



ENERGY STAR® Program Requirements for Commercial Dishwashers

Partner Commitments FINAL DRAFT

Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified commercial dishwashers. The ENERGY STAR Partner must adhere to the following program requirements:

- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on commercial dishwashers and specifying the testing criteria for commercial dishwashers. EPA may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at EPA's request;
- comply with current ENERGY STAR Identity Guidelines, describing how the ENERGY STAR marks and name may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;
- qualify at least one ENERGY STAR commercial dishwasher within one year of activating the commercial dishwashers' portion of the agreement. When Partner qualifies the product, it must meet the specification (e.g., Tier 1 or 2) in effect at that time;
- provide clear and consistent labeling of ENERGY STAR qualified commercial dishwashers. The ENERGY STAR mark must be clearly displayed on the top/front of the product, in product literature (i.e., user manuals, spec sheets, etc.), on product packaging, and on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed;
- provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying commercial dishwasher models. Once the Partner submits its first list of ENERGY STAR qualified commercial dishwashers, the Partner will be listed as an ENERGY STAR Partner. Partner must provide annual updates in order to remain on the list of participating product manufacturers;
- provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total number of ENERGY STAR qualified commercial dishwashers shipped (in units by model) or an equivalent measurement as agreed to in advance by EPA and Partner. Partner is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g., capacity, size, speed, or other as relevant), total unit shipments for each model in its product line, and percent of total unit shipments that qualify as ENERGY STAR. The data for each calendar year should be submitted to EPA, preferably in electronic format, no later than the following March and may be provided directly from the Partner or through a third party. The data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner;
- notify EPA of a change in the designated responsible party or contacts for commercial dishwashers within 30 days.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures and should keep EPA informed on the progress of these efforts:

- consider energy efficiency improvements in company facilities and pursue the ENERGY STAR mark for buildings;
- purchase ENERGY STAR qualified products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR qualified product information to employees for use when purchasing products for their homes;
- ensure the power management feature is enabled on all ENERGY STAR qualified monitors in use in company facilities, particularly upon installation and after service is performed;
- provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR qualified product models;
- feature the ENERGY STAR mark(s) on Partner Web site and in other promotional materials. If information concerning ENERGY STAR is provided on the Partner Web site as specified by the ENERGY STAR Web Linking Policy (this document can be found in the Partner Resources section on the ENERGY STAR Web site at www.energystar.gov), EPA may provide links where appropriate to the Partner Web site;
- provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, communicate, and/or promote Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR Web pages, etc. The plan may be as simple as providing a list of planned activities or planned milestones that Partner would like EPA to be aware of. For example, activities may include: (1) increase the availability of ENERGY STAR labeled products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrate the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) provide information to users (via the Web site and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products, and (4) build awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event;
- provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.



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Eligibility Criteria FINAL DRAFT

Below is the **FINAL DRAFT** product specification for ENERGY STAR qualified commercial dishwashers. A product must 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. **Dishwashing Machine:** A machine designed to clean and sanitize plates, glasses, cups, bowls, utensils, and trays by applying sprays of detergent solution (with or without blasting media granules) and a sanitizing final rinse.
- B. **Under Counter Dishwasher:** A machine with an overall height 38 inches or less, in which a rack of dishes remains stationary within the machine while being subjected to sequential wash and rinse sprays, and is designed to be installed under food preparation workspaces. Under counter dishwashers can be either chemical or hot water sanitizing, with an internal booster heater for the latter.

Note: Several stakeholders expressed concern with the proposed 36-inch maximum height requirement for undercounter machines. Many companies carry models that are taller than 36 inches and approved by NSF as an undercounter machine. Where available, EPA has used the definitions developed by NSF for the different dishwasher types in this specification, providing additional clarification, as needed. However, NSF does not provide a definition for undercounter machines. Since undercounter machines are allowed a higher water consumption limit under this proposed ENERGY STAR specification, it is important to be able to draw a clear line between this and other types of equipment. EPA presented these concerns to industry stakeholders at a meeting during the National Restaurant Association (NRA) Show on May 21, 2007. Attendees suggested that raising the height to 38 inches would be sufficient to address industry and EPA's concerns regarding this product category.

