



ENERGY STAR® Program Requirements Product Specification for Dehumidifiers

Eligibility Criteria DRAFT 1: Version 3.0

Following is the **DRAFT 1 Version 3.0** product specification for ENERGY STAR qualified dehumidifiers. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

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

- A. **Dehumidifier:** A self-contained, electrically operated, and mechanically encased assembly consisting of: (a) a refrigerated surface (evaporator) that condenses moisture from the atmosphere; (b) a refrigerating system, including an electric motor; (c) an air-circulating fan; and (d) means for collecting and/or disposing of the condensate.
 - a. **Stand Alone:** Portable unit designed to provide dehumidification within the confined living space where it is placed and plugged into an electrical outlet.
 - b. **Whole House:** Unit designed to be incorporated into the home's HVAC system to provide dehumidification for all living spaces.
- B. **Capacity:** Capacity is a measure of the ability to remove moisture from its surrounding atmosphere. The capacity of a dehumidifier is the amount of water stated in pints collected per 24 hours of continuous operation when tested in accordance with the test standard referenced in Section 4, below.
- C. **Energy Factor (EF):** The energy efficiency of dehumidifiers will be measured in liters of water removed per kilowatt-hour of energy consumed at standard test conditions. EF shall be calculated according to the test standard referenced in Section 4, below.
- D. **Idle Mode:** The dehumidifier is not actively removing moisture but monitoring room humidity levels.
- E. **Basic Model:** A group of models that have electrical characteristics that are essentially identical, and which do not have any differing physical or functional characteristics that affect energy consumption.

Note: The definition provided above for Capacity has been updated to match that provided in ANSI/AHAM DH-1-2008, which is referenced in Section 4, below. For purposes of harmonizing with the U.S. Department of Energy (DOE) minimum standards, a new basic model definition is also proposed based on the definition for Basic Model referenced in 10 CFR 429.

Stakeholders are encouraged to provide feedback on all of the definitions presented in this section and identify terms that might need further clarification for purposes of determining scope and qualification.

2) Scope:

- A. **Included Products:** Products that meet the definition of a dehumidifier as specified herein are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.B. Stand alone and whole house units with capacities measuring less than or equal to 185 U.S. pints (87.5 liters) are eligible for ENERGY STAR.

Note: A statement that stand alone and whole house dehumidifiers are eligible for ENERGY STAR has been added above to provide further clarification to EPA-recognized Laboratories and Certification Bodies. While stand alone plug in dehumidifiers account for most units sold, EPA recognizes that there are energy-efficient whole house options that also offer other HVAC system benefits available to the consumer. Stakeholders are encouraged to provide feedback on this terminology and the proposed definitions provided in Section 1, above.

B. Excluded Products: Dehumidifiers with daily water-removal capacities greater than 185 U.S. pints (87.5 liters) are not eligible for ENERGY STAR.

3) **Qualification Criteria:**

A. Energy Efficiency Requirements: To qualify for ENERGY STAR, dehumidifiers shall meet the EF requirements provided in Table 1, below.

Table 1: Performance Criteria for ENERGY STAR Qualified Dehumidifiers

Product Capacity (Pints/Day)	Energy Factor Under Test Conditions (L/kWh)
< 75	≥ 1.90
75 ≤ 185	≥ 2.80

Note: In correspondence distributed to industry stakeholders in November 2010, EPA proposed using a single EF level for all capacities rated < 75 pints/day based on the understanding that larger units equipped with a humidistat will remove the same amount of water as smaller units but will do so faster and using less energy. Based on further analysis, and initial stakeholder feedback supporting this approach, EPA is proposing a 1.90 EF level for all units with rated capacities under 75 pints/day.

EPA is in the process of conducting tests on several larger capacity (i.e., 65-75 pts/day) units to confirm that their greater efficiencies when measured under the ANSI/AHAM DH-1-2008 test conditions are maintained at part-load performance. Results will be shared with interested parties once available. Stakeholders are also encouraged to provide data and other documentation that supports or challenges a single EF level approach.

EPA estimates 5% of currently available models less than 75 pts/day will meet the proposed EF level, based on the ENERGY STAR Qualified Product List, Association of Home Appliance Manufacturers (AHAM) Directory, and additional data submitted to EPA for consideration. However, EPA expects, and stakeholders have validated, that by the time this specification goes into effect, the market will shift to higher efficiency products in anticipation of the DOE minimum federal standards going into effect October 2012. Even now, there is a range of technologies, applications, and brands that meet these proposed levels and provide the consumer with a reasonable payback.

