the proposed amendments to measure standby and off mode energy use, DOE tentatively concluded in the December 2008 TP NOPR that amending the relevant test procedures to incorporate clauses regarding test conditions and methods found in IEC Standard 62301 for measuring standby mode and off mode power consumption, along with the proposed clarifications and text corrections, would satisfy this requirement because the test methods and equipment that the amendments would require are not substantially different from the test methods and equipment in the current DOE test procedures for measuring the products energy consumption. Therefore, DOE stated the proposed test procedures would not require manufacturers to make major investments in test facilities and new equipment. 73 FR 74639, 74650 (December 9, 2008).

In the June 2010 TP SNOPR, DOE did not propose amendments to measure delay start and cycle finished modes in the clothes dryer test procedure. DOE instead proposed a simplified methodology in which the energy use associated with delay start and cycle finished modes, although determined to not be energy use in a standby mode, would be approximately represented by the measured energy in inactive and off modes. Therefore, because the proposal in the June 2010 TP SNOPR was less burdensome than the December 2008 TP NOPR proposal, DOE tentatively concluded that the proposed amendments to the clothes dryer test procedures for measuring standby and off modes adopted in June 2010 TP SNOPR are not unduly burdensome. 75 FR 37594, 37637 (June 29, 2010).

DOE proposed in the June 2010 TP SNOPR to provide manufacturers flexibility in setting the ambient conditions for standby mode and off mode testing for the room air conditioner test procedure. The proposed amendments to the room air conditioner test procedure specify maintaining the indoor test conditions at the temperature required by section 4.2 of IEC Standard 62301. Further, if the unit is tested in the cooling performance test chamber, the proposed amendments allow the manufacturer to maintain the outdoor test conditions either as specified for the DOE cooling test procedure or according to section 4.2 of IEC Standard 62301. Implementing those two specifications would mean that manufacturers would not have to build another facility to run the standby and off mode tests. In addition, DOE did not propose amendments that would specify measurement of energy use in delay start or off-cycle modes to the room air conditioner test procedure. DOE instead proposed a simplified methodology in which the energy use associated with delay start and off-cycle modes, although determined to not be energy use in a standby mode, would be approximately represented by the measured energy in inactive and off modes. For these reasons, DOE tentatively concluded that the test conditions proposed in the June 2010 TP SNOPR are not unduly burdensome and would result in representative standby mode and off mode energy consumption measurements. 75 FR 37594, 37637 (June 29, 2010).

As discussed in section III.B.2, AHAM, Whirlpool, and ALS commented that the requirement proposed in the June 2010 TP SNOPR to conduct standby and off mode testing for clothes dryers and room air conditioners in the settings that produce the highest power consumption level would result in extra test burden. This is because manufacturers will need to run several tests on every model in order to determine which cycle is the highest energy cycle (AHAM, No. 31 at pp. 4–5; Whirlpool, No. 27 at p. 1; ALS, No. 24 at pp. 1–2) DOE is not adopting the provisions for conducing standby and off mode testing in the settings that produce the highest power consumption level in today's final rule. DOE is instead incorporating by reference section 5.2 of IEC Standard 62301, which requires that the appliance be installed and set up in accordance with manufacturers instructions; if no instructions are given, then the appliance shall be tested at factory or "default" settings; and where there are no indications for such settings, the appliance shall be tested as supplied. DOE believes that such provisions would not require manufacturers to run several tests on every model to determine the appropriate mode, and therefore would not represent a testing burden.

For the reasons stated above and in the absence of additional comments, DOE concludes that the standby and off mode testing conditions for clothes dryers and room air conditioners adopted in today's final rule are not unduly burdensome, yet still produce representative standby mode and off mode energy consumption measurements.

Active Mode

In the June 2010 TP SNOPR, DOE noted that the proposed amendments to

its test procedure for clothes dryers to test automatic termination control dryers are based upon an international testing standard used to determine compliance with energy conservation standards for clothes dryers in Australia. A number of manufacturers that sell clothes dryers in the United States also sell clothes dryers in Australia, and therefore likely already test clothes dryers according to this test standard. DOE stated the proposed amendments would not require testing methods and equipment that are substantially different from the test methods and equipment in the current DOE test procedures. Therefore, manufacturers would not be required to make a major investment in test facilities and new equipment. 75 FR 37594, 37637 (June 29, 2010). As discussed in section III.C.2, DOE is not adopting in today's final rule the amendments for automatic cycle termination proposed in the June 2010 TP SNOPR.

In the June 2010 TP SNOPR, DOE also noted that the proposed amendments to its test procedure for residential clothes dryers to test ventless clothes dryers are based on an international test standard used throughout the EU to determine compliance with energy conservation standards. A number of manufacturers that sell clothes dryers in the United States also sell clothes dryers in the EU, and therefore likely already test clothes dryers according to this test standard. DOE stated the proposed amendments would not require testing methods and equipment that are substantially different from the test methods and equipment in the current DOE clothes dryer test procedure. 75 FR 37594, 37637 (June 29, 2010).

DOE noted that its proposed amendments to the clothes dryer test procedure to reflect current usage patterns and capabilities in the June 2010 TP SNOPR do not substantially change the testing procedures and methods. DOE noted that its proposed amendments to change the number of annual use cycles affects only the calculation of the estimated annual operating cost. The number of annual use cycles does not impact the testing procedures because the value is only used in the calculation of results. DOE also noted that the proposed amendments to change the initial RMC from 70 percent to 47 percent are intended to reflect current clothes loads after a wash cycle. DOE believes that such a change would likely require only a moderately longer spin time during test load preparation to achieve the proper lower moisture content. Finally, DOE noted that the proposed amendment to change the test load size for standard-size clothes dryers from 7.00 lb ± .07 lb to 8.45 lb ± .085 lb would not significantly impact the testing procedures because it only affects the amount of test cloth required to be used for the test cycle. The amendment also would not require manufacturers to make any significant new investment in test facilities and equipment. DOE stated in the June 2010 TP SNOPR that these proposed amendments to the DOE clothes dryer test procedure would produce test results that measure energy use of clothes dryers during a representative average use cycle. 75 FR 37594, 37637 (June 29, 2010).

DOE noted in the June 2010 TP SNOPR that the proposed amendments to update the references to external standards in the DOE room air conditioner test procedure are based on the availability of revised standards representing current industry practices and methods. The proposed amendments to reference ANSI/AHAM RAC–1–R2008 do not introduce any new changes in the measurement of cooling capacity or power input. The proposed amendments to reference ANSI/ASHRAE Standard 16–69 would introduce four new temperature measurements, provide increased test tolerances, and allow additional flexibility in the methodology for measuring capacity. DOE notes the four new temperature measurements would be measured simultaneously with the other measurements already required by the test procedure, and therefore would not require additional time to conduct the test. DOE stated in the June 2010 TP SNOPR that these proposed amendments would not require manufacturers to make any significant new investment in test facilities and equipment, nor require significant changes in the testing methodology. 75 FR 37594, 37637 (June 29, 2010).

For the reasons noted above, DOE tentatively concluded that the amendments to the active mode test procedures would produce representative test results for both residential clothes dryers and room air conditioners, and that testing under the test procedures would not be unduly burdensome to conduct. 75 FR 37594, 37638 (June 29, 2010).

ALS commented that there could be a test burden associated with the revised initial RMC requirements. ALS stated that it might not be able to achieve the 47 percent RMC proposed in the June 2010 TP SNOPR in one of their residential clothes washers due to the disconnect between the actual RMC and the corrected RMC values. (ALS, Public Meeting Transcript, No. 20 at pp. 166–167) AHAM commented that extracting moisture to the 47 percent RMC level would cause test cloth to deteriorate more quickly. Also, extracting moisture to the 47 percent RMC level would cause other problems. For example, to achieve the level it would be necessary to use an extractor, which would require spending significant sums of money. (AHAM, Public Meeting Transcript, No. 20 at pp. 167–168)

DOE notes that the tests conducted for the June 2010 TP SNOPR at an independent test lab prepared the clothes dryer test cloth with an RMC of 47 percent using a commercially available clothes washer. For the reasons discussed in section III.C.5.b, however, DOE adopts an initial RMC of 57.5 percent ± 3.5 percent for the clothes dryer test procedure in today's final rule. As a result, DOE believes that there would be no significant test burden associated with reaching this higher initial RMC value.

For the reasons stated above and in the absence of additional comments, DOE concludes that the amendments to the active mode test procedures in today's final rule would produce representative test results for both residential clothes dryers and room air conditioners, and that testing under the test procedures would not be unduly burdensome to conduct.

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

Section 325(gg)(2)(A) requires that standby mode and off mode energy consumption be "integrated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product" unless the current test procedures already fully account for the standby mode and off mode energy consumption or if such an integrated test procedure is technically infeasible. (42 U.S.C. 6295(gg)(2)(A)) For clothes dryers, today's final rule does not affect DOE's proposal in the December 2008 TP NOPR to incorporate the standby and off mode energy consumption into a "per-cycle combined total energy consumption expressed in kilowatt-hours" and into an CEF, as discussed in section III.B.5 of this notice. For room air conditioners, today's final rule does not affect DOE's proposal in the December 2008 TP NOPR to incorporate the standby and off mode energy consumption into a metric for "combined annual energy consumption" and into an CEER, as discussed in section III.B.5. In addition, DOE is amending the clothes dryer and room air conditioner test procedures in

today's final rule to incorporate standby and off mode energy consumption into the annual energy cost calculations, as discussed in section III.B.5.

IV. Effects of Test Procedure Revisions on Compliance With Standards

As noted in section I, DOE must determine to what extent, if any, the proposed test procedures would alter the measured energy efficiency of covered products as determined under the existing test procedures. If DOE determines that an amended test procedure would alter the measured efficiency of a covered product, DOE must amend the applicable energy conservation standard during the rulemaking carried out with respect to such test procedure. (42 U.S.C. 6293(e))

A. Standby Mode and Off Mode

As noted in section II, EPCA provides that amendments to the test procedures to include standby mode and off mode energy consumption will not determine compliance with previously established standards. (U.S.C. 6295(gg)(2)(C)) Because the proposed amended test procedures for standby mode and off mode energy consumption would not alter existing measures of energy consumption or efficiency for active mode, these amendments would not affect a manufacturer's ability to demonstrate compliance with previously established standards.