- C. **Stationary Rack, Single Tank, Door Type Dishwasher:** A machine in which a rack of dishes remains stationary within the machine while subjected to sequential wash and rinse sprays. This definition also applies to machines in which the rack revolves on an axis during the wash and rinse cycles. Subcategories of stationary door type machines include: single and multiple wash tank, double rack, pot, pan and utensil washers, chemical dump type and hooded wash compartment ("hood type"). Stationary rack, single tank, door type models are covered by this specification and can be either chemical or hot water sanitizing, with an internal or external booster heater for the latter.

Note: EPA received a comment that "single door type" should be changed to "door type" to avoid confusion regarding the number of doors allowed on the machine. EPA has made this change above. EPA was also asked to provide examples of "hooded wash compartments". It is EPA's understanding that the terms "hood type" and "door type" are used interchangeably to describe the same machine. "Hood type" machines simply allow for the entire "hood" over the wash/rinse compartment to be raised when loading dishes, as opposed the opening to be limited to the door. There are a few manufacturers who market these machines as "hood type" and in the interest of being inclusive EPA included these product designs in the definition above.

- D. Single Tank Conveyor Dishwasher: A warewashing machine that employs a conveyor or similar mechanism to carry dishes through a series of wash and rinse sprays within the machine. Specifically, a single tank conveyor machine has a tank for wash water followed by a final sanitizing rinse and does not have a pumped rinse tank. This type of machine may include a pre-washing section before the washing section. Single tank conveyor dishwashers can be either chemical or hot water sanitizing, with an internal or external booster heater for the latter.
- E. Multiple Tank Conveyor Dishwasher: A conveyor type machine that has one or more tanks for wash water and one or more tanks for pumped rinse water, followed by a final sanitizing rinse. This type of machine may include one or more pre-washing sections before the washing section. Multiple tank conveyor dishwashers can be either chemical or hot water sanitizing, with an internal or external booster heater for the latter.

Note: One commenter suggested that EPA limit the number of wash and rinse tanks included in the definition for multiple tank conveyor dishwashers to one of each so there will be no confusion regarding the NSF-specified temperatures for the water in these tanks. It was also suggested that auxiliary rinse is the same as pumped rinse, and therefore the reference to an auxiliary rinse section in the multiple tank conveyor definition can be deleted. EPA presented these suggestions to industry stakeholders during the May 21 meeting and attendees suggested that it was best to follow the NSF multiple tank conveyor definition. Stakeholders also suggested that the statement about auxiliary rinse could be deleted. This reference has been removed from the definitions for single and multiple tank conveyors.

- F. Hot Water Sanitizing (High Temp) Machine: A warewashing machine that applies potable hot water to the surfaces of wares to achieve sanitization.
- G. Chemical Sanitizing (Low Temp) Machine: A warewashing machine that applies potable water and a chemical sanitizing solution to the surfaces of wares to achieve sanitization.
- 2) Qualifying Products: Commercial dishwashers must meet the definitions provided in Section 1, above, to be eligible for ENERGY STAR. **Note:** EPA may consider additional product categories in future versions of this specification based on industry stakeholder interest, available test procedures and performance data, model differentiation, and ease of implementation.

Note: There continues to be significant stakeholder interest in covering flight type machines in this specification. EPA recognizes the impact that flight type machines have on total water consumption within this sector. With this first version of the specification, EPA addresses the majority of the commercial dishwasher market. Flight type machines are a small segment of the market and are custom-built for most sites making it difficult to develop an ENERGY STAR specification. EPA may consider addressing flight type machines under subsequent versions of the specification based on industry interest, available performance data, and a clear methodology for addressing the custom-built nature of flight type machines. In the meantime, a statement has been added that EPA may consider expanding the specification to flight type and other categories of machines.

In lieu of a performance requirement, some stakeholders asked EPA to provide guidance on how to consider energy and water performance when ordering flight type machines. EPA may consider highlighting some best practices or other helpful guidance to consider when purchasing and operating a commercial dishwasher on the ENERGY STAR Web site, as appropriate. However, EPA does not plan to make specific suggestions regarding water and/or energy efficiency for those products not covered by the ENERGY STAR specification.

