ASSOCIATION OF HOME APPLIANCE MANUFACTURERS

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April 12, 2013

Via E-Mail

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

Re: ENERGY STAR Program Requirements, Product Specification for Residential Refrigerators and Freezers Final Draft, Version 5.0 and Final Draft Test Method to Validate Demand Response

Dear Ms. Stevens:

On behalf of the Association of Home Appliance Manufacturers (AHAM), I would like to provide our comments on the ENERGY STAR Product Specification for Residential Refrigerators and Freezers, Eligibility Criteria, Final Draft, Version 5.0 and the corresponding Final Draft Test Method to Validate Demand Response.

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 EPA and the 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 thanks EPA for its extensive work to address stakeholder concerns regarding the various drafts of this specification, including several meetings with AHAM on a number of issues. We appreciate EPA's willingness to hear and address most all of the issues we raised. The resulting final draft is one that AHAM supports with the exception of the effective date, which we continue to oppose. In

addition, we suggest one minor change to the eligibility criteria that we believe is consistent with EPA's intent.

I. Qualification Criteria

EPA adjusted the levels for built-in product classes, such that those classes must use at least 10% less energy than the 2014 DOE standard. This is consistent with the levels for other product classes. AHAM fully supports this approach because it relies on DOE's rulemaking process and recognizes that the DOE product classes and standards are the foundation for the ENERGY STAR program. This is the best way to maintain clarity and consistency for stakeholders and to reduce burden on manufacturers. Accordingly, AHAM thanks EPA for making this change in accordance with our October 9, 2012, comments.

EPA also amended the levels in the Final Draft for product classes with automatic icemakers such that ENERGY STAR levels are based on the baseline energy consumption. AHAM supports this approach and thanks EPA for making this change. Because the DOE standards in 2014 incorporate a uniform adder for icemaking of 84 kWh per year, for the time-being, there is no ability to improve certified energy use by decreasing the energy use of the icemaker. Thus, in order to meet the previously proposed qualification criteria, improvements in energy efficiency would had to have been achieved through changes to the non-icemaking portions of the product, which would have made the "ten percent and above" the federal standard requirement more stringent for icemaking product classes—in practice that would have meant that the ENERGY STAR level for icemaking product classes is 11-14 percent above the federal standard. EPA's approach in the final draft appropriately puts these product classes back on equal footing. In addition, this approach avoids the complicated issues that AHAM described in previous comments regarding refrigerator/freezers with optional icemakers (kitable/icemaker ready units).

AHAM notes, however, that the levels in the Final Draft for product classes 5A, 5A-BI, 6, 7, and 7-BI do not seem to follow this approach. There is no reason to treat these product classes differently—all of the reasons for following this approach (described above) apply equally to these product classes. We thus assume that EPA meant to follow the same approach it did for the other product classes, and, in fact, understand from EPA that that is indeed the case. Accordingly, we note that 8.4 should be added to the intercept value for these product classes and, therefore, the levels should be as follows:

Product Class	Final Draft v 5.0 Energy Star Criteria	Recommended Energy Star Criteria
5A	8.33 * AV + 427.9	8.33 * AV + 436.3
5A-BI	8.85 * AV + 449.9	8.85 * AV + 458.3
6	7.56 * AV + 346.9	7.56 * AV + 355.3
7	7.69 * AV + 389.5	7.69 * AV + 397.9
7-BI	9.23 * AV + 452.3	9.23 * AV + 460.7

II. Effective Date

EPA continues to propose an effective date of March 1, 2014, and AHAM must continue to oppose that effective date. AHAM still believes that the effective date should be September 15, 2014, in order to align with the compliance date for DOE's revised standards.

As we have previously commented on a number of occasions, the magnitude of the change to the standards and test procedure in 2014 is the biggest it has been since energy labeling began. The work is not just on the part of manufacturers, but trade partners as well. The required change is very difficult to accomplish during the peak buying season, which is the summer months (roughly April through September, but it may vary) because of production schedules and promotions, as well as other factors. The fact that the transition will occur during this period (September 2014), only further increases the magnitude of the change.

Having an ENERGY STAR specification change just a little over six months prior to a federal standards change provides unnecessary complication and marketplace confusion in an already complex regulatory climate. ENERGY STAR generally requires certifications for a new specification to occur five or six months before the effective date, and so harmonizing with DOE's standard change on September 15, 2014, would require manufactures to comply with the new standard in the March timeframe anyway. The cumulative regulatory burden that is brought about by two federal agencies (that are supposed to be working *together*) pursuing two different effective dates for the same product only a few months apart is unnecessary and overly burdensome to manufacturers. In addition, there is little to no benefit to consumers or the environment that will result from an effective date six months prior to the mandatory compliance date with the DOE standards.