B. Active Mode—Clothes Dryers

DOE reviewed the amendments to the DOE clothes dryer active mode test procedure to evaluate the effects on the measured EF. The following sections discuss DOE's evaluation of each active mode amendment individually, as well as DOE's evaluation of the fully amended test procedure.

Automatic Cycle Termination

In the June 2010 TP SNOPR, DOE analyzed how the proposed changes to the DOE clothes dryer test procedure for automatic cycle termination controls discussed above in section III.C.2 would affect the measured EF of residential clothes dryers, as required by EPCA. 75 FR 37594, 37618 (June 29, 2010). As part of DOE's preliminary analyses for the energy conservation standards rulemaking for clothes dryers, DOE concluded that virtually all clothes dryers currently available on the U.S. market that are covered under the current energy conservation standards are equipped with some form of automatic cycle termination sensing. Therefore, DOE analyzed in the June 2010 TP SNOPR how the proposed changes to the clothes dryer test procedure for automatic termination control dryers would affect the measured EF of residential clothes dryers with such a feature. 75 FR 37594, 37618 (June 29, 2010).

DOE noted in the June 2010 TP SNOPR that the proposed amendment to change the field use factor from 1.04 to 1.0 for automatic termination control dryers would result in a 4-percent increase in EF for a dryer that has an automatic cycle termination setting capable of drying the test load to 5-percent RMC. In addition, DOE noted the proposed target final RMC of 5 percent or lower would result in an increase in EF of about 2.4 percent (assuming a starting RMC of 47 percent). This is as compared to the current DOE test procedure, which uses a correction factor in order to determine the energy consumption required to dry the test load to a final RMC of 4 percent. DOE also stated in the June 2010 TP SNOPR that a clothes dryer that is only minimally compliant with current energy conservation standards would likely use a less accurate automatic termination control system. DOE stated that such a dryer would possibly over-dry the test load below 5-percent RMC such that the energy consumption and measured EF would be equivalent to that measured by the existing DOE clothes dryer test procedure. As a result, DOE stated that it does not believe that any changes to the current energy conservation standards as a result of the proposed amendments to the test procedure to account for automatic cycle termination would be warranted. 75 FR 37619–20. Because DOE did not have data regarding how the proposed changes to the clothes dryer test procedure for automatic termination control dryers would affect the measured EF of residential clothes dryers with such a feature, however, DOE requested comment on this tentative conclusion in the June 2010 TP SNOPR. *Id.*

The Joint Petitioners and AHAM commented that if the full cycle test (including cool-down) is adopted, DOE must also revise the relevant energy conservation standards to reflect the new test procedure, ensuring no change in the stringency of the standards for clothes dryers with effective automatic termination controls, as per section 323 of EPCA. The Joint Petitioners and AHAM stated that, specifically, the procedures in section 323(e)(2) should be used, with the clarification that for the purposes of establishing a representative sample of products, DOE should choose a sample of minimally compliant clothes dryers that automatically terminate the drying cycle at no less than 4-percent RMC. The Joint Petitioners and AHAM also stated that there will be additional energy savings by improving the effectiveness of automatic termination controls. (Joint Petitioners, No. 30 at p. 6; AHAM, No. 31 at pp. 30–31)

The California Utilities/NRDC commented that they are very concerned with DOE's proposal to not revise the current energy conservation standard levels as a result of its analysis of the test procedure amendments to account for automatic cycle termination. They are also concerned about DOE's interpretation of the definition of a "minimally compliant" clothes dryer in the June 2010 TP SNOPR. The California Utilities/NRDC noted that clothes dryers with less accurate automatic termination controls may actually over-dry beyond the specified RMC in the field. They also stated that clothes dryers with less accurate automatic termination controls will not exhibit equivalent energy consumption and measured EF under the new test procedure; should not be used as a basis for DOE's analysis; and should not be considered automatically compliant under the new test procedure. (California Utilities/NRDC, No. 33 at pp. 6–7)

The California Utilities/NRDC further stated that clothes dryers with operational automatic cycle termination controls will dry the clothes to an appropriate range of RMC without over-drying (between 2.5- and 5-percent RMC). They also stated that such clothes dryers should have about the same measured per-cycle energy use under both the current and proposed test procedures. The California Utilities/NRDC stated, however, that by changing the calculation for per-cycle energy use, and changing the field use factor to 1.0, the calculated final per-cycle energy use for automatic termination control dryers will decrease. The California Utilities/NRDC stated that the new test procedure would make these clothes dryers with operational controls appear to be more efficient and have a higher EF than under the current test procedure. The EF for these clothes dryers would increase by 4-percent through the change in the field use factor alone. The California Utilities/NRDC stated that, based on their calculations, all clothes dryers that dry to between 2.5- and 5-percent RMC would have a higher measured EF. They stated that the energy conservation standards should be revised to reflect this measured higher EF. The California Utilities/NRDC commented that for dryers with less accurate automatic termination controls, EF would decrease because of

the over-drying energy consumption mesaured using the the new test procedure. The California Utilities/NRDC stated that adjustments to EF would be required to account for the new test procedure, per-cycle energy use calculation, and change in the field use factor. (California Utilities/NRDC, No. 33 at pp. 7–8)

The California Utilities/NRDC stated they are concerned that by not changing the clothes dryer standards accordingly DOE's current approach may qualify as backsliding prohibited by EPCA's "anti-backsliding" provision. The California Utilities/NRDC stated that under DOE's proposed approach, many compliant clothes dryers could test with lower per-cycle energy use and higher EF, than currently. By not adjusting the maximum allowable energy use (and minimum allowable EF) for such dryers, DOE risks effectively weakening the standard. (California Utilities/NRDC, No. 33 at p. 8) The California Utilities/NRDC proposed that DOE adjust its proposed candidate standard levels to a level consistent with the performance of a selection of dryers that are "minimally compliant" under both the current and proposed test procedure. The California Utilities/NRDC also recommended that when DOE selects a representative sample of minimally compliant clothes dryers, it choose models that automatically terminate at between 2.5- and 5-percent RMC. They explained that this approach would remove clothes dryers with less accurate automatic termination controls that comply under the current testing procedure and ensure that new standards are appropriately adjusted, so that the standard is not overly weak. *Id.*

As discussed in section III.C.2, DOE is not adopting the amendments to better account for automatic cycle termination proposed in the June 2010 TP SNOPR. For this reason, DOE is not revising the energy conservation standards based on the amendments for automatic cycle termination proposed in the June 2010 TP SNOPR. If DOE considers potential amendments for automatic cycle termination in a future rulemaking, it will consider any necessary revisions to the energy conservation standards.

Water Temperature for Clothes Dryer Test Load Preparation

DOE tested the 17 clothes dryers to evaluate the effects on measured EF to change the water temperature for clothes dryer test load preparation from 100 °F ± 5 °F to 60 °F ± 5 °F, as discussed in section III.C.2. DOE tested these units according to the current DOE clothes dryer test procedure, first with a water temperature for clothes dryer test load preparation of 100 °F ± 5 °F, and then with a water temperature of 60 °F ± 5 °F. For the ventless clothes dryer test units, DOE additionally used the proposed testing method for ventless dryers presented in section III.C.3. For each water temperature, DOE conducted up to three tests for each test unit and the results were averaged. Table IV.1 below shows the results from this testing, which indicate that, on average, measured EF decreases by about 2.9 percent when the water temperature for clothes dryer test load preparation is reduced from 100 °F ± 5 °F to 60 °F ± 5 °F. DOE also notes the variation in the percentage change in EF from model to model due to the change in water temperature may also be due to other test condition tolerances in the test procedure, such as the specified ranges for ambient temperature and relative humidity.

TABLE IV.1 DOE TEST RESULTS TO EVALUATE THE EFFECTS OF CHANGES TO THE WATER TEMPERATURE FOR CLOTHES DRYER TEST LOAD PREPARATION

Test unit	Average EF *lb/kWh*		% Change
	100° ± 5 °F Water temp	60° ± 5 °F Water temp	
Vented Electric Standard:			
Unit 1	3.07	3.00	−2.2
Unit 2	3.14	3.05	−3.1
Unit 3	3.20	3.10	−3.2
Unit 4	3.28	3.22	-1.9
Unit 5	3.24	3.17	−2.0
Unit 6	3.12	2.98	−4.6
Vented Gas:			
Unit 7	2.78	2.72	−2.4
Unit 8	2.83	2.92	3.1
Unit 9	2.85	2.64	−7.2
Unit 10	2.80	2.69	−3.7
Unit 11	2.98	2.79	−6.4
Vented Electric Compact (240V):.			
Unit 12	3.19	2.95	−7.7
Unit 13	2.93	2.84	−3.2
Vented Electric Compact (120V):			
Unit 14	3.23	3.11	−4.0
Ventless Electric Compact (240V):			
Unit 15	2.37	2.22	−6.1
Ventless Electric Combo Washer-Dryer:			
Unit 16	2.01	1.96	−4.0
Unit 17	2.50	2.60	3.8

Test Procedure for Ventless Clothes Dryers

The amendments for ventless clothes dryers are applicable to products not covered under the current DOE test procedure. For this reason, the amendments in today's final rule for ventless clothes dryers discussed in section III.C.3 would not affect the existing EF ratings of residential clothes dryers. Therefore, no change to the current clothes dryer energy conservation standards would be required. (42 U.S.C. 6293(e))

Detergent Specifications for Clothes Dryer Test Cloth Preconditioning

DOE stated in the June 2010 TP SNOPR that it is unaware of any data indicating that changes to the detergent specifications for test cloth preconditioning discussed in section III.C.4 would affect efficiency measurements. DOE stated that the proposed amendments in the June 2010 TP SNOPR changing the detergent specifications for test cloth preconditioning would not affect the EF rating of residential clothes dryers and would not require the existing energy conservation standards for these products to be revised because DOE is not aware of any data indicating the changes to the detergent formula affects the ability of the clothes dryer to remove moisture from the clothes load during the drying cycle. For the reasons stated above and in the absence of comments objecting to this determination, DOE continues to believe that the change to the detergent specifications would not affect the EF rating of clothes dryers.

Clothes Dryer Number of Annual Cycles

The amendments for the number of annual use cycles, discussed in section III.C.5.a, affect only the estimated annual operating cost for all clothes dryers. The EF rating for clothes dryers is expressed in terms of the total energy use per drying cycle. Because the EF rating is measured on a per-cycle basis, the number of annual use cycles is not used in the calculation. For this reason, DOE stated in the June 2010 TP SNOPR that the proposed amendments to change the number of clothes dryer annual use cycles would not affect the EF rating of residential clothes dryers. Therefore, the proposed amendments would not require the existing energy conservation standards for these products to be revised.