- 3) **Efficiency Requirements for Qualifying Products:** Commercial dishwashers must meet the requirements provided below in Table 1 to qualify as ENERGY STAR. **Machines designed to be interchangeable in the field from high temp to low temp, and vice versa, must be indicated as such on their Qualified Product Information (QPI) form and must meet both the high temp and low temp requirements of Table 1, below, to qualify as ENERGY STAR.**

Table 1: Efficiency Requirements for Commercial Dishwashers				
Machine Type	High Temp Efficiency Requirements		Low Temp Efficiency Requirements	
	Idle Energy Rate*	Water Consumption	Idle Energy Rate*	Water Consumption
Under Counter	≤ 0.90 kW	≤ 1.00 gal/rack	≤ 0.5 kW	≤ 1.70 gal/rack
Stationary Single Tank Door**	≤ 1.0 kW	≤ 0.950 gal/rack	≤ 0.6 kW	≤ 1.18 gal/rack
Single Tank Conveyor	≤ 2.0 kW	≤ 0.700 gal/rack	≤ 1.6 kW	≤ 0.790 gal/rack
Multiple Tank Conveyor	≤ 2.6 kW	≤ 0.540 gal/rack	≤ 2.0 kW	≤ 0.540 gal/rack

* Idle energy rate as measured with door closed and rounded to 2 significant digits.

** Includes pot, pan, and utensil machines.

To determine gallons per rack, manufacturers must use the calculations provided below. These calculations are based on gallons per rack conversions provided in the NSF Products and Service Listing for commercial dishwashers at www.nsf.org. **Note:** GPR should be rounded to 3 significant digits.

Conveyor Type

$$\text{GPR} = \frac{\text{GPH} \times \text{RL}}{\text{CS} \times 60}$$

Door Type

$$\text{GPR} = \frac{\text{GPH} \times (\text{WT} + \text{RT} + \text{DT} + \text{LT})}{3600}$$

Load Time= 5 seconds for straight through door-type dishwashers.

Load Time= 7 seconds for corner door-type dishwashers.

Undercounter Type

$$\text{GPR} = \frac{\text{GPH} \times (\text{WT} + \text{RT} + \text{DT} + \text{LT})}{3600}$$

Load time= 30 seconds for undercounter dishwashers.

WT= Wash Time in seconds.

RT= Rinse time in seconds.

DT= Dwell time in seconds.

RL= Rack length, use 20x20 in.

LT= Load time.

CS= Maximum conveyor speed in feet per minute

GPH= Water use in gallons per hour.

Note: Regarding the calculations above, stakeholders asked for the following: (1) a footnote in the definition of rack length that requires 20x20 inches to be used to ensure consistency and (2) guidance on how to report GPR values. These additions are provided under Table 1, above. EPA is proposing to require GPR rounding to three significant digits and idle energy to two significant digits. The levels provided in Table 1 now reflect these rounding requirements.

Multiple Tank Idle Energy Limit

The Draft 2 specification proposed an idle energy limit of 2.0 kW for multiple and single tank high temperature conveyors and 1.6 kW for multiple and single tank low temperature conveyors. Several stakeholders pointed out that the idle levels for multiple tank and single tank conveyors should not be identical. Specifically, the multiple tank machine idle limit should be higher due to the fact that two tank heaters are being considered in the measurement. In response to this comment, EPA revisited the data provided by manufacturers and found that some of the points represented wash tank idle energy use only. Idle energy measurements for multiple tank machines should represent the collective energy used by the wash and final rinse tanks. Based on reanalysis of the data, EPA is now proposing an idle energy limit of 2.6 kW for multiple tank high temperature machines and 2.0 kW for multiple tank low temperature machines.

Energy Usage Considerations

Many stakeholders believe that normal/peak energy consumption should be taken into account for ENERGY STAR qualification. There are some concerns that efforts to minimize water consumption and idle energy for ENERGY STAR qualification will still result in equipment that is inefficient from a total energy consumption standpoint. Future versions of this specification will address the energy being used in all modes of operation. However, the ASTM test procedures that seek to provide this more holistic view of machine energy consumption are still under revision. Once these test procedures are finalized, EPA intends to incorporate them into this specification. This will also require revising the specification performance requirements and asking manufacturers to test their products using the new test procedures. At that time new performance requirements will be proposed. EPA anticipates that the revised ASTM test procedures will be finalized within the next year and an additional year or two will be required to build a sufficient database using the new procedures such that a revised ENERGY STAR specification may be developed. Until then, idle energy and the indirect energy savings due to water efficiency, will serve as a good proxy for energy efficiency under this specification.

