



# ENERGY STAR® Program Requirements Product Specification for Residential Dishwashers

## Eligibility Criteria Draft 2 Version 5.0

Following is the **Draft 2 Version 5.0** ENERGY STAR Product Specification for Residential Dishwashers. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

### 1) Definitions

- A. Residential Dishwasher: A cabinet-like appliance used in a residential setting which with the aid of water and detergent, washes, rinses, and dries (when a drying process is included) dishware, glassware, eating utensils, and most cooking utensils by chemical, mechanical and/or electrical means and discharges to the plumbing drainage system.
- a. Compact Dishwasher: A residential dishwasher with a capacity of less than 8 place settings.
- b. Standard Dishwasher: A residential dishwasher with a capacity of 8 place settings or more.
- c. Portable Dishwasher: A residential dishwasher that is not permanently connected to household water and electric supply lines. It can be mounted on wheels and easily moved from one place to another in normal use. This definition includes dishwashers intended to be used on a countertop or table.
- d. Soil-Sensing Dishwasher: A residential dishwasher that has the ability to automatically adjust any energy consuming aspect of a wash cycle based on the soil load of the dishes.
- e. Non-Soil-Sensing Dishwasher: A residential dishwasher that does not have the ability to automatically adjust any energy consuming aspect of the wash cycle based on the soil load of the dishes.
- B. Basic Model: All units of a given type of covered product (or class thereof) manufactured by one manufacturer and which have electrical characteristics which are essentially identical and which do not have any differing physical or functional characteristics that affect energy consumption.
- C. Average Cleaning Index: Average of the Total Cleaning Index for each cleaning performance soil run, as calculated per ANSI/AHAM DW-1-2009, Section 5.12.

**Note:** EPA has made several updates to definitions in Draft 2 in response to stakeholder feedback on the Draft 1 specification and subsequent webinar. The changes are as follows:

- The Residential Dishwasher definition has been harmonized with the DOE definition, with the exception of the clause "used in a residential setting," which has been retained to distinguish residential dishwashers from products eligible for qualification under the ENERGY STAR Commercial Dishwasher specification.
- Compact and Standard Dishwasher definitions have been harmonized with DOE definitions.
- A Portable Dishwasher definition (per ANSI/AHAM DW-1-2009) has been added to clarify that this product sub-type is eligible for ENERGY STAR qualification under this specification.

- A definition for “Basic Model” has been included to support a Basic Model approach for dishwasher product qualification (similar to what is currently in use in Version 4.1) instead of the Product Family approach proposed in Draft 1. The Basic Model definition contains several minor changes from the ENERGY STAR Version 4.1 specification, and is now identical to the DOE definition.
  - Definitions for Soil-Sensing and Non-Soil-Sensing Dishwasher (per 10 CFR 430, Subpart B, Appendix C), and Average Cleaning Index (per ANSI/AHAM DW-1-2009) have been added to support the addition of new cleaning performance requirements proposed in Section 4 of this document.
- EPA is interested in any additional feedback on these changes and the definitions that are proposed above.

## 2) Scope

- A. Included Products: Products that meet the definition of a Residential Dishwasher as specified herein are eligible for ENERGY STAR qualification under this specification.
- B. Excluded Products: Product types not specifically identified in Section 2.A are not eligible for ENERGY STAR qualification under this specification. Products that are covered under other ENERGY STAR product specifications (e.g., Commercial Dishwashers) are not eligible for qualification under this specification.

## 3) Qualification Criteria

- A. Energy and Water Performance:

**Table 1: Energy and Water Performance Requirements**

Product Type	Tier 1		Tier 2	
	Water (gallons per cycle)	Energy (kWh per year)	Water (gallons per cycle)	Energy (kWh per year)
Standard	≤ 4.25	≤ 295	≤ 4.00	≤ 280
Compact	≤ 3.50	≤ 222	≤ 2.75	≤ 200

**Note:** EPA has made several changes to the proposed energy and water performance requirements in Draft 2 after careful consideration of stakeholder comments on the Draft 1 specification. A Tier 1 level has been proposed for Standard Dishwashers that harmonizes with the current Consortium for Energy Efficiency (CEE) Tier 2. Most importantly, Tier 2 levels have been proposed for both Standard and Compact Dishwashers, to take effect January 1, 2013. The changes are specified in Table 1.

