entities. Such rule would lessen the regulatory impact of the order on certain milk handlers and would tend to ensure that dairy farmers would continue to have their milk priced under the order and thereby receive the benefits that accrue from such pricing.

The Department is issuing this proposed rule in conformance with Executive Order 12866.

This proposed rule has been reviewed under Executive Order 12778, Civil Justice Reform. This action is not intended to have a retroactive effect. If adopted, this proposed rule will not preempt any state or local laws, regulations, or policies, unless they present an irreconcilable conflict with the rule.

The Agricultural Marketing Agreement Act of 1937, as amended (7 U.S.C. 601–674), provides that administrative proceedings must be exhausted before parties may file suit in court. Under section 608c(15)(A) of the Act, any handler subject to an order may file with the Secretary a petition stating that the order, any provisions of the order, or any obligation imposed in connection with the order is not in accordance with law and request a modification of the order or to be exempted from the order. A handler is afforded the opportunity for a hearing on the petition. After a hearing, the Secretary would rule on the petition. The Act provides that the district court of the United States in any district in which the handler is an inhabitant, or has its principal place of business, has jurisdiction in equity to review the Secretary's ruling on the petition, provided a bill in equity is filed not later than 20 days after the date of the entry of the ruling.

Notice is hereby given that, pursuant to the provisions of the Agricultural Marketing Agreement Act, the suspension of the following provisions of the order regulating the handling of milk in the Southwest Plains marketing area is being considered for the period of September 1, 1996, through August 31, 1998:

In § 1106.6, the words ''during the month''.

In § 1106.7(b)(1), beginning with the words ''of February through August'' and continuing to the end of the paragraph.

In § 1106.13, paragraph (d)(1) in its entirety.

All persons who wish to send written data, views or arguments about the proposed suspension should send two copies of them to the USDA/AMS/Dairy Division, Order Formulation Branch, Room 2971, South Building, P.O. Box 96456, Washington, DC 20090- 6456, by the 30th day after publication of this notice in the Federal Register.

All written submissions made pursuant to this notice will be made available for public inspection in the Dairy Division during regular business hours (7 CFR 1.27(b)).

Statement of Consideration

The proposed rule would suspend the requirement that producers ''touch-base'' at a pool plant with at least one day's production during the month before their milk is eligible for diversion to a nonpool plant. By suspending the touch-base provision, producer milk would not be required to be delivered to pool plants before going to unregulated manufacturing plants.

The proposed suspension would also allow a supply plant that has been associated with the Southwest Plains order during the months of September 1995 through January 1996 to qualify as a pool plant without shipping any milk to a pool distributing plant during the months of September 1996 through August 1998. Without the suspension, a supply plant would be required to ship 50 percent of its producer receipts to pool distributing plants during the months of September through January and 20 percent of its producer receipts to pool distributing plants during the months of February through August to qualify as a pool plant under the order.

According to Kraft's letter requesting the suspension, supplemental milk supplies will not be needed to meet the fluid needs of distributing plants. Kraft anticipates that there will be an adequate supply of direct-ship producer milk located in the general area of distributing plants available to meet the Class I needs of the market. Consequently, it states, there is no need to require producers located some distance from pool distributing plants to touch-base when their milk can more economically be diverted directly to manufacturing plants in the production area.

Accordingly, it may be appropriate to suspend the aforesaid provisions from September 1, 1996, through August 31, 1998.

List of Subjects in 7 CFR Part 1106

Milk marketing orders.

The authority citation for 7 CFR Part 1106 continues to read as follows:

Authority: 7 U.S.C. 601–674.

Dated: April 9, 1996.

Lon Hatamiya,

Administrator.

[FR Doc. 96–9831 Filed 4–19–96; 8:45 am]

BILLING CODE 3410–02–P

DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

10 CFR Part 430

[Docket No. EE–RM–94–230A]

Energy Conservation Program for Consumer Products: Test Procedure for Clothes Washers and Reporting Requirements for Clothes Washers, Clothes Dryers, and Dishwashers

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

ACTION: Supplemental Notice of Proposed Rulemaking.

SUMMARY: The Department of Energy (DOE or Department) today is issuing a supplemental notice of proposed rulemaking to expand the scope of the Department's proposed rule to amend the clothes washer test procedure used to test for compliance with the existing energy conservation standard. The Association of Home Appliance Manufacturers (AHAM) recommended an additional new test procedure that would apply to the anticipated future clothes washer energy conservation standards. The Department is reopening the comment period on its proposed rule to seek comments on whether it should adopt the AHAM recommended test procedure, with certain changes.

DATES: Written comments in response to this notice must be received by June 6, 1996.

ADDRESSES: Written comments, 10 copies, are to be submitted to: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, EE–43, Room 1J–018, ''Test Procedure for Clothes Washers and Reporting Requirements for Clothes Washers, Clothes Dryers, and Dishwashers,'' Docket No. EE–RM–94–230A, Forrestal Building, 1000 Independence Avenue SW., Washington, DC 20585, (202)–586–7574.

Copies of the transcript of the public hearing and the public comments received on the proposed rule, may be read and/or photocopied at the Department of Energy Freedom of Information Reading Room, U.S. Department of Energy, Forrestal Building, Room 1E–190, 1000 Independence Avenue SW., Washington, DC 20585, (202) 586–6020 between the hours of 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT:

P. Marc LaFrance, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Mail Station EE–43, Forrestal Building, 1000 Independence Avenue SW., Washington, DC 20585–0121, (202) 586–8423

Eugene Margolis, Esq., U.S. Department of Energy, Office of General Counsel, Mail Station GC–72, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586–9507

SUPPLEMENTARY INFORMATION:

I. Introduction

On Thursday, March 23, 1995, the Department published a proposed rule to amend the clothes washer test procedure. 60 FR 15330 (hereafter referred to as the Notice of Proposed Rulemaking or NOPR). On July 12, 1995, a hearing on the proposed rule was held in Washington, DC.

The proposed amendment to the test procedure was based on the same factual foundation as the existing test procedure and energy conservation standards for clothes washers, so that the existing energy conservation standard would not have to be adjusted. The Department believes, however, that the existing test procedure currently overstates the average annual energy consumption for clothes washers because of changes in consumer habits since the current test procedure was adopted.[1] The Department had planned on initiating a subsequent clothes washer test procedure rulemaking, at a later date, which would take into account current consumer habits, and would be used as the basis for considering revision of the clothes washer energy conservation standards.[2]

In response to the NOPR, AHAM submitted comments asking DOE to adopt an additional new test procedure to take effect when new standards take effect. The Department greatly appreciates AHAM's effort in developing a new test procedure. The Department is considering adopting the test procedure with certain revisions. The Department is considering issuance of a final rule with two test procedures, to be codified in Appendices ''J'' and ''J1'' in the Code of Federal Regulations, title 10, part 430, § 430.23. Appendix ''J'' would be a revision of the current test procedure, would be consistent with the existing standards, and would become effective 30 days after issuance of the final rule. Appendix ''J1'', based on AHAM's test procedures, would be used in the analysis and review of revised efficiency standards, and would apply to any revised standards. At that time the Department would amend its regulations to replace Appendix ''J'' with Appendix ''J1.''

The Department solicits comments from the public at this time on issues raised by the AHAM recommended test procedure and by the options under consideration with respect to this proposal. In connection with the reopening of the comment period, the Department is proposing regulatory language for part 430, § 430.23, Appendix J1.

II. Discussion

A. AHAM Recommended Test Procedure

AHAM recommended a test procedure for use and adoption during the next round of clothes washer standards rulemaking. The AHAM test procedure addresses current consumer usage habits which result in approximately a 30 percent reduction in energy consumption from the current test procedure. Discussed below are comments by the following industry representatives: General Electric Company (GE), Maytag and Admiral Products (Maytag), Speed Queen Company (Speed Queen), Whirlpool Corporation (Whirlpool), and Miele Appliances Inc. (Miele), directed to the AHAM test procedures, as well as industry comments that were directed to the NOPR but that concern matters also covered by the AHAM test procedure. In addition, AHAM provided copies of its clothes washer test procedure to non-industry representatives who have been involved with the residential appliance standards program. (AHAM, No. 8).[3] The Department received comments concerning the AHAM test procedure from the Clorox Company (Clorox), the Proctor and Gamble Company (P&G), and American Council for and Energy Efficient Economy (ACEEE).

Annual Energy Consumption

GE recommended that the Department incorporate into the AHAM test procedure a table for the annual number of clothes washer cycles per year based on the capacity of the clothes washer being tested for determining annual energy consumption. GE's recommendation would in essence specify a constant amount of clothing (in pounds) that is washed per year per typical household. GE derived its table by averaging P&G data for average wash loads used in ''regular'' and ''large'' capacity clothes washers. The GE table shows a range of ''Adjusted Annual Cycles (AAC)'' from 264 to 810 based on capacity. (GE, No. 6 at 4). Maytag strongly opposes the GE recommendation primarily because it states, ''there is no evidence that average load size is a function of washer capacity. To the contrary, there is evidence that wash load sizes are based on factors other than washer capacity most of the time.'' (Maytag, No. 41 at 1).

The Department understands GE's purpose is to provide some type of scale to adjust for the use of larger capacity machines. The Department is proposing to reduce the number of annual cycles from 416 to 392, as stated in the NOPR. The Department is aware that the number of annual cycles has declined over time,[4] while the shipment weighted average capacity of clothes washers has increased over the same relative time period.[5] However, the Department believes that it is reasonable to assume that the number of cycles for all sizes of clothes washers is relatively constant and that families with large needs, based on lifestyle or number of family members, purchase larger clothes washers and families with smaller needs purchase smaller clothes washers. If the GE table were to be employed it would result in the following expected

[1] Proctor & Gamble data indicates a decrease in the use of hot water and the number of cycles per year over time.

[2] The second round of clothes washer standards rulemaking was initiated by the publication of an Advance Notice of Proposed Rulemaking (ANOPR), (59 FR 56423, November 14, 1994.)

[3] Comments on the NOPR have been assigned docket numbers and have been numbered consecutively. Statements that were presented at the July 12, 1995, public hearing are identified as Testimony.

[4] Proctor and Gamble letter of September 2, 1994 to DOE.

