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## Comments Regarding the Laboratory Grade Refrigerator and Freezer Test Protocol for Energy Star

The Delfield Company is a producer of both commercial Refrigeration Equipment and Laboratory grade refrigerator and freezers.

As an Energy Star partner for many years, Delfield appreciates the opportunity to comment on and to help shape the standards and test protocols for our equipment. Delfield is a strong supporter of energy reduction in the commercial food equipment industry and believe that continued governmental and industry partnering is the best path to achieving significant, yet reasonable reduction goals.

Detailed comments pertaining to the proposed test method are listed below, however, as a general statement, Delfield believes that maintaining common test standards and procedures for similar equipment provides significant benefit to manufactures, third party test agencies and the DOE / EPA. Common procedures will reduce testing burden and improve testing efficiencies of different product categories as well as reduce the potential for error and inaccuracies that are likely to occur when testing similar products with different methods.

### Comments

Line 103 – The tolerance for steady state is very tight and allowing for a greater range would not impact the test results. The time period, allowing for cycle to cycle or 24 hours is adequate. I would recommend up to 2°F of tolerance to account for inherent cycle instability and measurement capability.

Line 139 – 0.5 m/s does not convert to 45 ft/min. ASHRAE 72 calls for .25/49.

Line 126 – Ambient conditions should be kept consistent with the established ASHRAE 72 standard to allow for maximum test room utilization and efficiency.

Line 142 – Having performed hundreds of comparative energy tests, lighting has not been shown to impact the results. This may be due to the design of the particular test chamber and/or what else is in the chamber at the time of the test.

Line 146 – Similar to lighting, radiant heat has not been shown to impact the results. This may be due to the design of the particular test chamber and/or what else is in the chamber at the time of the test. An increase in apparent radiant heat would increase the energy consumption which would not negatively impact the consumer however, it may affect repeatability of results. Utilizing the white gloss finished surface as indicated in the standard significantly reduces test chamber throughput due to the

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excess space occupied by the white surface. It would simplify the procedure for manufacturers if this condition was removed, but Delfield cannot speak to its impact across the testing results of multiple labs.

Line 217 – Un-weighted Bare thermocouples provide large variances in individual temperature readings. For consistency and stability of data, a weighted thermocouple, such as used in NSF testing, should be specified.

Line 225 – It is unclear how to place thermocouples when adjacent shelves exist. If 2 shelves are adjacent, are 8 tc's used or are 10 TC's used?

Line 229 – ASHRAE 72 does not provide specific details of how to test a unit with drawers. If drawers are to be cycled similar to doors, two issues exist. Thermocouple routing and durability is a concern due to the constant flexing of the TC wire. Thermocouples in a drawer will be removed from the refrigerated compartment and exposed to ambient air each time that the drawer cycles. This will cause significant fluctuations in temperature, particularly if an unweighted TC is used. In Delfield's opinion, drawers should not be cycled as part of the test protocol as this will adversely affect gross energy consumption and repeatability.

Line 269 – Door openings are difficult to automate accurately and consistently, increase the test chamber space and complexity and add variability to the test results. It is also impossible to mimic real world conditions due to the large variance in usage patterns, ambient conditions and pack out levels normally seen in the field. Door openings should be eliminated from the test protocol. It is not necessary to increase the ambient to account for the lack of door openings. The primary purpose of the standard test protocol is for the consumer to be able to compare like units, not to provide an expected energy consumption. The actual energy consumption that an end user will experience is highly affected by conditions beyond the test environment including ambient conditions, pack out levels, unit maintenance, etc. If door openings are to be required, they should match the ASHRAE standard and should be the same for refrigerators and freezers to reduce confusion and test complexity. Please note that Lab refrigeration equipment is used for applications ranging from drive through pharmacies to scientific lab storage where door openings can range from every few minutes to every few days or weeks.

Drawer openings are not discussed in this protocol and should be clarified.

Line 321 – Volume measurements should follow an established guideline. The AHAM standard would be preferable for manufacturers and third party test agencies since this is already used extensively for other energy programs.

Line 356 – This line mentions test simulator temperatures, but bare thermocouples are specified prior in the standard.

Line 394 – The table includes a set point temperature. This is not necessarily a setting on the unit. A temperature control may have letters, numbers, tick marks or actual temperature values. It is sufficient to state the thermocouple average temperature as this will dictate the position or setting of the temperature control.

The temperature average for the commercial refrigeration standard is 38°F +/- 2°F or 0°F +/- 2°F. It would be preferable to remain consistent where possible with other similar standards.

Thank you for allowing The Delfield Company to provide input on this important standard.

Sincerely,

**Rick Seiss**  
**Director - Engineering**