Whirlpool commented that the change in the number of annual use cycles has a linear effect ((416–283)/416 = 32 percent), and therefore the clothes dryer would be rated as consuming 32 percent less energy under the proposed under the proposed test procedure. (Whirlpool, No. 27 at p. 5) The California Utilities/NRDC supported DOE's proposed revisions to the energy conservation standards to account for changes to the cycles per year. (California Utilities/NRDC, No. 33 at p. 6) DOE first notes it did not propose any revisions to the energy conservation standards to account for changes to the number of clothes dryer cycles per year. DOE notes that the current energy conservation standards for clothes dryers are based on EF and that changes to the number of annual use cycles does not affect EF for clothes dryers. As a result, DOE continues to believe that the amendments to change the number of clothes dryer annual use cycles would not affect the EF rating of residential clothes dryers. Therefore, the amendments would not require the existing energy conservation standards for these products to be revised.

Clothes Dryer Initial Remaining Moisture Content

In the June 2010 TP SNOPR, DOE evaluated how the amendments to the clothes dryer initial RMC discussed in section III.C.5.b affect the measured EF. DOE estimated, based on results of testing conducted at an independent testing laboratory, that the measured EF increases by 41 percent when the initial RMC is reduced to 47 percent. DOE stated that if the proposed amendments to change the initial RMC from 70 percent ± 3.5 percent to 47 percent ± 3.5 percent were implemented, current energy conservation standards in terms of EF for vented clothes dryer product classes would need to increase by 41 percent. 75 FR 37594, 37631 (June 29, 2010).

The California Utilities/NRDC supported DOE's proposed revisions to the energy conservation standards to account for changes in the initial RMC. (California Utilities/NRDC, No. 33 at p. 6) Whirlpool commented that the change in RMC is not linear, but that it does not have sufficient data to fully address how this would be reflected in total energy consumption. Whirlpool recommended that further study regarding the impact of changing the RMC on the energy factor be undertaken. Whirlpool added that if DOE were to make a specific request to AHAM for such data, Whirlpool would be willing to gather and supply information to AHAM for aggregation and submittal to DOE. (Whirlpool, No. 27 at pp 4, 5) The Joint Petitioners and AHAM both supported increasing EF for vented clothes dryer product classes to account for the change in initial RMC. The Joint Petitioners and AHAM also stated that they do not currently have data to quantify the increase, but upon DOE request would gather data to determine an appropriate increase. (Joint Petitioners, No. 30 at p. 7; AHAM, No. 31 at p. 9) The California Utilities/NRDC supported DOE's proposed revisions to the energy conservation standards to account for changes in test load weight, initial RMC, and cycles per year. (California Utilities/NRDC, No. 33 at p. 6) ALS supported the manner in which DOE has analyzed the impact of its proposed revisions to the test procedure on the minimum standard. ALS requested the analysis be conducted using a methodology consistent with the ALS proposal of an initial RMC of 53 percent. (ALS, No. 24 at p. 8)

After issuance of the June 2010 TP SNOPR, DOE conducted additional clothes dryer testing on 17 representative clothes dryers to evaluate the effects of the proposed amendment to change the initial RMC from 70 percent ± 3.5 percent to 57.5 percent ± 3.5 percent for the measured efficiency. DOE tested these units according to the current DOE clothes dryer test procedure with an initial RMC of 70 percent ± 3.5 percent and with an initial RMC of 57.5 percent ± 3.5 percent. For the ventless clothes dryer test units, DOE additionally used the proposed testing method for ventless dryers presented in section III.C.3. For each initial RMC, DOE conducted up to three tests for each test unit and the results were averaged Table IV.2 below shows the results from the tests. The results indicate that, on average, EF increases by about 17.1 percent when the initial RMC is changed from 70 percent ± 3.5 percent to 57.5 percent ± 3.5 percent.

TABLE IV.2—DOE TEST RESULTS TO EVALUATE THE EFFECTS OF CHANGES TO THE INITIAL RMC

Test unit	Average EF *lb/kWh*		% Change
	70% ± 3.5% RMC	57.5% ± 3.5% RMC	
Vented Electric Standard:			
Unit 1	3.07	3.67	19.8
Unit 2	3.14	3.62	15.1
Unit 3	3.20	3.83	19.6
Unit 4	3.28	3.79	15.5

TABLE IV.2—DOE TEST RESULTS TO EVALUATE THE EFFECTS OF CHANGES TO THE INITIAL RMC—Continued

Test unit	Average EF *lb/kWh*		% Change
	70% ± 3.5% RMC	57.5% ± 3.5% RMC	
Unit 5	3.24	3.91	20.9
Unit 6	3.12	3.70	18.7
Vented Gas:			
Unit 7	2.78	3.32	19.1
Unit 8	2.83	3.43	20.9
Unit 9	2.85	3.23	13.3
Unit 10	2.80	3.29	17.5
Unit 11	2.98	3.40	14.2
Vented Electric Compact (240V):			
Unit 12	3.19	3.61	13.2
Unit 13	2.93	3.45	17.7
Vented Electric Compact (120V):			
Unit 14	3.23	4.08	26.1
Ventless Electric Compact (240V):			
Unit 15	2.37	2.74	15.9
Ventless Electric Combo Washer-Dryer:			
Unit 16	2.01	2.33	15.8
Unit 17	2.50	2.70	8.0

Clothes Dryer Test Load Weight

As noted previously, EF for clothes dryers is the bone-dry test load weight divided by the clothes dryer energy consumption per cycle. DOE notes that the proposed amendments to the test load size, discussed in section III.C.5.c, would increase both the bone-dry test load weight and the energy consumption per cycle. For example, for a test in which the nominal RMC of the test load is reduced from an initial 70 percent to a final 4 percent, an 8.45-lb test load would require about 5.6 lb of water to be removed during the drying cycle. However, a 7-lb. test load would require only 4.6 lb. of water to be removed. DOE also notes that as lower nominal RMCs are reached at the end of the test cycle, the rate and efficiency of water removal from the load would be higher for the larger test load. This is because there would simply be more water in the load, hence making it easier to remove.

In the June 2010 TP SNOPR, DOE reviewed research on the effects of changing the load size on the measured efficiency to determine a quantifiable estimate of the change in the measured EF. 75 FR 37594, 37632 (June 29, 2010). NIST conducted testing to investigate the effects of changing the clothes dryer load size on the measured efficiency of a vented electric standard clothes dryer with a capacity of 6.3 ft^3.[41] NIST tested the clothes dryer according to the DOE clothes dryer test procedure, except the test load size varied from 2–15 lb. Table IV.3 presents the results of the NIST testing, which shows an increase in EF when the load size was increased in 7–9 lb. range, which for the purpose of analysis corresponds to the 7–8.45 lb. range.

TABLE IV.3—NIST VENTED ELECTRIC STANDARD CLOTHES DRYER VARIABLE TEST LOAD DATA

Test Number	1	2	3	4	5	6	7	8
Room Temperature, °*F*	74.1	74.4	73.8	73.3	73.8	74.1	74.4	74.4
Room Humidity, *%*	40	38	38	33	42	38	40	36
Nominal Bone-Dry Weight, *lb*	2	3	5	7	9	11	13	15
Measured Bone-Dry Test Load Weight, *lb*	1.99	2.99	4.99	7.00	8.99	10.98	13.01	15.01
Measured Dry Test Load Weight, *lb*	2.05	3.06	5.17	7.99	9.11	11.56	13.57	15.71
Measured Wet Test Load Weight, *lb*	3.40	5.10	8.50	11.89	15.34	18.98	22.04	25.56
Measured Energy Consumption, *kWh*	0.953	1.159	1.593	2.112	2.667	3.250	3.796	4.384
Initial RMC, *%*	70.30	70.67	70.52	69.99	70.67	72.81	69.35	70.34
Final RMC, *%*	2.84	2.48	3.73	2.88	1.28	5.27	4.29	4.67
Per-Cycle Energy Consumption, *kWh*	0.970	1.167	1.637	2.160	2.638	3.303	4.005	4.582
EF, *lb/kWh*	2.06	2.56	3.04	3.24	3.41	3.33	3.25	3.27
Percentage Change in EF Compared to 7-lb Test, *%*	−36.6	−20.9	−6.0	0.0	5.2	2.7	0.3	1.1

In the June 2010 TP SNOPR, DOE estimated the percentage change in EF for an 8.45-lb test load by linearly interpolating the results for the 7-lb and 9-lb tests. Estimates based on this method showed the EF increase by about 3.8 percent when the test load size increased from 7 lb. to 8.45 lb. DOE stated that this percentage change in EF can be applied to all vented standard-size clothes dryer product classes because the moisture removal mechanisms are comparable among them. For these reasons, DOE stated that if the proposed amendments to increase the test load size to 8.45 ± .085 lb for standard-size clothes dryers were implemented, the current energy conservation standards in terms of EF for vented standard-size clothes dryer product classes would need to be

[41] J. Y. Kao. Energy Test Results of a Conventional Clothes Dryer and a Condensing Clothes Dryer. pp. 11–*21 1999. International Appliance Technical Conference, 49th. Proceedings. May 4–6,, 1998.*

increased by 3.8 percent. 75 FR 37594, 37632 (June 29, 2010).

The California Utilities/NRDC supported DOE's proposed revisions to the energy conservation standards to account for changes to the test load weight. (California Utilities/NRDC, No. 33 at p. 6) Whirlpool commented that the change in load size is not linear, but that it does not have sufficient data to fully address how this would be reflected in total energy consumption. Whirlpool commented that if DOE were to make a specific request to AHAM for such data, Whirlpool would be willing to gather and supply information to AHAM for aggregation and submittal to DOE. (Whirlpool, No. 27 at p. 5) The Joint Petitioners and AHAM supported DOE's proposal to revise the relevant energy conservation standards to reflect the new test load weight. The Joint Petitioners and AHAM stated they do not currently have data that would support a specific test load weight, but upon DOE request would gather such data. (Joint Petitioners, No. 30 at p. 7; AHAM, No. 31 at p. 9)

DOE conducted additional clothes dryer testing after issuance of the June 2010 TP SNOPR on 11 representative standard size clothes dryers to evaluate the effects of the proposed amendment to increase the test load size for standard-size clothes dryers on the measured efficiency. DOE tested these units according to the current DOE clothes dryer test procedure with a 7.00 ± .07 lb load and at the increased test load size of 8.45 ± .085 lb for standard-size clothes dryers. For the ventless clothes dryer test units, DOE additionally used the proposed testing method for ventless dryers presented in section III.C.3. For each test load weight, DOE conducted up to three tests for each test unit and the results were averaged. Table IV.4 below shows the results from this testing, which indicate that, on average, measured EF increases by about 2.6 percent when the test load weight is increased to 8.45 ± .085 lb for standard-size clothes dryers. DOE believes the 2.6 percent increase in measured EF represents a more accurate estimate than the 3.8 percent increase because the 2.6 percent increase in measured EF is based on more extensive testing on a representative sample of clothes dryers.

