

Rules and Regulations

Federal Register

Vol. 66, No. 243

Tuesday, December 18, 2001

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DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

10 CFR Part 430

[Docket No. EE-RM/TP-99-500]

RIN 1904-AB04

Energy Conservation Program for Consumer Products: Test Procedure for Dishwashers

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

ACTION: Final rule.

SUMMARY: The Department of Energy (We, DOE, or the Department) today amends its test procedure for dishwashers. This amendment revises the number of cycles per year used for calculating the estimated annual operating cost, changes the definitions of compact and standard models, and modifies some of the testing specifications to improve testing repeatability. These amendments to the test procedure do not alter the minimum energy conservation standards currently in effect for dishwashers.

EFFECTIVE DATES: This rule is effective June 17, 2002. The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register as of June 17, 2002.

ADDRESSES: You can read copies of all materials related to this rulemaking in the Freedom of Information Reading Room (Room 1E-190) at the U.S. Department of Energy, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585, between the hours of 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Barbara Twigg, U.S. Department of Energy, Office of Energy Efficiency and

Renewable Energy, EE-41, 1000 Independence Avenue, SW, Washington, DC 20585-0121, (202) 586-8714, email: barbara.twigg@ee.doe.gov; or Eugene Margolis, Esq., U.S. Department of Energy, Office of General Counsel, GC-72, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586-9507, email: eugene.margolis@hq.doe.gov.

SUPPLEMENTARY INFORMATION: This final rule incorporates, by reference, the "American National Standard, Household Electric Dishwashers, ANSI/AHAM DW-1-1992" published by the Association of Home Appliance Manufacturers (AHAM). You may obtain copies of the referenced standard AHAM DW-1 from the Association of Home Appliance Manufacturers, 1111 19th Street, NW., Suite 402, Washington, DC 20036, (202) 872-5955. Information regarding this rulemaking is also available on the Office of Codes and Standards web site at the following address: http://www.eren.doe.gov/buildings/codes_standards/index.htm.

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I. Introduction

A. Authority

Part B of Title III of the Energy Policy and Conservation Act, as amended (EPCA or Act), establishes the Energy

Conservation Program for Consumer Products Other Than Automobiles (Program). The products currently subject to this Program ("covered products") include residential dishwashers, the subject of today's final rule.

Under the Act, the Program consists of three parts: testing, labeling, and the Federal energy conservation standards. The Department, in consultation with the National Institute of Standards and Technology (NIST), must amend or establish test procedures as appropriate for each of the covered products. Section 323 of EPCA, 42 U.S.C. 6293. The purpose of the test procedures is to measure energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use. The test procedure must not be unduly burdensome to conduct. Section 323(b)(3) of EPCA, 42 U.S.C. 6293(b)(3).

If a test procedure is amended, DOE is required to determine to what extent, if any, the new test procedure would alter the measured energy efficiency or measured energy use of any covered product as determined under the existing test procedure. If DOE determines that an amended test procedure would alter the measured efficiency or measured energy use of a covered product, DOE is required to amend the applicable energy conservation standard accordingly. In determining the amended energy conservation standard, DOE is required to measure the energy efficiency or energy use of a representative sample of covered products that minimally comply with the existing standard. The average efficiency of these representative samples, tested using the amended test procedure, constitutes the amended standard. Section 323(e)(1) of EPCA, 42 U.S.C. 6293(e)(1). DOE has determined that today's amended test procedure does not alter the measured efficiency or measured energy use of dishwashers.

Beginning 180 days after a test procedure for a product is prescribed, no manufacturer, distributor, retailer, or private labeler may make representations with respect to the energy use, efficiency, or cost of energy consumed by such products, except as reflected in tests conducted according to the DOE procedure. Section 323(c)(2) of EPCA, 42 U.S.C. 6293(c)(2).

B. Background

On September 28, 1999, the Department published a Notice of Proposed Rulemaking (proposed rule) (64 FR 52248) that proposed a new test procedure for residential dishwashers. The key technological development that triggered the need for revision was the introduction of adaptive control or soil-sensing models. Industry and government tests indicated that the existing test method using only clean dishes did not produce results that would accurately reflect the energy consumed by these machines in a real use environment. The Association of Home Appliance Manufacturers (AHAM) proposed a new approach for testing the soil-sensing models using a formula to weight and average the energy consumption of the minimum and maximum sensor normal cycles. We adapted that method and presented it for comment in the September 28, 1999, proposed rule, along with several other issues such as the definitions for compact and standard models, a revision in the average number of times dishwashers are used each year, and some new specifications for improving testing repeatability. We held a public workshop on November 2, 1999, to discuss the proposed changes, with particular focus on the new method for testing soil-sensing or adaptive control models.