III. Connected Criteria

AHAM appreciates EPA's willingness throughout this specification development process to work with AHAM and its members, as well as other stakeholders, in order to come to a workable solution for the connected criteria. We support the final draft as written and would urge EPA not to make any revisions.

IV. Test Requirements

DOE released the Final Draft ENERGY STAR Connected Refrigerators Test Method to Validate Demand Response. AHAM thanks DOE for making the changes it suggested in its comments dated March 27, 2012. AHAM has one minor comment regarding references to Watt-hours (Wh) instead of Kilowatt-hours (kWh) in Section 6.1 and ambiguity in the units in Sections 7.2 and 8.1. We assume the references to Wh are typos and just need to be corrected. And we respectfully request clarification on the units in the other sections in order to ensure optimal clarity and consistency. More detail is below, and AHAM's suggested revisions are shown in redline in Attachment A.

A. Section 6.1, DOE Baseline

In subsection A, DOE references the DOE test procedure for measuring the energy consumption, EP_1, in Wh, starting on line 64: "Measure the energy consumption, EP_1, in Wh, and length of time, T_1, in minutes, as described in Section 4.1 of the DOE Test Procedure." But the units for EP_1, as described in the DOE test procedure, are in kWh, not Wh. Thus, DOE should ensure that the final draft properly references the units for EP_1 as kWh, not Wh. This revision will ensure consistency for the units of EP_1 in this section, in Section 9 Calculations of the Final Draft Test Method, and the DOE test procedure.

In item 2 of subsection B, DOE references the DOE test procedure for measuring the energy consumption, EP_{AD}, in Wh, starting on line 72: "Identify the energy consumed during the selected test period, EP_{AD}, in Wh , and the duration of the selected test period, T_{AD}, in minutes. EP_{AD} and T_{AD} shall be represented in the DR calculations by EP_{BL} and T_{BL}." Similar to the comment above, the units for the EP measurements, as described in the DOE test procedure, are in kWh, not Wh. Thus, DOE should ensure that the final draft properly references the units for EP_{AD} as kWh, not Wh. This revision will ensure consistency for the units of EP_{AD} in this section, in Section 9 Calculations of the Final Draft Test Method, and with the other EP measurements in the DOE test procedure.

B. Section 7.2, Delay Appliance Load Test – Percent Reduction

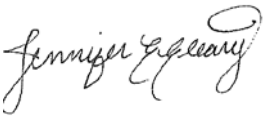
On line 94 of subsection B, DOE references measuring the energy consumption, EP_{DL}, and does not identify the units for EP_{DL}: "Measure and record the energy consumption, EP_{DL}, during the four-hour DAL test period." DOE should identify the units for EP_{DL} as kWh. This adjustment will ensure consistency for the units of EP_{DL} in this section, in Section 9 Calculations of the Final Draft Test Method, and with the other EP measurements in the DOE test procedure.

C. Section 8.1, Temporary Appliance Load Reduction Test

On line 103 of subsection B, DOE references measuring the energy consumption, EP_{TALR}, and does not identify the units for EP_{TALR}: "Measure and record the energy consumption, EP_{TALR}, during the 10-minute TALR test period." DOE should identify the units for EP_{TALR} as kWh. This adjustment will ensure consistency for the units of EP_{TALR} in this section, in Section 9 Calculations of the Final Draft Test Method, and with the other EP measurements in the DOE test procedure.

AHAM appreciates the opportunity to submit comments on the ENERGY STAR Product Specification for Residential Refrigerators and Freezers, Eligibility Criteria, Final Draft, Version 5.0 and the corresponding Final Draft Test Method to Validate Demand Response and would be glad to further discuss these matters should you so request.

Best Regards,



Jennifer Cleary
Director, Regulatory Affairs

ATTACHMENT A

ENERGY STAR® Program Requirements
Product Specification for Residential
Refrigerators, Freezers, and Refrigerator-Freezers

Final Draft Test Method to Validate
Demand Response
Rev. March-2013

1 OVERVIEW

The following test method shall be used for determining product compliance with requirements for Demand Response (DR) functionality in the ENERGY STAR Eligibility Criteria for Connected Refrigerators, Freezers, and Refrigerator-Freezers.

2 APPLICABILITY

This test method is applicable to refrigerators, refrigerator-freezers, and freezers intending to meet the Connected appliance requirements in the ENERGY STAR Version 5.0 Program Requirements.

3 DEFINITIONS

Unless otherwise specified, all terms used in this document are consistent with the definitions in the ENERGY STAR Eligibility Criteria for Residential Refrigerators and Freezers Version 5.0 and in the DOE Test Procedure in 10 CFR Part 430, Subpart B, Appendix A and Appendix B (DOE Test Procedure).

A) Utility Equivalent Communication Device: Device capable of communicating with the connected appliance and emulating signals sent from a utility. It will be controlled by the technician and will allow the technician to deliver the Delay Appliance Load and Temporary Appliance Load Reduction signals.

