



ENERGY STAR® Central Air-Conditioner and Air-Source Heat Pump Version 5.0 Specification Framework July, 2013

**Please send comments to CAC-ASHP@energystar.gov
no later than August 02, 2013**

I. Introduction

The ENERGY STAR Central Air-Conditioner and Air-Source Heat Pump (CAC/ASHP) specification was first introduced more than 10 years ago. The current requirements, which went into effect on January 1, 2009, include national ENERGY STAR requirements for Seasonal Energy Efficiency Ratio (SEER), Energy Efficiency Ratio (EER) and/or Heating Seasonal Performance Factor (HSPF) and apply to both ducted and ductless CAC/ASHP products less than or equal to 65,000 Btu/h. CAC/ASHP products that have earned the ENERGY STAR are 15% more efficient than the conventional models.

The U.S. Environmental Protection Agency (EPA) is revisiting the current eligibility criteria in light of the following:

- **New federal regional minimum standards:** Effective January 1, 2015, the new federal minimum standards will be close to and in some cases equal to the current ENERGY STAR CAC/ASHP levels,
- **More than 3 years since revision:** As part of its commitment to ensuring that ENERGY STAR remains a meaningful differentiator of highly efficient products in the market, EPA has committed to reviewing performance specifications at least every three years.

This specification framework document is intended to enable early engagement with interested stakeholders in the specification revision. The purpose of the framework document is to outline key elements of EPA's plan to re-assess the ENERGY STAR Version 4.1 CAC/ASHP performance requirements and describe potential strategies for revisions and updates to the criteria.

EPA will host a stakeholder discussion and webinar on July 22, 2013 that focuses on the information presented in this framework and will also consider all written comments received by August 02, 2013.

II. Qualification Criteria

Regional Specification: DOE has adopted regional minimum standards in the 2011 direct final rule¹ for CAC/ASHP products which will go into effect in 2015. The final rule divides the nation into three regions: Hot Dry (Southwest), Hot Humid (South) and Rest of the Country (North), based on the population-weighted number of heating degree days (HDD). Taking into consideration that the energy savings potential for these product types are dependent on climate factors, EPA is considering creating a regional specification for ENERGY STAR. If a regional approach is adopted, EPA would harmonize the regions with those defined in the DOE final rule to avoid confusion among manufacturers, distributors, contractors and consumers.

¹ <http://www.regulations.gov/#!documentDetail;D=EERE-2011-BT-STD-0011-0058>

EPA recognizes that taking a regional approach would require regionalized labeling of products. Given the complexities associated with a regional certification that might be granted for some but not all condenser combinations, the Agency is looking for low cost, reliable approaches to associating a regional ENERGY STAR label with qualifying models. One idea EPA is considering is possibly requiring the ENERGY STAR regional logo to be displayed on a rating certificate available for download from the manufacturer or their designee, such as a Certification Body. One example of such a certificate is the Air-Conditioning, Heating and Refrigeration Institute (AHRI) Directory certificate. The certificate would include the model numbers of the combination system and the system performance. The certificate would serve as proof to the customer and utilities offering rebates that the installed unit complies with the ENERGY STAR regional requirement. EPA appreciates stakeholder thoughts and feedback on this subject.

Questions for Discussion:

1. What alternative approaches can stakeholders suggest to allow for simplified, reliable labeling of ENERGY STAR certified models under a regional specification?
2. EPA's understanding is that if needed for verification, installers can print out a certificate of performance for a particular combination from the AHRI certified equipment directory for equipment listed there. What do manufacturers, who are not members of AHRI, provide as proof of performance to utilities or consumers for rebates?

Performance Metrics: EPA is looking into additional performance metrics, in recognition that they may enhance the ability to differentiate products when a regional approach is used. Based on discussions with stakeholders, EPA is considering Coefficient of Performance (COP) at 35°F or 17°F and capacity derating at 17°F as a metric for northern regions. Similar to the EER metric used for cooling, the COP metric may be useful for utilities to track peak load performance. EPA notes that the COP metric does not take supplemental heat into account. Thus, the capacity of the ASHP at 17°F may be useful to judge when the unit will provide the heat needed without supplemental heat. EPA requests that stakeholders share any test data or studies relevant to the viability of these metrics for the ENERGY STAR program.

Questions for Discussion:

1. Do utilities use COP and/or capacity at low temperatures to identify ASHPs that are better suited for use in cooler climates?
2. Do manufacturers capture COP data during the testing currently conducted for DOE regulatory metrics?
3. For the northern region, can the HSPF be raised without increasing the SEER?