However, because of the questions raised at the workshop and the need expressed by industry to gather additional data and explore alternatives to the proposed method for testing soil-sensing models, we reopened the comment period and extended the deadline for comments to February 14, 2000. Again, comments raised problems with the proposed method. Stakeholders questioned the data supporting the selection of the percentages used to reflect the relative amount of soil encountered by soil-sensing dishwashers in typical loads. (Natural Resources Defense Council (NRDC), No. 4 at 2, and Schleede, No. 8 at 3). Others cited insufficient knowledge as to how different machines would actually react to varying soil loads, that is, what length cycle would be triggered under different wash conditions. (Oregon Office of Energy (OOE), No. 9 at 1). One manufacturer commented that the original AHAM method did not do an adequate job of reflecting the performance of their machines' pressure-based, soil-sensing technology. (Whirlpool, No. 6 at 6).

AHAM concluded that because of significant changes and variations in soil-sensing technology, it was

premature to publish a new test method for those models at this time. AHAM cited the need for additional study by industry before their members could propose a new test procedure which would accurately test the response and performance of machines using a variety of soil-sensing technologies. They suggested that we divide the rulemaking into two parts with the following course of action: first, we should proceed to finalize the proposed modifications to improve testing reliability, revise the definitions for compact and standard models, and update the number of use cycles per year to reflect current consumer use patterns. However, AHAM recommended that we should wait to publish a new, comprehensive method for testing soil-sensing models until industry completed additional testing and proposed a new test procedure. (AHAM No. 12 at 8).

Following these comments, DOE further investigated the variety of soil-sensing technologies in the market. We determined that additional data and research were required before an adequate test procedure for all soil-sensing models could be devised. As a result, we agreed that it was premature to finalize a rulemaking for those models at this time. We also agreed that we should not wait to finalize the other proposed changes—the testing specifications, the definitions for compact and standard models, and the reduction in the average number of use cycles per year. These changes are needed to improve the reliability of the current test procedure, and to update the inputs for calculating the estimated operating cost of all models. Therefore, we are deferring the proposal of a new method for testing soil-sensing machines until NIST, industry, and other stakeholders complete the studies necessary for enacting a definitive test procedure. This final rule substantially retains the original test procedure, but adds new testing specifications, definitions, and a new number for average use cycles per year. We will continue to work with industry after this final rulemaking is enacted to develop a test procedure that accurately reflects the cycle performance of the variety of technologies used by soil-sensing machines. We anticipate that the final rule addressing soil-sensing dishwashers will be completed in 2003.

C. Summary of the Test Procedure Revisions

The following are the major revisions to the dishwasher test procedure included in this final rule:

1. Update the test procedure to reflect changes in consumer practices:

- Reduce the representative average number of use cycles per year to 264; and
 - Base the definitions of compact and standard dishwashers on place-setting capacity.
2. Improve testing repeatability:
- Tighten the tolerance for ambient temperature;
 - Add more detail to test chamber installation requirements; and
 - Add an instruction for manufacturers to run a conditioning cycle prior to the test.

II. Discussion

A. General Discussion

While this final rule retains many of the improvements to the test procedure for measuring the energy use of dishwashers presented in the September 28, 1999, proposed rule, it also includes important changes. Most significantly, we are withdrawing the new method described in the proposed rule for testing adaptive control dishwashers. We are retaining the original method currently in effect for testing conventional and adaptive control dishwashers until we adopt, with the assistance of the dishwasher industry and other stakeholders, a new test method that will accurately test machines using a variety of sensor technologies. Manufacturers of soil-sensing machines will continue to record the energy consumption of those models by measuring the energy used when the dishwasher runs the specified load of clean dishes through the normal cycle.