[5] AHAM Major Home Appliance Industry Book published 1995.

consumer use cycles per year: using a 1.5 cubic foot compact clothes washer, 517 cycles per year would be expected, whereas using a 3.2 cubic foot standard clothes washer, 298 cycles per year would be expected.[6] For the reasons indicated above, however, the Department does not believe that there is such great variation in the average usage of washers of different sizes. Moreover, the Department is not aware of any data concerning current usage which establish that as the capacity of a clothes washer increases, it is operated less frequently. Therefore, the Department does not propose to incorporate a table to allow for a variation in annual clothes washer cycles dependent upon clothes washer capacity. The Department will reconsider this issue, however, if it receives statistically valid data showing such a variation.

Capacity Measurement

The AHAM recommended test procedure, as well as the current and NOPR test procedures, require a test measurement of the clothes container capacity. This capacity is defined as the volume which a dry clothes load could occupy. This capacity is then used in the calculation of the Energy Factor which is used to rate the efficiency of clothes washers on a per load basis. The actual load, in pounds of clothing, that a clothes washer can wash is a function of many variables including the wetted clothes container volume which is actually available for clothes washing, the agitation system and the motor torque. The Department has used the measured clothes container capacity as a proxy for the actual load a clothes washer is capable of washing, and this has worked well for purposes of comparing vertical axis clothes washers. However, there has been discussion as to whether the measured capacity of a clothes container is a comparable proxy of the load capability for horizontal axis clothes washers.

The DOE and AHAM recommended test procedures both require measuring the capacity to the upper most part of the clothes washer container, which includes the volume occupied by the tub ring. The maximum water level in any vertical axis clothes washer may vary, but the water level cannot go to the top of the tub ring. Maytag calculated that this current method of measuring capacity results in the measured volume of vertical-axis clothes washers exceeding the wetted volume by a minimum of 15 percent to well over 20 percent. (Maytag, No. 13 at 1). However, all the manufacturers, including Maytag, believe that the current method for measuring vertical-axis clothes washer capacity is sufficient and should not be changed. (AHAM, No. 33 at 5).

Since the measured and wetted volumes of a horizontal axis clothes washer are the same, Maytag proposed multiplying the measured volume of a horizontal axis clothes washer by a factor of 1.2. (Maytag, No. 13 at 2). This factor would mathematically increase the capacity of horizontal-axis clothes washers and would result in a 20 percent increase in the energy factor for horizontal-axis clothes washers. A similar factor is included in the International Electrotechnical Commission (IEC) 456 test procedure for clothes washers. ACEEE supports a capacity credit for horizontal-axis clothes washers.[7] ACEEE states that the IEC test procedure has a 15 percent credit and believes the credit may be too low. ACEEE believes the credit should be 21 percent. (ACEEE, No. 32 at 3).

Speed Queen opposes a horizontal-axis clothes washer capacity adjustment factor stating that adequate time for discussion and comment is needed on this ''recently raised issue.'' (Speed Queen, No. 29 at 3). GE opposes any horizontal-axis clothes washer capacity credit stating, ''In view of the evidence, from P & G, that American consumer washing habits are driven in large part by their perception of capacity, proponents of a European adjustment factor must provide hard data of its applicability to the U.S. market.'' (GE, No. 36 at 2). Whirlpool also opposes any credit for horizontal-axis clothes washer capacity because no data has been presented that would demonstrate a difference of American loading habits for vertical-axis versus horizontal-axis clothes washers. (Whirlpool, No. 37 at 4).

The Department notes that the measured volume of a vertical axis clothes washer is larger than the wetted volume, whereas, these two volumes are the same for horizontal axis clothes washers. Therefore, for these two types of machines, capacity may not have the same relationship to the amount of clothes a clothes washer is capable of washing. However, the Department has no data to indicate that this possible difference translates into an actual difference in load size capability when the other variables that affect load size are considered, or as to how American consumers will use horizontal axis washers. If such data becomes available, the Department would consider making an adjustment to the calculation of the energy factor of either vertical or horizontal axis clothes washers to have relatively accurate comparisons. However, today's notice of proposed rulemaking would make no changes in this area.

Electrical Energy Supply

The NOPR would delete a provision in the existing test procedures that allowed turning off of console lights which did not consume more than 10 watts during the clothes washer test cycle. AHAM maintains this provision in its recommended test procedure. Speed Queen, however, indicated that it supported the Department's proposal to remove the provision. (Speed Queen, No. 29 at 4). Today's notice is consistent with the NOPR, and excludes this provision.

Remaining Moisture Content

The AHAM recommended test procedure includes a provision to test the Remaining Moisture Content (RMC) of a test load. RMC represents a percentage derived by dividing the moisture weight that is remaining in the clothing at the completion of the clothes washer cycle by the weight of the dry clothes prior to the clothes washing cycle. There are several issues raised relating to the methodology for testing RMC.

GE expressed a concern about the possibility of manufacturers providing manual selectable options to consumers which would affect the resulting RMC of consumer wash loads. GE believes that the Department should not use the lowest RMC level achieved in a clothes washer for the future minimum energy conservation standard analysis or for energy reporting, and that there should be some type of ''discounting of the RMC credit.'' According to GE, consumers may not always choose the setting which would result in the lowest RMC value. (Testimony at 157). GE provided a chart showing four factors which affect RMC—spin speed, spin time, load size, and rinse temperature (GE, No. 6 at appendix E)—and stated that clothes washers could be manufactured that offered user options for spin speed and duration. Whirlpool indicated that the AHAM test procedure addresses the concern regarding consumer selection of spin speed. Specifically, Whirlpool stated that the AHAM test procedure requires the use of the energy test cycle, which specifies that the spin speed recommended by the

[6] These figures were derived by DOE from the GE proposed table using the specified clothes washer capacities.

[7] Commenters have used both terms ''factor'' and ''credit'' which are intended to mean the same thing.

manufacturer for cotton and linen clothes shall be used in the test (section 2.1.1 AHAM submitted test procedure). (Testimony at 170). The Department realizes there are several issues that affect RMC measurement which have not been addressed and are discussed below, which could affect the final test procedure methodology for testing RMC.

Spin Speed and Spin Time

The Department is aware that the AHAM recommended test procedure requires the use of the energy test cycle to conduct the RMC test. The AHAM test procedure defines the ''energy test cycle'' as follows: ''the cycle recommended by the manufacturer for washing cotton and/or linen clothes. It includes the agitation/tumble operation, spin speed (s), wash times, and rinse times applicable to that cycle, including water heating time for water heating clothes washers, and applies to all wash/rinse temperature selections and water levels available on the model, regardless of whether the wash/rinse temperature selections or water levels are available in the cycle recommended for cotton and/or linens.'' This definition appears to address clothes washers with multiple spin speeds, because spin speed is depicted as ''spin speed(s).'' In addition, rinse time is depicted as ''rinse times.'' The definition clearly states that testing for energy reporting shall be conducted in the cycle the manufacturer specifies for cotton and/or linen clothes.

The AHAM test procedure appears to be adequate in the situation where the energy test cycle has only one spin speed and time. However, the AHAM test procedure does not specify the spin speed to be used in testing a clothes washer for which that cycle has several or a range of values for spin speed and time for cotton and linen clothes. Therefore, because exact consumer preferences are not known relative to the choice of multiple spin speed or spin time selections, the Department is considering the option of requiring the use of the average of the extreme values of the spin speeds and times that are available in the energy test cycle.[8] The Department believes that this would address the testing of clothes washers with multiple recommended spin speeds and times, and might discount the RMC value as proposed by GE. The Department welcomes comments on this issue.

[8] Similarly, for example, the DOE dishwasher test procedure has a 50 percent proration value for use of heated verses unheated dry option. (42 FR 15423, March 17, 1977)

Load Size

GE provided a graph with RMC on the ''Y'' axis and Load Size on the ''X'' axis. (GE, No. 6 at appendix E). The graph was not quantified, but depicted a relatively large negative slope of approximately 0.5. Thus, according to the graph, as load size gets larger the RMC level decreases substantially.[9] The Department requested data from all parties present at the hearing to help quantify the exact slope. (Testimony at 160). So far, the Department has not received any such data. The issue is important because the AHAM test procedure specifies that the maximum test load be used to conduct the RMC test, which is approximately 35 percent larger than an average test load. However, the AHAM test procedure indicates, based on P&G data, that consumers use a maximum load only 12 percent of the time whereas they use an average load 74 percent of the time.

If GE's graph accurately depicts the slope, this would have a major impact on the expected energy savings to consumers and manufacturer efficiency/energy consumption representations, because data shows that consumers use their clothes washers with an average size load 74 percent of the time. It would mean that, under the AHAM recommended test procedure, the anticipated energy consumption to remove the moisture from the clothing would be artificially low because the test procedure calculates RMC on the basis of a maximum size load. Under the AHAM test procedure RMC is first determined for a maximum size load. The RMC thus determined is then adjusted in order to determine the moisture content that would remain in an average size load. The adjustment formula is based on the assumption that RMC as a percentage amount is the same for different load sizes, the point that GE disputes. An alternative to the AHAM recommended test method for RMC could be to require testing using the average test load, rather than the maximum test load with an adjustment. However, the Department believes that this may increase test burden. Currently, the majority of clothes washer models do not have adaptive control features such as automatic water fill control. Under the AHAM recommended test procedure, machines with adaptive controls need to be tested using an average test load. Requiring testing of all machines using the average test load may not be warranted if the slope is actually small. At this time, the Department does not plan to change the AHAM recommended test method. The Department requests data, comment and suggested changes to the test procedure, if needed, to address this issue.

[9] RMC is a percentage which decreases, although the actual remaining moisture weight increases because the larger load retains more moisture.

Energy Required To Remove Moisture From the Test Load

The RMC value is used to calculate the energy required to remove moisture from the test load, ''D_E''. The ''DE'' is calculated using the maximum size test load, load adjustment factor (LAF) (P&G ratio of maximum load size to average load size), nominal energy required to remove moisture from clothes (constant for all clothes washers, 0.5 KWh/lb) and the clothes dryer utilization factor (DUF) (percentage of clothes washer loads that are dried by clothes dryers). AHAM recommended a DUF of 83 percent, although P&G calculates the DUF to be 84.4 percent.[10] AHAM stated at the hearing it did not think using the 84 percent figure would be controversial, but that it might need to further consider the matter. (Testimony at 104–105). The Department is using 84 percent for the DUF in today's proposal.