EPA received comments that rack capacity and tank volume should be considered when setting idle energy limits. The idle energy rate proposed in this specification is based on a limited set of data. Through the ENERGY STAR qualifying product reporting process, EPA will be able to acquire a more robust dataset including data on tank volume. We will then be able to make an educated evaluation as to whether the idle energy requirements should be adjusted based on total tank volume or rack capacity.

Single Tank, Low Temperature Door Type Machine GPR Level

One stakeholder commented that the 1.16 GPR limit proposed in Draft 2 for single tank, door type low temperature models was too stringent for batch-type, or fill and dump, machines and suggested a new level of 1.2 GPR. The performance levels presented in this specification recognize the most energy and water efficient products regardless of technology. When the levels for door type, low-temp models were proposed in Draft 2, approximately 25% of models listed in the NSF database met the 1.16 GPR limit. However, EPA has since revisited the dataset to determine whether it was representative of models currently being sold in the marketplace. Through this additional research EPA found that only 18% of models actually being sold could meet the proposed ENERGY STAR requirements in this category. EPA has reevaluated and has determined that the top 25% of models is better represented at 1.18 GPR.

Four manufacturers offer low-temp models at this level, which indicates that there are several technology options (non proprietary) available to reach this level of water efficiency performance. This follows ENERGY STAR's practice of representing approximately the top quartile of available models when the specification is set, thereby serving as a target for manufacturers when redesigning their machines. Initially, EPA questioned whether to allow fill and dump machines to qualify as ENERGY STAR due to their inherently more water intensive design. However, EPA also recognizes the prevalence of fill and dump machines in the marketplace and by proposing to set the level at 1.18 GPR, only the most energy and water efficient machines will be allowed to qualify.

Single Tank, Low Temperature Conveyor Machine GPR Level

Some stakeholders commented on the levels proposed for single tank, low temperature conveyors. Specifically, they suggested that the levels for high and low temperature models should be identical and that the proposed 0.62 GPR level may not be representative of the top 25% of models available in the marketplace. EPA revisited its dataset and found that a number of models to be either discontinued or misrepresented as single or multiple tank in the NSF database. The dataset was updated based on this additional research and only 10% of models now meet the 0.62 GPR level. EPA is now proposing a 0.79 GPR for single tank, low temperature conveyors, which represents the top 20% of models in that dataset.

- 4) **Test Criteria:** Manufacturers are required to perform tests and self-certify those product models that meet the ENERGY STAR guidelines. The test results must be reported to EPA using the Commercial Dishwasher QPI Form. In measuring water consumption and idle energy rate, partner agrees to use the following test standards:

- **Water Consumption:** NSF/ANSI 3-2003 Standard, *Commercial Warewashing Equipment*.

Note: All machines must be certified to NSF/ANSI 3-2003 by a third party laboratory capable of testing to the above referenced test procedure.

- **Idle Energy Rate for Hot Water and Chemical Sanitizing Undercounter and Stationary Rack Single Tank Door-Type Dishwashers:** ASTM Standard F1696, *Standard Test Method for Energy Performance of Single-Rack Hot Water Sanitizing, Door-Type Commercial Dishwashing Machines*.
- **Idle Energy Rate for Hot Water and Chemical Sanitizing Single and Multiple Tank Rack Conveyor Dishwashers:** ASTM Standard F1920, *Standard Test Method for Energy Performance of Rack Conveyor, Hot Water Sanitizing, Commercial Dishwashing Machines*.

Note: Although the titles of the ASTM test procedures listed above specifically call out hot water sanitizing machines the idle energy rate portion is also applicable, and should be used, for chemical sanitizing machines.

