

Appliance Standards Awareness Project
American Council for an Energy-Efficient Economy
Natural Resources Defense Council

February 22, 2022

Dr. Stephanie Johnson
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Building Technologies, EE-2J
1000 Independence Avenue SW
Washington, DC 2058

RE: Docket Number EERE-2017-BT-TP-0006: Proposed Rule for Test Procedures for Automatic Commercial Ice Makers

Dear Dr. Johnson:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), the American Council for an Energy-Efficient Economy (ACEEE), and the Natural Resources Defense Council (NRDC) on the notice of proposed rulemaking for test procedures for automatic commercial ice makers. 86 Fed. Reg. 72322 (December 21, 2021). We appreciate the opportunity to provide input to the Department.

We support DOE's proposal to include provisions in the test procedures for low-capacity and portable ACIMs. There are many low-capacity models on the market, and these units currently are not subject to DOE efficiency standards or test procedures. We support DOE's expansion of scope of the ACIM test procedures to include low-capacity units, which will ensure that any claims that manufacturers make about capacity and efficiency will be based on standardized test procedures. This will help purchasers make informed choices when deciding between models in the marketplace. We also support DOE's proposed provisions for the testing of low-capacity and portable units.

We encourage DOE to re-evaluate their results from relative humidity testing presented in the NOPR. In the NOPR, DOE proposed a relative humidity test condition for ACIMs, citing similar requirements in the industry test standards for other refrigeration equipment (e.g., commercial refrigerators, freezers and refrigerator-freezers and refrigerated bottled or canned beverage vending machines). However, we understand that ACIMs may respond very differently than these other refrigerated products to the humidity of ambient air due to the localized humidity regime that is created in the vicinity of the evaporator where moisture is sprayed to wet the surface during icemaking. We understand that today, ACIM test chambers generally do not control the relative humidity of ambient air.¹

In DOE's investigation of the impact of relative humidity on three ACIM units, it determined that one batch-type unit consumed 35% more energy when the relative humidity of the ambient air was 75% than when tested at 35% relative humidity. We encourage DOE to confirm the validity of the test results presented in the NOPR and/or conduct additional relative humidity testing. If the large difference for some units is confirmed, it suggests the need to establish relative humidity requirements to ensure the

¹ <https://www.regulations.gov/document/EERE-2017-BT-TP-0006-0012>. p. 30.

reproducibility of the test procedures. However, should DOE pursue a relative humidity test condition, we encourage the Department to investigate a more representative relative humidity condition than the proposed 35%. At the DOE public meeting, AHRI commented that a relative humidity of 35% was too low for a commercial kitchen, and two manufacturers commented that 35% was not a representative relative humidity for ACIM installations.²

We support DOE's proposal to introduce a water hardness requirement to improve the reproducibility of the test procedure. In the NOPR, DOE presented data that showed that the measured energy consumption of ACIMs can vary significantly with water hardness. Specifically, DOE found that the measured energy consumption of units tested with hard water was up to 10% lower than when tested with soft water. Since the hardness of tap water varies throughout the U.S., DOE's proposal to establish a water hardness condition will likely increase the reproducibility of the test procedure. We therefore support DOE's proposal to establish a maximum water hardness for testing of 180 mg/L, which will exclude very hard water.

We encourage DOE to consider adopting provisions related to additional purge water cycles. In the NOPR, DOE proposed not to capture the energy and water use of purge cycles, citing the small impact on overall energy and water usage it determined from testing. However, we are concerned that DOE may have underestimated the frequency of purge cycles. For example, DOE tested a batch-type ACIM in which the default purge setting caused a purge every 5 hours (which coincided with the start of a harvest, resulting in no separate purge cycle). However, we understand that for batch-type ACIMs, the purge water setting used in the field may differ from that in the manufacturer's instructions or default settings, and may be set such that a separate purge cycle occurs as frequently as every batch cycle.³ We therefore encourage DOE to investigate how the purge cycle settings in field installations may differ from the manufacturer default settings for ACIMs and to consider capturing the purge cycle energy in the test procedures.