TABLE IV.4—DOE TEST RESULTS TO EVALUATE THE EFFECTS OF CHANGES TO TEST LOAD WEIGHT FOR STANDARD-SIZE CLOTHES DRYERS

Test unit	Average EF *lb/kWh*		Percent change
	7.00 ± .07 lb	8.45 ± .085 lb	
Vented Electric Standard:			
Unit 1	3.07	3.13	2.0
Unit 2	3.14	3.21	2.1
Unit 3	3.20	3.28	2.5
Unit 4	3.28	3.50	6.7
Unit 5	3.24	3.34	3.1
Unit 6	3.12	3.13	0.4
Vented Gas:			
Unit 7	2.78	2.85	2.5
Unit 8	2.83	2.93	3.3
Unit 9	2.85	3.00	5.2
Unit 10	2.80	2.77	−0.9
Unit 11	2.98	3.02	1.5

All Active Mode Amendments

DOE also analyzed how the fully amended test procedure would affect the measured EF as compared to the existing test procedure. In the June 2010 TP SNOPR, DOE tested and analyzed minimally compliant clothes dryers, and reviewed available research. DOE found that the proposed amendments to the initial RMC would increase the measured EF of minimally compliant clothes dryers by 41 percent, while the proposed amendments to the test load size for standard-size clothes dryers would increase the measured EF for standard-size dryers by 3.8 percent. DOE also found that because of the proposed amendments in the June 2010 TP SNOPR, the measured EF of minimally compliant clothes dryers would increase by about 41 percent for compact-size clothes dryers and about 46 percent for standard-size clothes dryers (determined multiplying the 41 percent increase for the decrease in the initial RMC by the 3.8 percent increase for the increase in test load size for standard-size clothes dryers). 75 FR 37594, 37638 (June 29, 2010).

The Joint Petitioners stated that the final rule amending the clothes dryer test procedure should also amend the standards in their Joint Petition. The standards in the Joint Petition would be amended according to the procedures in section 323(e)(2), except that to establish a representative sample of products, DOE shall choose a sample of minimally compliant clothes dryers that automatically terminate the drying cycle at no less than 4 percent RMC. (Joint Petitioners, No. 25 at p. 6) In conducting the analysis under 42 U.S.C. 6293(3)(2) for the current clothes dryer energy conservation standards, DOE notes that as discussed in section I, EPCA requires that in determining the amended energy conservation standard, DOE must measure, pursuant to the amended test procedure, the energy efficiency, energy use, or water use of a representative sample of covered products that minimally comply with the existing standard and that the average of such energy efficiency, energy use, or water use levels determined under the amended test procedure shall constitute the amended energy conservation standard for the applicable covered products. (42 U.S.C. 6293(e)(2)) DOE notes that EPCA requires testing of a representative sample of minimally compliant products, and that the measurement of only clothes dryers that automatically terminate the drying cycle at no less than 4 percent RMC would not constitute a representative sample. In addition, for the reasons discussed in section III.C.2, DOE is not adopting in today's final rule the amendments for automatic cycle termination proposed in the June 2010 TP SNOPR. For these reasons, DOE does not intend to consider such limitations for product testing to determine the effects of the amended test procedure on the measured efficiency.

DOE conducted clothes dryer testing on a sample of 17 representative clothes dryers after issuance of the June 2010

TP SNOPR to evaluate the effects of all of the amendments on the clothes dryer test procedure on the measured EF. DOE tested these units according to the amended clothes dryer test procedure in today's final rule. DOE conducted up to three tests for each test unit and the results were averaged. The results from this testing are shown in Table IV.5. For vented electric standard-size clothes dryers, the measured EF increases by an average of about 20.1 percent as a result of the amendments to the test procedure in today's final rule. For vented gas clothes dryers, the measured EF increased by an average of about 19.8 percent. For vented electric compact-size 120V and 240V clothes dryers, the measured EF increased by an average of about 15.6 and 12.8 percent, respectively. For ventless electric compact 240V clothes dryers and ventless electric combination washer/dryers, the measured EF increased by an average of about 13.6 and 11.4 percent, respectively. DOE notes that the increase in measured EF is greater for the standard-size products (that is, for vented electric standard-size and vented gas clothes dryers) than for compact-size products due to the additional amendments that specify increased test load sizes for standard-size products. These measured increases in EF are different from the values presented in the June 2010 TP SNOPR, and shown above in this section. This is because the initial RMC was changed from 47 percent to 57.5 percent and the change to the water temperature specified for test load preparation. These values are also based on more extensive testing on a representative sample of clothes dryers.

TABLE IV.5—DOE TEST RESULTS TO EVALUATE THE EFFECTS OF THE TEST PROCEDURE AMENDMENTS ON MEASURED EF

Test unit	Average EF *lb/kWh*		Percent change
	Current test procedure	Amended test procedure	
Vented Electric Standard:			
Unit 1	3.07	3.69	20.4
Unit 2	3.14	3.77	19.5
Unit 3	3.20	3.83	19.6
Unit 4	3.28	3.92	19.4
Unit 5	3.24	3.96	22.5
Unit 6	3.12	3.72	19.1
Vented Gas:			
Unit 7	2.78	3.36	20.6
Unit 8	2.83	3.40	19.9
Unit 9	2.85	3.42	20.2
Unit 10	2.80	3.37	20.5
Unit 11	2.98	3.50	17.6
Vented Electric Compact (240V):			
Unit 12	3.19	3.56	11.4
Unit 13	2.93	3.35	14.2
Vented Electric Compact (120V):			
Unit 14	3.23	3.74	15.6
Ventless Electric Compact (240V):			
Unit 15	2.37	2.69	13.6
Ventless Electric Combo Washer-Dryer:			
Unit 16	2.01	2.27	12.5
Unit 17	2.50	2.76	10.3

Table IV.6 shows how the current energy conservation standards would be affected by the amendments to the DOE clothes dryer test procedure. DOE will consider such changes in the concurrent energy conservation standards rulemaking for clothes dryers and room air conditioners.

TABLE IV.6—ENERGY FACTOR OF A MINIMALLY COMPLIANT CLOTHES DRYER WITH THE CURRENT AND PROPOSED AMENDED TEST PROCEDURE

Product class	Energy factor *lb/kWh*	
	Current test procedure	Proposed amended test procedure
1. Electric, Standard (4.4 ft^3 or greater capacity)	3.01	3.62
2. Electric, Compact (120 v) (less than 4.4 ft^3 capacity)	3.13	3.62
3. Electric, Compact (240 v) (less than 4.4 ft^3 capacity)	2.90	3.27
4. Gas	2.67	3.20

Because the clothes dryer test procedure amendments for active mode would substantially change the existing EF metric, DOE has decided to create a new appendix D1 in 10 CFR 430 subpart B. This appendix contains a clothes dryer test procedure that manufacturers would be required to use on the mandatory compliance date of any

amended clothes dryer energy conservation standards. DOE is required by consent decree to publish the final rule for any amended clothes dryer energy conservation standards rulemaking by June 30, 2011, and the compliance date of any amended standards is expected to be 3 years later. Manufacturers must continue to use appendix D to subpart B of part 430 for clothes dryers until compliance with any amended energy conservation standards at 10 CFR 430.32(h) is required, at which point use of the procedures at appendix D1 will be required.

C. Active Mode—Room Air Conditioners

As discussed in section III.C.6, DOE amends the room air conditioner test procedure in today's final rule to update the references to the industry test standards, ANSI/AHAM RAC–1–R2008 and ANSI/ASHRAE Standard 16–1983 (RA 2009). These amendments provide more accurate and repeatable measurements of capacity while providing greater flexibility to manufacturers in selecting equipment and facilities but do not impact the measurement of EER. Because DOE's review of the room air conditioner test procedure amendments tentatively concluded that the measured EER would not be affected, manufacturers must continue to use appendix F to measure room air conditioner active mode energy use. Manufacturers would not be required to use the proposed provisions for standby mode and off mode energy use (specifically, sections 2.2, 3.2, 4.2, and 5.3) until the mandatory compliance date of any amended room air conditioner energy conservation standards.

The Joint Petitioners proposed that the final rule amending the room air conditioner test procedure must also amend the standards in the Joint Petition according to the procedures in section 323(e)(2). (Joint Petitioners, No. 25 at p. 7) As noted above, DOE believes that the amendments to the room air conditioner test procedure in today's final rule would not affect the measured efficiency of covered products, and DOE is not aware of any data indicating otherwise. For these reasons, DOE continues to believe that revisions to the energy conservation standards for room air conditioners are not warranted.

All representations related to standby mode and off mode energy consumption of both clothes dryers and room air conditioners made 180 days after the publication of today's test procedure final rule in the **Federal Register** and before the compliance date of amended energy conservation standards must be based upon the standby mode and off mode requirements of the amended test procedures. The requirements are specified in appendix D1 for clothes dryers, and in amended appendix F for room air conditioners.

V. Procedural Requirements

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 proposed action was not subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB).

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of an initial regulatory flexibility analysis for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, "Proper Consideration of Small Entities in Agency Rulemaking," 67 FR 53461 (Aug. 16, 2002), DOE published procedures and policies on February 19, 2003 to ensure that the potential impacts of its rules on small entities are properly considered during the rulemaking process. 68 FR 7990. DOE's procedures and policies may be viewed on the Office of the General Counsel's Web site (*http://www.gc.doe.gov*).

DOE reviewed today's final rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. This final rule prescribes amendments to test procedures that will be used to test compliance with energy conservation standards for clothes dryers and room air conditioners that are described in detail elsewhere in the preamble. DOE certifies that this final rule will not have a significant impact on a substantial number of small entities. The factual basis for this certification is as follows.

