



ENERGY STAR® Program Requirements Product Specification for Air Source Heat Pump and Central Air Conditioner Equipment

Eligibility Criteria Draft 1 Version 5.0

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Following is the Draft 1 Version 5.0 product specification for ENERGY STAR qualified central air conditioner and air source heat pump equipment. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

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1) Definitions: Below are the definitions of the relevant terms in this document.

- A. Air-Source Heat Pump (ASHP)²: An air-source unitary heat pump model is a product, which consists of one or more assemblies, powered by single phase electric current, rated below 65,000 Btu per hour, utilizing an indoor conditioning coil, compressor, and refrigerant-to-outdoor air heat exchanger to provide air heating, and may also provide air cooling, dehumidifying, humidifying circulating, and air cleaning.
- B. Central Air Conditioner²: A central air conditioner is a product, which is powered by single phase electric current, air cooled, rated below 65,000 Btu per hour, not contained within the same cabinet as a furnace, the rated capacity of which is above 225,000 Btu per hour, and is a heat pump or a cooling unit only.
- C. Single Package¹: A single package unit is an ASHP or central air conditioner that has all major assemblies enclosed in a single cabinet.
- D. Split System¹: A split system is an ASHP or central air conditioner that has one or more of the major assemblies separated from the others.
- E. Gas/Electric Package Unit: A single package unit with gas heating and electric air conditioning that is often installed on a slab or roof.
- F. Basic Model²: All units of a given type of covered product (or class thereof) manufactured by one manufacturer and which have the same primary energy source and, which have essentially identical electrical, physical, or functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption or water efficiency.
- G. Heating Seasonal Performance Factor (HSPF)¹: HSPF is the total space heating required during the space heating season, expressed in Btu, divided by the total electrical energy consumed by the heat pump system during the same season, expressed in watt-hours.
- H. Seasonal Energy Efficiency Ratio (SEER)¹: SEER is the total heat removed from the conditioned space during the annual cooling season, expressed in Btu, divided by the total electrical energy consumed by the air conditioner or heat pump during the same season, expressed in watt-hours.
- I. Energy Efficiency Ratio (EER)¹: EER is the ratio of the average rate of space cooling delivered to the average rate of electrical energy consumed by the air conditioner or heat pump. This ratio is expressed in Btu per watt.h (Btu/W.h).

¹ 10 CFR part 430 Subpart B, Appendix M

² 10 CFR 430, Subpart A, § 430.2 Definitions

Note: EPA has revised all the definitions except for Gas/Electric Package Unit (which is not included in the federal standard definitions), to be consistent with the regulatory definitions as defined in 10 CFR Part 430, Subpart A § 430.2 and 10 CFR part 430 Subpart B, Appendix M.

2) Scope:

- A. Included Products: Single package, split system, and gas/electric package units that meet the definitions of an ASHP or central air conditioner as specified herein are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.B. Units may be intended for installation into a duct system, or may be ductless.
- B. Excluded Products: Central air conditioners and ASHPs that use a third party (or independent) coil, three-phase equipment, and products rated above 65,000 Btu/h are not eligible for ENERGY STAR.

3) Qualification Criteria:

- A. Energy Efficiency Requirements:

| Table 1: Energy-Efficiency Criteria for Qualified Residential ASHPs and Central Air Conditioners | | | |
|---|-------------|------------|-------------------------|
| Product Type | SEER | EER | HSPF¹ |
| CAC Split Systems - South Region ² | ≥ 15.5 | ≥ 13 | N/A |
| CAC Split Systems - North Region ³ | ≥ 14.5 | ≥ 12 | N/A |
| ASHP Split Systems - National | ≥ 15.5 | ≥ 12.5 | ≥ 8.6 |
| CAC Single Package Equipment ⁴ - National | ≥ 15.5 | ≥ 12.5 | N/A |
| ASHP Single Package Equipment ⁴ - National | ≥ 14.5 | ≥ 12 | ≥ 8.3 |

Notes:

1. HSPF criteria is applicable to heat pump, only
2. Alabama, Arkansas, Delaware, Florida, Georgia, Hawaii, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, District of Columbia, Arizona, California, Nevada, New Mexico
3. Alaska, Colorado, Connecticut, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Washington, West Virginia, Wisconsin, Wyoming
4. Including gas/electric package units

- B. Multiple Assemblies: For split system ASHP and central air conditioner, ENERGY STAR qualification shall be determined by the rated performance of the particular combination of indoor and outdoor units, regardless of the fact that the components may be used in other combinations.

Note: EPA is revising the CAC/ASHP specification due to the: 1) new federal energy conservation standards, effective January 1, 2015, that are close to and in some cases equal to the current ENERGY STAR requirements; and 2) broad availability of higher efficiency products in the market. In an effort to continue to distinguish the most energy efficient products that provide significant energy and cost savings to the consumer while also providing excellent performance, EPA proposes the following changes to the requirements.

75 **Note (Cont.):**

76 **Regional versus National Requirement:** The new Federal standards propose regional requirements for CAC
77 and national requirements for ASHP systems. The Federal standard for split system CAC divides the nation
78 into three regions: Hot Dry (Southwest), Hot Humid (South) and Rest of the Country (North).

