January 9, 2024

Mr. Steve Leybourn
U.S. Environmental Protection Agency
Office of Air and Radiation
12000 Pennsylvania Avenue, NW
Washington, DC 20460

Topic: Draft 1 Test Method to Determine Room Air Conditioner Heating Mode Performance

Dear Mr. Leybourn:

This letter comprises the comments of the Pacific Gas and Electric Company (PG&E), San Diego Gas and Electric (SDG&E), and Southern California Edison (SCE), collectively referred to herein as the California Investor-Owned Utilities (CA IOUs), in response to the United States (U.S.) Environmental Protection Agency (EPA) Draft 1 Test Method to Determine Room Air Conditioner Heating Mode Performance.

The CA IOUs comprise some of the largest utility companies in the nation, serving over 32 million customers in the Western U.S. We are committed to helping customers reduce energy costs and consumption while striving to meet their evolving needs and expectations. Therefore, we advocate for specifications and test methods that accurately reflect the climate and conditions of our respective service areas.

We respectfully submit the following comments to EPA:

1. **The CA IOUs suggest standby power be included in the test procedure and integrated into the Heating Energy Efficiency Ratio.**

In the draft, the EPA notes that U.S. Department of Energy's (DOE) test procedure for Room Air Conditioners (RAC) cooling efficiency includes an account for standby power. However, EPA has not proposed any measurement of standby or off-mode power for heating. EPA asks if the standby power accounted for in the RAC cooling efficiency test procedure is sufficient.

Section 5.1 of DOE's RAC cooling efficiency test procedure assumes the RAC connects to power for only 5,865 hours annually.[1] However, once installed, Cool-Climate Room Heat Pumps (RHP) and Cold-Climate RHP will be powered year-round, leaving an unaccounted-for 2,895 hours. These Cool RHP and Cold RHP

[1]U.S. Department of Energy, "Appendix F to Subpart B of Part 430, Title 10 -- Uniform Test Method for Measuring the Energy Consumption of Room Air Conditioners," Code of Federal Regulations (CFR), December 28, 2023, https://www.ecfr.gov/current/title-10/chapter-II/subchapter-D/part-430/subpart-B/appendix-Appendix%20F%20to%20Subpart%20B%20of%20Part%20430. The test procedure assumes 5,115 hours on off-mode or standby and 750 hours of cooling operation.

will include crankcase heating and likely have drain pan heaters and powered defrost meltwater removal devices.

We recommend EPA incorporate a standby power measurement into the Heating Energy Efficiency Ratio (HEER) similar to Appendix G in the draft of AHRI Standard 1600 Performance Rating of Unitary Air-source Air Conditioner & Heat Pump Equipment (AHRI 1600), with the exception that the unit tests in standby-mode rather off-mode.[2] We also suggest integrating the measured power into HEER as it is in AHRI 1600.

2. **The CA IOUs support the inclusion of definitions for mild, cool, and cold-climate heat pumps.**

Most utilities use the ENERGY STAR® designation to create program criteria. Differentiating the levels of operation for cold weather would enable the customization of programs to suit the climate they serve.

3. **The CA IOUs urge EPA to consider defrost meltwater handling requirements and include them in the test procedure.**

The outdoor draining of the defrost meltwater during freezing weather is not feasible for multi-family installations. Challenges in water disposal may lead users to operate the RHP exclusively under non-frosting conditions. The CA IOUs believe the proper handling of meltwater should be a part of the specification and the test procedure.

Several methods exist to collect and dispose of meltwater:

- A gravity drain to a separate collector or a nearby drain.
- A removable or separate tank with an overflow switch that the user must empty.
- A pump that sends the water to a nearby drain.
- An internal device that sprays the water onto the indoor coil, where it evaporates into the occupied space.

We propose prohibiting gravity drain, given that only a few installations will likely have a suitable drain for this approach. Draining into a bucket poses an overflow risk and could cause substantial damage.

For units equipped with removable or separate tanks and an overflow switch, the specification should stipulate a size that not only prevents emptying the tank from becoming burdensome for the user but also accommodates the meltwater produced during twenty-four hours of operation. The H_2 test can demonstrate this by quantifying the condensate collected during the defrost cycles, and a persistent audible alarm should sound when the tank reaches capacity.

