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.
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>
<thead>
<tr>
<th>Product Type</th>
<th>Tier 1</th>
<th>Tier 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water</td>
<td>Energy</td>
</tr>
<tr>
<td></td>
<td>(gallons per cycle)</td>
<td>(kWh per year)</td>
</tr>
<tr>
<td>Standard</td>
<td>≤ 4.25</td>
<td>≤ 295</td>
</tr>
<tr>
<td>Compact</td>
<td>≤ 3.50</td>
<td>≤ 222</td>
</tr>
</tbody>
</table>

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.
B. **Cleaning Performance:**

a. **Tier 1:** No minimum cleaning performance requirements. The Average Cleaning Index for a minimum of two “sensor heavy response” soil runs shall be calculated and reported to EPA.

b. **Tier 2:** Cleaning performance shall be greater than or equal to TBD.

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

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

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

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

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

After considering feedback received on Draft 1 and further research and discussion with stakeholders, EPA is proposing the following approach for incorporation of cleaning performance in the Residential Dishwasher specification:
- **Tier 1**: Cleaning performance testing and reporting will be required for all ENERGY STAR qualified products. Although minimum cleaning performance requirements will not be specified for Tier 1, the Average Cleaning Index will be submitted to EPA, along with individual cleaning performance test reports. EPA does not intend to post Average Cleaning Index to the Qualified Product List, but rather, it will be used by EPA to inform development of minimum cleaning performance requirements for Tier 2. In order to minimize overall test burden, EPA will allow for concurrent testing and evaluation of cleaning performance, energy consumption and water consumption; thus, Tier 1 cleaning performance shall be tested per 10 CFR 430, Subpart B, Appendix C (sensor heavy response), and Average Cleaning Index shall be evaluated per ANSI/AHAM DW-1-2009 for a minimum of two soil runs. The soil runs used for evaluation of cleaning performance may be the same soil runs used for testing of energy and water performance at the manufacturer’s discretion.

- **Tier 2**: A minimum cleaning performance requirement will be included as a Tier 2 ENERGY STAR requirement. Cleaning performance scores will be listed on the Qualified Product List alongside energy and water performance test results. Testing and product qualification will be performed in accordance with all aspects of the ENERGY STAR 3rd-party Certification rules (www.energystar.gov/3rdpartycert). EPA understands the advantages associated with concurrent measurement of cleaning performance, energy consumption, and water consumption, but notes that concurrent testing may not be feasible for Tier 2.

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

**C. Significant Digits and Rounding:**

a. 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.

b. Unless otherwise specified, compliance with specification limits shall be evaluated using exact values without any benefit from rounding.

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

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

**4) Test Requirements**

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

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

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

<table>
<thead>
<tr>
<th>ENERGY STAR Requirement</th>
<th>Test Method Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Consumption (kWh/year)</td>
<td>10 CFR 430, Subpart B, Appendix C</td>
</tr>
<tr>
<td>Water Consumption (gallons/cycle)</td>
<td></td>
</tr>
<tr>
<td>Cleaning Performance (Average Cleaning Index)</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Tier 1 Effective Date</th>
<th>Tier 2 Effective Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 1, 2012</td>
<td>January 1, 2013</td>
</tr>
</tbody>
</table>

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.