

**ENERGY STAR<sup>®</sup> Laboratory Grade Refrigerator and Freezer  
Online Stakeholder Meeting  
May 1, 2008**

**Meeting Notes**

Laboratory grade refrigerator and freezer manufacturers and other industry stakeholders participated in an online meeting hosted by the U.S. Environmental Protection Agency (EPA) on May 1, 2008. The purpose of the meeting was to introduce stakeholders to the ENERGY STAR program and discuss efforts to develop a specification for laboratory grade refrigerators and freezers. The Attendee List and meeting presentation are available on the ENERGY STAR Web site at: [www.energystar.gov/productdevelopment](http://www.energystar.gov/productdevelopment). Click on the "New Specifications in Development" link.

Below is a summary of EPA's presentation and the discussion that took place during the meeting. EPA attempted to group the discussion points according to key themes. Where EPA was able to address stakeholder comments and/or questions during the meeting, these responses are provided.

**Overview of ENERGY STAR and the Specification Development Process – *Rachel Schmeltz, EPA***

Ms. Schmeltz provided an overview of the ENERGY STAR program and shared EPA's reasons for pursuing a specification for laboratory grade refrigerators and freezers, which included the concern that several laboratory grade units are already qualified as ENERGY STAR under commercial grade testing conditions. She then touched on each of the Guiding Principles that serve as a reference for EPA when developing an ENERGY STAR specification. These include:

- Significant energy savings will be realized on a national basis.
- Product energy consumption and performance can be measured and verified with testing.
- Product performance will be maintained or enhanced.
- Purchasers of the product will recover any cost difference within a reasonable time period.
- Specifications do not unjustly favor any one technology.
- Labeling will effectively differentiate products to purchasers.

Finally, Ms. Schmeltz walked through the steps of the ENERGY STAR specification development process and discussed the following important elements that make this process successful:

- Consistency – additional steps have been added to the process to allow for more consistent and frequent stakeholder involvement.
- Transparency – all EPA documents and comments are posted to the ENERGY STAR Web site.
- Inclusiveness – in addition to manufacturers, EPA engages other industry stakeholders such as trade associations, utilities, retailers, and end users.
- Responsiveness – EPA acknowledges receipt of all comments, responding promptly to questions and/or requests for meetings and conference calls.
- Clarity – additional discussion is provided in each draft specification discussing EPA's approach and justification for any changes.

**Laboratory Grade Refrigerator and Freezer Discussion – *Rebecca Duff, ICF International***

Ms. Duff shared with the group EPA's activities to date regarding laboratory grade refrigerators and freezers, including preliminary research findings about the types of products offered in the marketplace. She then revealed the remaining questions that EPA would like to address to help move the process forward. Ms. Duff presented the industry comments received in response to the initial November 2007 memo distributed to stakeholders and discussed performance data needs required to develop an

ENERGY STAR specification for laboratory grade refrigerators and freezers. Details regarding these discussions are provided below. At the end of the discussion, a list of upcoming industry conferences was shared and stakeholders were encouraged to identify opportunities where ENERGY STAR representatives could meet with manufacturers one-on-one and view equipment.

