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

February 18, 2022

Mr. Jeremy Dommu
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Building Technologies Office, EE-2J
1000 Independence Avenue SW
Washington, DC 20585

RE: Docket Number EERE-2016-BT-TP-0033: Proposed Rule for Test Procedures for Circulator Pumps

Dear Mr. Dommu:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), American Council for an Energy-Efficient Economy (ACEEE), and the Natural Resources Defense Council (NRDC) on the notice of proposed rulemaking (NOPR) for test procedures for circulator pumps. 86 Fed. Reg. 72096 (December 20, 2021). We appreciate the opportunity to provide input to the Department.

We are pleased DOE has published this NOPR and urge the Department to move quickly to publish a final rule for circulator pump test procedures. As discussed in the NOPR, ASRAC approved two term sheets from the circulator pumps working group (CPWG) in late 2016 with consensus recommendations regarding scope, metric, test procedures, energy conservation standards, and labeling and certification requirements for circulator pumps.[1] After many years of delay, we are pleased that DOE is advancing the process to adopt test procedures based on the CPWG recommendations. We support the CPWG recommendations along with the changes proposed in the NOPR, consistent with HI 41.5-2021, that were based on stakeholder feedback in response to the May 2021 request for information (RFI).

Specifically, we support the proposed update relating to pressure and manual control system test points; the inclusion of both user-adjustable and adaptive pressure controls and their proposed test methodologies; and the inclusion of on-demand controls. Further, we encourage DOE to consider requiring reporting of ratings representing the most consumptive control method. We discuss each of these items in more detail in the following sections.

Briefly, we also highlight that we also support, consistent with the CPWG recommendations:

- Exclusion of header pumps (pumps for which there is no matching volute available)
- Use of unique test point weights for different control types
- Testing of temperature controls as recommended by the CPWG
- Testing manual controls with test point weightings as recommended by the CPWG and using updated testing methodology consistent with HI 41.5-2021

[1] 86 Fed. Reg. 72098.

We support the proposed update, consistent with HI 41.5-2021, relating to pressure and manual speed control system test points. The ASRAC CPWG term sheet was developed into a voluntary labeling program built around HI 41.5-2018. The CPWG recommendations included a requirement that all test points on a control curve be above the reference system curve for pressure and manual controls. We understand that, as explained in comments by the CA IOUs[2] and HI,[3] experiences since show unintended challenges of testing constant pressure, proportional pressure, and manual controls with this methodology. Many circulator pumps with these control systems may operate at head pressures below the reference curve as provided in the HI 41.5-2018 method at one or more measurement points. Thus, many programmed control curves are not testable under this older methodology.

In contrast, HI 41.5-2021 does not require all test points on a control curve to be above the reference curve for pressure and manual speed controls.[4] HI 41.5-2021 instead stipulates that the minimum system control test point head pressure should be at least 25% of the best efficiency point (BEP) head pressure and that at least one control test point must have flow exceeding BEP flow. DOE is proposing to adopt this revised test method for constant pressure, proportional pressure, and manual controls, where power consumption at a given test point (e.g., below the reference system curve) is adjusted back to the reference curve. We understand that this power correction, which assumes a constant pump efficiency, is valid and does not give an arbitrary advantage to products using this assumption.[5] We support this change as we believe it will improve representativeness.

We support inclusion of adaptive pressure controls into the circulator pumps test procedure. DOE proposes to define adaptive pressure controls as "a pressure control that continuously senses the head requirements in the system in which it is installed and adjusts the control curve of the pump accordingly." These controls are unique in that there is a control area in which the pump can operate rather than a defined control curve. The NOPR, consistent with HI 41.5-2021, specifies that each test point for adaptive pressure controls must be at either the minimum head threshold specified in the manufacturer literature or the head values specified by the reference system curve, whichever is greater. Further, consistent with the CPWG, the NOPR requires that the minimum head thresholds must be documented in the manufacturer literature and be accessible based on the capabilities of the control. While we encourage DOE in the future to gather field data for adaptive pressure controls and their real-world operating points, we support this test methodology as a reasonable approach for testing these adaptive pressure control systems.