Although the Department recognizes the importance of determining a test method which will accurately reflect the energy performance of soil-sensing models under real life conditions, it became clear from all comments submitted during the Notice of Proposed Rulemaking process that additional research was necessary. Both industry and environmental advocates shared concerns that there was insufficient understanding of how the machines performed under “typical” soil conditions, and what those “typical” soil conditions actually were. The Natural Resources Defense Council (NRDC), for example, urged the Department not to “make changes in the test procedure unless they are supported by data.” (NRDC No. 4 at 1). AHAM stressed that “there have been significant changes in technology with regard to soil-sensing dishwashers and there is still additional information needed on the usage of these units.” (AHAM No. 12 at 8).

The Department at first considered adopting an interim strategy for

improving, at least partially, the accuracy of the energy factors derived from tests of soil-sensing models using only clean dishes. One proposal was imposing a maximum cap on the energy factor that could be claimed from using the conventional test method. However, the lack of reliable, statistical information in this area was one issue of significant concern during the workshop and comment periods: how to ascertain, with accuracy, the typical soil load, and then understand how a variety of soil-sensing models will function in response to that load. Therefore, rather than focusing time, resources, and research on an interim proposal, we decided to concentrate on the development of a permanent test method. We have underway, for example, a research project to evaluate available information on consumer behavior regarding the soil levels of typical dishwasher loads. This study will assess the validity and adequacy of existing consumer behavior data, and suggest a means of relating the different consumer usage patterns with amounts and characteristics of food soils. This information will point the direction toward translating that average soil load into a repeatable test load for testing dishwashers with adaptive controls and soil sensors. It appears that using a repeatable soil load may be the only solution for accurately testing the energy and water consumption of a variety of adaptive control dishwashers.

Although there are several existing soil tests for dishwashers, both national (such as the AHAM DW-1) and international, none of these currently satisfy our requirements for designing a normal test that is representative of the average soil load introduced by consumers. Since these methods test for both cleaning performance and energy consumption, they feature a very challenging soil load designed to be an extreme test of the dishwasher. However, it may be possible to use a reduced number of soiled dishes from one or a combination of these methods to represent normal soiling, recognizing the importance of test repeatability and the need to minimize test burden. We are exploring this possibility in conjunction with consumer use data and expect to present for comment a new test method for soil-sensing dishwashers in a proposed rule to be issued in 2002.

B. Changes in Consumer Practices—Representative Average Dishwasher Use

In 1983, DOE amended the dishwasher test procedure to reduce the representative average use from 416 cycles per year to 322 cycles per year

based on Proctor and Gamble (P&G) surveys of consumer use conducted prior to 1982. For this rulemaking, in looking for more recent data, the Department learned from industry that the Soap and Detergent Association (SDA) was now the source to be contacted for survey data obtained by detergent manufacturers. By averaging the SDA data for available years between 1985 and 1995, as discussed in the proposed rule, we calculated 264 as the average number of dishwasher use cycles per year.

There were some issues raised at the public workshop regarding the SDA data. Energy Market & Policy Analysis (Schleede) asked about the statistical validity of the survey. (Schleede, Transcript at 19). The Oregon Office of Energy asked as to whether the survey considered such issues as family size. (OOE, Transcript at 23). Northwest Power Planning Council (NPPC) asked about household income and sample size of the data. (NPPC, Transcript at 29). At the workshop, NIST provided additional information regarding the detergent manufacturers' survey method, stating, "The data below comes from our study contacting nationally representative panelists from the standpoint of geography, family size, age of homemaker, gender, income, and employment status. The data are obtained through an independent, outside research organization. This survey is run annually and has a base size of 1,500 to 1,800 respondents." AHAM commented that the SDA data should be considered as an unbiased source of information because "the manufacturers of dishwasher detergent have, if you will, a vested interest in making sure that the data is absolutely as accurate as they can do because they use it for inventory tracking, and to them it is extremely important to know exactly how much dishwasher detergent is going to be used." (AHAM, Transcript at 28). The Department believes the SDA data is the best there is regarding dishwasher usage in that it is based on the detergent industry's needs.

AHAM agreed with the Department's decision to use 264 cycles per year as the average figure for dishwasher use. (AHAM, Transcript at 21). Stephens thought the number could be higher because of an upswing in the SDA data for 1995-1996 and believed the data might extrapolate to a Pacific Northwest region 1998-1999 survey which tabulated 281 cycles per year. Stephens recommended that we wait for 1997-1998 detergent manufacturer data. (OOE, No. 9 at 2). Energy Market & Policy Analysis thought the 264 number was too high citing EIA's November

1999 Residential Energy Consumption Survey as a source for consumer use data. (Schleede, No. 10 at 1). He stated that "Data in the recently released EIA report indicates that your (DOE's) estimate of 264 "cycles" is excessive and that the correct number is approximately 220 cycles (or less)." (Schleede, No. 10 at 2).