Sodium Hypochlorite Bleach

Clorox recommended that the Department adopt a definition for sodium hypochlorite bleach (bleach) dispenser, and a corresponding credit because of the potential for energy savings. (Clorox, No. 30 at 1). In regard to the clothes washer standard rulemaking, Clorox has provided the Department with data indicating that a significant amount of energy can be saved with the use of bleach.[11] The savings would be realized through the use of colder water for washing. The Clorox data shows that cleaning performance is maintained or minimally degraded at colder temperatures if bleach is used. Clorox recommended revising the Temperature Use Factors (TUFs) and energy consumption calculations to provide a credit to clothes washers equipped with a bleach dispenser. Clorox stated, however, ''Consumer data identifies a large area for *potential* energy savings due to the higher incidence of hot water usage in bleach loads.'' (Emphasis added.) Clorox further stated, ''Consumers that use bleach typically are more concerned with getting their laundry clean, and recognize that hotter wash temperatures provide the best results.'' (Clorox, No. 30 at 2).

[10] Comment 32 on Docket number EE–RM–94–403.

[11] Comment 41 on docket number EE–RM–94–403.

The data provided from Clorox relative to the cleaning performance with bleach shows a significant potential for energy savings because cleaning performance is maintained or minimally degraded when bleach is added to cold water and detergent, versus when hot water is used with just detergent. However, the energy savings do not appear to be demonstrated by the data provided, because consumers who use bleach tend to use hot water rather than shifting to cold water. Therefore, the Department does not plan to include a provision for bleach in its clothes washer test procedures. The Department welcomes comment on this issue.

Suds-Saver Provision

The AHAM recommended test procedure does not provide a credit to clothes washers with a suds-saver feature. Based on previous information from AHAM (AHAM meeting, February 16, 1995), the Department believes that AHAM eliminated this provision due to the relatively low number of sales of clothes washers with a suds-saver feature. Additionally, AHAM believes that a suds-saver credit is no longer needed in the test procedure. The Department requests comments relative to the elimination of the suds-saver credit.

Temperature Use Factors

The Department received several comments regarding the method for determining Temperature Use Factors (TUFs), which are used to prorate energy consumption among cold, warm and hot wash, as well as to factor in a warm rinse if offered. Because any test procedure based on the AHAM test procedure would not become effective until approximately the year 2000, a significant emphasis in determining such test procedure's TUF values has been on the need and method to project future consumer usage habits based on currently available survey data.

AHAM provided the recommended test procedure with TUFs for wash temperatures and a range of TUF values for rinse temperature. (AHAM, No. 8). AHAM indicated that the original submission had been revised and provided the final version of TUFs. The final version also included a range of rinse TUF values. (AHAM, No. 48 at 1). GE indicated that it supported the AHAM wash TUFs and provided justification for a warm rinse TUF of 21 percent. GE provided a detailed analysis which included linear regression projections and utilized ''differencing to eliminate autocorrelation.'' (GE, No. 6 at 5 and No. 36 at 1). P&G provided data, linear regression analysis with and without projections, and recommendations for TUFs. P&G indicated that it believed the future projections of the linear regression were valid for the wash TUFs, although it thought the projection for the warm rinse TUF was too aggressive. (P&G, No. 12 at 1). ACEEE believed the TUFs should be determined by the average between a current linear regression and a linear regression projected to the year 1999. (ACEEE, No. 32 at 3). Although Whirlpool disagreed with AHAM's use of linear regression projection to obtain wash TUF values, and instead recommended use of an average of the last five years, it supported the AHAM wash TUFs because the resultant difference was small. Whirlpool indicated that it believed the warm rinse TUF value should be 33 percent. (Whirlpool, No. 37 at 2).

At the Department's request, the National Institute of Standards and Technology (NIST) has conducted a linear regression with and without future year projections. The NIST results varied slightly from the P&G analysis results, probably due to rounding off to integers or to use of the calendar year for the data (P & G survey data is conducted over two calendar years, *i.e.*, 93/94), but were basically consistent with the P&G results. The following table provides the TUF values as recommended from the various entities.

PRESENTATION OF VARIOUS POSITIONS FOR TEMPERATURE USE FACTORS

	Hot wash (DATA/TUF)	Warm wash (DATA/TUF)	Cold wash (DATA/TUF)	Warm rinse (DATA)	Warm rinse (TUF [3])
P&G 1994 RAW DATA	0.16	0.48	0.36	0.18	N/A
AHAM	0.14	0.47	0.39	[1] 0.13–0.21	0.21–0.33
GE	0.14	0.47	0.39	0.13	0.21
WHIRLPOOL	[1] 0.16	[1] 0.50	[1] 0.34	[1] 0.21	[1] 0.33
ACEEE	[1] 0.14	[1] 0.49	[1] 0.37	[1] 0.16	[1] 0.27
P&G 1994 REGRESSION	0.15	0.51	0.34	0.18	[1] 0.30
NIST 1994 REGRESSION	[1] 0.15	[1] 0.50	[1] 0.35	[1] 0.19	[1] 0.32
P&G 2000 REGRESSION	0.14	0.48	0.38	[2] 0.16	[1] 0.27
NIST 2000 REGRESSION	[1] 0.13	[1] 0.48	[1] 0.39	[1] 0.13	[1] 0.22

[1] Calculated by NIST independently or based on comment.
[2] Recommended by P&G, independent of regression results.
[3] Presently accepted by all commenters as being calculated by (P&G data)/0.60, representing that 60 percent of the clothes washers in the P&G survey had a warm rinse available.

The Department believes that linear regression is one acceptable method of conducting data plotting because it is generally accepted, for example, by educators, economists and businesses. However, to project consumer usage data into the future, linear regression may be unacceptable because it does not address factors which affect the change in consumer's habits (e.g., per P&G: improvements in detergent, change in fabric type or concern to save energy). (P&G, No. 12 at 1,2). From a statistical standpoint, if data were available on the factors which correlate to the decrease in hot water usage, then an accurate prediction could be made. However, the Department does not have this data and understands that the data is not readily available. Considering P&G's comments, the Department believes the trend to choose cooler wash temperatures is likely to continue, but possibly not at the rate indicated by the linear regression projection. Considering the above, the Department believes that the ACEEE position to average the current TUF values and the projected TUF values is a reasonable approach, since the test procedure is being developed for future use. Therefore, in its modifications of the AHAM test procedure, DOE is considering incorporation of the following TUFs: hot wash, 14 percent; warm wash, 49 percent; cold wash, 37 percent; and warm rinse, 27 percent. The Department welcomes comments relating to the acceptability of these TUF values.

Test Cloth and Test Load

AHAM recommended a requirement for pre-conditioning the ''energy test cloths'' (see AHAM test procedure section 2.6.1.2). In this section, AHAM referenced its standard ''test detergent IIA.'' The Department believes that specifying a particular detergent is too specific and may not be warranted because a variation in detergent for preconditioning test cloth is unlikely to measurably affect the energy consumption of a clothes washer being tested. Absent any justification to require use of AHAM's detergent in performing the test procedure, non-AHAM manufacturers should not be required to obtain the AHAM detergent to test their clothes washers. Therefore, the Department is considering changing the detergent to ''commercially available clothes washer detergent that is suitable for 135 °F (57.2 °C) wash water.'' The Department requests comment on this detergent description.

The Department is also concerned about the use of ''energy stuffer cloths'' (test procedure section 2.6.2). Energy test cloths and energy stuffer cloths are used to make up the various size test loads. An energy stuffer cloth is approximately one sixth the size of an energy test cloth. The concern is that if a large number of energy stuffer cloths are used instead of energy test cloths, then the mechanical energy needed to agitate the test load may be understated. The Department believes that there should be a maximum number of energy stuffer cloths that can be used to establish the test load. Therefore, the Department is considering the option of setting the maximum number of energy stuffer cloths that can be used to 5. This number represents the maximum number of energy stuffer cloths that should be needed because 6 energy stuffer cloths would be the equivalent of one energy test cloth. The Department requests comments on this issue.

In its test load table (table 5.1), AHAM recommended a tolerance of ± 0.10 pounds. The Department believes this tolerance is too large. A tolerance of ± 0.05 pounds appears to be more suitable because the required test load sizes can easily be obtained through the use of energy stuffer cloths that weigh approximately 0.04 pounds each. The Department requests comments on the tolerance value.

Uniformly Distributed Temperature Selections

At the hearing, the Department expressed concern regarding terminology used in AHAM's recommended test procedure—''uniformly distributed, by temperature [between hot wash and cold wash]''—relative to the calculation or testing of a warm wash temperature selection. (Testimony at 113). The AHAM test procedure requires that the warm wash (or multiple warm wash) selection(s) be calculated, in lieu of testing, when all of a model's temperature selections are uniformly distributed. If not uniformly distributed, then each temperature selection must be tested. The Department asked AHAM to define ''uniformly distributed, by temperature (between hot wash and cold wash)'' at the hearing. (Testimony at 115). AHAM responded with an expanded definition that sets two conditions for a ''warm wash having uniform distribution by temperature between hot wash and cold wash.'' (AHAM, No. 33 at 4). The first condition is: the ''theoretical mean warm wash temperature'' equals the ''theoretical mean of all wash temperatures.'' The second condition is: ''uniform separation'' of warm wash temperatures exists. AHAM included detailed mathematical equations (see AHAM No. 33 at 4) to further explain the above terms.

The Department appreciates AHAM's submission regarding the definition and mathematical expressions. However, the Department believes that a narrative definition would be more appropriate for the rule language to maintain consistency with other definitions. The Department is considering an approach that retains the content of the AHAM definition, but converts it into narrative form through a definition for ''uniformly distributed warm wash.''

