

Summary and Response to Stakeholder Comments received on the ENERGY STAR Program Draft 1 Test Method for Determining Residential Dishwasher Cleaning Performance

I. TEST SETUP

Comment #	Topic	Comment	Response
1	Instrumentation	The test setup and instrumentation should be identical to the DOE energy test, as proposed in the Draft Test Method.	The ENERGY STAR Draft 2 Test Method for Determining Residential Dishwasher Cleaning Performance (Draft 2 Test Method) specifies the same setup and instrumentation as the DOE energy test. However, there are additional setup and instrumentation requirements necessary for performance testing, such as water hardness and cleaning performance rating conditions for scoring the test load.
2	– Water hardness and cleaning performance rating conditions	The stakeholder agrees with the proposed test conditions being the same as the DOE test procedure, and with the lighting and water hardness conditions.	DOE appreciates the feedback. No change has been made in the Draft 2 Test Method.
3	Cleaning performance rating conditions	The DOE energy/water test is not necessarily conducted in the same room as performance testing at this time. Many manufacturer and independent testing facilities will likely have to alter their laboratories, which will be a burden. But, because these alterations to the laboratories will allow the energy and performance testing, for soil-sensing dishwashers, to be done during the same test run, test runs per unit is not increased, which would have been a more significant burden.	Altering the lighting conditions in the energy/water test facility should not represent an excessive burden. DOE agrees that this burden is less than running the performance testing separate from the energy and water tests. No change has been made to the test setup requirements in the Draft 2 Test Method.
4	Referenced testing requirements	DOE should simply cite the IEC standard 60436 Ed. 3.1, 2009-11 requirements rather than restate them. That is the best way to maintain clarity and consistency for stakeholders.	DOE has revised the Test Setup in the Draft 2 Test Method (section 5) to reference IEC standard 60436 Ed. 3.1, 2009-11, rather than restate the requirements, for consistency with the rest of the test method.

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5	Water hardness	Water hardness should not affect water and energy consumption; however, it will affect wash performance. There should be a tolerance of 0 – 85ppm for the cleaning performance similar to that in AHAM DW 1-1992.	DOE agrees that water hardness likely will not affect water and energy consumption, but may impact cleaning performance. Therefore, DOE has maintained the same water hardness requirement in the Draft 2 Test Method that was proposed in the ENERGY STAR Draft 1 Test Method for Determining Residential Dishwasher Cleaning Performance (Draft 1 Test Method).
6	Water hardness	Because the DOE test procedure at 10 CFR Part 430, Subpart B, Appendix C does not specify a water hardness requirement, DOE should not add that requirement to the ENERGY STAR test procedure for dishwasher cleanability, especially without data as to whether water hardness impacts energy and water performance. An ENERGY STAR test procedure is not the appropriate place to change DOE test procedures. If DOE wishes to specify water hardness in the test procedure, it should amend the dishwasher test procedure through notice and comment rulemaking.	DOE has proposed the water hardness requirement because it may impact cleaning performance. DOE has proposed this requirement as additional specification that is necessary for performance testing, not as a requirement for energy and water testing according to the DOE test procedure specified in 10 CFR Part 430, Subpart B, Appendix C1 ¹ . However, this water hardness requirement is not precluded by 10 CFR Part 430, Subpart B, Appendix C1. DOE has maintained the water hardness requirements originally proposed in the Draft 1 Test Method.

¹ Note: On September 14, 2012, DOE issued a final rule establishing an amended dishwasher test procedure that will be codified in the CFR at 10 CFR Part 430, Subpart B, Appendix C1. The Draft 2 Test Method references the DOE test procedure in 10 CFR Part 430, Subpart B, Appendix C1 because this test procedure will be required for Federal energy and water use testing by the time the ENERGY STAR Test Method for Determining Residential Dishwasher Cleaning Performance goes into effect.