The Small Business Administration (SBA) considers an entity to be a small business if, together with its affiliates, it employs less than a threshold number of workers specified in 13 CFR part 121. The thresholds set forth in these regulations are based on size standards and codes established by the North American Industry Classification System (NAICS).[42] The threshold number for NAICS classification for 335224, "Household Laundry Equipment Manufacturing," which includes clothes dryer manufacturers, is 1,000 employees. Additionally, the threshold number for NAICS classification for 335415, "Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing," which includes room air conditioner manufacturers, is 750 employees.

Most of the manufacturers supplying clothes dryers and room air conditioners are large multinational corporations. As part of the energy conservation standards rulemaking for residential clothes dryers and room air conditioners, DOE requested comment on whether there are any manufacturer subgroups, including potential small businesses, that it should consider for its analyses. DOE did not receive any comments regarding whether there are any residential clothes dryer or room air conditioner manufacturers that would be considered small businesses. DOE then conducted a more focused inquiry of the companies that could be small business manufacturers of products covered by this rulemaking. During its market survey, DOE used all available public information to identify potential small manufacturers. DOE's research included the AHAM membership directory, product databases (the AHRI, AHAM, CEC, and ENERGY STAR databases), individual company websites, and the SBA dynamic small business search[43] to find potential small business manufacturers. DOE also asked interested parties and industry representatives if they were aware of any other small business manufacturers during manufacturer interviews conducted and at DOE public meetings for the energy conservation standards rulemakings. DOE also contacted various companies, as necessary, to determine whether they met the SBA's definition of a small business manufacturer of covered residential clothes dryers or room air conditioners. DOE screened out companies that did not offer products covered by this rulemaking, did not meet the definition of a "small business," or are foreign owned and operated.

DOE initially identified at least 14 manufacturers of residential clothes

[42] For more information visit: *http://www.sba.gov/.*

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

dryers that sold products in the United States. DOE determined that 13 of these companies exceeded the SBA's maximum number of employees or foreign-owned and operated. Thus, DOE identified only one potential small business manufacturer of residential clothes dryers but could not locate this manufacturer on the dynamic small business search on the SBA website. In addition, upon further review, DOE does not believe that the small business is a clothes dryer manufacturer. While the manufacturer has developed a highly efficient technology that, while not yet commercially available, could be used by other manufacturers to increase the efficiency of clothes dryers, it does not produce clothes dryers. Because the company plans to produce only a technology for clothes dryers that is not yet commercially available, this potential small business manufacturer has no market share of the residential clothes dryer market.

For room air conditioners, DOE initially identified at least 11 manufacturers of room air conditioners that sold products in the United States. DOE determined that 10 of these were large or foreign-owned and operated. In addition, DOE subsequently determined that the one room air conditioner manufacturer that was previously designated as a small business manufacturer now exceeds SBA's employment threshold for consideration as a small business under the appropriate NAICS code specified above.

DOE received no comments on the certification, and comments on the testing burden are discussed elsewhere in the preamble and did not result in changes to the certification. For these reasons, DOE certifies that the amendments in today's final rule will not have a significant economic impact on a substantial number of small entities.

Based on the above, DOE has not prepared a regulatory flexibility analysis for this rulemaking. DOE transmitted the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the SBA for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of clothes dryers and room air conditioners must certify to DOE that their products comply with any applicable energy conservation standard. In certifying compliance, manufacturers must test their products according to the DOE test procedures for clothes dryers and room air conditioners, including any amendments adopted for those test procedures. DOE has proposed regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including clothes dryers and room air conditioners. 75 FR 56796 (Sept. 16, 2010). 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 submitted to OMB for approval. 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.

Public comment is sought regarding: Whether this proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information shall have practical utility; the accuracy of the burden estimate; ways to enhance the quality, utility, and clarity of the information to be collected; and ways to minimize the burden of the collection of information, including through the use of automated collection techniques or other forms of information technology. Send comments on these or any other aspects of the collection of information to Subid Wagley at the **ADDRESSES** above, and e-mail to *Christine_J._Kymn@omb.eop.gov.*

Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

D. Review Under the National Environmental Policy Act of 1969

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

E. Review Under Executive Order 13132

Executive Order 13132, "Federalism," imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. 64 FR 43255 (August 10, 1999). The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States, and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process that it will follow in developing such regulations. 65 FR 13735. DOE examined this final rule and determined that it will not preempt State law and will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of today's final rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) Therefore, Executive Order 13132 requires no further action.

F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, "Civil Justice Reform," 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) Eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; (3) provide a clear legal standard for affected conduct rather than a general standard; and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make

every reasonable effort to ensure that the regulation specifies the following: (1) The preemptive effect, if any; (2) any effect on existing Federal law or regulation; (3) a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) the retroactive effect, if any; (5) definitions of key terms; and (6) other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or whether it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this final rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) (Pub. L. 104–4; 2 U.S.C. 1501 *et seq.*) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish estimates of the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a),(b)) UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed "significant intergovernmental mandate," and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect such governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820. (The policy is also available at *http://www.gc.doe.gov).* DOE reviewed today's final rule under the statutory requirements and its policy and determined that the rule contains neither an intergovernmental mandate nor a mandate that may result in an expenditure of $100 million or more in any year, so these requirements do not apply.

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

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

I. Review Under Executive Order 12630

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

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

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

K. Review Under Executive Order 13211

Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OIRA a Statement of Energy Effects for any proposed significant energy action. A "significant energy action" is defined as any action by an agency that promulgates or is expected to lead to promulgation of a final rule, and that: (1) Is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use if the proposal is implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use. Today's regulatory action to establish amended test procedures for clothes dryers and room air conditioners is not a significant regulatory action under Executive Order 12866. It has likewise not been designated as a significant energy action by the Administrator of OIRA. Moreover, it will not have a significant adverse effect on the supply, distribution, or use of energy. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

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

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

The amendments to the test procedures in today's final rule incorporate testing methods contained in the commercial standard, IEC Standard 62301. Specifically DOE is incorporating from section 4, ("General conditions for measurements"), paragraph 4.2, "Test room," paragraph 4.3, "Power supply," paragraph 4.4, "Supply voltage waveform," and paragraph 4.5, "Power measurement accuracy," and from section 5 ("Measurements"), paragraph 5.1, "General," paragraph 5.2, "Selection and preparation of appliance or equipment," and paragraph 5.3, "Procedure" of IEC Standard 62301. DOE has evaluated this standard and is unable to conclude whether it fully complies with the requirements of section 32(b) of the FEAA (that is, whether it was developed in a manner that fully provides for public participation, comment, and review.) DOE has consulted with the Attorney General and the Chairman of the FTC about the impact on competition of using the methods contained in this standard, and neither

recommended against incorporation of these standards.

M. Congressional Notification

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

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of today's final rule.

List of Subjects in 10 CFR Part 430

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

Issued in Washington, DC, on December 15, 2010.

Cathy Zoi,

Assistant Secretary, Energy Efficiency and Renewable Energy.

■ For the reasons stated in the preamble, part 430 of chapter II of title 10, of the Code of Federal Regulations, is amended as set forth below:

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

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

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

■ 2. Section 430.3 is amended by:
■ a. Redesignating paragraphs (e)(1) through (e)(9) as (e)(2) through (e)(10).
■ b. Adding a new paragraph (e)(1).
■ c. Removing the word "Standard" from paragraph (g)(3).
■ d. Redesignating paragraphs (g)(1), (2), and (3) as paragraphs (g)(3), (1), and (4), respectively.
■ e. Adding new paragraphs (g)(2) and (5).
■ d. Removing in paragraph (1)(1), "Appendix N to Subpart B", and adding in its place, "Appendix D1, Appendix F and Appendix N to Subpart B".

The additions read as follows:

§ 430.3 Materials incorporated by reference.

* * * * *

(e) * * *

(1) ANSI/ASHRAE Standard 16–1983 ("ANSI/ASHRAE 16") (RA 2009), (Reaffirmation of ANSI/ASHRAE Standard 16–1983 [RA 1999]), Method of Testing for Rating Room Air Conditioners and Packaged Terminal Air Conditioners, ASHRAE approved October 18, 1988, and reaffirmed June 20, 2009. ANSI approved October 20, 1998 and reaffirmed June 25, 2009. IBR approved for Appendix F to Subpart B.

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(g) * * *

(2) AHAM HLD–1–2009 ("AHAM HLD–1"), Household Tumble Type Clothes Dryers, (2009), IBR approved for Appendix D1 to Subpart B.

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(5) ANSI/AHAM RAC–1–2008 ("ANSI/AHAM RAC–1"), Room Air Conditioners, (2008; ANSI approved July 7, 2008), IBR approved for Appendix F to Subpart B.

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■ 3. Section 430.23 is amended by revising paragraphs (d) and (f) to read as follows:

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

* * * * *

(d) *Clothes dryers.* (1) The estimated annual operating cost for clothes dryers shall be—

(i) For an electric clothes dryer, the product of the following three factors:

(A) The representative average-use cycle of 283 cycles per year,

(B) The per-cycle combined total energy consumption in kilowatt-hours per-cycle, determined according to 4.6 of appendix D1 to this subpart, and

(C) The representative average unit cost of electrical energy in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year, and

(ii) For a gas clothes dryer, the product of the representative average-use cycle of 283 cycles per year times the sum of:

(A) The product of the per-cycle gas dryer electric energy consumption in kilowatt-hours per cycle, determined according to 4.2 of appendix D1 to this subpart, times the representative average unit cost of electrical energy in dollars per kilowatt-hour as provided by the Secretary plus,

(B) The product of the per-cycle gas dryer gas energy consumption, in Btus per cycle, determined according to 4.3 of appendix D1 to this subpart, times the representative average unit cost for natural gas or propane, as appropriate, in dollars per Btu as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year plus,

(C) The product of the per-cycle standby mode and off mode energy consumption in kilowatt-hours per cycle, determined according to 4.5 of appendix D1 to this subpart, times the representative average unit cost of electrical energy in dollars per kilowatt-hour as provided by the Secretary.

(2) The energy factor, expressed in pounds of clothes per kilowatt-hour, for clothes dryers shall be either the quotient of a 3-pound bone-dry test load for compact dryers, as defined by 2.7.1 of appendix D to this subpart before the date that appendix D1 becomes mandatory, or the quotient of a 7-pound bone-dry test load for standard dryers, as defined by 2.7.2 of appendix D to this subpart before the date that appendix D1 becomes mandatory, as applicable, divided by the clothes dryer energy consumption per cycle, as determined according to 4.1 for electric clothes dryers and 4.6 for gas clothes dryers of appendix D to this subpart before the date that appendix D1 becomes mandatory, the resulting quotient then being rounded off to the nearest hundredth (.01). Upon the date that appendix D1 to this subpart becomes mandatory, the energy factor is determined in accordance with 4.7 of appendix D1, the result then being rounded off to the nearest hundredth (.01).