AHAM also indicated without qualification that an ''infinite selection'' warm wash temperature selection would be considered uniformly distributed. If a clothes washer has an infinite number of warm wash temperature selections which follows a proportional (or linear) relationship with the warm wash selection device (dial, slide, etc.), then clearly the warm wash temperature selection is uniformly distributed and the recommended AHAM method for uniformly distributed temperatures applies. However, the AHAM test procedure does not address an infinite warm wash selection which follows a path that is not proportional (linear). It is possible that some clothes washer manufacturers, in the future, may employ non-linear infinite warm wash selections. Therefore, the Department is considering the option of revising sections 3.5.1 and 3.5.2 of the AHAM test procedure to address this issue, and welcomes comments relative to the definitions and revised sections it is considering.

In addition, Whirlpool has indicated a concern about the language regarding intermediate warm wash temperatures. (Whirlpool No. 50 at 1). Whirlpool recommended changing the terminology in the test procedure from ''Warm Wash'' to ''Intermediate Wash'' to eliminate confusion. The Department agrees with Whirlpool that the intent of the AHAM recommended test procedure is that the warm wash temperatures refer to all temperatures which are below the hottest hot (135 °F (57.2 °C)) and above the coldest cold. The Department agrees with Whirlpool and believes that was the intent of the AHAM recommended test procedure. Therefore, to prevent any possible ambiguity regarding warm wash temperatures, the Department is considering defining ''warm wash'' as all temperature selections between the hottest and coldest. The Department welcomes comments regarding the AHAM test procedure and the acceptability of the new definition.

Water-Heating Clothes Washers

NIST on behalf of the Department expressed a concern regarding the possible need to establish ambient test conditions for testing water-heating clothes washers. (Testimony at 132). The Department believes that the energy consumed in a water-heating clothes washer may be affected by the ambient temperature of the clothes washer. Thus, if the ambient temperature prior to and during testing is relatively hot, then less energy will be consumed than under typical operating conditions, i.e., the test will understate the clothes washer's energy consumption. Conversely, if the ambient temperature prior to and during the test is relatively cold, then the energy consumption will be overstated. The Department asked AHAM to comment on this issue at the hearing. (Testimony at 132). AHAM recommended adding ambient temperature conditions for tests of water heating clothes washers, specified as 75 °F ± 5 °F. (AHAM, No. 33 at 6) . Speed Queen supported the AHAM recommendation. (Speed Queen, No. 29 at 2). The Department believes that AHAM's specified temperature is above room temperature but reflects acceptable test conditions for manufacturer facilities while preventing large variations. Therefore, DOE is considering adoption of this requirement.

The Department is concerned about the testing of water-heating clothes washers that may have been stored in an area that has a temperature outside of the above range, prior to testing. The concern is that the thermal mass of the clothes washer may affect the resultant energy consumption. Therefore, the Department is considering the addition of pre-conditioning requirements for water-heating clothes washers. The unique requirement would be to conduct the established pre-conditioning procedure, if the water-heating clothes washer has not been stored in the test room, at the specified ambient conditions, for at least 8 hours (see section 2.9.2). The Department welcomes comment on the 8 hour time frame and on the issue of ambient conditions for water-heating clothes washers.

AHAM's recommended test procedure provides for testing water-heating clothes washers that are capable of using externally heated water. However, the AHAM test procedure only included a provision for hot water heated externally by electricity and did not include a provision for water-heating clothes washers that use hot water heated externally by gas or oil. A test provision for hot water heated externally by gas or oil is required for Federal Trade Commission labeling. Therefore, the Department is considering adoption of such a provision. Additionally, in doing so, the Department is also considering simplification of the test procedure by combining sections for water-heating and nonwater-heating clothes washers where appropriate. The Department requests comments on these options.

Water Consumption Factor

In the NOPR, the Department proposed a Water Consumption Factor (WCF) (clothes washer capacity per gallon per cycle). The Department believes that providing a means of determining WCF may allow consumers, utilities or other organizations to compare clothes washer water consumption independent of clothes washer capacity. AHAM recommended language to calculate total water consumption in gallons per cycle. The AHAM expression is not adjusted to take into account variations of model capacities and will penalize larger capacity clothes washers on a comparison basis.

In response to the NOPR for Appendix ''J'', the Department received several comments regarding the WCF. Miele and Speed Queen indicated that WCF should be the inverse of what was proposed because many utilities already use that factor (gallons per cycle per cubic foot capacity). (Miele, No. 10 at 2 and Speed Queen, No. 29 at 3). AHAM indicated that WCF on a per cycle basis can be expressed as cubic feet per gallon (AHAM, No. 33 at 5). The Department agrees with Miele and Speed Queen that the WCF should be consistent with existing utility programs and represented on a per cycle basis as gallons (weighted water consumption) per cubic foot capacity. Therefore, the Department is considering addition of a provision to AHAM's recommended test procedure to calculate WCF expressed as gallons per cycle per cubic feet. The Department requests comments regarding this topic.

B. Related Matters

1. Potential Impacts/Changes to the Appendix J Test Procedure

Test Load Sizes

AHAM recommended that the Department adopt its test load table (table 5.1 of the Appendix ''J1'' test procedure) for the Appendix ''J'' test procedure. The Department supports the incorporation of the AHAM test load table because it reflects the latest consumer usage data. However, the impact of the incorporation of the recommended AHAM test load table will most likely result in the majority of front-loader clothes washers being tested with larger test loads. The Department realizes that front-loader clothes washers are not required to meet a performance minimum energy conservation standard, but existing models will require retesting and relabeling. The Department requests comments relative to the acceptability of the AHAM recommended test load table for the Appendix ''J'' test procedure.

Water-Heating Clothes Washers

AHAM recommended a provision for testing water-heating clothes washers that have the capability of using externally heated water (see discussion above). However, the provision for externally heated water was not in the NOPR. Therefore, the Department plans on similarly incorporating test procedures for water-heating clothes washers with externally heated water capability in the final rule for the Appendix ''J'' test procedure. The Department requests comments on this issue.

Field Testing

Methods for testing nonconventional clothes washers are not provided in the DOE current test procedure, the NOPR Appendix J, or AHAM recommended test procedure. In addition, none of these test procedures is valid for machines equipped with adaptive controls if consumers use the adaptive cycle more than 50% of the time. AHAM's recommended test procedure specifies guidelines for conducting field tests of nonconventional clothes washers, and of machines with adaptive controls where a manufacturer believes the controls will be used more than 50% of the time. The field testing provisions provide guidelines for manufacturers to conduct data gathering in support of a Petition for Waiver pursuant to Code of Federal Regulation, Title 10, Part 430, section 430.27. AHAM proposed that these same field testing provisions be added to Appendix ''J''. The Department requests comments on this proposal.

2. Section 430.23, ''Test Procedures for Measures of Energy Consumption'', Paragraph (j)

The Department proposed revisions to § 430.23 (j) in the NOPR. These changes dealt with the number of annual clothes washer cycles, corresponding Appendix ''J'' section number references and the incorporation of the Modified Energy Factor descriptor. If Appendix ''J1'' is promulgated, § 430.23(j) will need to be revised. The Department plans to make the required section reference changes to § 430.23(j), for both the Appendix ''J'' and Appendix ''J1'' test procedures.

List of Subjects in 10 CFR Part 430

Administrative practice and procedure, Energy conservation, Household appliances.

Issued in Washington, DC, April 15, 1996.

Christine A. Ervin,

Assistant Secretary, Energy Efficiency and Renewable Energy.

For the reasons set forth in the preamble, part 430 of Chapter II of Title 10, of the Code of Federal Regulations is proposed to be amended as set forth below:

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

Authority: 42 U.S.C. 6291–6309.

2. Appendix J1 is added to subpart B of part 430 as follows:

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

Note: This test procedure applies to amendments to revise 1994 minimum energy conservation standards for clothes washers set forth at Title 10 CFR 430.32(g).

1. Definitions

1.1 *Adaptive control system* refers to a clothes washer control system which is capable of automatically adjusting washer operation or washing conditions based on characteristics of the clothes load placed in the clothes container, without allowing or requiring consumer intervention and/or actions. Examples would be clothes washer control system independent selection, modifications, or absolute control of wash water temperature, agitation and/or tumble cycle time, number of rinse cycles, spin speed, etc.

Note: The energy consumption of any adaptive system which depends on the use of, detection of, or the presence of either soil, soap, suds, or any additive laundering substitute or complimentary product to determine the operation of the clothes washer must be determined following the field test procedures defined in section 6.

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

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

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

1.5 *Compact* refers to a clothes washer which has a clothes container capacity of less than 1.6 cubic feet.

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

1.7 *Energy test cycle* means the cycle recommended by the manufacturer for washing cotton and/or linen clothes. It includes the agitation/tumble operation, spin speed(s), wash times, and rinse times applicable to that cycle, including water heating time for water heating clothes washers, and applies to all wash/rinse temperature selections and water levels available on the model, regardless of whether the wash/rinse temperature selections or water levels are available in the cycle recommended for cottons and/or linens.

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

1.9 *Manual control systems* refers to the type of washer control system which requires that the consumer make the choices that determine washer operation or washing conditions, for example: wash/rinse temperature selections, and wash time before starting the cycle.

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

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

1.12 *Nonwater-heating clothes washer* refers to a clothes washer which does not have an internal hot water heating device to generate hot water.

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

1.14 *Standard* refers to a clothes washer which has a clothes container capacity of 1.6 cubic feet or greater.

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

1.16 *Thermostatically controlled water valves* refer to a set of clothes washer valves which sense water temperature and adjust the hot water and cold water supplies appropriately to maintain a desired mixed water temperature.

1.17 *Uniformly distributed warm wash* refers to warm wash selections for which the warm wash water temperatures have a linear relationship with all discrete warm wash selections when the water temperatures are plotted against equally spaced consecutive warm wash selections between the hottest warm wash and the coldest warm wash. If the warm wash has infinite selections, the warm wash water temperature shall have a linear relationship with the distance on the selection device (e.g. dial angle or slide movement) between the hottest warm wash and the coldest warm wash. The criteria for a linear relationship as specified above is that the difference between the actual water temperature at any warm wash selection and the corresponding temperature on the temperature/selection line formed by connecting the warmest and the coldest warm selections is less than ±5 percent. In all cases, the mean water temperature of the warmest and the coldest warm selections must coincide with the mean of the hot and cold water temperature.

1.18 *Warm wash* refers to all temperature selections that are below the hottest hot (≤135 °F (57.2 °C)) and above the coldest cold temperature selection.