EPA believes that the proposed criteria will effectively differentiate high efficiency products, while ensuring that a diverse selection of products from a variety of manufacturers is available to consumers at the time the specification takes effect. As of January 2011, approximately 25 percent of standard dishwasher models in the market meet the proposed Tier 1 levels, and approximately 11 percent meet the proposed Tier 2 levels. Further, EPA believes that consumers will be able to recoup the price premium of an ENERGY STAR qualified product within a reasonable time period.

62 B. Cleaning Performance:

- 63 a. Tier 1: No minimum cleaning performance requirements. The Average Cleaning Index for a  
64 minimum of two “sensor heavy response” soil runs shall be calculated and reported to EPA.
- 65 b. Tier 2: Cleaning performance shall be greater than or equal to **TBD**.

66 **Note:** EPA received valuable stakeholder feedback about cleaning performance metrics, minimum performance  
67 levels, and testing in response to questions posed in the Draft 1 specification. Stakeholders indicated support for  
68 both the IEC 60436 3<sup>rd</sup> Edition and AHAM DW-1-2009 cleaning performance test methods, and noted the various  
69 challenges posed by each standard. Stakeholders further cited the difficulty of comparing cleaning performance  
70 results between the two test methods and advised EPA to reference only one cleaning performance test method  
71 in the ENERGY STAR specification.

72 One advantage of AHAM DW-1-2009 is that it is more widely utilized by manufacturers in the United States. Test  
73 laboratories are more experienced running this test and the cleaning performance of dishwashers on the U.S.  
74 market under this test is well understood. Currently, the soil load in the previous iteration of this test method  
75 (ANSI/AHAM DW-1-1992) is used for DOE testing of energy and water use of soil-sensing dishwashers.  
76 However, DW-1 has not been subject to round-robin testing to demonstrate an acceptable level of repeatability for  
77 use as a certification standard.

78 EPA believes that the IEC 60436 3<sup>rd</sup> Edition test method is likely to generate more accurate and repeatable  
79 cleaning performance results because it includes more comprehensive control of testing variables (e.g., ambient  
80 humidity, standardized detergent formulation), and mandatory use of a reference machine to minimize lab-to-lab  
81 variation. Additionally, IEC 60436 has undergone round-robin testing. However, IEC 60436 is not widely used in  
82 the U.S. and domestic manufacturers have noted aspects of the test method that may require changes if it is to be  
83 used as a certification standard in the U.S. These elements include U.S. availability of food soils, dishware, place  
84 settings, and drying cabinets.

85 In comments submitted to EPA, AHAM has indicated its intent to align the next revision of DW-1 more closely with  
86 IEC 60436 by 2013. EPA supports this initiative for U.S. harmonization with international test standards and  
87 believes that the industry is best positioned to develop a U.S. localization of IEC 60436. EPA will provide  
88 recommendations to AHAM for harmonization of DW-1 with IEC 60436 3<sup>rd</sup> Edition in a manner consistent with  
89 ENERGY STAR Guiding Principles.

90 Prior to the Tier 2 effective date of January 1, 2013, EPA will conclude a stakeholder process to define and  
91 implement minimum cleaning performance requirements for ENERGY STAR qualification. EPA will give primary  
92 consideration to the harmonized AHAM DW-1 test method for use in ENERGY STAR cleaning performance  
93 testing, contingent upon its completion, but will also evaluate use of the IEC 60436 test method. Over the course  
94 of the next year, EPA will invite both the AHAM-DW-1 and IEC 50436 Working Groups to participate in EPA-  
95 organized webinars to share the status of the test procedure revisions and associated round-robin testing with all  
96 interested stakeholders. EPA encourages stakeholders actively in this process so that they help shape and are  
97 comfortable with using this new metric upon its completion.

98 After considering feedback received on Draft 1 and further research and discussion with stakeholders, EPA is  
99 proposing the following approach for incorporation of cleaning performance in the Residential Dishwasher  
100 specification:

- 101 - **Tier 1:** Cleaning performance testing and reporting will be required for all ENERGY STAR qualified products.  
102 Although minimum cleaning performance requirements will not be specified for Tier 1, the Average Cleaning  
103 Index will be submitted to EPA, along with individual cleaning performance test reports. EPA does not intend  
104 to post Average Cleaning Index to the Qualified Product List, but rather, it will be used by EPA to inform  
105 development of minimum cleaning performance requirements for Tier 2. In order to minimize overall test  
106 burden, EPA will allow for concurrent testing and evaluation of cleaning performance, energy consumption  
107 and water consumption; thus, Tier 1 cleaning performance shall be tested per 10 CFR 430, Subpart B,  
108 Appendix C (sensor heavy response), and Average Cleaning Index shall be evaluated per ANSI/AHAM DW-  
109 1-2009 for a minimum of two soil runs. The soil runs used for evaluation of cleaning performance may be the  
110 same soil runs used for testing of energy and water performance at the manufacturer's discretion.
- 111 - **Tier 2:** A minimum cleaning performance requirement will be included as a Tier 2 ENERGY STAR  
112 requirement. Cleaning performance scores will be listed on the Qualified Product List alongside energy and  
113 water performance test results. Testing and product qualification will be performed in accordance with all  
114 aspects of the ENERGY STAR 3<sup>rd</sup>-party Certification rules ([www.energystar.gov/3rdpartycert](http://www.energystar.gov/3rdpartycert)). EPA  
115 understands the advantages associated with concurrent measurement of cleaning performance, energy  
116 consumption, and water consumption, but notes that concurrent testing may not be feasible for Tier 2.

117 EPA requests comment on the proposed approach for incorporation of cleaning performance requirements in this  
118 specification.

119 **C. Significant Digits and Rounding:**

- 120 a. All calculations shall be performed with actual measured or observed values. Only the final result  
121 of a calculation shall be rounded. Calculated results shall be rounded to the nearest significant digit  
122 as expressed in the corresponding specification limit.
- 123 b. Unless otherwise specified, compliance with specification limits shall be evaluated using exact  
124 values without any benefit from rounding.

- 125 **D. Model Numbers:** Model numbers used for ENERGY STAR qualified product submissions shall be  
126 consistent with Federal Trade Commission (FTC) and Department of Energy (DOE) submissions.

127 **Note:** EPA has revised the model number language to clarify that model numbers used for ENERGY STAR  
128 qualified product submissions should be equivalent to those used in compliance reports submitted to FTC and  
129 DOE. Currently in Version 4.1, EPA requires that model numbers used follow FTC and DOE guidelines. EPA  
130 requests comment on this clarification.

131 **4) Test Requirements**

- 132 A. Units shall be selected for testing per the sampling requirements defined in 10 CFR 430.63, Subpart F,  
133 which references 10 CFR 430.24.

134 **Note:** EPA has amended the test requirement in Section 4.A to harmonize with DOE sampling requirements for  
135 certification of Basic Models to the applicable energy conservation standard. EPA understands that the DOE is  
136 scheduled to issue a Final Rule for compliance and enforcement in the near future, and plans to incorporate the  
137 latest available requirements into the ENERGY STAR specification in order to maintain harmonization. EPA  
138 requests stakeholder feedback on this proposal.

- 139 B. When testing residential dishwashers, the following test methods shall be used to determine ENERGY  
140 STAR qualification:

**Table 2: Test Methods for ENERGY STAR Qualification**

ENERGY STAR Requirement	Test Method Reference
Energy Consumption (kWh/year)	10 CFR 430, Subpart B, Appendix C
Water Consumption (gallons/cycle)	
Cleaning Performance (Average Cleaning Index)	

**C. Additional Cleaning Performance Test and Evaluation Guidance:**

- a. The test load for all cleaning performance tests shall be in accordance with 10 CFR 430, Subpart B, Appendix C, “sensor heavy response”, for both soil-sensing and non-soil-sensing dishwashers.
- b. Average Cleaning Index shall be evaluated and reported in accordance with ANSI/AHAM DW-1-2009 Sections 5.10, 5.11, and 5.12. Average Cleaning Index and individual cleaning performance test results shall be reported to EPA.
- c. Laboratory accreditation for testing and evaluation of cleaning performance is not required for Tier 1, since minimum cleaning performance requirements have not been established.

**5) Effective Date**

The ENERGY STAR Residential Dishwasher specification shall take effect on the dates specified in Table 3. 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.

**Table 3: Specification Effective Dates**

Tier 1 Effective Date	Tier 2 Effective Date
January 1, 2012	January 1, 2013

**Note:** EPA aims to finalize Version 5.0 Residential Dishwasher specification by the spring of 2011 with a proposed effective date of January 1, 2012 for Tier 1 and January 1, 2013 for Tier 2.

**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.