(3) Upon the date that appendix D1 to this subpart becomes mandatory, the combined energy factor is determined in accordance with 4.8 of appendix D1, the result then being rounded off to the nearest hundredth (.01).

(4) Other useful measures of energy consumption for clothes dryers shall be those measures of energy consumption for clothes dryers which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix D to this subpart before the date that appendix D1 becomes mandatory and appendix D1 upon the date that appendix D1 to this subpart becomes mandatory.

* * * * *

(f) *Room air conditioners.* (1) The estimated annual operating cost for room air conditioners, expressed in dollars per year, shall be determined by multiplying the following three factors:

(i) The combined annual energy consumption for room air conditioners, expressed in kilowatt-hours per year, as determined in accordance with paragraph (f)(4) of this section, and

(ii) A representative average unit cost of electrical energy in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The energy efficiency ratio for room air conditioners, expressed in Btus per watt-hour, shall be the quotient of:

(i) The cooling capacity in Btus per hour as determined in accordance with 5.1 of appendix F to this subpart divided by:

(ii) The electrical input power in watts as determined in accordance with 5.2 of appendix F to this subpart, the resulting quotient then being rounded off to the nearest 0.1 Btu per watt-hour.

(3) The average annual energy consumption for room air conditioners, expressed in kilowatt-hours per year, shall be determined by multiplying together the following two factors:

(i) Electrical input power in kilowatts as determined in accordance with 5.2 of appendix F to this subpart, and

(ii) The representative average-use cycle of 750 hours of compressor operation per year, the resulting product then being rounded off to the nearest kilowatt-hour per year.

(4) The combined annual energy consumption for room air conditioners, expressed in kilowatt-hours per year, shall be the sum of:

(i) The average annual energy consumption as determined in accordance with paragraph (f)(4) of this section, and

(ii) The standby mode and off mode energy consumption, as determined in accordance with 5.3 of appendix F to this subpart, the resulting sum then being rounded off to the nearest kilowatt-hour per year.

(5) The combined energy efficiency ratio for room air conditioners, expressed in Btu's per watt-hour, shall be the quotient of:

(i) The cooling capacity in Btus per hour as determined in accordance with 5.1 of appendix F to this subpart multiplied by the representative average-use cycle of 750 hours of compressor operation per year, divided by

(ii) The combined annual energy consumption as determined in accordance with paragraph (f)(4) of this section multiplied by a conversion factor of 1,000 to convert kilowatt-hours to watt-hours, the resulting quotient then being rounded off to the nearest 0.1 Btu per watt-hour.

* * * * *

■ 4. Appendix D to subpart B of part 430 is amended by adding introductory note to read as follows:

Appendix D to Subpart B of Part 430–Uniform Test Method for Measuring the Energy Consumption of Clothes Dryers

Note: Manufacturers must continue to use appendix D to subpart B of part 430 until the energy conservation standards for clothes dryers at 10 CFR 430.32(h) are amended to require mandatory compliance using appendix D1.

* * * * *

■ 5. Appendix D1 is added to subpart B of part 430 to read as follows:

Appendix D1 to Subpart B of Part 430–Uniform Test Method for Measuring the Energy Consumption of Clothes Dryers

Note: Appendix D1 to subpart B of part 430 is informational only. Manufacturers must continue to use appendix D to subpart B of part 430 until compliance with any amended energy conservation standards for clothes dryers at 10 CFR 430.32(h) is required, at which time manufacturers must use appendix D1.

1. Definitions

1.1 "Active mode" means a mode in which the clothes dryer is connected to a main power source, has been activated and is performing the main function of tumbling the clothing with or without heated or unheated forced air circulation to remove moisture from the clothing, remove wrinkles or prevent wrinkling of the clothing, or both.

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

1.3 "AHAM HLD–1" means the test standard published by the Association of Home Appliance Manufacturers, titled "Household Tumble Type Clothes Dryers" (2009), AHAM HLD–1–2009 (incorporated by reference; see § 430.3).

1.4 "Automatic termination control" means a dryer control system with a sensor which monitors either the dryer load temperature or its moisture content and with a controller which automatically terminates the drying process. A mark, detent, or other visual indicator or detent which indicates a preferred automatic termination control setting must be present if the dryer is to be classified as having an "automatic termination control." A mark is a visible single control setting on one or more dryer controls.

1.5 "Bone dry" means a condition of a load of test clothes 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 "Compact" or "compact size" means a clothes dryer with a drum capacity of less than 4.4 cubic feet.

1.7 "Conventional clothes dryer" means a clothes dryer that exhausts the evaporated moisture from the cabinet.

1.8 "Cool down" means that portion of the clothes drying cycle when the added gas or electric heat is terminated and the clothes continue to tumble and dry within the drum.

1.9 "Cycle" means a sequence of operation of a clothes dryer which performs a clothes drying operation, and may include variations or combinations of the functions of heating, tumbling, and drying.

1.10 "Drum capacity" means the volume of the drying drum in cubic feet.

1.11 "IEC 62301" means the test standard published by the International Electrotechnical Commission ("IEC"), titled "Household electrical appliances–Measurement of standby power," Publication 62301 (first edition June 2005) (incorporated by reference; see § 430.3).

1.12 "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.

1.13 "Moisture content" means the ratio of the weight of water contained by the test load to the bone-dry weight of the test load, expressed as a percent.

1.14 "Moisture sensing control" means a system which utilizes a moisture sensing element within the dryer drum that monitors the amount of moisture in the clothes and automatically terminates the dryer cycle.

1.15 "Off mode" means a mode in which the clothes dryer is connected to a main 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.

1.16 "Standard size" means a clothes dryer with a drum capacity of 4.4 cubic feet or greater.

1.17 "Standby mode" means any product modes where the energy using product is connected to a main power source and offers one or more of the following user-oriented or protective functions which may persist for an indefinite time:

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

(b) Continuous functions, including information or status displays (including clocks) or sensor-based functions. A timer is a continuous clock function (which may or may not be associated with a display) that provides regular scheduled tasks (e.g., switching) and that operates on a continuous basis.

1.18 "Temperature sensing control" means a system which monitors dryer exhaust air temperature and automatically terminates the dryer cycle.

1.19 "Ventless clothes dryer" means a clothes dryer that uses a closed-loop system with an internal condenser to remove the evaporated moisture from the heated air. The moist air is not discharged from the cabinet.

2. Testing Conditions

2.1 *Installation.* Install the clothes dryer in accordance with manufacturer's instructions. For conventional clothes dryers, as defined in 1.7, the dryer exhaust shall be restricted by adding the AHAM exhaust simulator described in 3.3.5.1 of AHAM HLD–1 (incorporated by reference; see § 430.3). For ventless clothes dryers, as defined in 1.19, the dryer shall be tested without the AHAM exhaust simulator. Where the manufacturer gives the option to use the dryer both with and without a duct, the dryer shall be tested without the exhaust simulator. All external joints should be taped to avoid air leakage. If the manufacturer gives the

option to use a ventless clothes dryer, as defined in 1.19, with or without a condensation box, the dryer shall be tested with the condensation box installed. For ventless clothes dryers, the condenser unit of the dryer must remain in place and not be taken out of the dryer for any reason between tests. For drying testing, disconnect all console lights or other lighting systems on the clothes dryer which do not consume more than 10 watts during the clothes dryer test cycle. For standby and off mode testing, the clothes dryer shall also be installed in accordance with section 5, paragraph 5.2 of IEC 62301 (incorporated by reference; see § 430.3). For standby and off mode testing, do not disconnect console lights or other lighting systems.

2.2 *Ambient temperature and humidity.*

2.2.1 For drying testing, maintain the room ambient air temperature at 75 ± 3 °F and the room relative humidity at 50 ± 10 percent relative humidity.

2.2.2 For standby and off mode testing, maintain room ambient air temperature conditions as specified in section 4, paragraph 4.2 of IEC 62301 (incorporated by reference; see § 430.3).

2.3 *Energy supply.*

2.3.1 *Electrical supply.* Maintain the electrical supply at the clothes dryer terminal block within 1 percent of 120/240 or 120/208Y or 120 volts as applicable to the particular terminal block wiring system and within 1 percent of the nameplate frequency as specified by the manufacturer. If the dryer has a dual voltage conversion capability, conduct the test at the highest voltage specified by the manufacturer.

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

2.3.2 *Gas supply.*

2.3.2.1 *Natural gas.* Maintain the gas supply to the clothes dryer immediately ahead of all controls at a pressure of 7 to 10 inches of water column. If the clothes dryer is equipped with a gas appliance pressure regulator for which the manufacturer specifies an outlet pressure, the regulator outlet pressure shall be approximately that recommended by the manufacturer. The hourly Btu rating of the burner shall be maintained within ± 5 percent of the rating specified by the manufacturer. The natural gas supplied should have a heating value of approximately 1,025 Btus per standard cubic foot. The actual heating value, H_n2, in Btus per standard cubic foot, for the natural gas to be used in the test shall be obtained either from measurements made by the manufacturer conducting the test using a standard continuous flow calorimeter as described in 2.4.6 or by the purchase of bottled natural gas whose Btu rating is certified to be at least as accurate a rating as could be obtained from measurements with a standard continuous flow calorimeter as described in 2.4.6.

2.3.2.2 *Propane gas.* Maintain the gas supply to the clothes dryer immediately ahead of all controls at a pressure of 11 to 13 inches of water column. If the clothes dryer is equipped with a gas appliance pressure regulator for which the manufacturer specifies an outlet pressure, the regulator outlet pressure shall be approximately that recommended by the manufacturer. The hourly Btu rating of the burner shall be maintained within ± 5 percent of the rating specified by the manufacturer. The propane gas supplied should have a heating value of approximately 2,500 Btus per standard cubic foot. The actual heating value, H_p, in Btus per standard cubic foot, for the propane gas to be used in the test shall be obtained either from measurements made by the manufacturer conducting the test using a standard continuous flow calorimeter as described in 2.4.6 or by the purchase of bottled gas whose Btu rating is certified to be at least as accurate a rating as could be obtained from measurement with a standard continuous calorimeter as described in 2.4.6.