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

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

1.21 *Symbol usage.*

The following identity relationships are provided to help clarify the symbology used throughout this procedure. The other symbols and corresponding terms from the table below a sample variable can be substituted with their appropriate meanings:

1.21.1 For example, ''Electrical Energy Consumption'' for an ''Extra Hot Wash'' and ''Maximum Test Load'' would be depicted as follows:

Em_x

E—Electrical Energy Consumption
H—Hot Water Consumption
C—Cold Water Consumption
m—Extra Hot Wash (max. temp. >135°F (57.2°C.))
h—Hot Wash (max. temp. <=135°F (57.2°C.))
w—Warm Wash (intermediate temp.)
c—Cold Wash (minimum temp.)
x—Maximum Test Load
a^+—Above Average Test Load
a—Average Test Load
a^-—Below Average Test Load
n—Minimum Test Load

1.21.2 For example, ''Hot Water Consumed by Warm Rinse'' for the ''Maximum Test Load'' would be depicted as follows:

R_x

R—Hot Water Consumed by Warm Rinse
Er—Electrical Energy Consumed by Warm Wash/Warm Rinse
ER—Electrical Energy Consumed by Warm Rinse $^+$—Maximum Test Load
a^+—Above Average Test Load
a—Average Test Load
a^-—Below Average Test Load
n—Minimum Test Load

1.21.3 For example, ''Temperature Use Factor'' for ''Extra Hot Wash'' would be depicted as follows:

TUF_m

m—Extra Hot Wash
h—Hot Wash
w—Warm Wash
c—Cold Wash
R—Warm Rinse

1.21.4 For example, ''Temperature Weighted Hot Water Consumption'' for the ''Maximum Test Load'' would be depicted as follows:

Vh_x

x—Maximum Test Load
a^+—Above Average Test Load
a—Average Test Load
a^-—Below Average Test Load
n—Minimum Test Load

1.21.5 For example, ''Hot Water Energy Consumption'' for the ''Maximum Test Load'' would be depicted as follows:

E_{max}

E—Hot Water Energy Consumption
F—Load Usage Factor
Q—Total Water Consumption
ME—Machine Electrical Energy Consumption
max—Maximum Test Load
avg—Average Test Load
min—Minimum Test Load

1.21.6 The following additional symbols are used in the test procedure:

RMC—Remaining Moisture Content
WI—Initial Weight of Dry Test Load
WC—Weight of Test Load After Extraction
ME_T—Total Machine Electrical Energy Consumption
E_{TE}—Total Per-Cycle Energy Consumption

2. Testing Conditions

2.1 *Installation.* Install the clothes washer in accordance with manufacturer's instructions.

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

2.3 *Supply Water Temperature.*

2.3.1 *Clothes washers in which electrical energy consumption and/or water energy consumption are affected by the inlet water temperature (for example, water heating clothes washers or clothes washers with thermostatically controlled water valves).* The temperature of the hot water supply at the water inlets shall be maintained at 135°F +0°F −10°F (57.2°C +0°C −5.5°C) and the cold water supply at the water inlets shall be maintained at 60°F +0°F −10°F (15.6°C +0°C −5.6°C). A water meter shall be installed in both the hot and cold water lines to measure water consumption.

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

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

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

2.5.1 *Weighing scales.*

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

2.5.1.2 *Weighing scale for clothes container capacity measurements.* The scale should have a resolution of 0.50 pounds (0.2 kg) and a maximum error no greater than 0.5 percent of the measured value.

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

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

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

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

2.6 *Test cloths.*

2.6.1 *Energy test cloth.*

2.6.1.1 The energy test cloth shall not be used for more than 25 test runs and shall be clean and consist of the following:

(a) Pure finished bleached cloth, made with a momie or granite weave, which is 50 percent cotton and 50 percent polyester and weighs 5.75 ounces per square yard (195.0 g/m^2) and has 65 ends on the warp and 57 picks on the fill. (b) Cloth material that is 24 inches by 36 inches (61.0 cm by 91.4 cm) and has been hemmed to 22 inches by 34 inches (55.9 cm by 86.4 cm) before washing. The maximum shrinkage after five washes shall not be more than four percent on the length and width.

2.6.1.2 The new test cloths, including energy test cloths and energy stuffer cloths shall be pre-conditioned in a clothes washer in the following manner:

2.6.1.2.1 For each gallon (3.79 liters) of water used, use 6 grams of a commercially available clothes washing detergent that is suitable for 135 °F (57.2 °C) wash water, with the washer set on maximum water level. Place detergent in washer and then place the new load to be conditioned in the washer. Wash the load for ten minutes in soft water (17ppm or less). Wash water is to be hot, and controlled at 135 °F ± 5 °F (57.2 °C ± 2.8 °C). Rinse water temperature is to be cold, and controlled at 60 °F ± 5 °F (15.6 ± °C 2.8 °C). Rinse the load through a second rinse using the same water temperature (utilize an optional second rinse if available).

2.6.1.2.2 Dry the load.

2.6.1.2.3 A final cycle is to be hot water wash with no detergent followed by two cold water rinses.

2.6.1.2.4 Dry the load.

2.6.2 *Energy stuffer cloth.* The energy stuffer cloth shall be made from energy test cloth material and shall consist of pieces of material that are 12 inches by 12 inches (30.5 cm by 30.5 cm) and have been hemmed to 10 inches by 10 inches (25.4 cm by 25.4 cm) before washing. The maximum shrinkage after five washes shall not be more than four percent on the length and width. The number of test runs on the same energy stuffer cloth shall not exceed 25 runs.

2.7 *Test Load Sizes.* Maximum, minimum, and when required, average test load sizes shall be determined using Table 5.1 and the clothes container capacity as measured in 3.1 through 3.1.4. Test loads shall consist of energy test cloths, except that adjustments to the test loads to achieve proper weight can be made by the use of energy stuffer cloths with no more than 5 stuffer clothes per load.

2.8 *Use of Test Loads.* Table 2.8 defines the test load sizes and corresponding water fill settings which are to be used when measuring water and energy consumption. ''Control System'' refers to the type of clothes washer control system as defined in section 1 of this appendix:

TABLE 2.8.—TEST LOAD SIZES AND WATER FILL SETTINGS REQUIRED

Water fill control system	Manual		Manual		Adaptive	
Other control systems	Manual		Adaptive		Manual or adaptive	
	Test load size	Water fill setting	Test load size	Water fill setting	Test load size	Water fill setting
	Max	Max	Max	Max	Max	As determined by the Clothes Washer.
	Min	Min	Avg	Max	Avg+[1].	
			Min	Min	Avg.	
				....	Avg[1].	
					Min.	

[1] See 3.3.3.1, 3.4.3.1, or 3.6.3.1 to determine if these load sizes are required.

2.8.1 The test load sizes to be used to measure RMC are specified in section 3.8.

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

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

2.9 *Pre-conditioning.*

2.9.1 *Nonwater-heating clothes washer.* If the clothes washer has neither been tested nor filled with water in the preceding 96 hours, pre-condition it by running it through a cold rinse cycle and then draining it to ensure that the hose, pump, and sump are filled with water.

2.9.2 *Water-heating clothes washer.* If the clothes washer has neither been tested nor filled with water in the preceding 96 hours and/or if it has not been in the test room at the specified ambient conditions for 8 hours, pre-condition it by running it through a cold rinse cycle and then draining it to ensure that the hose, pump, and sump are filled with water.

2.10 *Wash time setting.* If one wash time is prescribed in the energy test cycle, that shall be the wash time setting; otherwise, the wash time setting shall be the higher of either the minimum, or 70 percent of the maximum, wash time available in the energy test cycle.

2.11 *Test room temperature for water-heating clothes washers.* Maintain the test room ambient air temperature at 75°F±5 °F (23.9 °C ±2.8 °C).

3. Test Measurements

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

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

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

3.1.3 Fill the clothes container manually with either 60 °F±5 °F (15.6 °C±2.8 ° C) or 100°F#±10 °F (37.8°C ±2.8°C) water to its uppermost edge. Measure and record the weight of water, W, in pounds.

3.1.4 The clothes container capacity is calculated as follows:

$C=W/d$.

Where:

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

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

TABLE 3.2.—TEST SECTION REFERENCE

Max. wash temp. available	<=135 °F (57.2 °C)			≤135 °F (57.2 °C) [2]	
Number of wash temp. selections	1	2	≤=3	3	≤3
Test Sections Required to be Followed	3.6	3.4	3.4	3.3	3.3
	[1] 3.7	3.6	3.5	3.5	3.4
	3.8	[1] 3.7	3.6	3.6	3.5
	....	3.8	[1] 3.7	[1] 3.7	3.6
	....	....	3.8	3.8	[1] 3.7
	....	....	3.8	3.8	[1]3.7
	....	....	....	....	3.8

[1] Only applicable to machines with warm rinse.
[2] This only applies to water heating clothes washers on which the maximum wash temperature available exceeds 135° F (57.2° C).

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

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

3.2.1.2 For semi-automatic washers: (1) For hot water temperature: open the hot water faucet completely and close the cold water faucet; (2) for warm inlet water temperature: Open both hot and cold water faucets completely; (3) for cold water temperature: close the hot water faucet and open the cold water faucet completely.

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

3.2.3 *Clothes washers with adaptive/manual/consumer optional control systems*

3.2.3.1 *Clothes washers with adaptive controls and alternate manual controls.* If clothes washers with adaptive controls allow consumer selection of manual controls as an alternative, then both manual and adaptive modes shall be tested and the energy consumption, E_{TE} , calculated in section 4 shall be the average of the measured values. If the product manufacturer feels more energy savings would result from the actual in home use of the adaptive control system, then the procedures in section 6.2 can be used as an alternate means to provide data in support of a waiver.

3.2.3.2 *Clothes washers with adaptive water fill controls.* When testing these clothes washers in adaptive water fill control, the maximum, minimum, and average water levels as defined in the following sections shall be interpreted to mean that amount of water fill which is selected by the control system when the respective test loads are used, as defined in Table 2.8. The load usage factors which shall be used when calculating energy consumption values are defined in Table 4.1.3.

