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BSH HOME APPLIANCES CORPORATION

October 19, 2011

Via E-Mail

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

Re: BSH Dishwasher Division Comments on the ENERGY STAR Residential Dishwasher Cleanability Test Procedure Webinar held on September 19, 2011.

Dear Ms. Stevens:

**General**

BSH supports any efforts to protect our environment and accepts a responsibility to prepare for future generations. Best in class energy performance is embedded in the BSH philosophy. BSH supports EPA and the Department of Energy (DOE) in their efforts to provide incentives to manufacturers, retailers, and consumers for continual energy efficiency improvement. However, much care should be taken to ensure methods and test procedures are correctly developed and not prematurely implemented. A good test procedure introduced correctly will serve as a tool to manufacturers, consumers and regulators; but a test procedure incorrectly implemented will be a burden and will result in countless hours of discussions, loss of confidence in programs, and ultimately an increase in cost to all involved. If a test procedure will be used as part of a verification program, reproducibility is a requirement. Otherwise, there will be numerous cases of false noncompliance and uncertainty for manufacturers, consumers and regulators.

Achieving top rated energy performance while maintaining customer satisfaction is complex, with our most advance dishwashers requiring many months of testing to develop complex soil sensing systems that adjust the cycle to the usage habits of the customer.

Manufacturers must make considerable investments to introduce products and count on long production cycles to spread cost. When changes in regulation occur too quickly, resources and energy are wasted, as tooling is retired before the life cycle. It is critical that energy programs operate on fairly predictable paths to avoid wasted resources. With mass production, unplanned changes results in large quantities of scrap parts dumped into land fields.

BSH has continually modified dishwasher designs to reduce water and energy consumption while maintaining a focus on customer satisfaction. These reductions of energy and water are normally made in small steps. Big steps in performance or energy reduction are not the norm. Examples included reducing the physical size of spray arms or integrating the heating element into the water pump, both changes save about ¼ cup per fill. It should be noted that the implementation cost for the above changes was hundreds of thousands of dollars in tooling and testing cost. A top priority

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BOSCH AND SIEMENS HOME APPLIANCES GROUP

for any dishwasher cleanability test procedure would be to develop a procedure that is sensitive enough to effectively evaluate small improvements.

We are now at a critical time with dishwashers, due to the planned introduction of a performance requirement from Energy Star as well as the introduction of a new Tier 2 Energy Star level. This yet unknown performance attribute will serve as an additional tool for Energy Star to control market saturation. While most are in agreement that a performance attribute is the right direction, many are in disagreement about the details behind such a requirement. It is also unknown what impact the Energy Star Tier 2 level will have on rebate programs or tax incentives. BSH cautions that too much change that occurs too fast will interrupt planned product life cycles, resulting in increased cost for the manufacturers and ultimately the consumers. In addition, delays in production starts of new energy reduced platforms will occur as manufactures wait to see new regulations before tooling commitments.

## **IEC Procedure**

The IEC dishwasher test procedure is a very refined method involving experts from around the world in a continual improvement process. Constantly reviewing the modifying the test procedure to prevent circumvention and to prepare for new technology. These experts include manufacturers, environmentalist, and governmental agencies with all having the goal of a repeatable and reproducible test procedure that can be used to provide reliable and meaningful comparisons. There is a massive amount of data showing that the resulting IEC test procedure is the most repeatable and reproducible dishwasher test procedure available. When the IEC dishwasher test procedure is conducted using correct methods and with dishwashers designed for the procedure, repeatability and reproducibility have been proven.

At BSH we produce dishwashers in several different countries that have basically identical construction. All have different cycle structures based on the regional consumer use habits (top priority) with consideration to regional test procedures. Since the IEC test has different food soils that are prepared differently, the food soil will fall off the dishes at a different rate. Therefore, the US dishwashers will most likely need modification to the dishwasher cycle structure and/or sensor decision set points in order to have good and repeatable performance with the IEC procedure. Without these changes performance may not be optimal and sensor decisions may not be repeatable. At this point, testing US dishwashers with the IEC dishwasher test procedure could lead to incorrect conclusions.

In order to have reproducible results it is critical to have a specially defined reference machine that has the cycle structure tuned to the test procedure being evaluated. In order for the reference machine to be effective, the cleanability score, water usage, energy usage and related allowable tolerances must be established prior to verification testing and checked with an established calibration procedure. When reference machine test results do not fall within known tolerances, investigation must determine root cause before official testing occurs. This is one of the primary methods of obtaining reproducible test results with the current IEC dishwasher test procedure. There is not currently a reference machine that is developed for the US test procedures. Development and production of such a reference machine is a complex and involved process, as reflected in the cost of the Miele reference machine.