79 Taking this into careful consideration, EPA proposes to adopt a regional approach for CAC split systems but
80 maintain national criteria for the rest of product classes, that is, ASHP split systems and CAC/ASHP single
81 package. CAC split system criteria will include two regional requirements - North and South (combining South
82 and Southwest regions in the Federal CAC Standard). EPA proposes a national requirement for ASHP
83 because high SEER products which provide savings in cooling dominated climates also have high HSPF and
84 will provide savings in heating dominated climates. Also, to the extent that the HSPF does not take into
85 account that the heat pump may offset more expensive forms of heat in some homes, some consumers will
86 see more monetary saving than predicted by HSPF alone. Thus, a single national level is reasonable. For
87 single package air conditioners, their use is sufficiently rare that the complexity of regional requirements is not
88 justified. EPA is open to considering regional specification requirements for other product classes as well if
89 there is strong justification.

90 **Performance Criteria:** The levels proposed in Table 1 provide a balance between consumer savings, initial
91 cost, and differentiation between standard and high efficiency products. EPA understands that the savings
92 attained by the consumer is dependent on the application and the product delivers maximum savings when
93 installed correctly, in the right application and climate. Similar to many HVAC products, contractors play an
94 important role in working with homeowners to determine the best choice of product for their intended use and
95 conditions.

96 For split system central air conditioners, energy savings in cooler climates will not justify the same level of
97 performance as they do in hot climates. Therefore, for CAC split systems, EPA proposes more stringent
98 requirements in the South, by raising the minimum SEER from 14.5 to 15.5 and EER from 12 to 13, while
99 maintaining the current requirement of 14.5 SEER and 12 EER in the North. The more stringent levels provide
100 excellent energy savings to consumers in hot climates. Based on the AHRI certified products directory, about
101 30% of the products available that will meet the new Federal standards in the South will meet the proposed
102 requirement. A regionalized specification for split system central AC also facilitates cooperation with the
103 ENERGY STAR New Homes program and with the new ENERGY STAR Verified HVAC Installation program,
104 by increasing the number of installations in the North for which ENERGY STAR CAC will be appropriate.

105 With the institution of regional requirements, a regional certification mark will also be needed. Products that
106 are certified to meet the requirements for labeling in the South will also meet those for the North, and will
107 therefore carry the regular certification mark. Products that are certified only in the North will carry a separate
108 label, similar to that developed for furnaces meeting the Version 4.0 Furnaces requirements only in the South.
109 For CAC, the northern states will be cyan and the southern states will be white. The postal abbreviations of
110 northern states will be listed, along with text indicating that Canada is also in this region. We do not anticipate
111 that the map graphic will include Canada.

112 For split systems, EPA is considering adjusting the product literature labeling requirement to more clearly
113 communicate which particular combinations of indoor and outdoor units have earned the ENERGY STAR. In
114 the usual product literature, such as brochures, the performance of various combinations are presented in
115 compact tabular form. On the Energy Guide label as well, a range of performance values are listed, reflecting
116 the performance variation due to the indoor unit. Using these tools, it is hard for manufacturers to
117 communicate clearly to installers, homeowners and energy efficiency program sponsors whether a particular
118 combination has earned the ENERGY STAR. EPA anticipates the introduction of a regional label will
119 exacerbate this situation.

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121 **Note (Cont.):**

122 To address this, EPA intends to require that manufacturers provide a downloadable document with the
123 ENERGY STAR mark (or ENERGY STAR Regional mark in the case of units in the Northern zone) on it. The
124 document would include the model number of the complete system, that is, both the outdoor and indoor model
125 numbers for split systems, and the product performance rating. It would serve as proof to the consumer and
126 utilities offering rebates that the installed unit/system complies with the ENERGY STAR criteria and is
127 ENERGY STAR certified for the intended region. The manufacturer can choose to offer the document on their
128 own website or through a designee such as a Certification Body. However, the manufacturer will be
129 responsible for ensuring accurate representation of the information and the ENERGY STAR mark.
130 Stakeholders are encouraged to provide feedback on this potential new requirement.

131 For ASHP split systems, EPA proposes to raise the minimum SEER from 14.5 to 15.5, EER from 12 to 12.5
132 and HSPF from 8.2 to 8.6. The proposed levels provide substantial savings in both hot climates (South) and
133 cooler climates (North). In cases where the ASHP will offset more expensive forms of heating, consumers
134 can save even more. Based on the AHRI certified products directory, about 15% of the products now on the
135 market that will meet the new Federal North standard meet the proposed ENERGY STAR requirement. The
136 current market provides a broad variety of models that meet the proposed requirements and in addition, EPA
137 expects the model count will rise in reaction to new Federal standards.

138 For CAC single package units, EPA proposes to raise the minimum SEER from 14 to 15.5 and EER from 11
139 to 12.5 and for ASHP single package units, SEER from 14 to 14.5, EER from 11 to 12 and HSPF from 8.0 to
140 8.3. The proposed level for CAC single package offers increased energy savings to consumers. Based on the
141 AHRI certified products directory, about 14% of the products currently available that will meet the new Federal
142 standard also meet the proposed ENERGY STAR requirement.