3.2.3.3 *Clothes washers with adaptive control systems which do not adaptively modify the water fill levels.* The water fill selector shall be set to the maximum water level available on the clothes washer for the maximum and average test load sizes and set to the minimum water level for the minimum test load size as defined in Table 2.8. The load usage factors which shall be used when calculating energy consumption values are defined in Table 4.1.3.

3.2.3.4 *Clothes washers with manual control systems.* The water fill selector shall be set to the maximum water level available on the clothes washer for the maximum test load size and set to the minimum water level for the minimum test load size as defined in Table 2.8. The load usage factors which shall be used when calculating energy consumption values are defined in Table 4.1.3.

3.2.3.5 *Clothes washers with consumer options for the energy test cycle.* Clothes washers which have more than one option or a range of options for various characteristics (other than wash time) of the energy test cycle, such as various spin speeds or adaptive water fill selections, etc., shall be tested at the maximum and minimum extremities of the available options. The energy consumption and other equations calculated in section 4 shall be determined by the average of the measured values.

3.3 *''Extra Hot Wash'' Cycle (Max Wash Temp* >135° F (57.2° C)). This section applies to water heating clothes washers only. Water and electrical energy consumption shall be measured for each water fill level and/or test load size as specified in 3.3.1 through 3.3.3.5.2 for the hottest setting available.

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

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

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

3.3.3.1 Steps 3.3.3.2 through 3.3.3.5.2 are to determine if additional testing of clothes washers with adaptive water fill controls is necessary, by checking for linearity in the three water consumption values (minimum, average, and maximum) measured.

3.3.3.2 Calculate the total water consumption for the maximum test load size ($V_x=Hm_x+Cm_x$)

3.3.3.3 Calculate the total water consumption for the average test load size ($V_a=Hm_a+Cm_a$)

3.3.3.4 Calculate the total water consumption for the minimum test load size ($V_n=Hm_n+Cm_n$)

3.3.3.5 If V_a is different than the average of V_x and V_n by 5 percent or more then two additional test load sizes, average$^{(+)}$ and average$^{(-)}$ shall be tested as follows:

3.3.3.5.1 To determine the average$^{(+)}$ test load size, add the weights for the maximum and average test load sizes and divide by two. Place the average$^{(+)}$ test load size into the clothes washer and measure the hot water consumption (Hm_{a+}), cold water consumption (Cm_{a+}), and electrical energy consumption (Em_{a+}) for an extra hot wash/cold rinse energy test cycle.

3.3.3.5.2 To determine the average$^{(-)}$ test load size, add the weights for the average and minimum test load sizes and divide by two. Place the average$^{(-)}$ test load size into the clothes washer and measure the hot water consumption (Hm_{a-}), cold water consumption (Cm_{a-}), and electrical energy consumption (Em_{a-}) for an extra hot wash/cold rinse energy test cycle.

3.4 *''Hot Wash'' Cycle (Max Wash Temp ≤135 °F (57.2 °C)).* Water and electrical energy consumption shall be measured for each water fill level and/or test load size as specified in 3.4.1 through 3.4.3.5.2 for 135 °F (57.2 °C) wash if available or the hottest selection less than 135 °F (57.2 °C).

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

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

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

3.4.3.1 Steps 3.4.3.2 through 3.4.3.5.2 are to determine if additional testing of clothes washers with adaptive water fill controls is necessary, by checking for linearity in the three water consumption values (minimum, average, and maximum) measured.

3.4.3.2 Calculate the total water consumption for the maximum test load size ($V_x=Hh_x+Ch_x$)

3.4.3.3 Calculate the total water consumption for the average test load size ($V_a=Hh_a+Ch_a$)

3.4.3.4 Calculate the total water consumption for the minimum test load size ($V_n=Hh_n+Ch_n$)

3.4.3.5 If V_a is different than the average of V_x and V_n by 5 percent or more then two additional test load sizes, average$^{(+)}$ and average$^{(-)}$ shall be tested as follows:

3.4.3.5.1 To determine the average$^{(+)}$ test load size, add the weights for the maximum and average test load sizes and divide by two. Place the average$^{(+)}$ test load size into the clothes washer and measure the hot water consumption (Hh_{a+}), cold water consumption (Ch_{a+}), and electrical energy consumption (Eh_{a+}) for a hot wash/cold rinse energy test cycle.

3.4.3.5.2 To determine the average$^{(-)}$ test load size, add the weights for the average and minimum test load sizes and divide by two. Place the average$^{(-)}$ test load size into the clothes washer and measure the hot water consumption (Hh_{a-}), cold water consumption (Ch_{a-}), and electrical energy consumption (Eh_{a-}) for a hot wash/cold rinse energy test cycle.

3.5 *''Warm Wash'' Cycle (Intermediate Wash Temperature Selection Between Hot and Cold).* Water and electrical energy consumption shall be measured for each water fill level and/or test load size as specified in 3.5.1 through 3.5.5.3 for the warm water wash temperature.

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

3.5.2 For clothes washers that do not have uniformly distributed warm wash temperature selections, test all intermediate wash temperature selections for washers having discrete warm wash selections. For washers having infinite warm wash selections which are non-uniformly distributed by temperature between ''hot wash'' and ''cold wash'', test at 20 percent, 40 percent, 60 percent, and 80 percent positions of the temperature selection device between the hottest hot (≤135 °F (57.2 °C)) wash and the coldest cold wash. The reportable values to be used for the warm water wash setting shall be the arithmetic averages of all tests required in this section.

3.5.3 *Maximum test load and water fill.* Hot water consumption (Hw_x), cold water consumption (Cw_x), and electrical energy consumption (Ew_x) shall be measured for a warm wash/cold rinse energy test cycle, with the controls set for the maximum water fill level. The maximum test load size is to be used and shall be determined per table 5.1.

3.5.4 *Minimum test load and water fill.* Hot water consumption (Hw_n), cold water consumption (Cw_n), and electrical energy consumption (Ew_n) shall be measured for a warm wash/cold rinse energy test cycle, with the controls set for the minimum water fill level. The minimum test load size is to be used and shall be determined per table 5.1.

3.5.5 *Average test load and water fill.* For clothes washers with adaptive controls, measure the values for hot water consumption (Hw_a), cold water consumption (Cw_a), and electrical energy consumption (Ew_a) for a warm wash/cold rinse energy test cycle, with an average test load size as determined per table 5.1.

3.5.5.1 If additional testing of clothes washers with adaptive water fill controls was determined to be necessary by section 3.3.3.1 or 3.4.3.1. average$^{(+)}$ and average$^{(-)}$ test load sizes shall be determined for warm wash as follows:

3.5.5.2 To determine the average$^{(+)}$ test load size, add the weights for the maximum and average test load sizes and divide by two. Place the average$^{(+)}$ test load size into the clothes washer and measure the hot water consumption (Hw_{a+}), cold water consumption (Cw_{a+}), and electrical energy consumption (Ew_{a+}) for a warm wash/cold rinse energy test cycle.

3.5.5.3 To determine the average$^{(-)}$ test load size, add the weights for the average and minimum test load sizes and divide by two. Place the average$^{(-)}$ test load size into the clothes washer and measure the hot water consumption (Hw_{a-}), cold water consumption (Cw_{a-}), and electrical energy consumption (Ew_{a-}) for a warm wash/cold rinse energy test cycle.

3.6 *''Cold Wash'' Cycle (Minimum Wash Temperature Selection).* Water and electrical energy consumption shall be measured for each water fill level and/or test load size as specified in 3.6.1 through 3.6.3.5.2 for the coldest wash temperature selection available.

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

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

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

3.6.3.1 Steps 3.6.3.2 through 3.6.3.5.2 are to determine if additional testing of clothes washers with adaptive water fill controls is necessary, by checking for linearity in the three water consumption values (minimum, average, and maximum) measured.

3.6.3.2 Calculate the total water consumption for the maximum test load size ($V_x=Hc_x+Cc_x$)

3.6.3.3 Calculate the total water consumption for the average test load size ($V_a=Hc_a+Cc_a$)

3.6.3.4 Calculate the total water consumption for the minimum test load size ($V_n=Hc_n+Cc_n$)

3.6.3.5 If V_a is different than the average of V_x and V_n by 5 percent or more then two additional test load sizes, average$^{(+)}$ and average$^{(-)}$ shall be tested as follows:

3.6.3.5.1 To determine the average$^{(+)}$ test load size, add the weights for the maximum and average test load sizes and divide by two. Place the average$^{(+)}$ test load size into the clothes washer and measure the hot water consumption (Hc_{a+}), cold water consumption (Cc_{a+}), and electrical energy consumption (Ec_{a+}) for a cold wash/cold rinse energy test cycle.

3.6.3.5.2 To determine the average$^{(-)}$ test load size, add the weights for the average and minimum test load sizes and divide by two. Place the average$^{(-)}$ test load size into the clothes washer and measure the hot water consumption (Hc_{a-}), cold water consumption (Cc_{a-}), and electrical energy consumption (Ec_{a-}) for a cold wash/cold rinse energy test cycle.

3.7 *Warm Rinse.*

3.7.1 Measure the amount of hot water consumed during the hottest rinse cycle with the rinse temperature set to warm, including all deep and spray rinses, for the maximum (R_x), minimum (R_n), and average (R_a) test load sizes and/or water fill levels.

3.7.2 Measure the total amount of electrical energy consumed by the clothes washer with a warm wash and hottest rinse cycle, including all wash, deep rinses, and spray rinses, for the maximum (Er_x), minimum (Er_n), and average (Er_a) test load sizes and/or water fill levels.

3.7.3 Subtract the electrical energy values for warm wash/cold rinse as measured in section 3.5 (Ew) from the Er values determined above in section 3.7.2 to calculate the additional electrical energy required to heat the water and operate the clothes washer for the warm wash/warm rinse cycle (ER).

(a) $ER_x = Erx - Ew_x$
(b) $ER_a = Er_a - Ew_a$
(c) $ER_n = Er_n - Ew_n$

3.7.4 If additional testing of clothes washers with adaptive water fill controls was determined to be necessary by section 3.3.3.1, 3.4.3.1, 3.5.5.1 or 3.6.3.1., the average$^{(+)}$ and average$^{(-)}$ values shall be determined for warm rinse in sections 3.7.1 (R_{a+} and R_{a-}), 3.7.2 (Er_{a+} and Er_{a-}), and 3.7.3 (ER_{a+} and ER_{a-}) as appropriate.

