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November 9, 2012

Via E-Mail

Amanda Stevens
U.S. Environmental Protection Agency
ENERGY STAR Appliance Program
appliances@energystar.gov

Re: ENERGY STAR Draft 2 Test Method for
Determining Residential Dishwasher Cleaning Performance

Dear Ms. Stevens:

On behalf of the Association of Home Appliance Manufacturers (AHAM), I would like to provide our comments on the ENERGY STAR Draft 2 Test Method for Determining Residential Dishwasher Cleaning Performance (Draft Procedure).

AHAM represents manufacturers of major, portable and floor care home appliances, and suppliers to the industry. AHAM's membership includes over 150 companies throughout the world. In the U.S., AHAM members employ tens of thousands of people and produce more than 95% of the household appliances shipped for sale. The factory shipment value of these products is more than \$30 billion annually. The home appliance industry, through its products and innovation, is essential to U.S. consumer lifestyle, health, safety and convenience. Through its technology, employees and productivity, the industry contributes significantly to U.S. jobs and economic security. Home appliances also are a success story in terms of energy efficiency and environmental protection. New appliances often represent the most effective choice a consumer can make to reduce home energy use and costs.

AHAM supports the Environmental Protection Agency (EPA) and Department of Energy (DOE) in their efforts to provide incentives to manufacturers, retailers, and consumers for continual energy efficiency improvement, as long as product performance can be maintained for the consumer. AHAM continues to believe that it is critical in the current environment of increased third party testing and enforcement that DOE and EPA demonstrate—through round robin testing and with transparent documentation—that the ENERGY STAR cleanability test procedure is repeatable and reproducible. Otherwise, there will be numerous cases of findings of false non-compliance and uncertainty for manufacturers and consumers. Accordingly, we strongly urge DOE to initiate round robin testing once it has a well-developed and mature test procedure.

I. Test Setup (Section 4)

A. Test Setup and Instrumentation

DOE proposed that the test setup and instrumentation shall be in accordance with 10 C.F.R. 430, Subpart B, Appendix C1 (Appendix C1). AHAM agrees that the test setup and instrumentation should be identical to the DOE energy test. Because Appendix C1 will be mandatory to determine compliance with the energy conservation standards at the time the cleanability test is required for ENERGY STAR qualification, AHAM agrees that that is the only version of the dishwasher test procedure to reference.

B. Cleaning Performance Rating Conditions

DOE proposed that the lighting setup in the evaluation room be according to IEC Standard 60436. AHAM thanks DOE for citing the IEC Standard 60436 requirements rather than restating them. But, because the lighting setup in IEC Standard 60436 is substantively the same as the lighting setup in ANSI/AHAM DW-1-2010 (AHAM DW-1-2010), AHAM suggests that DOE cite AHAM DW-1-2010, section 5.1 instead. That would be more consistent with the rest of the test procedure (though not the scoring), which cites the AHAM procedure. Regardless of whether DOE implements AHAM's suggestion to cite AHAM DW-1-2010, we suggest that DOE cite the note to AHAM DW-1-2010, section 5.1:

NOTE: For comparative purposes, the same individual should perform scoring in a given facility. If more than one technician is used for scoring, the test lab shall have a plan in place to eliminate bias in the scoring procedure. All scoring technicians should be experienced in use of this procedure. Technicians who have never conducted previous tests should familiarize themselves by conducting trial tests in order to gain experience.

It is important that the graders and the facility are consistent and that graders are trained and experienced in order to minimize variation in the test procedure. Introducing multiple graders introduces variation, especially if those graders have varying degrees of knowledge about the test.

C. Water Hardness

DOE proposed to require that the water hardness be as specified in AHAM DW-1-2010. AHAM agrees that there should be a water hardness requirement in the ENERGY STAR test procedure and believes that such a requirement should also be in Appendix C1. Water hardness can affect measured energy and water consumption, and it has an even larger impact on wash performance. The absence of a water hardness requirement in the cleanability test procedure will be a significant source of variation, even beyond what we know to exist today under AHAM DW-1 (which contains a water hardness requirement). Accordingly, AHAM requested, as part of the recent test procedure rulemaking, that DOE add a water hardness requirement to the energy test procedure.¹ DOE declined. AHAM thus reiterates that DOE should specify water hardness in the ENERGY STAR cleanability test procedure, and, on a parallel path, should promptly amend

¹ See SNOPR for Test Procedures for Residential Dishwashers, Dehumidifiers, and Conventional Cooking Products; Docket No. EERE-2010-BT-TP-0039; RIN 1904-AC27, AHAM Comments (June 25, 2012 and Aug. 30, 2012).