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

2.4.1 *Weighing scale for test cloth.* The scale shall have a range of 0 to a maximum of 30 pounds with a resolution of at least 0.2 ounces and a maximum error no greater than 0.3 percent of any measured value within the range of 3 to 15 pounds.

2.4.1.2 *Weighing scale for drum capacity measurements.* The scale should have a range of 0 to a maximum of 500 pounds with resolution of 0.50 pounds and a maximum error no greater than 0.5 percent of the measured value.

2.4.2 *Kilowatt-hour meter.* The kilowatt-hour meter shall have a resolution of 0.001 kilowatt-hours and a maximum error no greater than 0.5 percent of the measured value.

2.4.3 *Gas meter.* The gas meter shall have a resolution of 0.001 cubic feet and a maximum error no greater than 0.5 percent of the measured value.

2.4.4 *Dry and wet bulb psychrometer.* The dry and wet bulb psychrometer shall have an error no greater than ± 1 °F.

2.4.5 *Temperature.* The temperature sensor shall have an error no greater than ± 1 °F.

2.4.6 *Standard Continuous Flow Calorimeter.* The calorimeter shall have an operating range of 750 to 3,500 Btu per cubic feet. The maximum error of the basic calorimeter shall be no greater than 0.2 percent of the actual heating value of the gas used in the test. The indicator readout shall have a maximum error no greater than 0.5 percent of the measured value within the operating range and a resolution of 0.2 percent of the full-scale reading of the indicator instrument.

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

2.5 *Lint trap.* Clean the lint trap thoroughly before each test run.

2.6 *Test Clothes.*

2.6.1 *Energy test cloth.* The energy test cloth shall be clean and consist of the following:

(a) Pure finished bleached cloth, made with a momie or granite weave, which is a blended fabric of 50-percent cotton and 50-percent polyester and weighs within +10 percent of 5.75 ounces per square yard after test cloth preconditioning, and has 65 ends on the warp and 57 picks on the fill. The individual warp and fill yarns are a blend of 50-percent cotton and 50-percent polyester fibers.

(b) Cloth material that is 24 inches by 36 inches and has been hemmed to 22 inches by 34 inches before washing. The maximum shrinkage after five washes shall not be more than 4 percent on the length and width.

(c) The number of test runs on the same energy test cloth shall not exceed 25 runs.

2.6.2 *Energy stuffer cloths.* The energy stuffer cloths shall be made from energy test cloth material, and shall consist of pieces of material that are 12 inches by 12 inches and have been hemmed to 10 inches by 10 inches before washing. The maximum shrinkage after five washes shall not be more than 4 percent on the length and width. The number of test runs on the same energy stuffer cloth shall not exceed 25 runs after test cloth preconditioning.

2.6.3 *Test Cloth Preconditioning.*

A new test cloth load and energy stuffer cloths shall be treated as follows:

(1) Bone dry the load to a weight change of ± 1 percent, or less, as prescribed in section 1.5.

(2) Place the test cloth load in a standard clothes washer set at the maximum water fill level. Wash the load for 10 minutes in soft water (17 parts per million hardness or less), using 60.8 grams of AHAM standard test detergent Formula 3. Wash water temperature is to be controlled at 140 ° ± 5 °F (60 ° ± 2.7 °C). Rinse water temperature is to be controlled at 100 ° ± 5 °F (37.7 ± 2.7 °C).

(3) Rinse the load again at the same water temperature.

(4) Bone dry the load as prescribed in section 1.5 and weigh the load.

(5) This procedure is repeated until there is a weight change of 1 percent or less.

(6) A final cycle is to be a hot water wash with no detergent, followed by two warm water rinses.

2.7 *Test loads.*

2.7.1 *Compact size dryer load.* Prepare a bone-dry test load of energy cloths which weighs 3.00 pounds ± .03 pounds. Adjustments to the test load to achieve the proper weight can be made by the use of energy stuffer cloths, with no more than five stuffer cloths per load. Dampen the load by agitating it in water whose temperature is 60 °F ± 5 °F and consists of 0 to 17 parts per million hardness for approximately 2 minutes in order to saturate the fabric. Then, extract water from the wet test load by spinning the load until the moisture content of the load is between 54.0–61.0 percent of the bone-dry weight of the test load.

2.7.2 *Standard size dryer load.* Prepare a bone-dry test load of energy cloths which weighs 8.45 pounds ± .085 pounds.

Adjustments to the test load to achieve the proper weight can be made by the use of energy stuffer cloths, with no more than five stuffer cloths per load. Dampen the load by agitating it in water whose temperature is 60 °F ± 5 °F and consists of 0 to 17 parts per million hardness for approximately 2 minutes in order to saturate the fabric. Then, extract water from the wet test load by spinning the load until the moisture content of the load is between 54.0–61.0 percent of the bone-dry weight of the test load.

2.7.3 *Method of loading.* Load the energy test cloths by grasping them in the center, shaking them to hang loosely, and then dropping them in the dryer at random.

2.8 *Clothes dryer preconditioning.*

2.8.1 *Conventional clothes dryers.* For conventional clothes dryers, before any test cycle, operate the dryer without a test load in the non-heat mode for 15 minutes or until the discharge air temperature is varying less than 1 °F for 10 minutes—whichever is longer—in the test installation location with the ambient conditions within the specified test condition tolerances of 2.2.

2.8.2 *Ventless clothes dryers.* For ventless clothes dryers, before any test cycle, the steady-state machine temperature must be equal to ambient room temperature described in 2.2.1. This may be done by leaving the machine at ambient room conditions for at least 12 hours between tests.

3. Test Procedures and Measurements

3.1 *Drum Capacity.* Measure the drum capacity by sealing all openings in the drum except the loading port with a plastic bag, and ensuring that all corners and depressions are filled and that there are no extrusions of the plastic bag through the opening in the drum. Support the dryer's rear drum surface on a platform scale to prevent deflection of the drum surface, and record the weight of the empty dryer. Fill the drum with water to a level determined by the intersection of the door plane and the loading port. Record the temperature of the water and then the weight of the dryer with the added water and then determine the mass of the water in pounds. Add or subtract the appropriate volume depending on whether or not the plastic bag protrudes into the drum interior. The drum capacity is calculated as follows:

$C = w/d$

C = capacity in cubic feet.

w = weight of water in pounds.

d = density of water at the measured temperature in pounds per cubic feet.

3.2 *Dryer Loading.* Load the dryer as specified in 2.7.

3.3 *Test cycle* Operate the clothes dryer at the maximum temperature setting and, if equipped with a timer, at the maximum time setting and dry the load until the moisture content of the test load is between 2.5 and 5 percent of the bone-dry weight of the test load, but do not permit the dryer to advance into cool down. If required, reset the timer or automatic dry control. If the dryer automatically stops during a cycle because the condensation box is full of water, the test is stopped, and the test run is invalid, in which case the condensation box shall be emptied and the test re-run from the beginning. For ventless dryers, as defined in 1.19, during the time between two cycles, the door of the dryer shall be closed except for loading (and unloading).

3.4 *Data recording.* Record for each test cycle:

3.4.1 Bone-dry weight of the test load described in 2.7.

3.4.2 Moisture content of the wet test load before the test, as described in 2.7.

3.4.3 Moisture content of the dry test load obtained after the test described in 3.3.

3.4.4 Test room conditions, temperature, and percent relative humidity described in 2.2.1.

3.4.5 For electric dryers—the total kilowatt-hours of electric energy, E_t, consumed during the test described in 3.3.

3.4.6 For gas dryers:

3.4.6.1 Total kilowatt-hours of electrical energy, E_{te}, consumed during the test described in 3.3.

3.4.6.2 Cubic feet of gas per cycle, E_{tg}, consumed during the test described in 3.3.

3.4.6.3 Correct the gas heating value, GEF, as measured in 2.3.2.1 and 2.3.2.2, to standard pressure and temperature conditions in accordance with U.S. Bureau of Standards, circular C417, 1938.

3.5 *Test for automatic termination field use factor.* The field use factor for automatic termination can be claimed for those dryers which meet the requirements for automatic termination control, defined in 1.4.

3.6 *Standby mode and off mode power.* Establish the testing conditions set forth in Section 2 "Testing Conditions" of this appendix, omitting the requirement to disconnect all console light or other lighting systems on the clothes dryer that do not consume more than 10 watts during the clothes dryer test cycle in section 2.1. If the clothes dryer waits in a higher power state at the start of standby mode or off mode before dropping to a lower power state, as discussed in section 5, paragraph 5.1, note 1 of IEC 62301 (incorporated by reference; see § 430.3),wait until the clothes dryer passes into the lower power state before starting the measurement. Follow the test procedure specified in section 5, paragraph 5.3 of IEC 62301 for testing in each possible mode as described in 3.6.1 and 3.6.2, except allow the product to stabilize for 30 to 40 minutes and use an energy use measurement period of 10 minutes. For units in which power varies over a cycle, as described in section 5, paragraph 5.3.2 of IEC 62301, use the average power approach described in paragraph 5.3.2(a) of IEC 62301, except allow the product to stabilize for 30 to 40 minutes and use an energy use measurement period not less than 10 minutes.

3.6.1 If a clothes dryer has an inactive mode, as defined in 1.12, measure and record the average inactive mode power of the clothes dryer, P_{IA}, in watts.

3.6.2 If a clothes dryer has an off mode, as defined in 1.15, measure and record the average off mode power of the clothes dryer, P_{OFF}, in watts.

4. Calculation of Derived Results From Test Measurements

4.1 *Total Per-cycle electric dryer energy consumption.* Calculate the total electric dryer energy consumption per cycle, E_{ce}, expressed in kilowatt-hours per cycle and defined as:

$E_{ce} = [53.5/(W_w - W_d)] \times E_{tt} \times$ field use,

Where:

53.5 = an experimentally established value for the percent reduction in the moisture content of the test load during a laboratory test cycle expressed as a percent.

field use = field use factor.

= 1.18 for clothes dryers with time termination control systems only without any automatic termination control functions.

= 1.04 clothes dryers with automatic control systems that meet the requirements of the definition for automatic control systems in 1.4, 1.14 and 1.18, including those that also have a supplementary timer control, or that may also be manually controlled.

W_w = the moisture content of the wet test load as recorded in 3.4.2.

W_d = the moisture content of the dry test load as recorded in 3.4.3.