3.8 *Remaining Moisture Content.*

3.8.1 The wash temperature will be the same as the rinse temperature for all testing.

3.8.2 *For clothes washers with cold rinse only.*

3.8.2.1 Determine the maximum test load as defined in table 5.1 and section 3.1.

3.8.2.2 Record the actual 'bone dry' weight of the test load (WI_{max}).

3.8.2.3 Set water level selector to maximum fill.

3.8.2.4 Run the energy test cycle.

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

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

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

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

3.8.3.1 Complete steps 3.8.2.1 through 3.8.2.5 for cold rinse. Calculate the remaining moisture content of the maximum test load for cold rinse, RMCCOLD, expressed as a percentage and defined as:

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

3.8.3.2 Complete steps 3.8.2.1 through 3.8.2.6 for warm rinse. Calculate the remaining moisture content of the maximum test load for warm rinse, RMC_{WARM}, expressed as a percentage and defined as:

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

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

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

4. Calculation of Derived Results from Test Measurements

All calculations for average, above average, and below average test load sizes in this section are applicable only to those clothes washers which were required to be tested in these conditions, as stated in Table 2.8.

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

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

(a) $Vh_x = [Hm_x \times TUF_m] + [Hh_x \times TUF_h] + [Hw_x \times TUF_w] + [Hc_x \times TUF_c] + [R_x \times TUF_R]$

(b) $Vh_{a+} = [Hm_{a+} \times TUF_m] + [Hh_{a+} + \times TUF_h] + [Hw_{a+} \times TUF_w] + [Hc_{a+} \times TUF_c] + [R_{a+} \times TUF_R]$

(c) $Vh_a = [Hm_a \times TUF_m] + [Hh_a \times TUF_h] + [Hw_a \times TUF_w] + [Hc_a \times TUF_c] + [R_a \times TUF_R]$

(d) $Vh_{a-} = [Hm_{a-} \times TUF_m] + [Hh_{a-} \times TUF_h] + [Hw_{a-} \times TUF_w] + [Hc_{a-} \times TUF_c] + [R_{a-} \times TUF_R]$

(e) $Vh_n = [Hm_n \times TUF_m] + [Hh_n \times TUF_h] + [Hw_n \times TUF_w] + [Hc_n \times TUF_c] + [R_n \times TUF_R]$

Where:

x, a, & n are the maximum, average, and minimum test load for the clothes washer under test.

a+ is the above average test load size.

a− is the below average test load size.

Hm_x, Hm_{a+}, Hm_a, Hm_{a-}, and Hm_n, are reported hot water consumption values, in gallons per-cycle (or liters per cycle), at maximum, above average, average, below average, and minimum fill, respectively, for the extra-hot wash cycle with the appropriate test loads, as defined in section 2.8.

Hh_x, Hh_{a+}, Hh_a, Hh_{a-}, and Hh_n, are reported hot water consumption values, in gallons per-cycle (or liters per cycle), at maximum, above average, average, below average, and minimum fill, respectively, for the hot wash cycle with the appropriate test loads, as defined in section 2.8.

Hw_x, Hw_{a+}, Hw_a, Hw_{a-}, and Hw_n, are reported hot water consumption values, in gallons per-cycle (or liters per cycle), at maximum, above average, average, below average, and minimum fill, respectively, for the warm wash cycle with the appropriate test loads, as defined in section 2.8.

Hc_x, Hc_{a+}, Hc_a, Hc_{a-}, and Hc_n, are reported hot water consumption values, in gallons per-cycle (or liters per cycle), at maximum, above average, average, below average, and minimum fill, respectively, for the cold wash cycle with the appropriate test loads, as defined in section 2.8.

R_x, R_{a+}, R_a, R_{a-}, and R_n are the reported hot water consumption values, in gallons per- cycle (or liters per cycle), at maximum, above average, average, below average, and minimum fill, respectively, for the warm rinse cycle and the appropriate test loads, as defined in section 2.8

TUF_m, TUF_h, TUF_w, TUF_c, and TUF_R are temperature use factors for extra hot wash, hot wash, warm wash, cold wash, and warm rinse temperature selections, respectively, and are as defined in Table 4.1.1.

TABLE 4.1.1.—TEMPERATURE USE FACTORS

Max Wash Temp Available	≤135 °F (57.2 °C)	≤135 °F (57.2 °C)	≤135 °F (57.2 °C)	>135 °F (57.2 °C)	>135 °F (57.2 °C)
No. Wash Temp Selections	Single	2 Temps	≥3 Temps	3 Temps	>3 Temps
TUF_m (extra hot)	NA	NA	NA	0.14	0.05
TUF_h (hot)	NA	0.63	0.14	NA	0.09
TUF_w (warm)	NA	NA	0.49	0.49	0.49
TUF_c (cold)	1.00	0.37	0.37	0.37	0.37
TUF_R (warm rinse)	0.27	0.27	0.27	0.27	0.27

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

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

(b) $E_{avg} = [Vha \times T \times K]$ or if above average and below average test loads were required to be tested $E_{avg} = [(1/3) \times (Vh_{a+} + Vh_a + Vh_{a-}) + T \times K]$ = Total energy for an average load.

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

Where:

T=Temperature rise=75 °F (23.9 °C).

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

Vh_x, Vh_{a+}, Vh_a, Vh_{a-}, and Vh_n, are as defined in 4.1.1.

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

$E_T=[E_{max} \times F_{max}]+[E_{avg} \times F_{avg}]+[E_{min} \times F_{min}]$

Where:

E_{max}, E_{avg}, and E_{min} are as defined in 4.1.2.

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

TABLE 4.1.3.—LOAD USAGE FACTORS

Water Fill Control System	Manual	Manual	Adaptive
Other Control Systems	Manual	Adaptive	Manual or Adaptive
F_{max}=	[1].72	[2].10	[3].12
F_{avg}=		[2].62	[3].74
F_{min}=	[1].28	[2].28	[3].14

[1] Reference 3.2.3.4
[2] Reference 3.2.3.3.
[3] Reference 3.2.3.2

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

$E_{TG}=E_T \times 1/e \times 3412$ Btu/kWh or $E_{TG}=E_T \times 1/e \times 3.3$ MJ/kWh

Where:

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

E_T = As defined in 4.1.3.

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

(a) $ME_{max}=[Em_x \times TUF_m]+[Eh_x \times TUF_h]+[Ew_x \times TUF_w]+[Ec_x \times TUF_c]+[ER_x \times TUF_R]$

(b) $ME_{avg}=[Em_a \times TUF_m][Eh_a \times TUF_h]+[Ew_a \times TUF_w]+[Ec_a \times TUF_c]+[ER_a \times TUF_R]$

Note: Em_a is the average of Em_{a+}, Em_a, and Em_{a-} if above average and below average test loads were required to be tested. The same applies to Eh_a, Ew_a, Ec_a, and ER_a.

(c) $ME_{min}=[Em_n \times TUF_m]+[Eh_n \times TUF_h]+[Ew_n \times TUF_w]+[Ec_n \times TUF_c]+[ER_n \times TUF_R]$

Where:

x, a, & n are the maximum, average, and minimum test load for the clothes washer under test.

a_+ & a_- are the above average and below average test load sizes for the clothes washer under test.

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

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

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

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

ER_x, ER_{a+}, ER_a, ER_{a-}, and ER_n are reported electrical energy consumption values, in kilowatt-hours per cycle, at maximum, above average, average, below average, and minimum test loads, respectively, for the warm rinse cycle.

TUF_m, TUF_h, TUF_w, TUF_c, and TUF_R are as defined in 4.1.1.

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

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

Where:

ME_{max}, ME_{avg}, and ME_{min} are as defined in 4.1.5.

F_{max}, F_{avg}, and F_{min} are as defined in 4.1.3.

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

$E_{TE}=E_T+ME_T$

Where:

ME_T=As defined in 4.1.6.

E_T=As defined in 4.1.3.

4.2 *Water consumption of clothes washers.*

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

$Q_{max}=[Hc_x+Cc_x]$

$Q_{avg}=[Hc_a+Cc_a]$

Note: Hc_a is the average of Hc_{a+}, Hc_a, and Hc_{a-} if above average and below average test loads were required to be tested. The same applies to Cc_a.

$Q_{min}=[Hc_n+Cc_n]$

Where:

Hc_x, Cc_x, Hc_a, Cc_a, Hc_n, and Cc_n are as defined in 3.6.

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

$Q_T=[Q_{max} \times F_{max}]+[Q_{avg} \times F_{avg}]+[Q_{min} \times F_{min}]$

Where:

Q_{max}, Q_{avg}, and Q_{min} are as defined in 4.2.1.

F_{max}, F_{avg}, and F_{min} are as defined in 4.1.3.

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

$WCF=Q_T/C$

Where:

Q_T=as defined in section 4.2.2.

C=as defined in section 3.1.

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

$D_E=(LAF) \times (\text{Maximum test load weight}) \times (RMC_{max} - 4\%) \times (DEF) \times (DUF)$

Where:

LAF=Load adjustment factor=0.52.

Maximum test load weight=As shown in Table 5.1 expressed in lbs/cycle.

RMC_{max}=As defined in 3.8.2.6 or 3.8.3.3.

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

DUF=dryer usage factor, percentage of washer loads dried in a clothes dryer=0.84.

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

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

Where:

C=As defined in 3.1.4.
E_{TE}=As defined in 4.1.7.
D_E=As defined in 4.3.

