



ENERGY STAR® Program Requirements Product Specification for Residential Dishwashers

Eligibility Criteria Draft 1 Version 5.0

Following is the 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: An appliance designed to clean and sanitize plates, glasses, cups, bowls, and utensils by applying sprays of water and detergent solution.

Note: EPA has identified several pertinent definitions for residential dishwashers:

- **AHAM DW-1 2009:** Dishwasher: A machine which washes, rinses and (when drying process is included) dries dishware, glassware and flatware and many cooking utensils by chemical, mechanical and/or thermal means.
- **DOE:** Dishwasher: Dishwasher means a cabinet-like appliance 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.
- **IEC 60436 3rd Edition:** Dishwasher: Machine which cleans, rinses, and dries dishware, glassware, cutlery, and, in some case, cooking utensils by chemical, mechanical, thermal, and electric means. A dishwasher may or may not have a specific drying operation at the end of the program.

EPA's inclination is to revise the current ENERGY STAR definition of residential dishwasher, listed above, to harmonize with the DOE definition; EPA requests comments on this proposal.

- B. Compact Dishwasher: A dishwasher with a capacity of fewer than eight place settings and six serving pieces.
- C. Standard Dishwasher: A dishwasher with a capacity of at least eight place settings and six serving pieces.
- D. Product Family: A group of models sufficiently similar that the energy and water performance of all members may be predicted from the energy performance of a platform model. Generally, this will be a regular range of sizes of a similar type, design and construction, and having a common designation as catalogued. Differentiators within product families include control panel configuration and internal configuration.

Note: EPA's goal in providing a definition for product family is to ensure a level playing field during testing and evaluation of products for ENERGY STAR qualification. The definition is intended to allow manufacturers to qualify and label several variations within one family based on the same platform design using the test results of one representative model (defined in Section 4, below). For residential dishwashers, these variations cannot change the energy or water consumption profile of the unit. EPA is interested in stakeholder feedback on how the product family definition can be further refined to best meet this objective.

2) Scope

- A. Included Products: Products that meet the definition of a residential dishwasher as specified herein are eligible for ENERGY STAR. Only compact and standard dishwashers are eligible for ENERGY STAR.
- B. Excluded Products: Product types not specifically defined in Section 2.A are not eligible for ENERGY STAR qualification.

3) Qualification Criteria

- A. Significant Digits and Rounding:
- All calculations shall be performed with actual measured or observed values. Only the final result of a calculation shall be rounded. Calculated results shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.
 - Unless otherwise specified, compliance with specification limits shall be evaluated using exact values without any benefit from rounding.
- B. Model Numbers: Model numbers used for ENERGY STAR qualified products shall follow FTC and DOE guidelines.
- C. Energy and Water Consumption Requirements:

Table 1: Water and Energy Consumption Criteria

Product Type	Water Consumption (gallons per cycle)	Energy Consumption (kWh per year)
Standard	≤ 4.0	≤ 280
Compact	≤ 3.5	≤ 222

Note: The primary objective of the ENERGY STAR Dishwasher Program is to recognize the most energy and water efficient products in the marketplace. In developing a specification, EPA considers the following Guiding Principles:

- Significant energy and/or water savings can be realized on a national basis;
- Product performance is maintained or enhanced with increased efficiency;
- Purchase of high efficiency product will be cost-effective;
- Energy and/or water efficiency can be achieved through several technology options; at least one of which is non-proprietary;
- Product energy and/or water consumption and performance can be measured and verified with testing;
- Labeling would effectively differentiate products and be visible for purchasers.

EPA is proposing new energy and water efficiency levels for standard dishwashers of 280 kWh/year and 4.0 gallons/cycle, respectively. For compact dishwashers, EPA proposes to retain the energy and water efficiency levels of 222 kWh/year and 3.5 gallons/cycle, respectively, which were established in the last ENERGY STAR dishwasher specification that was finalized on November 14, 2008.

Although new criteria for standard and compact dishwashers had been established in 2008, to become effective July 1, 2011, EPA is proposing the above levels for standard dishwashers, as an alternative to the July 1, 2011 standard dishwasher levels. EPA is proposing these levels, in part, based on review of the ENERGY STAR qualified product list. As of August 2010, 10% percent of standard dishwasher models on the qualified product list meet these levels, representing six out of the 20 residential dishwasher manufacturing partners. In developing this proposal, EPA also considered actual test data on dishwasher energy use and water use. As part of the ENERGY STAR program enhancements, EPA has been reviewing lab reports for models that have been submitted for qualification over the past five months. From these lab reports, EPA has learned that the tested kWh/year and gallons/cycle values may be lower than the listed values, and in some cases, dramatically lower. This test data indicates more models will be able to meet the proposed levels than the current reported kWh/year and gallons/cycle values, listed on the qualified product list, suggest. This test data also shows that at least two additional manufacturers have models that meet the new ENERGY STAR specification. As a result, EPA believes a broad range of qualifying product models from a number of different manufacturers would be available.