B) Communication Module (Appliance): A built-in or external device that enables appliance bi-directional communication with the Utility Equivalent Communication Device.

C) Connected Signal Simulation Hardware: Self-contained or Power Computer (PC) based hardware that will allow the operator to execute necessary communications and commands and receive necessary feedback from the Unit Under Test (UUT).

D) Consumer Override: The capability for an end-user to cancel a product's response to a DR signal.

E) Signals: Communications to a connected product that provide information or indicate that it should modify its operation. Signals include, but are not limited to, Delay Appliance Load (DAL), Temporary Appliance Load Reduction (TALR), and time-based pricing.

F) Delay Appliance Load Capability: Capability of an appliance to reduce its average energy input over a specified time period. The delay load command provides the start time and duration of the delay load time period.

G) Temporary Appliance Load Reduction Capability: Capability of an appliance to reduce its average energy input over a short specified time period. The temporary load reduction command provides the start time and duration of the temporary load reduction time period.

H) Acronyms:

- DR: Demand Response
- DAL: Delay Appliance Load
- TALR: Temporary Appliance Load Reduction
- Wh: Watt Hours
- W: Watts
- UUT: Unit Under Test

4 TEST REQUIREMENTS

Unless otherwise specified, all test conditions and requirements shall be identical to 10 CFR Part 430, Subpart B, Appendices A or B, Section 2.

5 PRE-TEST UUT CONFIGURATION

5.1 General Configuration

The UUT shall be set up as described in 10 CFR Part 430, Subpart B, Appendices A or B, Section 3.

5.2 Communication Setup

The communication device shall be set up in accordance with manufacturer installation instructions. The communication device setup described below applies only to the Demand Response tests in Sections 7 and 8.

A) Connect the Communication Module to the Utility Equivalent Communication Device via wired or wireless connection depending on the module's capability. A wireless connection is preferred if both are available.

B) Ensure that the module is properly connected, secured according to manufacturer instructions, and can both receive and send data to the Utility Equivalent Communication Device.

5.3 UUT Steady State Stabilization

A) All compartment temperature controls shall be set at their median position, as described for the "first test" in 10 CFR 430, Subpart B, Appendix A or Appendix B, Section 3.2.1.

B) Prior to the start of testing, the UUT shall be stabilized according to 10 CFR Part 430, Subpart B, Appendix A Section 2.9 or Appendix B Section 2.7.

C) The ice maker shall be on with harvesting inoperative, as described in Section 2.2 of the DOE Test Procedure. The ice maker shall remain in this inoperative state throughout testing unless otherwise specified.

D) If the UUT is equipped with an automatic ice maker, water line installation is required in accordance with the printed instructions supplied with the cabinet or water line for the Ice Maker Deferral test.

6 BASELINE ENERGY CONSUMPTION

6.1 DOE Baseline

A) Measure the energy consumption, EP_1, in kWh, and length of time, T_1, in minutes, as described in Section 4.1 of the DOE Test Procedure. Conduct the test at the median temperature set point, as described in Section 3.2.1 of the DOE Test Procedure, with the anti-sweat heater switch, if present, in the "off" position. EP_1 and T_1 shall be represented in the DR calculations by EP_{BL} and T_{BL}.

Comment [SL1]: Changed from Wh to kWh because EP_1 in the DOE Test Procedure is measured in kWh not Wh.

B) If the UUT has automatic defrost as specified in Section 4.2 of the DOE Test Procedure, and does not require the use of the two part test described in Sections 4.2.1 through 4.2.3:

1) Select a stable test period consistent with that of the first part test of a Long-time Automatic Defrost unit as described in Section 4.2.1 of the DOE Test Procedure.

2) Identify the energy consumed during the selected test period, EP_{AD}, in kWh, and the duration of the selected test period, T_{AD}, in minutes. EP_{AD} and T_{AD} shall be represented in the DR calculations by EP_{BL} and T_{BL}.

Comment [SL2]: Changed from Wh to kWh because the values for EP within the DOE Test Procedure are measured in kWh not Wh.

7 DELAY APPLIANCE LOAD (DAL) TEST

All connected features and network modes must be setup and enabled per Section 5.2, and the anti-sweat heater switch, if present, must be in the "off" position, during the Delay Appliance Load Test. As specified in the ENERGY STAR Program Requirements for Residential Refrigerators and Freezers Version 5.0, only one of the following tests in Section 7 are required for complying with Delay Appliance Load requirements.

7.1 Delay Appliance Load Test - Ice Maker Deferral

A) Activate the ice maker harvest capabilities.

B) Ensure that the ice maker is properly activated through the successful production of ice.

C) Once ice making operations are activated, empty the ice bin, if necessary, and initiate a four-hour DAL signal.