143 **Multiple Assemblies:** The Multiple Assemblies requirement has been redefined to provide more clarity that
144 for splits systems, the ENERGY STAR qualification is based on the particular combination of indoor and
145 outdoor units.

146 **Connected Criteria:** CAC and ASHP products offer good opportunities for Demand Response (DR) and other
147 smart grid features. EPA is aware of the collaborative efforts of AHRI and CEE to develop uniform signals and
148 communication requirements for several connected HVAC products. EPA is following the process and will
149 consider including connected criteria in a future revision but is not proposing inclusion in this revision.

150 **Additional Metrics:** In the Framework, EPA introduced the idea of using additional metrics, such as 17F COP
151 or heating capacity, particularly to differentiate products that are well suited to some regions. In response to
152 comments, and having come to better understand the range of available products and metrics, EPA does not
153 believe such differentiation is useful for this Version 5.0 specification. However, such metrics may make
154 sense in distinguishing ENERGY STAR Most Efficient products.

155 EPA welcomes stakeholder feedback on this proposal and requests that stakeholders share any test data or
156 studies that would support their recommendation.

157 C. Gas/Electric Package Units: To qualify for ENERGY STAR, gas/electric package units shall meet the
158 cooling portion of the single package specification requirements in Table 1, above.

159 D. The HSPF and SEER ratings shall be identical to the levels reported on the Federal Trade
160 Commission (FTC) Energy guide label and reported to DOE.

161 E. Significant Digits and Rounding:

162 a. All calculations shall be carried out with actual measured or observed values. Only the final
163 result of a calculation shall be rounded. Unless otherwise directed below, calculated results
164 shall be rounded to the nearest significant digit as expressed in the corresponding specification
165 limit.

166 b. Unless otherwise specified, compliance with specification limit shall be evaluated using exact

- 167 values without any benefit from rounding.
- 168 c. As specified in 10 CFR, 430.23(m)(3), SEER, and HSPF shall be rounded off to the nearest
- 169 0.05 Btu/W.h. Similarly, EER should also be rounded off to the nearest 0.05 Btu/W.h.
- 170 d. As specified in 10 CFR part 430 Subpart B, Appendix M, capacity shall be expressed in
- 171 accordance with in Table 2, below.

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| Table 2: Rounding Requirements for Capacity | |
|--|-------------------------|
| Capacity Ratings, Btu/h | Multiples, Btu/h |
| < 20,000 | 100 |
| ≥ 20,000 and < 38,000 | 200 |
| ≥ 38,000 and < 65,000 | 500 |

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174 **4) Test Requirements:**

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176 A. One of the following sampling plans shall be used for purposes of testing for ENERGY STAR

177 certification:

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179 a. A single unit is selected, obtained, and tested. The measured performance of this unit and

180 of each subsequent unit manufactured must be equal to or better than the ENERGY STAR

181 specification requirements. Results of the tested unit may be used to certify additional

182 individual model variations within a Basic Model as long as the definition for Basic Model

provided in Section 1, above, is met; or

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184 b. Units are selected for testing and results calculated according to the sampling requirements

185 defined in 10 CFR Part 429, Subpart B § 429.16. The certified rating must be equal to or

186 better than the ENERGY STAR specification requirements. Results of the tested unit may

187 be used to certify additional model variations within a Basic Model as long as the definition

188 for provided above and in 10 CFR Part 430.2 is met. Further, all individual models within a

189 basic model must have the same certified rating per DOE's regulations in Part 429 and this

190 rating must be used for all manufacturer literature, the qualified product list, and certification

191 of compliance to DOE energy conservation standards.

192 **Note:** EPA has modified the sampling requirements to be consistent with the DOE sampling requirements for

193 CAC/ASHP as defined in 10 CFR Part 429, Subpart B § 429.16. This language replaces previous direction

194 regarding individual and product family testing. This is consistent with EPA practice across the ENERGY

195 STAR Products program.

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197 B. When testing ASHPs and central air conditioners, the following test method shall be used to

198 determine ENERGY STAR qualification:

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| Table 3: Test Method for ENERGY STAR Qualification | |
|---|---------------------------------------|
| ENERGY STAR Requirement | Test Method Reference |
| SEER, EER, HSPF | 10 CFR part 430 Subpart B, Appendix M |

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Note: The test method reference has been updated to directly refer to the Federal test method, 10 CFR part 430 Subpart B, Appendix M.

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5) Effective Date: This ENERGY STAR ASHP and Central Air-Conditioners Specification shall take effect on **TBD**. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on the date of manufacture. The date of manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is considered to be completely assembled.

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Note: EPA expects to finalize the Version 5.0 CAC/ASHP specification in fall of 2014. At that point, EPA will establish sufficient lead time before the specification becomes effective for manufacturers to update product literature and other marketing materials for those products that no longer meet ENERGY STAR requirements.

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6) Future Specification Revisions: EPA reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through industry discussions. In the event of a specification revision, please note that the ENERGY STAR qualification is not automatically granted for the life of a product model.