4.2 *Per-cycle gas dryer electrical energy consumption.* Calculate the gas dryer electrical energy consumption per cycle, $E_{ge,}$ expressed in kilowatt-hours per cycle and defined as:

$E_{ge} = [53.5/(W_w - W_d)] \times E_{te} \times$ field use,

Where:

E_{te} = the energy recorded in 3.4.6.1 field use, 53.5, W_w, W_d as defined in 4.1.

4.3 *Per-cycle gas dryer gas energy consumption.* Calculate the gas dryer gas energy consumption per cycle, $E_{ge.}$ expressed in Btus per cycle as defined as:

$E_{gg} = [53.5/(W_w - W_d)] \times E_{tg} \times$ field use $\times$ GEF

Where:

E_{tg} = the energy recorded in 3.4.6.2

GEF = corrected gas heat value (Btu per cubic feet) as defined in 3.4.6.3, field use, 53.5, W_w, W_d as defined in 4.1.

4.4 *Total per-cycle gas dryer energy consumption expressed in kilowatt-hours.* Calculate the total gas dryer energy consumption per cycle, E_{cg}, expressed in kilowatt-hours per cycle and defined as:

$E_{cg} = E_{ge} + (E_{gg}/3412$ Btu/kWh)

Where:

E_{ge} as defined in 4.2

E_{gg} as defined in 4.3

4.5 *Per-cycle standby mode and off mode energy consumption.* Calculate the dryer inactive mode and off mode energy consumption per cycle, E_{TSO}, expressed in kWh per cycle and defined as:

$E_{TSO} = [(P_{IA} \times S_{IA}) + (P_{OFF} \times S_{OFF})] \times K/283$

Where:

P_{IA} = dryer inactive mode power, in watts, as measured in section 3.6.1;

P_{OFF} = dryer off mode power, in watts, as measured in section 3.6.2.

If the clothes dryer has both inactive mode and off mode, S_{IA} and S_{OFF} both equal 8,620 ÷ 2 = 4,310, where 8,620 is the total inactive and off mode annual hours;

If the clothes dryer has an inactive mode but no off mode, the inactive mode annual hours, S_{IA}, is equal to 8,620 and the off mode annual hours, S_{OFF}, is equal to 0;

If the clothes dryer has an off mode but no inactive mode, S_{IA} is equal to 0 and S_{OFF} is equal to 8,620

Where:

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

283 = representative average number of clothes dryer cycles in a year.

4.6 *Per-cycle combined total energy consumption expressed in kilowatt-hours.* Calculate the per-cycle combined total energy consumption, E_{CC}, expressed in kilowatt-hours per cycle and defined for an electric clothes dryer as:

$$E_{CC} = E_{ce} + E_{TSO}$$

Where:

E_{ce} = the energy recorded in 4.1, and

E_{TSO} = the energy recorded in 4.7, and defined for a gas clothes dryer as:

$$E_{CC} = E_{cg} + E_{TSO}$$

Where:

E_{cg} = the energy recorded in 4.4, and

E_{TSO} = the energy recorded in 4.7.

4.7 *Energy Factor in pounds per kilowatt-hour.* Calculate the energy factor, EF, expressed in pounds per kilowatt-hour and defined for an electric clothes dryer as:

$$EF = W_{bonedry}/E_{ce}$$

Where:

$W_{bonedry}$ = the bone dry test load weight recorded in 3.4.1, and

E_{ce} = the energy recorded in 4.1, and

and defined for a gas clothes dryer as:

$$EF = W_{bonedry}/E_{cg}$$

Where:

$W_{bonedry}$ = the bone dry test load weight recorded in 3.4.1, and

E_{cg} = the energy recorded in 4.4,

4.8 *Combined Energy Factor in pounds per kilowatt-hour.* Calculate the combined energy factor, CEF, expressed in pounds per kilowatt-hour and defined as:

$$CEF = W_{bonedry}/E_{CC}$$

Where:

$W_{bonedry}$ = the bone dry test load weight 3.4.1, and

E_{CC} = the energy recorded in 4.6

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

Appendix F to Subpart B of Part 430–Uniform Test Method for Measuring the Energy Consumption of Room Air Conditioners

Note: Manufacturers are not required to use the test procedures and calculations that refer to standby mode and off mode energy consumption, (specifically, sections 2.2, 3.2, 4.2, and 5.3 of this appendix F) until the compliance date of any amended energy conservation standards for room air conditioners at 10 CFR 430.32(b).

1. *Definitions.*

1.1 "Active mode" means a mode in which the room air conditioner is connected to a mains power source, has been activated and is performing the main function of cooling or heating the conditioned space, or circulating air through activation of its fan or blower, with or without energizing active air-cleaning components or devices such as ultraviolet (UV) radiation, electrostatic filters, ozone generators, or other air-cleaning devices.

1.2 "ANSI/AHAM RAC–1" means the test standard published jointly by the American National Standards Institute and the Association of Home Appliance Manufacturers, titled "Room Air Conditioners," Standard RAC–1–2008 (incorporated by reference; see § 430.3).

1.3 "ANSI/ASHRAE 16" means the test standard published jointly by the American National Standards Institute and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers titled "Method of Testing for Rating Room Air Conditioners and Packaged Terminal Air Conditioners," Standard 16–1983 (RA 2009) (incorporated by reference; see § 430.3).

1.4 "IEC 62301" means the test standard published by the International Electrotechnical Commission, ("IEC"), titled "Household electrical appliances—Measurement of standby power," Publication 62301 (first edition June 2005), (incorporated by reference; see § 430.3).

1.5 "Inactive mode" means a standby mode that facilitates the activation of active mode by remote switch (including remote control) or internal sensor or which provides continuous status display.

1.6 "Off mode" means a mode in which a room air conditioner 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 clasification of an off mode.

1.7 "Standby mode" means any product modes where the where the energy using product is connected to a mains power source and offers one or more of the following user oriented or protective functions which may persist for an indefinite time:

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

(b) Continuous functions, including information or status displays (including clocks) or sensor-based functions. A timer is a continuous clock function (which may or may not be associated with a display) that provides regular scheduled tasks (*e.g.,* switching) and that operates on a continuous basis.

2. *Test methods.*

2.1 *Cooling.* The test method for testing room air conditioners in cooling mode shall consist of application of the methods and conditions in ANSI/AHAM RAC–1 sections 4, 5, 6.1, and 6.5 (incorporated by reference; see § 430.3), and in ANSI/ASHRAE 16 (incorporated by reference; see § 430.3).

2.2 *Standby and off modes.* The method for testing room air conditioners in standby and off modes shall consist of application of the methods and conditions in IEC 62301 (incorporated by reference; see § 430.3), as modified by the requirements of this standard. The testing may be conducted in test facilities used for testing cooling performance. If testing is not conducted in such a facility, the test facility shall comply with IEC 62301 section 4.2.

3. *Test conditions.*

3.1 *Cooling mode.* Establish the test conditions described in sections 4 and 5 of ANSI/AHAM RAC–1 (incorporated by reference; see § 430.3) and in accordance with ANSI/ASHRAE 16 (incorporated by reference; see § 430.3).

3.2 *Standby and off modes.*

3.2.1 *Test room conditions.* Maintain the indoor test conditions as required by section 4.2 of IEC 62301 (incorporated by reference; see § 430.3). If the standby and off mode testing is conducted in a facility that is also used for testing cooling performance, maintain the outdoor test conditions either as required by section 4.2 of IEC 62301 or as described in section 3.1. If the unit is equipped with an outdoor air ventilation damper, close this damper during testing.

3.2.2 *Power supply.* Maintain power supply conditions specified in section 4.3 of IEC 62301 (incorporated by reference; see § 430.3). Use room air conditioner nameplate voltage and frequency as the basis for power supply conditions. Maintain power supply voltage waveform according to the requirements of section 4.4 of IEC 62301.

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

4. *Measurements.*

4.1 *Cooling mode.* Measure the quantities delineated in section 5 of ANSI/AHAM RAC–1 (incorporated by reference; see § 430.3).

4.2 *Standby and off modes.* Establish the testing conditions set forth in section 3.2. Prior to the initiation of the test measurements, the room air conditioner shall also be installed in accordance with section 5, paragraph 5.2 of IEC 62301 (incorporated by reference; see § 430.3). For room air conditioners that drop from a higher power state to a lower power state as discussed in section 5, paragraph 5.1, note 1 of IEC 62301, allow sufficient time for the room air conditioner to reach the lower power state before proceeding with the test measurement.

Follow the test procedure specified in section 5, paragraph 5.3 of IEC 62301 for testing in each possible mode as described in 4.2.1 and 4.2.2, except allow the product to stabilize for 5 to 10 minutes and use an energy use measurement period of 5 minutes. For units in which power varies over a cycle, as described in section 5, paragraph 5.3.2 of IEC 62301, use the average power approach in paragraph 5.3.2(a).

4.2.1 If a room air conditioner has an inactive mode, as defined in 1.5, measure and record the average inactive mode power of the room air conditioner, P_{IA}, in watts.

4.2.2 If a room air conditioner has an off mode, as defined in 1.6, measure and record the average off mode power of the room air conditioner, P_{OFF}, in watts.

5. *Calculations.*

5.1 Calculate the cooling capacity (expressed in Btu/hr) as required in section 6.1 of ANSI/AHAM RAC–1 (incorporated by reference; see § 430.3) and in accordance with ANSI/ASHRAE 16 (incorporated by reference; see § 430.3).

5.2 Determine the electrical power input (expressed in watts) as required by section 6.5 of ANSI/AHAM RAC–1 (incorporated by reference; see § 430.3) and in accordance with ANSI/ASHRAE 16 (incorporated by reference; see § 430.3).

5.3 *Standby mode and off mode annual energy consumption.* Calculate the standby mode and off mode annual energy consumption for room air conditioners, E_{TSO}, expressed in kilowatt-hours per year, according to the following:

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

Where:

P_{IA}= room air conditioner inactive mode power, in watts, as measured in section 4.2.1

P_{OFF} = room air conditioner off mode power, in watts, as measured in section 4.2.2.

If the room air conditioner has both inactive mode and off mode, S_{IA} and S_{OFF} both equal 5,115 ÷ 2 = 2,557.5, where 5,115 is the total inactive and off mode annual hours;

If the room air conditioner has an inactive mode but no off mode, the inactive mode annual hours, S_{IA}, is equal to 5,115 and the off mode annual hours, S_{OFF}, is equal to 0;

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

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

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