## **Webinar Data**

The data presented at the webinar lacks the details necessary to fully understand the results. In order to arrive at reasonable conclusions detailed information must be analyzed. Whenever dishwasher testing occurs in our internal lab we must have the following at a minimum to develop conclusions (we collect more detailed information for BSH dishwashers):

- Examples of things that help analyze data:
  - Amount of water for each individual filling (also total fill amount).
  - Thermocouple inside dishwasher attached to upper rack to monitor internal temperature.
  - Thermocouple inside the end of the drain hose (inserted about 12") to determine when the unit is draining.
  - Amps draw to determine when the heater is on.
  - Incoming water temperature (directly at the dishwasher).
  - Water pressure (as close to the dishwasher as possible).
  - If the unit has a soil sensor

Conducting test without following the detailed procedures can lead to bad conclusions. Extensive training is necessary to have repeatable results with the subjective grading of a dishwasher cleanability test procedure. Improper methods can have big impacts on test results. Substitutions of food soils, dishes and reference machines, cannot be considered without round robin testing showing that the changes do not have impacts. Changes to scoring methods should be considered after establishing a clear basic direction. Changes to the soil application (soiling entire plates with a single soil) will certainly impact the rate the food soil falls off the dishes, and this may influence the sensor decisions.

BSH disagrees with the test burden evaluation presented in the webinar. We feel that the soiling and grading portion of the test procedure are only a fraction of the time required to obtain and investigate results. In addition, we do not feel that the opinion presented in the webinar considers the bigger topic of managing multiple test procedures. The US AHAM IEC TAG plans to be involved with the continual development of the IEC dishwasher test procedure even if a different cleanability test procedure is selected by DOE.

The way that our current system was developed, the Manufacturers have the most experience and knowledge regarding dishwasher cleanability and energy testing. BSH would encourage complete involvement of the Manufacturers throughout the entire process. BSH would also suggest setting up a schedule of phone conferences and face to face meetings, starting with the Energy Summit. BSH encourages that the Energy Summit be setup in a manner that allows product specific discussions, instead of a mass meeting and discussion of all Energy Star products at the same time.

## **Variation**

Efforts must be made to prevent variation in methods and lab setups. Even with extreme care there will be a certain amount of variation that is impossible to prevent.

- Food soils vary due to many reasons such as: genetics, soil type, season grown, temperature, rain fall, region grown, variations in processing.
- Off the shelf dishwashing detergents vary from batch to batch with formulation changes taking place without notification. Therefore a specially formulated test detergent with consistent results is recommended.
- Lab setups vary; with some variations being critical to certain dishwasher designs while other's designs are unaffected. Many lab setup issues were noted when AHAM visited labs and witnessed energy testing. What became apparent is that none of the labs conducting energy testing are setup in exactly the same way. This is one of the base reasons for requesting the energy summit.
  - It would be suggested to have the DOE/NETL ATEC Lab setup reviewed by industry experts to ensure lab setup is consistent with common industry practice. It would be a waste of resources to find issues with lab setup after extensive testing has been completed.

This discussion takes us back to another base reason for the reference machine. It is critical to have a reference machine that provides repeatable and known results to the test procedure at hand, so that variables can be equalized.

## **AHAM / DOE Test Procedure**

At this point it is unknown how difficult, costly and time consuming it will be to make some form of the AHAM / DOE test procedure reproducible. It will be a major undertaking to develop a specific reference machine and determine relevant test scores and tolerances. Extensive training would need to take place to ensure consistent methods and setups. After these accomplishments, round robin testing would need to occur to determine if reproducibility has been achieved.

Then there would be a tremendous amount of work and expense to manage the process of having a repeatable and reproducible test procedure. Continuous discussions and revisions must occur to keep the procedure updated to current designs and to prevent circumvention; basically, creating a living process of continual improvement involving the experts in the field.

## **Closing Statements**

The AHAM group has made a commitment to move toward the IEC dishwasher test procedure and work is in process. However due to the continual demands of new regulations, resources have been limited. Now the majority of the AHAM Dishwasher Working Group feels that with all the work that may be required to make some version of the AHAM / DOE test procedure reproducible, resources may not be available to work on both procedures, and the work on a new IEC based AHAM procedure may be delayed. It should be noted that if we continue down the road of developing a special US AHAM / DOE test procedure, it will become much more difficult to change to IEC based procedure in the future.

At BSH we believe that switching toward an IEC base procedure will result in a robust and cost effective solution that is better than any current USA based proposal; resulting in a test procedure with proven reproducibility and consumer satisfaction. The soil load and degree of soil attachment in the IEC procedure is representative of how we would like consumers in the US to use their dishwasher, avoiding pre-rinsing which will result in a substantial energy savings when compared to current US consumer use habits. On the other hand, the DOE procedure was developed based on current consumer use habits of pre-rinsing, which has been proven to use more energy. BSH feels that the IEC procedure is a more realistic approach, which will allow more aggressive use of the dishwasher while improving ease of use, and offering energy savings at the same time. It will also reduce the need to develop different cycle structures for different countries, with an ultimate goal to have identical cycle structures.

In the long term, switching toward the IEC cleanability procedure will enable use of the IEC infrastructure, reduce procedural maintenance cost by avoiding involvement in multiple cleanability test procedures, improved utilization of experts in the field, reduced test burden due to a common procedure, improve customer satisfaction, reducing pre-rinsing and offering a true reduction in overall dish washing energy consumption.

No matter which direction is decided, it will be a big project to introduce a US dishwasher cleanability test procedure that is repeatable and reproducible while achieving customer satisfaction, without causing the dishwasher to use more energy than is required to achieve customer satisfaction.

Thank you for consideration of our comments. Please let us know if additional information would be helpful.

Best Regards,  
Mike Edwards  
BSH Home Appliances  
Senior Engineer – Consumption and Performance