## **Laboratory Grade Discussion – All Attendees**

### ***Ultra Low Freezers***

- There is significant interest in knowing the efficiency of ultra low freezers from the end user perspective.
- Question to Group: Do ultra low freezers represent a niche market?
- Many of these product types are used on college campuses, require significant maintenance, and are very costly to operate. There are also some concerns regarding reliability and waste heat.
- Manufacturers should not use the same test procedure (i.e., door openings) for ultra low freezers because they serve a very different application. For example, while you might have several door openings on general purpose or other refrigerators and freezers, ultra low freezers are designed for long term storage. Therefore, the current door openings required by ASHRAE 72 does not emulate how these products will be used in the field.
- ENERGY STAR Response: Perhaps conditions specific to ultra low freezers could be added to the test procedure and/or specification.
- What is the overall national energy consumption of low temperature units? Is it significant enough to make it worth going to great lengths to cover in the specification?
- There are thousands of ultra low freezers sold each year so it is a robust and diverse market. It will be critical to establish tighter restrictions (i.e., tighter temperature tolerance) because of the need for customers to protect the samples that are typically stored in these units. Customers are not using these units to hold food but rather to hold precious samples.
- ENERGY STAR Response: It will be important to determine whether there is sufficient differentiation in performance for this product type. These products may use a lot of energy but if there is little differentiation between units then an ENERGY STAR specification may not make sense. Regardless, it will be beneficial to both manufacturers and end users to know how much energy these products consume.
- Cryogenic units will use more energy – many of these units are mechanical (e.g., -140°C and -150°C) but many more use liquid nitrogen. Even though liquid nitrogen units use less energy on-site to operate (i.e., the only electricity needs would be for controls) the total energy footprint is much larger due to the amount of energy it takes to create liquid nitrogen in the first place.
- ENERGY STAR Response: This situation draws parallels to the development of the ENERGY STAR exit sign specification, where two different technologies were addressed by the same specification requirements because their functionality was the same.

### ***Testing Tolerances***

- There is a real need for a buyers' guide that establishes how samples should be stored (e.g., temperatures and tolerances). End users can then determine what kind of unit they need based on this guide. Perhaps EPA could serve a role in developing this type of guide?
- It will be important to ensure tight temperature tolerances during testing, which will most likely eliminate conversion units from qualifying.
- Question to Group: Would including a tighter tolerance and thus eliminating conversion units be a problem for end users?

- There are applications suitable for using conversion units, where the temperature tolerance doesn't have to be so tight and may be the more cost effective option to the end user (e.g., storing large quantities of liquid). Consumers should be given the option of choosing different units (i.e., +/- 2°C versus 1°C) if they do not need such an extreme degree of exact temperature holding.
- Is the goal of ENERGY STAR to take commercial grade units and apply them for laboratory applications? Or rather, design a purely laboratory grade specification with tight temperature tolerances?
- ENERGY STAR Response: Ideally, the commercial grade and laboratory grade refrigerator and freezer specifications would cover all solid and glass door refrigeration products available to the end user, based on application. Laboratories should conduct due diligence to determine the tolerance required for whatever product they are storing. Making the tolerances too tight could risk eliminating conversion units, which are also excluded in the revised commercial refrigeration specification, and thus creating a gap in the marketplace.
- ENERGY STAR Response: It would be unrealistic for EPA to present a detailed guide regarding tolerances and temperature ranges but the ENERGY STAR specification could include different tolerances based on application. For example, enzyme storage that is very sensitive to temperature differences could be tested using a tolerance of +/- 1°C while units serving applications less susceptible to temperature swings (e.g., storage of large quantities of liquid) could be tested using a +/- 2°C tolerance. EPA could then list and delineate products based on application and associated tolerance, providing the end user with this information to help their purchasing decision.
- The tolerance of +/- 1°C is quite common in the industry and well understood. Furthermore, a tolerance of +/- 2°C could result in a 15% difference in power consumption. Increasing the allowable temperature range greatly increases the possible power consumption scale.
- EPA should specify that any single package cannot have more than 1-2°C range in tolerance, which will help to ensure temperature uniformity across the unit.

### ***Testing Conditions and Categorization of Products***

- ASHRAE guidelines as written do not represent temperature uniformity within the cabinet. This is an important purchasing point for end users. However, the procedure is a good proxy for comparing products to one another.
- EPA should stick to temperature ranges as a way of segregating categories as opposed to basing these categories on the actual biological products stored. For example, instead of having a blood bank category EPA would require units designed to hold temperature at 4°C to be tested at 4°C. This will allow manufacturers to map certain applications and products to those temperature ranges for purposes of testing and qualification.
- ENERGY STAR Response: Segregating by functionality would be the easiest approach. We don't want to eliminate specification technologies but need to consider if there are true differences in functionality that need to be addressed by separate performance requirements.
- For the -20°C category, manual defrost technology is inherently more energy-efficient than automatic defrost. EPA should analyze these product types separately.
- Question to Group: Is there a possibility of creating two different specifications for house built and conversion units?
- True laboratory grade and conversion units cannot be incorporated into the same specification requirements.
- EPA could include conversion units in the specification but establish a separate testing protocol, requiring a tighter tolerance for true laboratory grade units.
- Many customers demand temperature uniformity and tight tolerances, which tend to consume more energy. Large manufacturers with several product offerings won't want to miss out on the opportunity to get the ENERGY STAR on these product types.