5. Test Loads

TABLE 5.1.—TEST LOAD SIZES

Container volume	cu. ft. ≥ < (liter)	Minimum load		Maximum load		Average load	
		lb	(kg)	lb	(kg)	lb	(kg)
0 –0.80	0 –22.7	3.00	1.36	3.00	1.36	3.00	1.36
0.80–0.90	22.7–25.5	3.00	1.36	3.50	1.59	3.25	1.47
0.90–1.00	25.5–28.3	3.00	1.36	3.90	1.77	3.45	1.56
1.00–1.10	28.3–31.1	3.00	1.36	4.30	1.95	3.65	1.66
1.10–1.20	31.1–34.0	3.00	1.36	4.70	2.13	3.85	1.75
1.20–1.30	34.0–36.8	3.00	1.36	5.10	2.31	4.05	1.84
1.30–1.40	36.8–39.6	3.00	1.36	5.50	2.49	4.25	1.93
1.40–1.50	39.6–42.5	3.00	1.36	5.90	2.68	4.45	2.02
1.50–1.60	42.5–45.3	3.00	1.36	6.40	2.90	4.70	2.13
1.60–1.70	45.3–48.1	3.00	1.36	6.80	3.08	4.90	2.22
1.70–1.80	48.1–51.0	3.00	1.36	7.20	3.27	5.10	2.31
1.80–1.90	51.0–53.8	3.00	1.36	7.60	3.45	5.30	2.40
1.90–2.00	53.8–56.6	3.00	1.36	8.00	3.63	5.50	2.49
2.00–2.10	56.6–59.5	3.00	1.36	8.40	3.81	5.70	2.59
2.10–2.20	59.5–62.3	3.00	1.36	8.80	3.99	5.90	2.68
2.20–2.30	62.3–65.1	3.00	1.36	9.20	4.17	6.10	2.77
2.30–2.40	65.1–68.0	3.00	1.36	9.60	4.35	6.30	2.86
2.40–2.50	68.0–70.8	3.00	1.36	10.00	4.54	6.50	2.95
2.50–2.60	70.8–73.6	3.00	1.36	10.50	4.76	6.75	3.06
2.60–2.70	73.6–76.5	3.00	1.36	10.90	4.94	6.95	3.15
2.70–2.80	76.5–79.3	3.00	1.36	11.30	5.13	7.15	3.24
2.80–2.90	79.3–82.1	3.00	1.36	11.70	5.31	7.35	3.33
2.90–3.00	82.1–85.0	3.00	1.36	12.10	5.49	7.55	3.42
3.00–3.10	85.0–87.8	3.00	1.36	12.50	5.67	7.75	3.52
3.10–3.20	87.8–90.6	3.00	1.36	12.90	5.85	7.95	3.61
3.20–3.30	90.6–93.4	3.00	1.36	13.30	6.03	8.15	3.70
3.30–3.40	93.4–96.3	3.00	1.36	13.70	6.21	8.35	3.79
3.40–3.50	96.3–99.1	3.00	1.36	14.10	6.40	8.55	3.88
3.50–3.60	99.1–101.9	3.00	1.36	14.60	6.62	8.80	3.99
3.60–3.70	101.9–104.8	3.00	1.36	15.00	6.80	9.00	4.08
3.70–3.80	104.8–107.6	3.00	1.36	15.40	6.99	9.20	4.17

Notes:
(1) All test load weights are bone dry weights.
(2) Allowable tolerance on the test load weights are +/− 0.05 pounds (0.023 kg).

6. Field Testing

6.1 *Nonconventional Wash System Energy Consumption Test.*

If a clothes washer has washer controls or systems that do not allow for adequate measurement of energy consumption under the test procedure, or for calculation of energy consumption using a procedure accepted by DOE and a representative number of other manufacturers, such nonconventional clothes washers must be field tested as a basis for a waiver request.

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

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

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

6.2 *Adaptive control system field test.*

Section 3.2.3.1 defines the test method for measuring energy consumption for clothes washers which incorporate control systems having both adaptive wash cycle and alternate manual wash cycle selections. Energy consumption calculated by the method defined in section 3.2.3.1 assumes the adaptive cycle will be used 50 percent of the time. The purpose of this section is to define the requirements for developing in-house and field test data in support of a request for a waiver when it is felt that the adaptive cycle will be used more than 50 percent of the time.

The field test sample size shall be a minimum of 10 test clothes washers. The test clothes washers shall be totally representative of the design, construction, and control system that will be placed in commerce. The duration of field testing in the user's house shall be a minimum of 50 energy test cycles, for each unit. No special instructions as to cycle selection or product usage shall be given to the field test participants, other than inclusion of the product literature pack which will be shipped with all units, and instructions regarding filling out data collection forms, use of data collection equipment, and/or basic procedural methods.

Prior to the test clothes washers being installed in the field test locations, baseline data shall be developed for all field test units by conducting laboratory tests as defined by section 1 through section 5 of these test procedures to determine the energy consumption, water consumption, and remaining moisture content values.

The following data shall be measured and recorded *for each wash load* during the test period: wash cycle selected (adaptive or manual), clothes load dry weight (measured prior to placement into the clothes washer) in pounds, and type of articles in the clothes load (i.e., cottons, linens, permanent press, etc.).

The wash loads used in calculating the in-home percentage split between adaptive and manual cycle usage shall be only those wash loads which conform to the definition of the energy test cycle.

Calculate:

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

T_a=The total number of adaptive control energy test cycles

T_m=The total number of manual control energy test cycles

The percentage weighing factors:

$P_a=(T_a/T)\times100$ (the percentage weighing for adaptive control selection)

$P_m=(T_m/T)\times100$ (the percentage weighing for manual control selection)

Energy consumption (E_{TE}), calculated in section 4.1, and water consumption (Q_T), calculated in section 4.2, shall be the weighted average of the measured values using P_a and P_m as the weighing factors.

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FEDERAL HOUSING FINANCE BOARD

12 CFR Part 932

[No. 96–27]

Federal Home Loan Bank Directors' Compensation and Expenses

AGENCY: Federal Housing Finance Board.

ACTION: Notice of proposed rulemaking.

SUMMARY: The Federal Housing Finance Board (Finance Board) is proposing to repeal its Directors' Fees and Allowances Policy (Policy) and amend its regulation on the compensation of Federal Home Loan Bank (Bank) directors to provide greater flexibility to the Banks in compensating their directors and to set forth a clear standard of reasonableness for such compensation under the Federal Home Loan Bank Act (Bank Act). The current Finance Board regulation on the compensation of Bank directors subjects the payment of fees and expenses to limits set by the Finance Board. Those limits and other criteria are contained in the Policy, which essentially imposes a uniform directors' compensation structure on all Banks. The proposed rule would replace the current regulatory/policy scheme with an amended regulation permitting each Bank, within certain general guidelines, to devise its own compensation structure for Bank directors, and allowing each Bank to pay its directors for such expenses as are payable by the Bank to its senior officers.

The Finance Board is also proposing a rule requiring that meetings of a Bank's board of directors be held within the United States. This will codify an important provision of the Finance Board's Policy, which would be rescinded simultaneously with the adoption of a final rule on Bank directors' compensation and expenses.

DATES: Comments must be received on or before June 21, 1996.

ADDRESSES: Comments may be mailed to: Executive Secretariat, Federal Housing Finance Board, 1777 F Street, N.W., Washington, D.C. 20006. Comments will be available for public inspection at this address.

FOR FURTHER INFORMATION CONTACT: Patricia L. Sweeney, Program Analyst, District Banks Secretariat, (202) 408–2872; or Eric M. Raudenbush, Attorney-Advisor, Office of General Counsel, (202) 408–2932; Federal Housing Finance Board, 1777 F Street, N.W., Washington, D.C. 20006.

SUPPLEMENTARY INFORMATION:

I. Statutory and Regulatory Background

Subsection 7(i) of the Bank Act permits each Bank, with the approval of the Finance Board, to pay its directors reasonable compensation and necessary expenses for the time required of them in the performance of their Bank-related duties, in accordance with resolutions adopted by such directors. 12 U.S.C. 1427(i) (1994). A general provision on Bank directors' compensation, which appears at section 932.27 of the Finance Board's regulations, provides merely that directors' fees shall be established by each Bank within limits set by the Finance Board. See 12 CFR 932.27 (1995).

The Finance Board has exercised its statutory responsibility to approve Bank director compensation and expenses largely through its Directors' Fees and Allowances Policy, adopted by resolution of its Board of Directors on February 23, 1993. See Finance Board Resolution No. 93–12 (Feb. 23, 1993). The existing policy establishes a maximum fee of $1,200 per day payable to the Chair of a Bank's board of directors when presiding over meetings of the board or its executive committee, and a maximum fee of $650 per day payable to all other directors for attendance at board, committee, or other meetings for which a fee is authorized. Under the Policy, daily meeting fees are the only authorized source of compensation for Bank directors; the Policy does not provide for payment of either a retainer, or non-cash benefits to directors. The Policy also sets forth generally the categories of expenses that are payable to Bank directors and identifies several specific expense items the payment of which is either authorized or prohibited.

The Banks first became subject to a formal policy on directors fees and expenses in 1974, when the former Federal Home Loan Bank Board (FHLBB) (the Finance Board's predecessor agency) adopted a policy that revised, clarified and incorporated the various resolutions, minute entries and interpretations on director compensation and expenses that had been issued by the FHLBB since its creation in 1932. The FHLBB policy was amended several times, lastly in 1986, when the current dual $1200/$650 per day meeting fee caps were incorporated. When the Finance Board succeeded the FHLBB as regulator of the Bank system in 1989, the FHLBB's policy on Bank directors' fees and expenses remained in effect, as provided by the Financial Institutions Reform, Recovery and Enforcement Act's (FIRREA) provision on the continuation of orders, resolutions, determinations and regulations of the FHLBB. See Public Law 101–73, section 401(h), 103 Stat. 183 (1989) (codified at 12 U.S.C. 1437 note). The Policy is essentially identical to the FHLBB's 1986 policy.

The Bank Act currently vests in the Finance Board the responsibility to supervise the Bank System, to regulate it for financial safety and soundness, and to pass upon most matters of corporate governance of the Banks. A series of studies and reports mandated by the Housing and Community Development Act of 1992, Public Law 102–550, section 1393, 106 Stat. 3672 (1992), including a report prepared by the Finance Board in April 1993, concluded that the Finance Board's authority over Bank corporate governance is in conflict with the agency's primary role as Bank System regulator. Since the completion of these studies, the Finance Board has been working closely with the Banks to implement regulatory and policy changes designed to devolve to the Banks the authority to set policy on matters of corporate governance, to the extent permissible under the Bank Act. In conjunction with these efforts, two separate task forces composed of senior officials of the Banks have recommended that the Finance Board rescind the Policy and establish broad