Appendix C1 so that the DOE test procedure is not improperly amended via an ENERGY STAR test procedure.

II. Test Method

A. Loading

DOE stated explicitly in Draft 2 of the Draft Procedure that manufacturers' use and care guide instructions should be followed to load the unit under test. AHAM fully supports that provision and thanks DOE for addressing our previous comment to that effect.

DOE also proposed to require that "[e]mpty rack spaces between items are acceptable only if the manufacturer's use and care guide for the [unit under test] instructs the user to have empty spaces while loading." AHAM understands that empty spaces need to be addressed because the test load place setting size is smaller than that used in AHAM DW-1-2010. But we are concerned that referencing the use and care guide in this context could cause consumer confusion and/or provide a means for circumvention.

Currently, we do not believe that all or many manufacturers include instructions in their use and care guides for the place setting sizes called for in Appendix C1. Thus, it is possible that a manufacturer could put loading patterns in its use and care guide specifically aimed at this requirement (in an attempt to ensure, for example, that third party laboratories load the unit the same way as the manufacturer) which would not be relevant to the consumer. There are already several loading patterns identified in most use and care guides, and this would add further complication.

As an alternative option to DOE's proposal for addressing empty spaces, AHAM suggests that DOE follow an approach similar to the approach taken to loading patterns in Europe. In Europe, manufacturers provide an e-mail address that third party laboratories can use to request the loading pattern used for testing. We understand that this has been an efficient and successful way to address the fact that loading patterns can vary. We, therefore, propose that DOE allow manufacturers to provide a publicly available webpage address that third party laboratories can use to view the loading pattern used for ENERGY STAR qualification. We recognize that this is not an approach DOE or EPA normally permit. But this is an unusual case. A cleanability test procedure has a much higher degree of variability than the energy and water test procedure. Accordingly, DOE and EPA should facilitate approaches that help to minimize that variation.

Furthermore, DOE will need to indicate criteria to limit the location of open spaces. That is, open spaces should not be positioned in front of soiled load items. An open space in front of soiled load items could result in improved water spray to the adjacent soiled surface, provide more favorable cleaning performance, and, thus, offer a means of test procedure circumvention.

B. Appendix A

DOE proposed language in Appendix A to introduce the schematics for the loading pattern examples. AHAM appreciates the changes DOE made to the Draft Procedure to make it clear that the schematics are examples only. We see one remaining area for improvement in that regard, which is shown below in redline:

Manufacturer use and care guides should be followed for loading the UUT, but clean and soiled items should be alternated in the load. Examples of potential ways to alternate clean and soiled items are shown as in the schematics below.

DOE also updated the schematics to differentiate between the serving platter and the dinner plates by making the line used to indicate the serving platter thicker and a different size than the line used to indicate the dinner plate. AHAM thanks DOE for making that clarification.

III. Scoring

A. Flatware

DOE proposed not to exclude any items of the test load, including the flatware, from scoring. AHAM agrees with that approach, and thanks DOE for addressing our comment suggesting that flatware be included in the scoring.

B. Scoring Procedure

AHAM continues to believe that it is problematic to mix and match soiling procedures and scoring techniques from different test procedures. Accordingly, we again comment that DOE should use the AHAM DW-1-2010 scoring procedure. In North America, technicians have the most experience using the AHAM DW-1 scoring method, and so it is the best procedure to use.

DOE stated during the webinar on October 16, 2012, and in the Draft Procedure, that recent testing at two different test laboratories indicated that the scoring procedure in IEC Standard 60436 is more repeatable than the scoring procedure in AHAM DW-1-2010. AHAM seeks to understand that conclusion and, accordingly, requests that DOE provide the raw test data it relied on to make that conclusion. The summary slides that accompanied the October 16 presentation are not sufficient. We would also like to know whether DOE provided External Lab 1 and/or External Lab 2 with guidance during the testing process. From the data DOE did present, we do not believe that DOE did sufficient testing to draw conclusions about repeatability or reproducibility. Testing of only a handful of units at two laboratories is not enough to determine repeatability and reproducibility.