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II. TEST METHOD

Comment #	Topic	Comment	Response
7	Harmonization of cleaning performance test with energy and water use test	DOE and EPA should ensure that the cleanability test procedure is linked to energy and water use by using the identical test loads used to capture energy and water use under the DOE test procedure.	DOE agrees that the cleaning performance test method should be linked to the energy and water use test procedure, and the Draft 2 Test Method continues to propose soil loads consistent with those required in 10 CFR Part 430, Subpart B, Appendix C1.
8	Harmonization of cleaning performance test with energy and water use test	It seems to be EPA and DOE’s intent that the energy and performance tests be run at the same time (i.e., for a soil-sensing dishwasher, the energy test would also be the performance test). EPA and DOE should simply state this in the test procedure to make it clear. This approach simplifies the test and is an anti-circumvention measure.	DOE agrees, and has clarified in the Draft 2 Test Method that cleaning performance ratings for soil-sensing units shall be based on the same test series used for energy and water use ratings, if tested on a soil-sensing cycle. For non-soil sensing units and soil-sensing units tested on a non-soil sensing cycle, the ratings cannot be coordinated because 10 CFR Part 430, Subpart B, Appendix C1 requires the use of a clean test load; however, DOE has proposed in the Draft 2 Test Method that the cleaning performance test cycles use the same cycle setting as required by 10 CFR Part 430, Subpart B, Appendix C1 for performance testing.
9	Test cycles	In a non-soil sensing dishwasher, the dishwasher would go through a prescribed wash profile with set times, set temperatures etc. It would make more sense to run only one wash program that a consumer would use most often, such as Normal, rather than the other 2 heavy or light cycles. The non-soil sensing dishwasher cannot sense heavy, medium, or light loads. It seems unreasonable when comparing this type of machine to a soil-sensing dishwasher to expect the same type of wash results. Using different soils should not alter the wash program in any way.	DOE agrees that the changing soil loads will not affect the response of non-soil sensing dishwashers; however, the changing soil loads may produce different cleaning performance test results. Generally, the light soil loads result in better cleaning performance compared to the heavier loads. For a meaningful cleaning performance comparison, all three soil loads should be used for both soil-sensing and non-soil sensing dishwashers as proposed in the Draft 2 Test Method. Additionally, DOE has proposed a per-cycle cleaning performance score at each soil load. Therefore, non-soil sensing dishwashers should be tested at all three soil loads and meet the minimum qualification requirements that shall be established once the test method is finalized.

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10	Test cycles	<p>Adding a required preconditioning cycle to the performance test requirements essentially adds it to the energy and water test requirements as well because the tests are to be run at the same time and the performance and energy results are linked. Manufacturers cannot rate or certify products based on a test procedure that differs from the test procedure set forth in 10 CFR Part 430, Subpart B, Appendix C, even if DOE is the agency prescribing the change. An ENERGY STAR test procedure is not the proper place for DOE to amend its test procedures. Instead, the ENERGY STAR test procedure could allow for more than one preconditioning cycle, so long as the DOE test procedure does not preclude more than one preconditioning cycle.</p>	<p>The number of pre-conditioning cycles that should be operated prior to running the energy and water consumption tests was discussed during the public meeting held with AHAM, manufacturers, third-party laboratories, efficiency organizations, and other stakeholders on June 1, 2012 (the June 2012 public meeting). DOE considered these comments and addressed them in the final rule for DOE’s dishwasher test procedure rulemaking that was issued on September 14, 2012 and may be found on DOE’s website at: http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/aham-1_tp_final_rule.pdf.²</p> <p>10 CFR Part 430, Subpart B, Appendix C1 specifies that two pre-conditioning cycles shall be operated prior to determining the energy and water consumption of the dishwasher. The Draft 2 Test Method references the DOE test procedure in 10 CFR Part 430, Subpart B, Appendix C1 for the pre-conditioning cycle requirement, which specifies the two pre-conditioning cycles.</p>

² Note: This link will expire once the final rule is published in the Federal Register.