The Department notes that survey data on the annual usage of dishwashers are likely to vary from year to year. Rather than base its number on any particular one year, the Department prefers to take an average over several years in order to smooth out year to year variations. Regarding the use of the EIA data, NIST reviewed the EIA report which had surveyed 8,000 respondents nationwide and collected data on how often households use automatic dishwashers in an average week. The data, however, do not present a firm, clear figure for the number of dishwasher cycles per year because of the way the information was collected. In the report, the data are provided in bands categorizing dishwasher use per week along with the percentage of responses for each band (less than 4 times per week, 4 to 6 times per week, and at least once per day). In order to use the EIA data, DOE somehow would have to annualize the data or abandon the existing methodology. Neither the EIA data nor the option of abandoning the existing methodology were within the scope of the proposed rule. Rather than reopening the comment period or repropounding the rule for public comment, DOE has decided to continue studying the EIA data with a view toward possibly including it in the forthcoming notice of proposed rulemaking that would cover a test procedure for adaptive control models. In DOE's view, there is ample support in the record for the proposed figure of 264 cycles per year, and the improvement in accuracy that might come from use of the EIA data is not worth the delay in bringing this rulemaking to a conclusion.

C. Improving Testing Repeatability

In the proposed rule, the Department discussed several changes to clarify the existing test procedure and improve its repeatability when multiple tests are conducted. Although the manufacturers agreed that such changes as tightening the tolerances for ambient temperature testing would improve reproducibility, they expressed concern over one item: the new definition for "truncated normal cycle." AHAM stated that changing the word "interrupted" to "preset" would unnecessarily increase test burden by requiring additional test

runs. Many manufacturers were measuring the energy consumption at the end of the wash cycle, before the power dry, and recording that value as the machine energy consumption for the truncated normal cycle. The cycle was not terminated. The machine then was allowed to complete the power dry, and the energy consumption was measured and recorded as the value of the machine energy consumption for the normal cycle. The current test procedure (sections 2.6.1 and 2.6.2) calls for the user to average the water consumption for the normal and truncated normal cycles. However, the proposal in the proposed rule (section 1.10) called for a separate test cycle to be run for the truncated normal cycle in order to measure the amount of energy consumed during the air dry portion of the cycle. In the public hearing discussions the manufacturers claimed that the energy consumed during the air dry sequence was negligible, regardless of whether the action was to open a vent mechanically and let drying occur by natural convection, or whether mechanical drying was used to assist the air dry. After tests by NIST confirmed the claim that the energy consumption during the air dry sequence was indeed negligible, DOE concluded that a separate cycle need not be run. Under this final rule, manufacturers may continue to extract the normal and truncated normal energy consumption from a single test run.

Thus, the original definition will be retained and reads: "Truncated Normal Cycle" means the normal cycle interrupted to eliminate the power-dry feature after the termination of the last rinse operation.

D. New Definitions for Compact and Standard Models

As discussed in the proposed rule, we are changing the definitions for determining compact and standard models. The new definitions of "compact dishwasher" and "standard dishwasher" use place-setting capacity instead of the measurement of the width of the unit.

III. Procedural Requirements

A. Review Under the National Environmental Policy Act of 1969

In this rule, the Department finalizes amendments to test procedures that may be used to implement future energy conservation standards for dishwashers. The Department 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 (NEPA), 42 U.S.C.

4321 *et seq.* The rule is covered by Categorical Exclusion A5, for rulemakings that interpret or amend an existing rule without changing the environmental effect, as set forth in the Department's NEPA regulations in appendix A to subpart D, 10 CFR part 1021. This final rule will not affect the quality or distribution of energy usage and, therefore, will not result in any environmental impacts. Accordingly, neither an environmental impact statement nor an environmental assessment is required.

B. Review Under Executive Order 12866, "Regulatory Planning and Review"

Today's final rule is not a "significant regulatory action" under Executive Order 12866, "Regulatory Planning and Review." 58 FR 51735 (October 4, 1993). Accordingly, today's action is not subject to review under the Executive Order by the Office of Information and Regulatory Affairs.

C. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act, 5 U.S.C. 601-612, requires that an agency prepare an initial regulatory flexibility analysis for any rule, for which a general notice of proposed rulemaking is required, that would have a significant economic effect on small entities unless the agency certifies that the proposed rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. 5 U.S.C. 605.

Today's rule prescribes test procedures that will be used to test compliance with energy conservation standards. The rule affects dishwasher test procedures and would not have a significant economic impact, but rather would provide common testing methods. Therefore DOE certifies that today's rule would not have a "significant economic impact on a substantial number of small entities," and the preparation of a regulatory flexibility analysis is not warranted.

D. "Takings" Assessment Review

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

E. Review Under Executive Order 13132, "Federalism"

Executive Order 13132, "Federalism," 64 FR 43255 (August 4, 1999), requires that regulations, rules, legislation, and any other policy actions be reviewed for any substantial direct effects on States, on the relationship between the Federal Government and the States, or in the distribution of power and responsibilities among various levels of Government. If there are substantial direct effects, then this Executive Order requires preparation of a Federalism assessment to be used in all decisions involved in promulgating and implementing a policy action.

The rule published today would not regulate or otherwise affect the States. Accordingly, DOE has determined that preparation of a Federalism assessment is unnecessary.

F. Review Under the Paperwork Reduction Act

No new information or record keeping requirements are imposed by this rulemaking. Accordingly, no OMB clearance is required under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*

G. Review Under Executive Order 12988, "Civil Justice Reform"

With respect to the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, "Civil Justice Reform," 61 FR 4729 (February 7, 1996), imposes on Executive agencies the general duty to adhere to the following requirements: (1) Eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; and (3) provide a clear legal standard for affected conduct rather than a general standard and promote simplification and burden reduction. With regard to the review required by sections 3(a) and 3(b) of Executive Order 12988, it specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) Clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in

sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE reviewed today's final rule under the standards of section 3 of the Executive Order and determined that, to the extent permitted by law, the final regulations meet the relevant standards.

H. Review Under the Unfunded Mandates Reform Act of 1995

Section 202 of the Unfunded Mandates Reform Act of 1995 ("Unfunded Mandates Act") requires that the Department prepare a budgetary impact statement before promulgating a rule that includes a Federal mandate that may result in expenditure by state, local, and tribal governments, in the aggregate, or by the private sector, of \$100 million or more in any one year. The budgetary impact statement must include: (i) Identification of the Federal law under which the rule is promulgated; (ii) a qualitative and quantitative assessment of anticipated costs and benefits of the Federal mandate and an analysis of the extent to which such costs to state, local, and tribal governments may be paid with Federal financial assistance; (iii) if feasible, estimates of the future compliance costs and of any disproportionate budgetary effects the mandate has on particular regions, communities, non-Federal units of government, or sectors of the economy; (iv) if feasible, estimates of the effect on the national economy; and (v) a description of the Department's prior consultation with elected representatives of state, local, and tribal governments and a summary and evaluation of the comments and concerns presented.

The Department has determined that the action today does not include a Federal mandate that may result in estimated costs of \$100 million or more to State, local or to tribal governments in the aggregate or to the private sector. Therefore, the requirements of Sections 203 and 204 of the Unfunded Mandates Act do not apply to this action.

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

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. No. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any proposed rule or policy that may affect family well-being. Today's final rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to

prepare a Family Policymaking Assessment.

J. 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 the Office of Information and Regulatory Affairs (OIRA), Office of Management and Budget, 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 the promulgation of a final rule, and that: (1) Is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

Today's final rule will not have a significant adverse effect on the supply, distribution, or the use of energy, and, therefore, is not a significant energy action. Accordingly, DOE has not prepared a Statement of Energy Effects.

K. Congressional Notification

As required by 5 U.S.C. 801, DOE will submit to Congress a report regarding the issuance of today's final rule prior to the effective date set forth at the outset of this notice. 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).

List of Subjects in 10 CFR Part 430

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

Issued in Washington, DC, on December 12, 2001.

David K. Garman,

Assistant Secretary, Energy Efficiency and Renewable Energy.

For the reasons set forth in the preamble, part 430 of Chapter II of Title 10, 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 430.22 is amended in Subpart B by revising paragraph (b)(1) introductory text and adding paragraph (b)(7) to read as follows:

§ 430.22 Reference Sources.

