Residential HVAC & Supply
6200 Troup Hwy
Tyler, TX 75707
Tel 903-730-4470
jim.vershaw@irco.com

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Ms. Abigail Daken
EPA - ENERGY STAR
1200 Pennsylvania Ave NW
Washington, D.C. 20460
(Sent via email to CAC-ASHP@energystar.gov)

Re: Product Specification for Central Air Conditioner and Heat Pump Equipment--Eligibility Requirements, Draft 2, Version 6.0

Dear Ms. Daken:

Ingersoll Rand appreciates the opportunity to comment on Draft 2, Version 6.0 of Energy Star's Product Specification for Central Air Conditioner and Heat Pump Equipment. Ingersoll Rand (NYSE:IR) advances the quality of life by creating comfortable, sustainable 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. We are a global business committed to a world of sustainable progress and enduring results. To this end, we believe that the ENERGY STAR program for HVAC systems has had value in identifying how homeowners can save energy by choosing ENERGY STAR products. This has been accomplished through 2 levels of energy efficiency and features. The base level saves energy with a reasonable payback to the homeowner, and the most efficient level identifies the systems that are available for those that want a system at the very highest level. The two tier system has resulted in appropriate level of qualifying systems in the ENERGY STAR program.

Version 6.0 Draft 2 abandons this successful approach by moving the efficiency levels to a point where the payback to the homeowner are much too long. Looking at the data package provided, split system paybacks of 11 to 16 years are too long. In particular, the cold climate heat pump was shown to have a 16.2 year payback with an expected life of 16.4 years. Beyond this issue, this draft adds the installation requirements from the most efficient category along with adding a prescriptive requirement on compressors that eliminates single stage systems regardless of efficiency level. Ingersoll Rand believes that this is a mistake that will make the ENERGY STAR program for HVAC essentially meaningless with low participation by manufacturers and drastically reduced sales of ENERGY STAR qualified systems. Our recommendations to remedy these issues are given below.

1. **ENERGY STAR Qualifying Efficiency Levels**

There needs to be two levels for air conditioner and heat pump products in ENEREGY STAR. The base level of ENERGY STAR needs to focus on energy savings. As such, we believe that the base level efficiency levels, using today's metrics, should be:

	SEER	EER	HSPF
Split AC	16.0	13.0	n/a
Split HP	16.0	13.0	9.0
Pack AC/HP	15.0	12.0	8.2

a. There should be *no prescriptive* requirement for multi-staging
b. There should be *no prescriptive* diagnostics.
c. Packaged products levels are unchanged as Federal minimums do not change.
d. These values will have to be cross-walked to the new metrics.

2. Labelling

Product labelling requirements should be eliminated completely. There are several good reasons for not requiring labels.

a. The buyer does not see the product before purchase, so the label cannot aid in the purchase decision. The buyers use product literature, manufacturer web sites, and directories from CEE, ENERGY STAR, and AHRI.

b. The rating applies not to the outdoor unit alone but to the system. Since not every indoor-outdoor match qualifies, there are times when there is a qualified system installed without a label on the outdoor product. This creates confusion for the homeowner.

c. There are products still in inventory and sold after a level change occurs that while they no longer qualify, they are labelled as such.

3. Cold Climate Heat Pump Option

Ingersoll Rand disagrees with the addition of a cold climate option at this time.

a. The values listed are essentially the same as today's most efficient levels. Having little difference between different classifications. This can also create confusion for buyers.

b. The "controls verification procedure" is yet to be defined and the ability for manufacturers to run this unknown test cannot be determined. The ability to make modifications to test rooms and prove capability is time consuming.

c. The same is true for industry capability of getting repeatable data at 5F. There has been no lab to lab qualification at the 5F point, and this needs to be done to ensure the integrity of the data obtained in the AHRI test program.

4. Connected Equipment Option

Ingersoll Rand does see value in a connected equipment ENERGY STAR certification. But there are issues with the proposal in this draft of Version 6.0.

a. The connected requirements need to be based on a recognized standard. That standard should be AHRI 1380 without modifications.

b. We cannot agree to the use of a controls verification procedure without being able to review the procedure.

c. It is not clear how the need for a defrost in heating during a curtailment should be handled. Defrosting is done at high speed and resistance heating is used to minimize cold drafts during defrost. We would recommend that, if needed, a defrost be allowed with resistance heat.

5. Timing

The start of the next levels is proposed to be 01/01/2023. This will impose additional burden on manufacturers who will be scrambling to meet the changes in DOE minimums and test procedures along with introducing new refrigerants to meet proposed California rules. A 07/01/2023 start date would be a better choice.

6. Reduction In Test Burden Is Required

The testing burden imposed by ENERGY STAR needs to be relaxed. Today it is a deterrent to entry into the program, and we believe it has proven to be unnecessary. This will only be more of an issue as we move to more complex systems. It should be noted, and ENERGY STAR can validate that:

a. The AHRI program has sufficient rigor:
   i. No EnergyStar rerates since 2016
   ii. Only a single test first test failure in 2019

b. The verification process doesn't match certification process:
   i. Certification: 90% confidence mean of population is at 95% of rating
   ii. Verification/Enforcement: Mean of 4 tests is within a tolerance determined by the standard deviation of those 4 tests.

c. Enforcement process stops with too few tests
   i. EnergyStar stops at 4
   ii. DOE stops at 21

d. HVAC testing has variability that should be considered
   i. A University of Maryland study (2013) showed an 8% testing uncertainty
   ii. The detailed review of existing methods suggests the alarming potential that even units with relatively consistent performance could fail enforcement requirements, indicating that the current method is inconsistent.
   iii. Measurement uncertainty should be included with any rating and enforcement test results.

Respectfully,

James T VerShaw

James T. VerShaw
Chief Engineer