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11	Soil preparation	<p>The procedure does not have requirements regarding the length of time soils may sit before they are applied to the dishes. Potatoes will get stiffer the longer they sit and oatmeal will settle. This is an issue requiring discussion at the correlation summit proposed to DOE. The stakeholder suggests that the test procedure allows for storage of reconstituted milk for use over the course of a day, but require that prepared potatoes and oatmeal be used within 30 minutes of final preparation. It is possible that the time between soiling and running the test could have varied in DOE's testing, and could have caused some variation in the results. DOE should provide the time and conditions between applying the soil and running the test.</p>	<p>The DOE test procedure in 10 CFR Part 430, Subpart B, Appendix C1 references the AHAM standard ANSI/AHAM DW-1-2010 and includes some additional information in the test procedure itself for the length of time soils may sit before they are applied to dishes. The Draft 2 Test Method does not provide any additional information and references the DOE test procedure in 10 CFR Part 430, Subpart B, Appendix C1 for all requirements pertaining to the length of times soil may sit before they are applied.</p>
12	Soil load	<p>Using ½, 2, and 4 soiled place settings is insufficient when determining a dishwasher's energy consumption. Setting the largest level at only 4 soiled settings may not always be sufficient to trigger that unit's maximum response. We recommend that all three levels of soil should be increased to 2, 4, and 10 soiled place settings, respectively, but at the very least, the top-most soil level should be greater.</p>	<p>DOE has proposed the soil loads in the test method based on stakeholder support to harmonize performance testing with energy and water use testing according to 10 CFR Part 430, Subpart B, Appendix C1. The Draft 2 Test Method retains the requirement for ½, 2 and 4 soiled place settings during the performance test (for standard dishwashers).</p>
13	Detergent	<p>DOE should consider stating what amount of detergent should be used (and may need to clarify that in 10 CFR Part 430, Subpart B, Appendix C as well).</p>	<p>The amount of detergent required is explained in detail in 10 CFR Part 430, Subpart B, Appendix C1. DOE has referenced 10 CFR Part 430, Subpart B, Appendix C1 in the Draft 2 Test Method for determining the quantity of detergent that should be used in the pre-wash and main-wash cycles of the dishwasher.</p>

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14	Detergent	<p>To use the last preconditioning run for detergent measurements can lead to circumvention. If a machine runs clean, more water could be placed in the 1st and 2nd fills so that maximum quantities of water are used to maximize detergent usage. It should be up to the manufacture's discretion as to what detergent is required to achieve performance. But there should be a maximum amount of detergent allowed.</p>	<p>10 CFR Part 430, Subpart B, Appendix C1 specifies the preconditioning cycle that should be used to determine the quantity of detergent. The Draft 2 Test Method references this requirement and therefore, requires that the detergent quantity be calculated based on the pre-wash and main-wash fill volumes in the second preconditioning cycle.</p> <p>DOE does not expect manufacturers to alter the control schemes so that clean loads trigger greater water consumption, leading to a greater quantity of detergent used for the soiled loads. DOE observed that the sensor light soil load specified in 10 CFR Part 430, Subpart B, Appendix C1 typically triggered the lightest cycle responses in the test units, meaning the sensor observed light soil or no soil (DOE observed similar responses for the clean preconditioning cycles). Because the sensor light cycle is weighted most heavily in the final energy and water use calculations, manufacturers have incentive to minimize energy and water use for this cycle.</p>
15	Detergent	<p>The ANSI/AHAM DW-1-2010 standard produces the least repeatable results. This is likely due to the lack of a standardized detergent. The detergents used are commercially available products that are subject to product improvement. If a standardized detergent was used, it would eliminate one of the variables.</p>	<p>DOE intends to tie the cleaning performance test method to the energy and water use test procedure in 10 CFR Part 430, Subpart B, Appendix C1, including the detergent requirements. As discussed in comment #13, 10 CFR Part 430, Subpart B, Appendix C1 provides detailed information about the detergent that should be used as well as how to determine the detergent quantity.</p>

