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May 23, 2019

Ms. Abigail Daken
U.S. Environmental Protection Agency
Office of Air and Radiation
1200 Pennsylvania Avenue NW
Mail Code: 6202A
Washington, DC 20460

Re: ENERGY STAR Program Requirements, Product Specification for Air Source Heat Pump and Central Air Conditioner Equipment, Eligibility Criteria, Draft 1, Version 6.0

Dear Ms. Daken:

Ingersoll Rand Residential HVAC, manufacturer of Trane, American Standard, and Ameristar residential heating and air conditioning products, appreciates the opportunity to comment on the Environmental Protection Agency's (EPA or the Agency) Draft ENERGY STAR Product Specification for Air Source Heat Pump and Central Air Conditioner Equipment, Version 6.0 (draft specification criteria), published by the Agency on April 23, 2019. Ingersoll Rand products covered by this specification are assembled at our facilities in Columbia, SC, Lynn Haven, FL, Trenton, NJ, Tyler, TX, and Waco, TX.

Ingersoll Rand (NYSE:IR) advances the quality of life by creating and sustaining safe, comfortable and efficient environments. Our people and our family of brands—including Club Car, Ingersoll Rand, Thermo King, and Trane,—work together to enhance the quality and comfort of air in homes and buildings; transport and protect food and perishables; and increase industrial productivity and efficiency. In 2014, we announced a roadmap to increase energy efficiency and reduce the environmental impact of our product portfolio and in our own operations, which will result in the avoidance of 20.85 million metric tons of CO₂e globally by 2020.

Ingersoll Rand has reviewed the draft specification criteria and is in general support for EPA's proposal to increase the stringency of energy efficiency requirements for ENERGY STAR certification. However, there are certain proposals – notably those which establish prescriptive requirements without necessarily addressing energy performance and the addition of new test conditions – that we urge EPA to reconsider. It is important to consider the level of design activity that the industry is about to undertake to meet the upcoming changes to the U.S. Department of Energy (DOE) appliance standards for central air conditioners and heat pumps which take effect in 2023 as well as introduce new low GWP refrigerants for this equipment in response to state regulation. Any changes to the ENERGY STAR criteria that occur between now and 2023 needs to minimize the testing burden on manufacturers.

We elaborate on our comments by addressing EPA's specific requests for feedback below.



Definition of COP and use of the metric @ 5°F when defining Cold Climate Heat Pumps

Ingersoll Rand supports the use of Coefficient of Performance (COP) @ 5°F to define and evaluate the performance of a heat pump in cold climates. This metric is already incorporated in the Northeast Energy Efficiency Partnerships (NEEP) Cold Climate Heat Pump specification, and is widely used by utilities for cold climate heat pump incentive programs. We currently use the Alternative Efficiency Determination Method (AEDM) for DOE ratings to determine performance at 5°F. We recommend that this be an alternative method that for determining ENERGY STAR ratings.

There are a number of issues with requiring testing to establish the 5°F rating. First, the proposal is to use the DOE test method from the M1 appendix. This is not yet an official test condition, and it is run at a different external static pressure than what is used in Appendix M for all of the other conditions. Thus not only would this require all ENERGY STAR models to be re-tested at a great burden to the manufacturers, it would result in a 4% to 5% lower COP at 5°F than would be measured using the static pressure specified in Appendix M.

Climate-differentiated Specification and Label

Ingersoll Rand supports EPA's proposal to set separate specifications for Cold Climate Heat Pumps and Moderate/Hot Climate Heat Pumps. We agree that there are distinct operating conditions in cold climates under which heat pumps should be optimized, and separate specifications will help customers identify a heat pump which is more appropriate for their space heating needs. As heat pump technologies continue to advance, the separate ENERGY STAR specifications allow manufacturers to design equipment optimized for either operating conditions, and differentiate between the two in the marketplace.

Additionally, we support EPA's proposal to qualify a Cold Climate Heat Pump based on performance criteria for use in any geographic location, as opposed to a "regional" specification as is used with furnaces. Unlike furnaces, heat pump performance is dependent on the outdoor ambient conditions, which can vary significantly within states. EPA's proposal allows the flexibility for the customer to select an ENERGY STAR-certified Cold Climate Heat Pump based on expected operating conditions, as opposed to state boundaries, which will improve the appropriateness of equipment selection.