* * * * *

(b) * * * (1) American National Standards Institute (ANSI). The ANSI standards listed in this paragraph may be obtained from the American National Standards Institute, 25 W. 43rd Street, 4th Floor, New York, NY 10036, (212) 642-4900.

* * * * *

(7) Association of Home Appliance Manufacturers, 1111 19th Street, NW., Suite 402, Washington, DC 20036, (202) 872-5955, "American National Standard, Household Electric Dishwashers, ANSI/AHAM DW-1-1992."

* * * * *

3. Section 430.23 of subpart B is amended by revising the section heading, and paragraph (c) to read as follows:

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

* * * * *

(c) *Dishwashers.* (1) The estimated annual operating cost (EAOC) for dishwashers must be rounded to the nearest dollar per year and is defined as follows:

(i) When cold water (50°F) is used,

(A) For dishwashers having a truncated normal cycle as defined in section 1.9 of appendix C to this subpart,

$$EAOC = N \times D_e \times (0.5 \times (M_n + M_t))$$

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

$$EAOC = N \times D_e \times M_n$$

where,

N = the representative average dishwasher use of 264 cycles per year,

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

M_n = the machine electrical energy consumption per-cycle for the normal cycle as defined in section 1.5 of appendix C to this subpart, in

kilowatt-hours and determined according to section 5.1 of appendix C to this subpart,

M_t = the machine electrical energy consumption per-cycle for the truncated normal cycle, in kilowatt-hours and determined according to section 5.1 of appendix C to this subpart.

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

(A) For dishwashers having a truncated normal cycle as defined in section 1.9 of appendix C to this subpart,

$$EAO = N \times D_e \times (0.5 \times (E_n + E_t))$$

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

$$EAO = N \times D_e \times E_n \times \text{where,}$$

N and D_e are defined in paragraph (c)(1)(i) of this section,

E_n = the total electrical energy consumption per-cycle for the normal cycle as defined in section 1.5 of appendix C to this subpart, in kilowatt-hours and determined according to section 5.1 of appendix C to this subpart,

E_t = the total electrical energy consumption per-cycle for the truncated normal cycle, in kilowatt-hours and determined according to section 5.1 of appendix C to this subpart.

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

(A) For dishwashers having a truncated normal cycle as defined in section 1.9 of appendix C to this subpart,

$$EAO = N \times ((D_e \times 0.5(M_n + M_t)) + (D_w \times 0.5(W_n + W_t)))$$

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

$$EAO = N \times ((D_e \times M_n) + (D_w \times W_n))$$

where,

N , D_e , M_n and M_t are defined in paragraph (c)(1)(i) of this section,

D_w = the representative average unit cost in dollars per Btu for gas or oil, as appropriate, as provided by the Secretary,

W_n = the total water energy consumption per cycle for the normal cycle as defined in section 1.5 of appendix C to this subpart, in Btus and determined according to section 5.3 of appendix C to this subpart,

W_t = the total water energy consumption per cycle for the truncated normal cycle as defined in section 1.9 of appendix C to this subpart, in Btus and determined according to section 5.3 of appendix C to this subpart.

(2) The energy factor for dishwashers, expressed in cycles per kilowatt-hour is defined as:

(i) For dishwashers not having a truncated normal cycle, as the reciprocal of the total energy consumption per cycle (E_n) for the normal cycle in kilowatt-hours per cycle, determined according to section 5.4 of appendix C to this subpart, and

(ii) For dishwashers having a truncated normal cycle, as the reciprocal of one-half the sum of

(A) The total energy consumption per cycle for the normal cycle (E_n), plus

(B) The total energy consumption per cycle for the truncated normal cycle (E_t), each in kilowatt-hours per cycle and determined according to section 5.4 of appendix C to this subpart.

(3) Other useful measures of energy consumption for dishwashers are those which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix C to this subpart.

4. Appendix C to Subpart B of Part 430 is revised to read as follows:

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

1. Definitions

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

1.2 *Compact dishwasher* means a dishwasher that has a capacity less than eight place settings plus six serving pieces as specified in ANSI/AHAM Standard DW-1 (see § 430.22).

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

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

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

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

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

1.8 *Standard dishwasher* means a dishwasher that has a capacity equal to or greater than eight place settings plus six serving pieces as specified in ANSI/AHAM Standard DW-1 (see § 430.22).