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16	Rinse aid	Rinse aid is an integral part of wash performance. Not using rinse aid leads to streaking and redeposited soils. This would have a detrimental effect on wash performance and it would increase the dry time of the dishes before grading of the dish load can start. AHAM uses rinse aid in its testing.	DOE has proposed a cleaning performance test method based on the DOE test procedure in 10 CFR Part 430, Subpart B, Appendix C1. This procedure does not specify the use of a rinse aid and, therefore, DOE continues to propose that no rinse aid be used in the Draft 2 Test Method.
17	Dishwasher loading	It must be up to the manufacturer’s discretion how the dishes are loaded. In some situations it may be necessary to have empty spaces between items	DOE has clarified in the Draft 2 Test Method that the loading pattern shall follow manufacturer instructions while alternating soiled and clean items in the load. Empty spaces between items are acceptable only if the dishwasher’s use and care guide instructs the user to have empty spaces while loading.
18	Dishwasher loading	The stakeholder agrees that the manufacturer’s instructions should control the overall loading pattern, and that the illustrative examples of how to alternate clean and soiled items in Section 5.1(D) and Appendix A are helpful as a generic reference. However, DOE should make it clear that these examples are only examples, and should remove the “shall” from 5.1(D) or clarify that the mandate is only that the clean and soiled items be alternated.	DOE has clarified in the Draft 2 Test Method that the loading pattern shall follow any manufacturer instructions, and that the schematics provided are examples only. However, DOE continues to propose that clean and soiled items shall be alternated and empty spaces between items are acceptable only if the dishwasher’s use and care guide specifies it.
19	Dishwasher loading	The diagram in Appendix A could be misread as showing nine place settings instead of the correct eight plus one platter. DOE should clearly show a difference between the platter and other plates in the diagram to reflect only the required number of place settings.	DOE has adjusted the example loading diagrams in the Draft 2 Test Method to better differentiate between the plates and the platter.

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20	Scoring method	It is a problem to mix and match soiling procedures and scoring techniques from different test procedures. Accordingly, DOE should use the ANSI/AHAM DW-1-2010 scoring procedure. Technicians in the United States have the most experience scoring using ANSI/AHAM DW-1-2010, and so it is the best procedure to use. The level of experience with the IEC standard 60436 Ed. 3.1, 2009-11 procedure in the United States is not the same as with the ANSI/AHAM DW-1-2010 procedure. If DOE believes that repeatability of the ANSI/AHAM DW-1-2010 scoring is an issue, there are ways to address that, such as round robin testing and grader training.	DOE's view is that the scoring techniques in ANSI/AHAM DW-1-2010 and IEC standard 60436 Ed. 3.1, 2009-11 are sufficiently similar that technicians will be able to appropriately apply both methods with minimal training. In both internal and external testing at three labs, DOE observed more repeatable results from the IEC standard 60436 Ed. 3.1, 2009-11 scoring method, and has proposed that scoring method in the Draft 2 Test Method. Additionally, the soil loads used in 10 CFR Part 430, Subpart B, Appendix C1 do not match those required ANSI/AHAM DW-1-2010 (fewer place settings are soiled and replacements are specified for obsolete soil items), so using the DW-1 scoring method with the DOE test procedure in 10 CFR Part 430, Subpart B, Appendix C1 would also be combining different soiling and scoring procedures.
21	Scoring method	The stakeholder supports the use of the IEC standard 60436 Ed. 3.1, 2009-11 scoring method, from 0 to 5, as it is simpler to understand and limits evaluator interpretation compared to the ANSI/AHAM DW-1-2010 method.	DOE observed that both scoring methods are sufficiently easy to understand while limiting evaluator interpretation. DOE has proposed the IEC standard 60436 Ed. 3.1, 2009-11 scoring method in the Draft 2 Test Method because it produced the most repeatable results in testing.
22	Scoring method	IEC standard 60436 Ed. 3.1, 2009-11 is a 0-5 scale. But the Draft Procedure and the data sheets reference two different scales—both a scale of 0-5 and 0-4. We assume that the mention of 0-4 is a typo, but wish to confirm that the intent is to use the 0-5 scale should DOE continue with the IEC standard 60436 Ed. 3.1, 2009-11 scoring procedure.	Each item in the test load would be scored using the IEC standard 60436 Ed. 3.1, 2009-11 0-5 scale, in which a score of 5 represents a completely clean item. Because the per-cycle cleaning performance score in the Draft 2 Test Method (the per-cycle cleaning performance score was referred as the per-cycle cleaning metric in the Draft 1 Test Method) varies based on the number of items that have some residual soil, items receiving a score of 5 are not separately used in the calculation, but are accounted for in the total number of items in the test load. Therefore, the Test Reporting Templates only make use of items with scoring in the range of 0-4.