D) Ensure that all ice maker operations are deferred beyond the test period by confirming the ice bin is empty at the end of the four-hour test period.

E) Verify no precool cycle (as defined in Section 4.2.1.1 of the DOE Test Procedure) occurs and the defrost heater is off during the entire duration of the four-hour DAL test period.

F) For the remainder of testing, return the ice maker to its inoperative state as described in Section 5.3.C and empty the ice bin if ice is present.

7.2 Delay Appliance Load Test - Percent Reduction

A) Initiate a four-hour DAL signal within five minutes after the start of a compressor on cycle.

B) Measure and record the energy consumption, EP_{DL}, in kWh, during the four-hour DAL test period.

C) Verify no precool cycle occurs and the defrost heater is off during the entire duration of the four-hour DAL test period.

Comment [SL3]: Added "in kWh," to stay consistent with EP measurements in 6.1.A and 6.1.B.2 of this test procedure, the calculation section of this test procedure and the DOE test procedure.

8 TEMPORARY APPLIANCE LOAD REDUCTION (TALR) TEST

All connected features and network modes must be setup and enabled per Section 5.2, and the anti-sweat heater switch, if present, must be in the "off" position, during the Temporary Appliance Load Reduction Test.

8.1 Temporary Appliance Load Reduction Test

A) Initiate a 10-minute TALR signal within five minutes after the start of a compressor on cycle.

B) Measure and record the energy consumption, EP_{TALR}, in kWh, during the 10-minute TALR test period.

C) Verify no precool cycle occurs and the defrost heater is off during the entire duration of the 10-minute TALR test period.

Comment [SL4]: Added "in kWh," to stay consistent with EP measurements in 6.1.A and 6.1.B.2 of this test procedure, the calculation section of this test procedure and the DOE test procedure.

9 CALCULATIONS

9.1 DR Baseline Average Power

Calculate the average DR baseline power, AP_{BL}.

Equation 1: DR Baseline Average Power

$$AP_{BL} = \frac{(EP_{BL} \times 1000)}{\left(\frac{T_{BL}}{60}\right)}$$

Where:

- *AP_{BL} is the average baseline power in W*
- *EP_{BL} is the baseline energy consumption in kWh, as described in section 6.1*
- *1000 is the conversion factor from kWh to Wh*
- *T_{BL} is the baseline time period in minutes, as described in section 6.1*
- *60 is the conversion factor from minutes to hours*

9.2 Delay Load Period Average Power

Calculate the average delay load power, AP_{DL}.

Equation 2: Delay Load Average Power

$$AP_{DL} = \frac{(EP_{DL} \times 1000)}{4}$$

Where:

- *AP_{DL} is the average delay load power in W*
- *EP_{DL} is the delay load energy consumption in kWh, as described in section 7.2*
- *1000 is the conversion factor from kWh to Wh*
- *4 is the delay load duration in hours*

9.3 Percent Delay Load Average Power Reduction

Calculate the percent average delay load power reduction compared to the DR Baseline Test.

Equation 3: Percent Delay Load Average Power Reduction

$$Percent\ Average\ Power\ Reduction = \frac{(AP_{BL} - AP_{DL})}{AP_{BL}} \times 100\%$$

Where:

- *AP_{BL} is the average baseline power in W, as calculated in section 9.1*
- *AP_{DL} is the average delay load power in W, as calculated in section 9.2*

9.4 Temporary Appliance Load Reduction Average Power

Calculate the average TALR power, AP_{TALR}.

Equation 4: TALR Average Power

$$AP_{TALR} = \frac{(EP_{TALR} \times 1000)}{0.1667}$$

Where:

- AP_{TALR} *is the average TALR power in W*
- EP_{TALR} *is the TALR energy consumption in kWh, as described in section 8.1*
- *0.1667 is the time duration of the TALR period in hours*

9.5 Percent TALR Average Power Consumed

Calculate the percent average TALR power consumed compared to the DOE Baseline Test.

Equation 5: Percent TALR Average Power Consumed

$$Percent\ Average\ Power\ Consumed = \frac{AP_{TALR}}{AP_{BL}} \times 100\%$$

Where:

- AP_{BL} *is the average baseline power in W, as calculated in section 9.1*
- AP_{TALR} *is the average TALR power in W, as calculated in section 9.4*

10 REFERENCES

A) 10 CFR Part 430, Subpart B, Appendix A. Uniform Test Method for Measuring the Energy Consumption of Electric Refrigerators and Electric Refrigerator-Freezers.

B) 10 CFR Part 430, Subpart B, Appendix B. Uniform Test Method for Measuring the Energy Consumption of Freezers.

C) ENERGY STAR Program Requirements for Residential Refrigerators and Freezers - Eligibility Criteria Version 5.0 Draft 3 published September 2012.