We encourage DOE to measure standby power consumption in the test procedures. We understand that the standby power associated with powered controls outside of active icemaking can be around 25-50 kWh per year.⁴ In the 2015 Final Rule TSD for ACIM standards, DOE assumed a utilization factor (i.e., the percent of time the ice maker is actively producing ice) of 42%, and assumed the unit was in standby mode 58% of the time.⁵ DOE stated that the utilization factor was based on data provided by manufacturers and a field study. However, despite the available information cited in the 2015 standards rulemaking, in the current NOPR, DOE cites insufficient information as a reason not to amend the test procedures to capture standby power. We encourage DOE to capture standby energy use in the test procedure, which will improve representativeness by more fully capturing the total energy consumption of ACIMs.

We urge DOE to include the energy use associated with ice storage in the test procedures. The operation of ice makers includes replacement cycles (i.e., when additional ice is produced to replenish the storage bin due to ice melt). The effectiveness of the storage bin at keeping the stored ice cold (i.e., slowing the melt) drives the frequency of the replacement cycles, and thus impacts the energy

² <https://www.regulations.gov/document/EERE-2017-BT-TP-0006-0012>. p. 28, 29, and 32.

³ <https://www.regulations.gov/document/EERE-2017-BT-TP-0006-0012>. p. 48.

⁴ We understand that the typical standby power of ACIMs is in the range of 5-10 Watts. For the 2015 final rule for ACIM standards, DOE assumed that ACIMs are in standby mode 58% of the time.

⁵ <https://www.regulations.gov/document/EERE-2010-BT-STD-0037-0136>. p. 8-11.

consumed over a period of time, such as a day or a year. DOE previously found that the energy use associated with replacement of melted ice from ice storage bins ranged from 30 to 75% of total ice maker energy consumption.⁶

We urge DOE to capture the energy use associated with ice storage due to ice replacement cycles in the test procedures for self-contained units (SCU), which include an integrated storage bin, as well as for ice-making heads (IMH) and remote-condensing units (RCU).⁷ In the 2014 miscellaneous refrigeration products (MREF) test procedures NOPR, DOE proposed a test procedure that included a measurement of both the energy consumed during active ice production and the energy use associated with replenishing the ice supply to replace melted ice during ice storage.⁸ For SCUs, we encourage DOE to investigate the appropriateness of a procedure similar to the one it proposed for ice makers in the MREF test procedures rulemaking.

For IMHs and RCUs, we encourage DOE to consider an approach that could involve establishing default values that represent the energy use associated with ice replacement. The melt rates associated with the least-efficient storage bins on the market could be used to determine the extent of replacement cycle operation during a fixed period, such as 24 hours. The default value of replacement cycle energy would take the form of an adder to measured energy consumption in the normal icemaking cycle. A manufacturer could then choose to either use the default value or, if they wanted to demonstrate improved storage bin effectiveness, they could conduct a similar test to that used for SCUs. Specifically, DOE notes in the NOPR that many IMH and RCU models are advertised as compatible with a list of specific bins. We believe that it could make sense in these cases for the manufacturer to test with the least-efficient storage bin of those advertised in their literature. If no bin is specified, the manufacturer would instead use the default values.

We encourage DOE to require testing and reporting of potable water use. In the NOPR, DOE is proposing a voluntary method for measuring potable water use. We understand that manufacturers are already measuring potable water use as part of the ENERGY STAR and AHRI certification and programs. While most ACIM models in the AHRI directory meet the ENERGY STAR potable water use requirements, the three highest water-consuming models consume 120%, 97%, and 72% more potable water than the ENERGY STAR requirements.⁹ We encourage DOE to require that potable water use be measured and reported, which would ensure that information about the potable water use of all ice maker models is available to purchasers so that they can make informed decisions.

Thank you for considering these comments.

⁶ <https://www.energy.gov/sites/prod/files/2017/12/f46/acim2-tp-rfi.pdf>. p. 29-30.

⁷ While most ACIM SCU models on the market have uncooled storage bins, some low-capacity ACIMs have cooled storage. For cooled storage bins, energy will be consumed by the compressor during the refrigeration cycle in ice storage mode. To reflect the difference in how these units operate, DOE proposed slightly different test procedures for models with cooled storage bins and those with uncooled storage bins in the December 2014 MREF test procedures NOPR. We believe that it would make sense for DOE to take a similar approach here.

⁸ <https://www.regulations.gov/document/EERE-2013-BT-TP-0029-0011>. p. 74921.

⁹ <https://www.ahridirectory.org/NewSearch?programId=31&searchTypeld=3>. Accessed 2-10-2022.

Sincerely,



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