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

1.10 *Water-heating dishwasher* means a dishwasher which is designed for heating cold inlet water (nominal 50°F) or a dishwasher for which the manufacturer recommends operation with a nominal inlet water temperature of 120°F, and may operate at either of these inlet water temperatures by providing internal water heating to above 120°F in at least one wash phase of the normal cycle.

2. Testing Conditions

2.1 *Installation Requirements.* Install the dishwasher according to the manufacturer's instructions. A standard or compact under-counter or under-sink dishwasher must be tested in a rectangular enclosure constructed of nominal 0.374 inch (9.5 mm) plywood painted black. The enclosure must consist of a top, a bottom, a back, and two sides. If the dishwasher includes a counter top as part of the appliance, omit the top of the enclosure. Bring the enclosure into the closest contact with the appliance that the configuration of the dishwasher will allow.

2.2 *Electrical energy supply.*

2.2.1 *Dishwashers that operate with an electrical supply of 115 volts.* Maintain the electrical supply to the dishwasher within two percent of 115 volts and within one percent of the nameplate frequency as specified by the manufacturer.

2.2.2 *Dishwashers that operate with an electrical supply of 240 volts.* Maintain the electrical supply to the dishwasher within two percent of 240 volts and within one percent of its nameplate frequency as specified by the manufacturer.

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

2.3.1 *Dishwashers to be tested at a nominal 140°F inlet water temperature.* Maintain the water supply temperature at $140 \pm 5^\circ\text{F}$.

2.3.2 *Dishwashers to be tested at a nominal 120°F inlet water temperature.* Maintain the water supply temperature at $120 \pm 2^\circ\text{F}$.

2.3.3 *Dishwashers to be tested at a nominal 50°F inlet water temperature.* Maintain the water supply temperature at $50 \pm 2^\circ\text{F}$.

2.4 *Water pressure.* Using a water pressure gauge as specified in section 3.3 of this Appendix, maintain the pressure of the water supply at 35 ± 2.5 pounds per square inch gauge (psig).

2.5 *Ambient and machine temperature.* Using a temperature measuring device as specified in section 3.1 of this Appendix, maintain the room ambient air temperature at $75 \pm 5^\circ\text{F}$, and ensure that the dishwasher and the test load are at room ambient temperature at the start of each test cycle.

2.6 *Load.*

2.6.1 *Dishwashers to be tested at a nominal inlet temperature of 140°F.* These units must be tested on the normal cycle without a test load.

2.6.2 *Dishwashers to be tested at a nominal inlet temperature of 50°F or 120°F.* These units must be tested on the normal cycle with a test load of eight place settings

plus six serving pieces, as specified in AHAM Standard DW-1. If the capacity of the dishwasher, as stated by the manufacturer, is less than eight place settings, then the test load must be the stated capacity.

2.7 *Testing requirements.* Provisions in this appendix pertaining to dishwashers that operate with a nominal inlet temperature of 50 °F or 120 °F apply only to water heating dishwashers.

2.8 *Preconditioning requirements.* Precondition the dishwasher by establishing the testing conditions set forth in sections 2.1 through 2.5 of this Appendix. Set the dishwasher to the preconditioning cycle as defined in section 1.7 of this Appendix, without using a test load, and initiate the cycle.

3. *Instrumentation*

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

3.2 *Water meter.* The water meter must have a resolution of no larger than 0.1 gallons and a maximum error no greater than 1.5 percent for all water flow rates from one to five gallons per minute and for all water temperatures encountered in the test cycle.

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

3.4 *Watt-hour meter.* The watt-hour meter must have a resolution of no greater than 1 watt-hour and a maximum error of no more than 1 percent of the measured value for any demand greater than 50 watts.

4. *Test Cycle and Measurements*

4.1 *Test cycle.* Perform a test cycle by establishing the testing conditions set forth in section 2 of this Appendix, setting the dishwasher to the cycle type to be tested, initiating the cycle, and allowing the cycle to proceed to completion.

4.2 *Machine electrical energy consumption.* Measure the electrical energy consumed by the machine during the test cycle, M, expressed in kilowatt-hours per cycle, using a water supply temperature as set forth in section 2.3 of this Appendix and using a watt-hour meter as specified in section 3.4 of this Appendix.