We support DOE's approach to testing user-adjustable pressure controls. The NOPR discusses that some circulator pumps are equipped with user-adjustable pressure controls where the maximum and minimum control curve head values can be set to match the system. DOE's interpretation of HI 41.5-2021 is that these controls are not addressed in the industry standard.[6] DOE is thus proposing that the head values on user-adjustable pressure controls may be adjusted to a maximum head value at the

[2]EERE-2016-BT-STD-0004-0116, www.regulations.gov/comment/EERE-2016-BT-STD-0004-0116
[3]EERE-2016-BT-STD-0004-0112, www.regulations.gov/comment/EERE-2016-BT-STD-0004-0112
[4]HI 41.5-2021, Program Guideline for Circulator Pump Energy Rating Program, p. 9, 14. estore.pumps.org/mobile/CirculatorProgramGuide.aspx
[5]Pump efficiency increases with increasing head pressure for a given flow. Thus, using the lower efficiency based on the test point below the reference curve will result in overestimated power consumption when adjusted up to the reference curve. This should ensure products do not gain an arbitrary power advantage from this adjustment.
[6]86 Fed. Reg. 72112.

pump's BEP and a minimum head pressure equivalent to 20% of the BEP head; this is consistent with the static offset of the proposed reference system curve. In other words, DOE is proposing to allow a one-time manual adjustment of the maximum and/or minimum control curve head values with all subsequent test points taken along this adjusted control curve. Importantly, DOE states that these settings can only be adjusted for testing if they are adjustable by the user; this would prevent testing of specifically tuned control options that are not representative. We believe this approach is reasonable and support DOE's inclusion of user-adjustable pressure controls and the proposed test methodology.

We support inclusion of on-demand controls and encourage DOE to consider ways of fostering their adoption in appropriate applications. On-demand controls are different from the other control systems discussed in the NOPR in that they reduce circulator pump run-time rather than speed. DOE is not proposing to exclude on-demand circulator pumps,[7] consistent with CPWG recommendations, from the scope of the test procedure; however, the energy savings benefits of reduced run time would not be directly captured by the test procedure. The idea of a CEI rating credit was discussed in RFI comments submitted by NEEA.[8] On-demand controls have the potential to reduce energy consumption in hot water recirculation applications. Thus, we encourage DOE to consider options to promote the adoption of on-demand controls that reduce energy consumption by reducing circulator pump run-time.

We encourage DOE to consider requiring reporting of ratings associated with the most consumptive control method. HI 41.5-2021 specifies rating the most-consumptive and least-consumptive of the control curves that are available on a circulator pump as shipped. Alternatively, the CPWG made a specific recommendation only for pressure controls, where it was determined that a manufacturer should be able to choose the tested control curve (e.g., when multiple options are available), but should report the control curve used and method of adjustment. Consistent with the CPWG, DOE is proposing to allow manufacturers to select the control variety used for testing if multiple control varieties are available on the circulator pump. When given the option to choose a control variety for rating, it is expected that most manufacturers would choose the least consumptive control curve. Thus, in practicality there is expected to be little difference between "manufacturer-selected" and the "least-consumptive" control method. Concurrently, requiring additional reporting of ratings representing the "most-consumptive" control method may encourage adoption of energy efficient options and would better inform purchasers. Thus, we encourage DOE to consider requiring that manufacturers additionally report ratings of circulator pumps at the "most consumptive" control setting.

Thank you for considering these comments.

Sincerely,

Jeremy Dunklin, PhD
Technical Advocacy Associate
Appliance Standards Awareness Project

Amber Wood
Director, Buildings Program
American Council for an Energy-Efficient Economy

[7] 86 Fed. Reg. 72104.
[8] EERE-2016-BT-STD-0004-0115, www.regulations.gov/comment/EERE-2016-BT-STD-0004-0115

Joe Vukovich
Energy Efficiency Advocate
Natural Resources Defense Council