Based on analysis of available data, EPA also believes that consumers can expect to recoup the price premium of a product that meets these proposed requirements within a reasonable time period. EPA considered current retail price information which indicates the price premium for a standard dishwasher that meets the July 1, 2011 levels is zero, as well as incremental cost data from the DOE Advanced Notice of Proposed Rulemaking (ANOPR). EPA also recognizes that current retail prices do not adequately characterize the incremental cost associated with increasing the efficiency of a product to meet the proposed levels, since the highly efficient dishwashers with the greater price premium at retailers include other features not related to efficiency, such as more sophisticated control panels, stainless steel tubs, and additional specialized wash cycles.

The DOE ANOPR indicates that there are at least ten possible design options that, in various combinations, would allow manufacturers to reach an efficiency level of 280 kWh/year and 4.0 gallons/cycle. The ten options are:

1. Condenser drying and venting/fan drying
2. Sump pressure transducer
3. Electronic controllers paired with water meters
4. Multi-speed pumps
5. Interior water distribution tubing
6. Sprayer
7. Flow-through heating
8. Thermocouple for temperature monitoring
9. Humidity sensors
10. Insulation

For example, as part of the ANOPR analysis, DOE noted one model which had an electronic water meter, interior water supply tubing, and flow-through heating, and would meet the Version 5.0 requirements EPA is proposing.

D. Cleaning Performance Requirements: **TBD**

Note: A common stakeholder concern is that as energy and water efficiency standards become more stringent, dishwasher cleaning performance could suffer. To ensure that ENERGY STAR qualified dishwashers continue to live up to the ENERGY STAR promise of efficiency with no sacrifice in performance, EPA plans to include a cleaning performance requirement as part of this ENERGY STAR specification. EPA is aware of several dishwasher cleaning and sanitation tests:

- AHAM-DW-1 2009
- AHAM-DW-1 1992 (as cited by the U.S. Department of Energy's dishwasher test procedure)

- IEC 60436 3rd Edition
- NSF International 184 2003 (Issue 8 Revision 1)
- Consumers' Union cleaning performance test method (proprietary)
- Good Housekeeping cleaning performance test method (proprietary)

It is EPA's preference to cite a test method that will yield accurate, representative, and repeatable results, and establish a minimum cleaning performance 'score' that will prevent dishwashers with poor cleaning performance from qualifying for ENERGY STAR. EPA invites stakeholder comments on the following questions:

1. What cleaning performance test method should EPA cite? What are the strengths and weaknesses of the current cleaning performance test protocols? How could weaknesses be addressed?
2. Should EPA consider allowing more than one cleaning performance test? If so, how could EPA assure comparable cleaning performance is achieved?
3. Assuming the EPA adopts the cleaning performance test method(s) you recommended in response to the previous question, what metric for cleaning performance should the EPA use?
4. Assuming the EPA adopts the cleaning performance test method(s) and metric you have recommended in response to the previous questions, what cleaning performance 'score' should dishwashers receive to be eligible for ENERGY STAR qualification?
5. Is data available showing that certain test scores accurately predict consumer satisfaction with product cleaning performance?
6. Is there a certain tolerance EPA should consider establishing to account for qualitative differences in cleaning performance scoring that impact the final, quantitative score?

Although EPA welcomes all stakeholder comments on these issues, comments that are accompanied by supporting data will be afforded the greatest consideration.

4) Test Requirements

- A. Representative Models shall be selected for testing per the following requirements:
 - a. For qualification of an individual product model, the representative model shall be equivalent to that which is intended to be marketed and labeled as ENERGY STAR.
 - b. For qualification of a product family, the representative (i.e., platform) model shall not differ from any other model within that product family in regards to efficiency characteristics.
- B. When testing residential dishwashers, the following test methods shall be used to determine ENERGY 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	TBD

5) Effective Date

The ENERGY STAR Residential Dishwasher 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.

Note: EPA aims to finalize the Version 5.0 Residential Dishwasher specification by February 28, 2011, with a proposed effective date in fall, 2011. Version 5.0 will replace the specification finalized on November 14, 2008.

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.