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23	Scoring method	Although the flatware is not soiled for the energy test, it is possible that soils can redeposit onto the flatware during the cycle. Removing grading of the flatware could be an avenue for circumvention. Accordingly, the flatware should be graded. Grading the flatware would require some additional time for the grading process, but this would be an acceptable trade-off for assessing redeposited soils.	In the Draft 1 Test Method, DOE proposed not scoring flatware to reduce test burden. Stakeholders generally supported including the flatware scores in the calculation of the per-cycle cleaning performance score to limit opportunities for circumvention. DOE conducted additional testing to compare cleaning performance with and without flatware. The test results with the flatware were generally more repeatable than those without the flatware. Given stakeholder support and more repeatable results, DOE has proposed to require scoring of all items in the test load, including flatware, in the Draft 2 Test Method.
24	Scoring method	The stakeholder recommends including the scoring of flatware in the test method as it is an integral part of the wash test.	See response to comment #23.

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25	Performance metric vs. per-cycle cleaning metrics	<p>There should not be weighting of the performance metric. Instead, each soil level should have a minimum performance requirement, and that requirement should be the same for all soil levels. In other words, the heavy, medium, and light test cycles should each be required to perform at a specified level independently. And that level should be the same for each test cycle. Weighting is appropriate for the energy test procedure, but consumers will expect, and should receive, equal and acceptable cleaning performance for each soil level. Thus, weighting, even equal weighting, is not appropriate for the cleanability metric. Equal weighting should not be applied because it could allow good performance in the heavy soil level and poor performance at lower soil levels, which is where most consumers do the majority of their loads according to the data supporting the energy weighting. This poor performance could be “averaged” out and hidden by a single performance metric under the approach DOE proposed.</p>	<p>Stakeholders generally supported independently evaluating cleaning performance for each soil level rather than combining the results in an overall performance metric. DOE has revised the Draft 2 Test Method to eliminate the overall performance metric, and to require a calculation of the per-cycle cleaning performance score at each soil load.</p>

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26	Performance metric vs. per-cycle cleaning metrics	Without having done any testing, it is hard to see if the proposed performance metric is satisfactory. Does this performance metric need to be so complicated? What is the proposed PM value?	<p>The performance metric that was proposed in the Draft 1 Test Method averaged the per-cycle cleaning metric at each soil load. However, as explained in the response to comment #25, in the Draft 2 Test Method, DOE has eliminated the overall performance metric and is proposing a calculation of the per-cycle cleaning performance score at each soil load.</p> <p>The proposed per-cycle cleaning performance scores satisfactorily reflect the cleaning performance of residential dishwashers, and represent the simplest way to evaluate cleaning performance tied to the DOE test procedure. There is currently no minimum cleaning performance criteria for ENERGY STAR. Criteria will be determined after the test method for determining cleaning performance is finalized.</p>
27	Test reporting template	The proposed test reporting template and scoring sheet should be optional. DOE should also state that certification bodies cannot require the test reporting template and scoring sheet be used to submit test results to the certification body. The section of the test reporting template for inputting the measured test conditions of the UUT should make clear that the conditions are to remain the same throughout the test, and should not be measured only at the start of the test.	DOE agrees that the proposed test reporting template is optional, but encourages test labs and certification bodies to use the template to determine the per-cycle cleaning performance scores. DOE has clarified in the test conditions portion of the template that the conditions are to be maintained throughout the test, not only at the start.