Based on stakeholder feedback, EPA considered requirements in addition to EF for whole house dehumidifiers, but ultimately decided that developing test methods to capture the expected minimal additional savings was not a top priority for this revision.

B. Other Requirements:

- a. Qualifying units shall be equipped with an adjustable humidistat control.
- b. During idle mode, the main fan within the qualifying unit shall not exceed the runtime frequency of operating every 20 seconds within a 5 minute period to check humidity levels. Units using a smaller auxiliary fan to perform this function shall not consume more than 7% of the main fan power,

Note: EPA is proposing that ENERGY STAR qualified dehumidifiers be equipped with an adjustable humidistat control to provide the consumer with an opportunity to determine the appropriate setting based on their comfort level and other needs. The addition of a humidistat also ensures that the unit doesn't run longer than needed. EPA is not suggesting specific parameters regarding the manner in which consumers are informed of humidity level, instead leaving it up to the marketplace to drive product design.

It has been brought to EPA's attention that some stand alone dehumidifiers operate with their fans running continuously to bring air past the humidity sensor in the unit. EPA views this as another opportunity to further reduce total unit energy consumption and reward those manufacturers who have already incorporated energy-efficient components to address energy use in this mode.

The Integrated Energy Factor (IEF) metric currently being developed by DOE addresses the energy consumed in standby, off, and active modes but not idle mode as defined in Section 1. To address energy consumption in idle mode, EPA is proposing a requirement in Section 3.B that limits the continuous running of the main fan during this mode of operation. Manufacturers also have the option to use a smaller auxiliary fan to perform this function as long as the total power does not exceed 7% of the main fan power, or to use a remote sensor so that no fan operation is needed.

This prescriptive requirement is meant to ensure that ENERGY STAR dehumidifiers employ widely available efficient fan technologies, without burdening manufacturers with an additional test. EPA is interested in stakeholder feedback on the prescriptive approach for reducing energy consumption in idle mode.

C. Significant Digits and Rounding:

- a. All calculations shall be carried out with directly measured (unrounded) values.
- b. Unless otherwise specified, compliance with specification limits shall be evaluated using directly measured or calculated values without any benefit from rounding.
- c. Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

4) **Test Requirements:**

- A. Units shall be selected for testing per the sampling requirements defined in 10 CFR 429, Subpart B.
- B. When testing dehumidifiers, the following test methods shall be used to determine ENERGY STAR qualification:

ENERGY STAR Requirement	Test Method Reference
Capacity and Energy Factor	ANSI/AHAM DH-1-2008 "Dehumidifiers"

Note: As proposed above, manufacturers are required to follow the sampling requirements defined by DOE for purposes of choosing units for ENERGY STAR testing. This language replaces previous direction regarding individual and product family testing.

EPA is proposing to reference the ANSI/AHAM DH-1-2008 standard for purposes of measuring and calculating EF with the understanding that this latest version incorporates conditions and methods presented in the previous 2003 version and CAN/CSA-C749-94, which are currently referenced in Version 2.1. In addition, EPA has added Capacity to the table since DH-1-2008 also provides a method for measurement and calculation.

Several stakeholders expressed concern with the ambient conditions (i.e., 80°F and 60% RH) required for determining Capacity and EF under DH-1-2008. These stakeholders suggest that typical operation is actually at a temperature and humidity level lower than these test conditions. While EPA supports improvements to test procedures to better emulate real world conditions, data and information received to date regarding the impacts on energy efficiency and alternative test conditions does not clearly and consistently flag a gap in the current test method. Therefore, EPA will not propose additional testing at conditions that differ from widespread industry use and DOE minimum standard requirements at this time. In a subsequent revision, EPA is interested in researching this issue further and working with various industry groups, including ANSI and AHAM, and with DOE, to determine if changes in test conditions are warranted.

- 5) **Effective Date:** This ENERGY STAR Dehumidifier Specification shall take effect on **June 1, 2012**. 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 on which a unit is considered to be completely assembled.

Note: EPA is targeting September 2011 for the release of the Final Version 3.0 specification. To give manufacturers sufficient time to update product literature and other marketing materials for those products that no longer meet ENERGY STAR requirements, EPA is proposing an effective date of June 1, 2012.

As of this date, only those models that have been third-party certified by an EPA-recognized Certification Body to the new Version 3.0 specification requirements will remain ENERGY STAR qualified. For more information on the third-party certification requirements visit the ENERGY STAR website at: www.energystar.gov/3rdpartycert.

- 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.