- ENERGY STAR Response: It is possible that EPA may take different approaches based on data and differences in functionality but we need to first decide the testing tolerances so manufacturers know which tolerances to use during testing.
- Some manufacturers neglect to perform tests correctly, which results in significant differences in reported energy usage.
- Similar to the issues with commercial grade refrigerators and freezers, EPA will need to provide direction regarding which accessories are turned on or off during testing.
- ENERGY STAR Response: The turning on and off of accessories could change the energy use profile of the product and presents a challenge to fairly comparing products across the board. We need to strive to ensure apples to apples comparison when testing and reporting energy performance.
- One idea could be to test according to manufacturer recommended operation. Otherwise it would be considered cheating if the manufacturer is boasting accessories but not incorporating them into the overall energy use results.
- Manufacturers should test with the lights off to encourage turning off lights in operation.
- There are significant differences between chromatography units and other product types that impact energy use (i.e., humidification). Should these features be turned off or on during testing?
- It's up to the site as to whether or not some of these switches need to be turned on. For example, in super cool environments you would not need to switch on the door heater because the unit would not be sweating whereas in other, warmer applications you may need this feature.
- ENERGY STAR Response: EPA is inclined to require all manual switches to be turned on during testing to represent the worst case scenario. If a broad statement about incorporating all accessories is included in the specification would this be sufficient to address these concerns?
- EPA should leave it broad in regards to specific accessories and then provide some examples (e.g., humidification).
- EPA should send a statement regarding accessories being turned on to the ASHRAE 72 standards committee in order to close any loopholes.
- Incubators incorporate even more features/accessories, should these be considered a class of their own under ENERGY STAR? Incubators have a similar set of manufacturers and units have a much wider range of temperature settings.
- ENERGY STAR Response: There is a question as to whether or not the incubating (warmer) mode would be able to be measured by ASHRAE 72, which focuses on refrigeration. If it is determined that ASHRAE 72 is not appropriate for these product types then EPA will make sure to create a clear definition that excludes them in the specification.
- If different settings are an option, can manufacturers test with accessories off if they clearly delineate what they are doing? This could result in a positive change in behavior (e.g., turning lights off).
- It would be helpful to end users if manufacturers explained the amount of energy/electricity that is consumed in each mode. For example, door heating may require 7 amps of electricity but if a manufacturer qualified a product with this feature turned off then its ENERGY STAR qualification would be voided if shipped with this feature turned on.
- ENERGY STAR Response: Again, EPA prefers to take a worst case scenario approach so that no matter where the unit is installed, or how it might be operated, it would meet the ENERGY STAR requirements.

### **Next Steps – Rachel Schmeltz, EPA**

Ms. Schmeltz concluded the meeting by identifying key next steps toward the further development of an ENERGY STAR specification for laboratory grade refrigerators and freezers:

- Manufacturers should contact EPA/ICF to schedule follow up discussions and suggest industry conferences or other venues to meet and view equipment. ENERGY STAR representatives will be attending AACC in Washington, DC July 27 – 31, 2008 to meet with manufacturers or other stakeholders planning to attend.
- Manufacturers should provide EPA/ICF feedback on proposed testing tolerances (i.e., +/- 1°C versus +/- 2°C) and whether these should be based on application (e.g., conversion versus house built). Tolerances need to be identified before manufacturers can begin testing and submitting data so that EPA can fairly compare and analyze the data. ENERGY STAR representatives will follow up with manufacturers directly to discuss test conditions in greater detail.