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III. REPEATABILITY/REPRODUCIBILITY

Comment #	Topic	Comment	Response
28	Repeatability and reproducibility	It is critical to ensure that the test procedure is repeatable and reproducible. Too much variation could result in false findings of noncompliance. A deep understanding of the variables involved in ensuring repeatability and reproducibility, including food soil batch, ambient temperatures, soil application techniques, relative humidity variability, and grading techniques, needs to be complete before proceeding with the cleaning score development.	DOE agrees that the cleaning performance test method must be repeatable and reproducible. The proposed test method includes the procedures that DOE found to be most repeatable through internal and external testing. DOE conducted tests at two additional facilities following the publication of the Draft 1 Test Method, and found the test method to be reproducible given consistent operation of the UUT. Certain units displayed variability in the cycle response to a given soil level, leading to inconsistent cleaning performance; however, DOE's data suggest that this inconsistency is due to the control scheme of the UUT rather than the repeatability or reproducibility of the proposed test method.
29	Repeatability and reproducibility	The cleanability test procedure must be repeatable and reproducible. Otherwise, there will be numerous false noncompliance findings and uncertainty for manufacturers and consumers.	See response to comment #28.
30	Repeatability and reproducibility	It is imperative that DOE organize and oversee round robin testing with manufacturer and third party test facilities.	See response to comment #28.
31	Reproducibility	To date, reproducibility of the proposed procedure has not been tested, and the raw cleaning performance test data DOE provided show significant variation.	See response to comment #28.

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32	Validation testing	The draft test method is still very light on details and would need some form of testing before it could possibly come into force.	DOE conducted additional testing at two external test labs prior to writing the Draft 2 Test Method; DOE has confidence that the Draft 2 Test Method provides all the necessary information to perform tests to qualify the cleaning performance of residential dishwashers. DOE welcomes specific comments from stakeholders on additional information or clarification that could be provided in the next revision of the test method.
33	Training material	A video on proper procedure and scoring would be helpful and be particularly important for repeatability over time, reproducibility, and third party testing.	DOE does not intend to provide a video explaining the proper application of the test procedure and scoring; however, DOE welcomes stakeholders to generate training materials.

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34	Training material	<p>Uniform training materials on soiling, grading, and reading use and care guides should be developed. Without such materials, it will be difficult to control variation and apply cleanability criteria to the ENERGY STAR program, especially with third party verification elements. Stakeholders are willing to work with DOE to develop these materials, perhaps including a guidance video to capture critical test procedure elements, and to train technicians. To this end, DOE should invite stakeholders to witness testing in order to identify any differences between laboratories and to give stakeholders the opportunity to ask questions. Furthermore, DOE should meet with stakeholders (as early as April 2012) to walk through the proposed procedure in detail and make sure everyone understands all of the details of how the procedure should be run. As the procedure enters its more final stages, a training video would be appropriate. And, as it is being developed, it may even be helpful to have DOE post a video of how it conducts the test on YouTube (or some similar forum) so that stakeholders can get a full understanding.</p>	<p>DOE has included more information to make the Draft 2 Test Method as clear as possible, but does not intend to provide further guidance or training materials addressing soiling, grading, and reading use and care guides. Stakeholders may choose to generate training materials for the test method independent of DOE. DOE may host a meeting with stakeholders to walk through the proposed test method at a future date, once the proposed test method is finalized.</p>