As we discuss more fully in section V.A, if DOE believes that repeatability (or reproducibility) of the AHAM DW-1 scoring is an issue, there are ways to address that, such as round robin testing and grader training. As we have previously commented, a video on proper procedure and scoring would also be helpful and be particularly important for repeatability over time,

reproducibility, and third party testing. AHAM and its members would be glad to participate in round robin testing and grader training.

IV. Cleaning Performance Score

A. Equation

DOE decided not to propose a performance metric that combines the individual per-cycle cleaning metrics. Instead, DOE proposed to calculate the individual cleaning performance score at each soil load that will need to meet minimum criteria to be set by EPA through a future specification development. AHAM agrees the performance metric should not be combined, and thus supports DOE’s proposal to calculate the individual cleaning performance score at each soil load.

In the explanation of Equation 1, there is no $N_{5,i}$ listed. We suspect that is because it would be captured in the “100” part of the equation or omitted because it would always be multiplied by zero. We respectfully request, however, that, for clarity, DOE expressly state in the test procedure that $N_{5,i}$ is intentionally omitted along with the reasoning. That should minimize questions to DOE about the test procedure when stakeholders notice that the scoring sheet goes from 0-5, but the equation only goes from $N_{0,i}$ to $N_{4,i}$.

B. Sampling Plan

DOE’s proposed sampling plan is summarized below in Table A. DOE invited comment on the proposed sampling plan and reporting requirements. In particular, DOE sought comment on using the lowest per-cycle cleaning performance score at each soil load for qualification of soil-sensing dishwashers and the average score for non-soil sensing dishwashers when more than one unit is used for qualification.

Table A

Type of Unit	Number of Units Tested	Soil Loads Tested	Score Used To Determine Qualification
Soil-Sensing	3	Heavy Medium Light	Lowest at each soil load
Non-Soil-Sensing	1	Heavy Medium Light	Only one unit is required to be tested, so that score would be used Optional: Average per-cycle cleaning performance score at each soil load

AHAM does not agree with several elements in the proposed sampling plan. It is too confusing to have different requirements for soil-sensing and non-soil-sensing units. This is especially true for third party laboratories because whether or not the unit is soil-sensing may not be readily apparent (though it will be in the manufacturer’s DOE certification statement when using Appendix C1). We certainly appreciate DOE’s efforts to minimize testing burden, particularly for non-soil-sensing units. But it is also burdensome to keep track of such different sampling plans. Furthermore, we strongly oppose use of only one unit to qualify non-soil-sensing dishwashers. Doing so completely ignores the fact that any test procedure has variation. And, this test procedure has even more variation than an energy and water test, for example. Thus, though it will dramatically increase traditional testing burden, AHAM suggests a statistical approach for both soil-sensing and non-soil sensing dishwashers.

Specifically, AHAM proposes that manufacturers be required to test the same number of units for cleanability as they test for energy and water use.² That number will be two or more per DOE regulations, and will vary by manufacturer and/or model. For the number of units tested, the score for each soil level should be determined using a statistical analysis such as that in 10 C.F.R. 429.19. Soil load types would not be combined. For example, if three units were tested, the heavy soil response from all three units would be used to determine a heavy soil response score based on the mean and control limits. Scores would also be calculated for each of the medium and light soil response cycles. The heavy, medium, and light response scores would each need to satisfy a minimum performance score (which, consistent with AHAM’s prior comments, could be the same score for each response, but should not be a combined or weighted score). This is the best approach to ensure representative qualification scores and to minimize false findings of non-compliance. Accordingly, manufacturers are willing to accept the additional test burden—it is balanced by a simpler procedure and more accurate result. Our proposed sampling plan is summarized below in Table B.