Note: EPA received a comment that all machines seeking ENERGY STAR qualification should be listed with NSF as a prerequisite, which will ensure that the units will sanitize and remove soil properly. Requiring listing to NSF would exclude other certification bodies that are capable of performing the NSF-3 test procedure and certifying machines. However, ensuring that product performance is maintained with greater efficiencies is vital to the ENERGY STAR specification development process. Therefore, EPA has added a statement above requiring that every machine be certified to NSF-3, which will ensure that sanitation and soil removal are properly addressed without eliminating other testing organizations.

Regarding testing for idle energy rate, one stakeholder suggested that units that start by closing the door should have the extra wash and rinse cycle produced included in the idle energy calculation. There was some concern that the propping of the door to prevent this condition during testing is not indicative of real world use. The purpose of including idle energy in this specification is to account for the amount of energy used to maintain tank temperature between wash cycles. Therefore, including the energy used during the wash and rinse cycle would not be indicative of idle energy use. Furthermore, the ASTM test procedure requires the machine to be stabilized following the initial wash and rinse cycle that is triggered once the door is closed. In fact, the door should not be propped to avoid the wash and rinse cycle; rather, the machine should be allowed to go through one complete cycle and stabilize prior to testing idle energy use.

One comment was made that during real world conditions, the idle test with the door closed is not practiced. The stakeholder cautioned that the test method may want to be expanded to include an open door idle test, which may be more reflective of true idle energy use. The role of ENERGY STAR is to identify the most energy and water efficient models through the use of credible, consistent, and industry accepted test methods and conditions. It is assumed that performance under closed-door and open-door conditions will yield similar comparative results among products. Where deemed important, real world performance is emulated but the critical requirements of an ENERGY STAR test procedure are reliability, credibility, and repeatability. Operators are expected to follow best practices and keep the door closed during idle periods to avoid heat loss to the surrounding kitchen area.

Note: There continues to be some concern with the current cleaning and sanitation performance requirements of NSF-3. EPA was asked to view the current equipment sanitation testing standards as interim guidance, with the intent of supporting the pending formal request to NSF to revise its cleaning and sanitation standard to take into account actual use conditions. EPA would be interested in reviewing and participating in discussions on potential revisions to the current NSF-3 test standard. Maintaining product performance of ENERGY STAR qualified products is important to EPA and to the extent that revisions to the NSF-3 test procedure can help to ensure continued sanitation and performance in the field, we support those efforts.

- 5) **Effective Date:** The date that manufacturers may begin to qualify products as ENERGY STAR will be defined as the *effective date* of the agreement. The ENERGY STAR Commercial Dishwasher Specification shall go into effect on **October 11, 2007**.

Note: EPA received a request to delay the launch of this specification to at a minimum the NRA Show in May 2008, which would give all companies time to generate more environmentally friendly appliances. Consistent with the principle of establishing energy specifications to capture roughly the top 25% of models, EPA believes that an adequate selection of products able to qualify, representing a variety of manufacturers, is currently available in the marketplace. Furthermore, there is significant support among stakeholders to launch the specification at the NAFEM show, October 11-13, 2007. Therefore, EPA is retaining the October 11, 2007 effective date and is proposing to move forward with plans to launch the new program at the 2007 NAFEM show.

- 6) **Future Specification Revisions:** ENERGY STAR 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. To qualify with the energy and water efficiency criteria of ENERGY STAR, a product model must meet the ENERGY STAR specification in effect on the date of manufacture.

ASTM Test Standard Review: ENERGY STAR plans to revisit this specification once the revision processes for ASTM F1696 and ASTM F1920 are complete. These test methods will address energy consumption in various modes of operation as well as water consumption.

Review of Idle Energy Requirements: Within two years of this specification becoming effective, ENERGY STAR will review idle energy data to determine whether the limits provided in Table 1 provide for sufficient differentiation in the marketplace. If it is determined that revisions are needed, EPA will work closely with industry stakeholders to develop appropriate new levels.

Note: EPA received a request to review the appropriateness of the proposed idle energy levels when more data is made available. Through the ENERGY STAR qualifying product reporting process, EPA will be able to acquire a more robust idle dataset which will indicate if there is a need to revise the levels. A statement has been added above that within the next two years, EPA will revisit the idle energy levels to determine if these levels need to be adjusted.