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September 21, 2018

Ms. Abigail Daken
Manager, ENERGY STAR HVAC Program
United States Environmental Protection Agency
Washington, DC 20460
(Sent via email to cacashp@energystar.gov)

Re: ENERGY STAR Residential Air Source Heat Pump (ASHP) and Central Air Conditioner (CAC) Equipment Version 6.0 Discussion Guide

Dear Ms. Daken,

The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) and the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) (collectively, the Joint Commenters) are submitting these comments in response to the United States Environmental Protection Agency (EPA) ENERGY STAR Residential Air Source Heat Pump (ASHP) and Central Air Conditioner (CAC) Equipment Version 6.0 Discussion Guide, issued on August 3, 2018.

The Discussion Guide inquired about the inclusion of optional connected criteria in the Residential ASHP and CAC specification. To the extent that the EPA pursues this route, AHRI and HRAI urge the EPA to consider following characteristics of connected, or “smart” systems. Smart systems should be:

- Capable of receiving, interpreting and acting on external signals;
- Adjusting operation according to preset minimum performance standards depending on the external signal’s requirements;
- Communicating relevant information back to the utility;
- Easy for consumers to activate and provide audio or visual alerts and information to consumers.

A smart system should encourage interoperability between equipment and utilities, and possibly other entities, so that each system can be used on all utilities’ grids.

The Discussion Guide also indicated that that it intends to build on the work that has already gone into the development of AHRI Standard 1380P, *Demand Response through Variable Capacity HVAC Equipment in Residential and Small Commercial Applications*. Along with EPA’s contribution, this standard has benefitted from the participation of Consortium for Energy

Efficiency (CEE), Electric Power Research Institute, Inc. (EPRI) and other utilities. The standard establishes requirements for variable capacity HVAC systems 65,000 Btu/hr and less that support demand response (DR) strategies that predictably benefit the electric grid. AHRI Standard 1380P promotes consumer participation by facilitating price response or similar incentive programs offered by electric utilities or related entities. It standardizes communication and equipment functionality as they relate to energy management strategies for variable capacity unitary DR-Ready HVAC systems, including two-stage products, installed in residential and small commercial applications. The standard provides two communication protocols for broad utility adoption. Equipment will respond to signals for general and critical curtailments. These shed requests for cooling direct the system to curtail energy consumption, limiting input power to a maximum of 70% and 40% of the rated load power. Similar signals are included for curtailing power in heating mode as well. . Utilities will be able to schedule events in advance and turn off during grid emergencies. Consumers will be able to configure equipment to respond automatically to utility peak load price signals.

AHRI committees are in the approvals process for AHRI 1380P. Therefore, a draft has not been included with these comments; however, once the standard is distributed for ANSI review, AHRI will notify EPA.

AHRI and HRAI request that EPA abstain from make any formal decisions about including optional connected criteria until AHRI Standard 1380P is final. As the EPA is aware, stakeholders have already accomplished much of the substantive work on the standard, but to ensure harmony across industry standards and EPA specifications, the Joint Commenters request that EPA permit AHRI to finalize the standard before making a determination about specifications.

Once the standard is finalized, hopefully later this year, it will be publicly available, at no cost, on AHRI's website. At that time, we request EPA reopen this Discussion Draft so that other stakeholders have the opportunity to review the standard referenced in the discussion draft and provide feedback to EPA's questions. For EPA and other interested stakeholders' information, the standard was based on a white paper, developed by AHRI's Smart or Connected Equipment Ad Hoc Committee, and is publicly available here: <http://www.ahrinet.org/Policy/Regulatory/Smart-or-Connected-Equipment>.

Variable Capacity

The Discussion Guide identified variable capacity equipment as the “biggest current and upcoming opportunity in CAC/ASHP efficiency and performance.” EPA is interested in examining the CAC/ASHP specification to address market trends toward two-stage and variable speed equipment. The Joint Commenters agree that variable capacity HVAC systems afford the capability to provide greater peak load reduction than traditional single-capacity systems (for the same reduction in cooling). Indeed, computer simulations, validated by EPRI testing, show approximately 43-percent reduction in power consumption for a 25-percent cooling reduction for a variable speed system compared to 25-percent reduction in power for the same cooling reduction for a comparable fixed speed system. AHRI provides the following responses to EPA's specific questions raised in the Discussion Guideline below:

Regionally-Specific Performance Requirements

The Joint Commenters do not support proliferation of regional-specific performance requirements and strongly recommends that the EPA not proceed with regional requirements. Manufacturers discourage regional specifications because it makes harmonizing between ENERGY STAR and other energy efficiency specifications difficult and may reduce participation in the program.

EPA has posed an interesting series of questions regarding Energy Efficiency Ratio (EER) and the metric's relationship to seasonal efficiency. EER is calculated using a constant outside temperature of 95 degrees, a constant inside temperature of 80 degrees dry-bulb, 67 degrees wet-bulb, and a humidity level of 51-percent. This metric is not used to predict seasonal efficiency as no seasonal changes are taken into account. Seasonal Energy Efficiency Ratio (SEER) is the primary metric as it represents the ratio of the cooling output of an HVAC unit over a typical cooling season, divided by the energy consumed. AHRI and HRAI do not support using EER as the main performance indicator, particularly outside the U.S. Southwest region.