Table B

Type of Unit	Number of Units Tested	Soil Loads Tested	Score Used To Determine Qualification
Soil-Sensing	2 or more	Heavy Medium Light	Determine per statistical analysis like that in 10 C.F.R. 429.19
Non-Soil-Sensing	2 or more	Heavy Medium Light	Determine per statistical analysis like that in 10 C.F.R. 429.19

² We do not oppose EPA continuing to *allow* manufacturers to qualify based on the testing of one unit so long as the statistical approach we propose is also available. If the voluntary one unit approach to qualification is maintained, it should be an option regardless of the type of unit, as should the option to qualify based on the testing of two or more units. That approach would be consistent with the approach in current ENERGY STAR specifications. We do not believe that many manufacturers select the option to qualify based on only one unit, but do not object to it being an *option*.

V. Other Comments

A. Repeatability and Reproducibility

As AHAM previously commented, and DOE recognizes, the cleanability test procedure must be repeatable and reproducible, especially with increasing enforcement and verification testing. Too much variation could result in false findings of non-compliance.

To date, reproducibility of the proposed procedure has not been sufficiently tested. DOE needs to demonstrate that the test procedure is in fact repeatable and reproducible. It appears from the summary data DOE provided, that only a handful of dishwashers were tested at only two laboratories.³ (*See, e.g.*, October 16 Slides at 21). This is hardly sufficient to determine repeatability and/or reproducibility.

The raw cleaning performance test data DOE provided with Draft 1 of the Draft Procedure show significant variation. There are several potential sources for that variation. In order to assess what the source(s) of the variation could be, and to assess reproducibility in general, **AHAM strongly believes that a round robin test is needed.** AHAM urges DOE to organize and oversee such testing and to do so according to IEC Standard 61923 (or ASTM Standard 691) requirements for round robin testing. Round Robin testing elements would include:

- A mature test procedure;
- Participation by multiple manufacturer laboratories, third party laboratories (including EPA recognized Certification Bodies), DOE's internal laboratory, and relevant government consultant laboratories, such as Navigant.
- A cross section of models including soil-sensing and non-soil-sensing models;
- A neutral observer to visit laboratories and gather additional data and observations;
- Planned testing and repeats;
- Protocols for soiling (number of soilers) and grading;
- Assessment of grader to grader variation (multiple graders grade the same load); and
- Documentation of ambient and supply information.

Prior to conducting a round robin, a workshop should be held as a prerequisite activity in order to commonize on soiling and scoring techniques and discuss and resolve obvious sources of variation. The workshop would be used to instruct testers on best practices and more quickly build confidence and competence. Without the workshop, additional and unnecessary variation would be imbedded during the round robin. AHAM would be glad to help DOE organize the round robin and/or the workshop. And AHAM's members will participate in the round robin. Creation of a video, perhaps during the workshop, would further memorialize soiling and scoring methods and manage variation.

³ Though testing was done at DOE's internal laboratory as well as two external laboratories, it does not appear from the data presented that any dishwashers were tested at all three laboratories.

B. Verification Testing Requirements

It is unclear what the requirements will be for verification testing of cleaning performance. AHAM believes it should be similar to the verification testing scheme currently in place for ENERGY STAR products. (See Third Party Certification Implementation for ENERGY STAR Products, Directive No. 2011-04 (May 9, 2011)). Under those requirements, when a manufacturer qualifies a product for ENERGY STAR based on multiple test samples, one unit is initially tested for a spot check. “If the tested unit fails to meet the requirement by less than 5% of the applicable ENERGY STAR specification, no further tests will be conducted and the model will be considered to meet ENERGY STAR requirements.” (*Id.*). The “5%” will need to be different for cleanability because cleanability variation is much greater than energy/water use variation. For example, Europe has a ten percent tolerance for cleaning. (See Commission Regulation No 1016/2010, Implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to Ecodesign Requirements for Household Dishwashers, Annex III, Table 1 (Nov. 10, 2010)).

AHAM would like to suggest what the percentage should be when using AHAM DW-1-2010, but cannot do so based on the limited data available. We (and DOE) need more data documenting the repeatability and reproducibility of the test procedure. **This highlights the need for the round robin testing we recommended above.** In the absence of a rigorous round robin test, we will not know the sources and magnitude of variation. With the round robin test, we would be able to make a comparison between energy and water consumption variation and performance variation and establish the appropriate “X%.”

AHAM appreciates the opportunity to submit comments on the ENERGY STAR Draft 2 Test Method for Determining Residential Dishwasher Cleaning Performance, and would be glad to further discuss these matters.

Best Regards,



Jennifer Cleary
Director, Regulatory Affairs