For units equipped with a pump that necessitates routing to a drain, the external packaging should inform the purchaser of this requirement.

During all tests, the condensate disposal system must be active to capture the power consumption. For tankless systems, the H_2 test should prove that the subsequent heating cycle can effectively manage the meltwater. As it would be challenging to ascertain if the drain pan is empty, we believe showing that the pump or sprayer stopped operation during the heating cycle is sufficient.

[2] AHRI 1600 is not currently publicly available. It has been previously released for public comment and will likely be published soon. We believe AHRI would share the text with EPA if requested.

Systems that spray water onto the coil should exclude the added latent heat from the heating capacity. While we recognize that some consumers might perceive the humidification of the space as a benefit, this is not the equipment's primary function.

Finally, for units without a provided drain pan heater, we suggest that EPA mandate an additional defrost operational test under freezing conditions to demonstrate that water will not solidify in the drain pan.

4. **The CA IOUs recommend that EPA provide design requirements for integrated supplemental heat to minimize its use.**

In preparation for DOE's test procedure updates, the CA IOUs tested several Packaged Terminal Heat Pumps (PTAC) at a qualified third-party laboratory.[3] In addition to steady-state performance testing, we examined the behavior of resistance heating. We found that resistance heating was used to quickly satisfy a setpoint change. We believe this type of control strategy is likely an attempt to ensure the comfort of hotel guests. Furthermore, in no case did the compressor and electric resistance heat operate simultaneously. Therefore, we encourage the EPA to include the following design requirements:

> *Electric resistance heat shall not operate for thirty minutes after an increase of the setpoint.*
>
> We found that some equipment switches to electric resistance heating when a thermostat set point increases by a few degrees. Residential users typically lower the set point by several degrees when the space is unoccupied and raise it upon return. However, their energy consumption will significantly increase if this action automatically initiates resistance heating. Therefore, we propose electric resistance heating shall not activate less than thirty minutes after an increase in the set point.
>
> *Electric resistance heating shall not be used to achieve a set point if the compressor can be operated and the temperature in the space is not more than 4^{o}F from the set point.*
>
> Our testing identified at least one unit that did not initiate compressor operation at the cut-in temperature until the space reached the set point. While this approach maximizes comfort, it increases energy consumption. We also recognize rare cases where the space cools rapidly. Therefore, we suggest that electric resistance heating should not be permitted to operate when the compressor can function unless the space exceeds 4^{o}F below the set point.
>
> *Controls shall not allow the unit to operate exclusively with electric resistance heating unless the refrigeration system is inoperable.*
>
> Although we are unaware of any products that allow the user to turn off the compressor and use only electric resistance heat, we suggest prohibiting the provision of controls that disable the compressor.

5. **The CA IOUs believe an optional H_2 test for heat pumps that do not have active defrost would not adequately measure the power consumption for heating the space.**

[3] These units did not have active defrost.

We recognize the inherent value in permitting RHPs without active defrost to operate during frosting conditions and utilizing the outdoor fan for defrosting. However, the defrost periods will inevitably be lengthy. Supplemental heat is necessary in nearly all cases to provide user comfort. The H_2 test does not account for supplemental heat, so it does not include the total energy required to heat the space.

6. **When the RHP provides a setting for the minimum outdoor air temperature operation, we suggest that EPA limit this temperature to no more than 30^{o}F and require the default temperature to be no more than 17^{o}F.**

In most installations, the RHP will share the space with a primary heating source. Many thermostat manufacturers provide the capability to discontinue heat pump operation below a user-adjustable temperature and switch to another form of heating. It is reasonable to assume some RHP manufacturers will offer the same option.

To ensure that consumers get the expected energy and cost savings from the RHP, we recommend that when there is an option for a minimum operation temperature, the following requirements are confirmed as part of the test procedure:

- The minimum operation temperature cannot be more than 30^{o}F.
- The default value should be no more than 17^{o}F.
- Minimum operation temperature should not be enabled by default.

The CA IOUs appreciate the opportunity to provide these comments regarding the Draft 1 Test Method to Determine Room Air Conditioner Heating Mode Performance. We thank the EPA for its consideration. We look forward to the next steps in the process.

Sincerely,

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