System status and diagnostics: Research has shown that losses due to low quality installation and maintenance are substantial – 20% - 30% of the total energy used for heating and cooling. Units with auto-diagnostics could address several of the issues that contribute to these losses, such as improper refrigerant charge and low airflow, by sending maintenance alerts to the system controller. These alerts could inform homeowners of required self maintenance actions (e.g., filter change) or contractor actions (e.g., low or incorrect refrigerant charge, high head pressure). There are several high efficiency units that come equipped with controls and diagnostics on the market today. EPA considers diagnostics and communication promising developments that may be appropriate for ENERGY STAR eligibility criteria. EPA is evaluating market readiness for such a requirement.

Questions for Discussion:

1. How prevalent are these technologies in the market today? What are your expectations for near term market evolution in this area?
2. What approximate percentage of your models have two way communication with a system controller?
3. In regard to maintaining energy efficiency, what information is most important to communicate back to the system controller? What is the potential resulting energy efficiency?
4. Are there any product studies or sources of data available on the savings attained by effective system status communications?
5. The National Institute of Science and Technology (NIST)² is working on a Fault Detection and Diagnostics (FDD) program, a standalone software tool that uses a rule-based chart FDD to detect and diagnose common faults such as refrigerant undercharge, overcharge and indoor airflow. How do manufacturers foresee system designs incorporating FDD? How do utilities plan to use FDD?

Supporting Quality Installation: As noted above, quality installation and maintenance, such as those defined in the American National Standards Institute (ANSI) approved Air Conditioning Contractors of America (ACCA) Standard HVAC Quality Installation Specification, are critical to maximizing the savings opportunity offered by efficient HVAC equipment. EPA, along with manufacturers, recognizes the importance of supporting designers and service personnel as they strive to achieve high quality installations. Two possible new requirements are being considered, consistent with this goal:

First, to properly design an air conditioner or heat pump system, the designer must know the capacity of the system at the indoor and outdoor design conditions selected, not just the rated capacity as reported to DOE. Designers commonly use 'Expanded Performance Data' from the manufacturer to determine the capacity of the system at these conditions, however, this data may not always be publically available or in a consistent format. EPA believes that freely accessible Expanded Performance Data, published in a consistent format, and provided for all rated combinations would significantly simplify designers' task of designing the air conditioner or heat pump systems.

Second, according to the ACCA Quality Installation standard, ANSI / ACCA 5 QI – 2010, *HVAC Quality Installation Specification*, which the ENERGY STAR Homes Version 3.0 specification requires, HVAC installers are instructed to measure air flow and/or static pressure at several specific points in the air path. This is generally done by drilling holes in the equipment cabinets immediately after installation. Air flow or pressure measurement probes are then inserted into these holes. EPA believes it would benefit installers, inspectors and manufacturers if equipment were shipped with holes or punch-outs already present, so that all parties are measuring at the same locations. This is based on the supposition that manufacturers have the best insight into the appropriate places for these pressure measurements. EPA is considering including a requirement that such measurement ports or punch-outs be provided. Please see the attached document from the National Comfort Institute as an example of current guidance for placement of pressure measurement holes. EPA anticipates inclusion of similar guidance along with any requirement included in the specification. EPA welcomes feedback on inclusion of this potential requirement.

Blowers: While high efficiency blowers are important energy savers, EPA understands that blower energy is largely captured in SEER ratings, such that combinations that qualify for ENERGY STAR labeling, if they include air handlers, will have modulating fans. Thus, EPA does not anticipate pursuing additional requirements on blowers.

² http://www.nist.gov/manuscript-publication-search.cfm?pub_id=912311

III. Test Methods

The current specification, Version 4.1, refers to ANSI/AHRI 210/240-2008 for SEER and HSPF, and AHRI 210/240-1994 for EER. These references will be updated to refer directly to the Code of Federal Regulations (CFR) for simplicity.

IV. Effective Date

EPA anticipates completing the specification revision process in time for the revised specification to go into effect on January 1, 2015, aligning with the new federal standard.

V. Stakeholder Feedback

Stakeholders are encouraged to provide feedback on the concepts presented in this document and identify other areas for EPA consideration in developing the Version 5.0 specification. Suggestions for improvements to the basic approach outlined in this document will be considered for inclusion in future specification drafts. EPA will host a stakeholder discussion and webinar on July 22, 2013 focused on this framework and will also consider all written comments received by August 02, 2013. In addition, program representatives are available for technical discussions with interested parties at any time during the specification development process. To schedule a discussion please contact Abigail Daken (EPA) at (202)-343-9375 or Daken.Abigail@epa.gov, and Sarah Medepalli (ICF International) at (202)-677-5201 or sarah.medepalli@icfi.com. For test method issues, please contact Lucas Adin (DOE) at (202)-287-1317 or lucas.adin@ee.doe.gov.