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35	Training material	<p>Prior to conducting round robin testing, training on soil application and grading should be conducted. In addition, DOE should host a correlation summit. The issues identified at that summit need to be resolved prior to conducting the round robin for the results of the round robin to clearly identify the unknown sources of variation.</p>	<p>DOE conducted tests at two additional facilities since the Draft 1 Test Method was published, and found the test method to be reproducible.</p> <p>DOE is aware that certain sections of 10 CFR Part 430, Subpart B, Appendix C were leading to inconsistent testing and hosted the June 2012 public meeting to discuss these issues. Some of these issues were addressed in the final rule issued by DOE on September 14, 2012 and have been incorporated into the test procedure in 10 CFR Part 430, Subpart B, Appendix C1. DOE does not intend to provide a video or other training material regarding application of the test soils and scoring; however, DOE welcomes stakeholders to generate training materials.</p>
36	Raw data request	<p>DOE did not provide the raw data on the energy and water usage testing that was done. Without that data it is difficult to understand the corresponding performance results. It is important to see the sensor decisions the UUTs were making during the test—were the units making the same decisions each time? The performance results DOE provided show a significant degree of variation and, if the sensor decisions were not the same that could be one explanation. Accordingly, the stakeholder requests the energy and water use data that corresponds to the performance test results. If DOE does not provide data from the testing it has already conducted, it should provide such data in the future.</p>	<p>DOE provided the energy and water consumption data corresponding to the cleaning performance scores, using the Draft 1 Test Method, in the materials presented during the webinar held on February 27, 2012.³</p>

³ The slides from the presentation are available on the ENERGY STAR website at

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37	Raw data request	In order for stakeholders to properly comment on there being no grader bias, it is necessary to see which grader did each run. In addition, knowing which grader and soiler did each run would be useful in order to assess or rule out reasons for the significant variation we see in the test results.	DOE provided data for which grader scored the test load for each run on the IEC reference unit during the webinar held on February 27, 2012. Comparing the scores for each grader on the IEC reference dishwasher provided the best basis for determining whether a grader bias existed because the reference dishwasher has consistent operation. Finally, DOE did not track who prepared the soils and soiled the test loads for each run and therefore, cannot provide these data. DOE requests stakeholders to share data, using the proposed test method, regarding the effect of the person grading and/or soiling on the test results.
38	Raw data request	<p>There are several other questions DOE should answer in an attempt to clarify why the cleanability results show significant variation:</p> <ol style="list-style-type: none"> 1. Did the graders change with each run? 2. Did the person who applied the soils remain constant throughout the testing? 3. Is it possible to know, via generic descriptor, which grader did each individual run? 4. Is it possible to know, via generic descriptor, which soiler did each individual run? 5. What were the time and conditions between applying the soil and running the test? Did those remain constant for each test? 	<p>For the data used to develop the Draft 1 Test Method:</p> <ol style="list-style-type: none"> 1. Within a series of tests (heavy, medium, light), the same person graded at least one UUT and the reference unit. Two UUTs were run parallel to the reference unit at a time, and the grader for the second unit changed from run-to-run. 2. DOE did not track the person applying the soils for each test cycle, but the same people usually applied the soils for each test. 3. DOE provided a summary of grader results for the reference unit in the webinar held on February 27. 4. DOE did not track who prepared the soils for each run, but the soils were typically prepared and applied by the same people for all of the test runs. 5. Each test was conducted after the oatmeal had dried for 2 hours, as specified in ANSI/AHAM DW-1-2010.

www.energystar.gov/ia/partners/prod_development/revisions/downloads/res_dishwashers/ENERGY_STAR_Draft_1_Test_Method_for_Determining_Dishwasher_Cleaning_Performance_Webinar.pdf?2ab2-a886