4.3 *Water consumption.* Measure the water consumption, V, specified as the number of gallons delivered to the dishwasher during the entire test cycle, using a water meter as specified in section 3.2 of this Appendix.

4.4 *Report values.* You must report the electrical energy consumption and water consumption values for the machine, as measured.

5. *Calculation of derived results from test measurements*

5.1 *Machine energy consumption for electric dishwashers.* Use the value recorded in section 4.2 of this Appendix as the per-cycle machine electrical energy consumption. Use the notation M_n for a test of the normal cycle or M_t for a test of the truncated normal cycle and express in kilowatt-hours per cycle.

5.2 *Water energy consumption for dishwashers using electrically heated water.* Determine the water energy consumption according to sections 5.2.1 and 5.2.2 of this Appendix. Use the notation W_n for a test of the normal cycle or W_t for a test of the truncated normal cycle, and express in kilowatt-hours per cycle. Note that electrically heated water was used.

5.2.1 *Dishwashers that operate with a nominal 140 °F inlet water temperature, only.* For each test cycle, calculate the water energy consumption, W, expressed in kilowatt-hours per cycle and defined as:

$$W = V \times T \times K$$

where,

V = reported water consumption in gallons per cycle, as measured in section 4.3 of this Appendix,

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

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

5.2.2 *Dishwashers that operate with a nominal inlet water temperature of 120 °F.* For each test cycle, calculate the water energy consumption, W, expressed in kilowatt-hours per cycle and defined as:

$$W = V \times T \times K$$

where,

V = reported water consumption in gallons per cycle, as measured in section 4.3 of this Appendix,

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

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

5.3 *Water energy consumption per cycle using gas-heated or oil-heated water.* Determine the water energy consumption for dishwashers according to sections 5.3.1 and 5.3.2 of this Appendix. Use the notation W_n for a test of the normal cycle or W_t for a test of the truncated normal cycle, and express in kilowatt-hours per cycle. Note that gas-heated or oil-heated water was used.

5.3.1 *Dishwashers that operate with a nominal 140 °F inlet water temperature, only.* For each test cycle, calculate the water energy consumption using gas-heated or oil-heated water, W, expressed in kilowatt-hours per cycle and defined as:

$$W = V \times T \times K/e$$

where,

V = reported water consumption in gallons per cycle, as measured in section 4.3 of this Appendix,

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

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

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

5.3.2 *Dishwashers that operate with a nominal inlet water temperature of 120 °F.* For each test cycle, calculate the water energy consumption using gas heated or oil heated water, W, expressed in kilowatt-hours per cycle and defined as:

$$W = V \times T \times K/c$$

where,

V is measured in section 4.3 of this Appendix,

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

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

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

5.4 *Total energy consumption per cycle.* For each test cycle the total per-cycle energy consumption, E, is defined as the sum of the per-cycle machine electrical energy consumption, M, and the per-cycle water energy consumption, W, in kilowatt-hours per cycle. For the cycle type, M is calculated according to section 5.1 of this Appendix and W is calculated according to section 5.2 of this Appendix for electrically heated water, or according to section 5.3 for gas or oil heated water. Use the notation E_n for a test of the normal cycle or E_t for a test of the truncated normal cycle, and express in kilowatt-hours per cycle.

5. Section 430.32 of Subpart C is amended by revising paragraph (f) to read as follows:

5. Section 430.32 of Subpart C is amended by revising paragraph (f) to read as follows:

§ 430.32 Energy and water conservation standards and effective dates.

* * * * *

(f) *Dishwashers.* The energy factor of dishwashers manufactured on or after May 14, 1994, must not be less than:

Product class	Energy factor (cycles/kWh)
(1) Compact Dishwasher (capacity less than eight place settings plus six serving pieces as specified in ANSI/AHAM Standard DW-1 (see section 430.22))	0.62
(2) Standard Dishwasher (capacity equal to or greater than eight place settings plus six serving pieces as specified in ANSI/AHAM Standard DW-1(see section 430.22))	0.46

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[FR Doc. 01-30980 Filed 12-17-01; 8:45 am]
BILLING CODE 6450-01-P

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Office of Federal Housing Enterprise Oversight

12 CFR Part 1773

RIN 2550-AA21

Flood Insurance

AGENCY: Office of Federal Housing Enterprise Oversight, HUD.