Energy Efficiency Requirements

Energy Efficiency Criteria

Ingersoll Rand supports EPA's proposed requirements for equipment Seasonal Energy Efficiency Ratio (SEER), Energy Efficiency Ratio (EER), Heating Seasonal Performance Factor (HSPF), and COP @ 5°F. The proposed changes to SEER, EER, and HSPF are a logical progression in energy efficiency requirements given the upcoming changes to the DOE appliance standards for central air conditioners and heat pumps, set to take effect in 2023, and the requirement for 1.75 COP @ 5°F in cold climate applications is consistent with the NEEP Cold Climate Heat Pump Specification, which creates helpful consistency.

However, EPA's proposed changes to SEER, EER, and HSPF should not prescribe how a manufacturer designs equipment to meet these levels. We encourage EPA to remove the prescriptive requirement to use a multi-stage compressor, discussed in the next sub-section.

Staged or Variable Capacity Requirement

As stated above, Ingersoll Rand is opposed to EPA's proposed requirement for staged or variable capacity equipment, and urges EPA to reconsider this prescriptive specification. This requirement will prevent a significant portion of cost-effective Moderate/Hot Climate Heat Pumps, which meet the proposed energy efficiency specifications, from eligibility for ENERGY STAR certification. Ingersoll Rand maintains that this requirement is not justified for several key reasons:

1. The DOE ratings method for AC and HP shows that a single speed AC at 16 SEER uses the same amount of energy as a multi-stage AC rated at 16 SEER.
2. Energy performance of HVAC equipment varies by application on a home-by-home basis. Presently there is no accurate, standardized methodology for testing equipment efficiency other than at the rating points for SEER and HSPF. The only accurate method for estimating performance is through energy modeling and simulation; capturing the benefits of multi-stage equipment may be appropriate through a whole house rating methodology, but will be inconsistent when used for a product standard.
3. Attempting to address equipment sizing by adding prescriptive requirements to a performance standard does not address the core issue, and has consequences elsewhere. EPA has made significant progress in the development of the ENERGY STAR Verified Installation (ESVI) specification, which is an appropriate method to improve equipment sizing, as well as other important factors that a mechanical contractor can address. Our understanding of this initiative is that it is intended to be referenced in incentive programs for high efficiency equipment, as well as in other standards, to drive quality installation, including equipment right-sizing.

As proposed by EPA, the requirement for staged or variable capacity equipment would remove a large portion of single stage central air conditioners and heat pumps from the ENERGY STAR program, despite the fact that they meet the same energy efficiency performance as multi-stage equipment. Where the price premium for multi-stage equipment presents a cost barrier for consumers – notably non-owner occupied and low-income homes – we are concerned this requirement will have the unintended consequence of shifting the market toward less efficient equipment that only meets minimum appliance standards.

Percentage of Heating Capacity @ 5°F and use of M1 H4 test conditions

Ingersoll Rand does not support EPA's proposed requirement for Cold Climate Heat Pumps to provide 80% of its rated heating capacity @ 5°F. Reviewing the NEEP database of qualified Cold Climate Heat Pumps, this requirement would eliminate nearly all of the ducted solutions available on the market today, and force consumers seeking ENERGY STAR certified Cold Climate Heat Pumps into ductless products. This will present a tremendous barrier for high performance homes utilizing ducted systems, as well as in the replacement of boilers and furnaces in homes that already utilize ducted air

conditioning. At the same time this would significantly reduce the number of AC/HP's that would qualify for ENERGY STAR.

Further exploration is necessary to determine whether a rated heating capacity @ 5°F is necessary for inclusion in the ENERGY STAR specification, and if so, what the appropriate rated capacity for ducted systems should be. Given their differences in applications and performance characteristics, it may be appropriate to set separate rated heating capacity @ 5°F requirements for ducted and ductless products.

Ingersoll Rand looks forward to the next draft of version 6 after EPA consideration of the improvements that we recommend above.

Sincerely,

James T. VerShaw

James T. VerShaw
Chief Engineer