The Joint Commenters understand the need for utilities to control peak load. While every utility is somewhat different, Southern California Edison has presented charts illustrating a 57-percent increase in peak load growth between summer of 2002 and 2006.¹ The utility estimated that 60-percent of the peak load results from air-conditioning. Increasing energy efficiency has partially offset growth in base utility load even as this region's population grew substantially, but peak demand continued to grow. Responsive variable capacity air-conditioning would be useful in utility demand-response and price-response programs to address peak load problems that simply increasing EER will not adequately address. Manufacturers have been seeing two-stage and variable speed load control requirements for incentives more frequently, which suggests this strategy is more widespread than incentivizing high EER systems.

The purpose of ENERGY STAR programs are to provide consumers and businesses with simple, credible, and unbiased information to make purchasing decisions for cost-saving energy efficiency solutions. While EER is of interest to utilities in the U.S. Southwest region, it is not relevant to the consumer.

AHRI and HRAI do not believe that a regional specification is required for heat pumps specifically intended for cold climates. A heat pump with a high Heating Seasonal Performance Factor (HSPF) should be adequate for consumers. Further, AHRI 210/240-2017 *Performance Rating of Unitary Air-conditioning & Air-source Heat Pump Equipment* (AHRI 210/240) includes a procedure for an optional low ambient maximum speed test at 5 degrees or at low cut-off temperature for variable speed heat pumps. If the manufacturer chooses to perform the low ambient max speed test, the heating performance would be determined based on an interpolation between the 17 and 5 degree test points (or other low ambient test point at the cut-off temperature) instead of calculating heating performance for ambient

¹ DOE workshop, Southern California Edison, 4/22/2008

temperatures 12 degrees and lower using an extrapolation between the 17 and 47 degrees test points. This optional test impacts the HSPF, reaffirming the applicability of the metric to all heat pumps.

The cold climate test was included as optional low ambient maximum speed test at 5 degrees or at low cut-off temperature in AHRI 210/240 and the Federal test procedure to recognize the reality of constraints on third party testing capabilities. While there are many proponents of cold-climate testing, there are few laboratories that can actually test below 5 degrees.

Optional Connected/Grid-aware Criteria

We agree that it reasonable for products with demand-response capability to have lower EER requirements as there is a clear value for the consumer. Utility programs incentivize participation monetarily and receive a reduction in peak load power draw on the grid.

Many stakeholders have worked to develop AHRI 1380P. We expect that when the standard is finalized it should provide adequate demand responsiveness criteria for utilities to implement programs, and for EPA to include in ENERGY STAR specifications. Again, AHRI requests that EPA reopen the discussion draft when AHRI 1380P is published so that others have the opportunity to review the standard and respond to this question.

Connectivity provides CAC/ASHP consumers with value, beyond grid value, as these products have advanced diagnostic and setup capabilities. Quality installation offers significant energy and financial savings over the lifetime of the product. The ability to diagnose and quickly troubleshoot problems reduces downtime and may also reduce repair cost. AHRI acknowledges diagnostics is currently on the “most efficient” specification and recommends it remain there.

Connectivity for products intended to work with a proprietary controller that is not part of the unit itself, but instead takes the place of a thermostat differently from an OEM controller does not necessarily need to be considered differently from products with the controller built-in, or within the manufacturer’s cloud. The ratings of the product are independent of controller and AHRI 1380P is agnostic regarding controller location.

Energy Efficiency Metrics

AHRI and HRAI members’ believe that Energy Star requirements in the US and Canada should be harmonized to the extent possible and therefore we offer the following recommendations specific to metrics:

We support EPA using the new metrics (SEER2, EER2, and HSPF2) that DOE requires for representations after January 1, 2023 for Version 6.0 and that the specification become effective on the same date. It took about two years to develop Version 5.0. Version 6.0 contemplates more complex proposals, including connectivity and transitioning to new metrics. Additional time will be required to properly implement these features and establish new levels. AHRI is concerned that providing levels parallel requirements using the new metrics would be confusing to consumers. There is not currently enough data to establish

levels using the new metrics, and production lines will need to be redesigned between now and the new standards coming into force in the US. Another challenge to establishing dual metrics is that Canada has not announced an amendment to determine if and when SEER2, EER2 and HSPF2 would be adopted.

AHRI and HRAI recommends that EPA establish levels using SEER, EER, and HSPF for all equipment manufactured prior to January 1, 2023. Testing should be conducted once new product is released and rated to the new metric to determine ENERGY STAR levels. These should be applied to all equipment manufactured on or after January 1, 2023.

We appreciate the opportunity to provide these comments. If you have any questions regarding this submission, please do not hesitate to contact Laura Petrillo-Groh, lpetrillo-groh@ahrinet.org.

Sincerely,

Sandy MacLeod



HRAI
President and CEO

Laura Petrillo-Groh



AHRI
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