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39	Raw data request	In the future, it would be more useful to see the performance scores on a more granular level – for each element (e.g., glasses, dishware, and flatware separately).	DOE appreciates the comment and will consider providing the per-item data in the future.
40	Reference dishwasher	The use of a reference dishwasher will reduce variability in test results, but it will add cost and extra time to the tests.	Data from internal testing that was performed prior to developing the Draft 1 Test Method indicated that the use of a reference unit introduced variability to the test results. Testing at two additional labs, performed after the Draft 1 Test Method was published and prior to developing the Draft 2 Test Method, also indicated that normalizing results to the reference dishwasher decreased repeatability compared to the non-normalized results. Due to the increased variability, as well as the increased burden, DOE has not proposed the use of a reference dishwasher in the Draft 2 Test Method.
41	Reference dishwasher	The ANSI/AHAM DW-1-2010 standard produces the least repeatable results. This is likely due to the lack of a reference dishwasher. The use of a reference machine is an extra burden to the labs both in cost and work load, however the results are much better and it eliminates any lab variability.	Data from both internal and external testing indicated that the use of a reference unit introduced variability to the test results. Due to the increased variability, as well as the increased burden, DOE has not proposed the use of a reference dishwasher in the Draft 2 Test Method.
42	Reference dishwasher	The IEC standard 60436 Ed. 3.1, 2009-11 tolerance for reference machine cleaning performance is ± 0.2 (based on IEC standard 60436 Ed. 3.1, 2009-11 scoring and soils), but DOE's data show a 0.63 variation to the reference machine range of scores. Although 0.63 variation is based on the IEC standard 60436 Ed. 3.1, 2009-11 test scoring (with ANSI/AHAM DW-1-2010 soils), it is indicative of the need to understand the source(s) of variation and apply controls.	The IEC reference machine was designed to run with the IEC standard 60436 Ed. 3.1, 2009-11 soil load, which is constant for all test cycles. The DOE soil loads vary from light to heavy, so a greater range in the reference scores is expected.

Summary and Response to Stakeholder Comments received on the ENERGY STAR Program Draft 1 Test Method for Determining Residential Dishwasher Cleaning Performance

Comment #	Topic	Comment	Response
43	Correlation workshop	In order to address confusion from myriad and inconsistent test procedure interpretations and practices emanating from the multiple parties now conducting testing (including DOE, EPA, its consultants, and multiple third party and other laboratories), DOE should host a correlation workshop to minimize variation in the interpretation of test procedures, including DOE’s residential dishwasher test procedure. That workshop is critical given the current climate of increased enforcement and third party testing, particularly by multiple sources.	These issues were discussed during the June 2012 public meeting. Some of these issues have been addressed in the final rule that was issued by DOE on September 14, 2012 and have been incorporated into the test procedure in 10 CFR Part 430, Subpart B, Appendix C1.

IV. OTHER

Comment #	Topic	Comment	Response
44	Qualification requirements	It is unclear, for both soil-sensing and non-soil sensing dishwashers, what the statistical requirements will/should be for the performance test. It is possible that the requirements will need to be different than the statistical requirements for energy and water use because cleanability variation is greater than energy/water use variation. Stakeholders may be able to suggest statistical requirements if provided with more data. Round robin testing would aid DOE and stakeholders in determining the appropriate level of confidence for performance testing.	The certification requirements for the performance test will be determined as part of setting the qualification criteria. DOE will share test data with EPA to help determine the appropriate criteria level and statistical requirements.

**Summary and Response to Stakeholder Comments received on the
ENERGY STAR Program Draft 1 Test Method for Determining Residential Dishwasher Cleaning Performance**

Comment #	Topic	Comment	Response
45	Sampling plan	DOE and EPA do not state how many units must be tested to obtain a performance score. The number of units should be the same as for energy and water use. That number will be two or more per DOE regulations, and will vary by manufacturer.	DOE and EPA will specify the sampling plan requirements as part of the ENERGY STAR Product Specification for Residential Dishwashers Version 6.0. However, DOE and EPA have discussed the sampling plan requirements in the Draft 2 Test Method and are requesting stakeholder feedback on the proposed sampling plan.