Summary and Response to Stakeholder Comments
ENERGY STAR Program Test Method for Commercial Dishwashers (Rev. Jan-2012)

Section	Comment Summary	Response
General	Will units still be required to be NSF listed for sanitation?	Yes. As specified in the Version 2.0 Draft 3 Specification Section 3E, "All machines shall be certified to the NSF/ANSI 3-2010 Standard, *Commercial Warewashing Equipment* ."
Definitions	The definition for "Under Counter" type machines should be revised to include hot water sanitizing machines with or without an internal booster heater. There are some machines that use water pre-heated to 180°F by an external booster. These models should be eligible for qualification also.	The definition for under counter machine has been updated to include designs that use external booters.
Definitions	The Energy Saver Mode definition should be updated to account for units that enter Energy Saver Mode automatically and manually.	The definition has been revised from "A dishwasher is in energy saver mode if, after inactivity, the dishwasher converts to a setting that consumes less energy than it does in idle mode (not all dishwashers include this feature)" to "A dishwasher is in energy saver mode if the dishwasher is manually converted or, after inactivity, the dishwasher automatically converts to a setting that consumes less energy than it does in idle mode (not all dishwashers include this feature)" in the Draft Final Test Method (Rev. Apr-2012).
Test Conduct	A new paragraph should be added to clarify the test method for the water consumption test and subsequent reporting for post-sanitizing rinse machines. For example, "water consumption testing for post-sanitizing rinse machines must be performed and reported both with the post-sanitizing rinse on and with it off." If the intent is to qualify these models with only the worst-case water consumption value, then it should be noted.	A new section has been added to the Draft Final Test Method (Rev. Apr-2012) to clarify that the water consumption test for post-sanitizing rinse machines must be performed and reported both with the post-sanitizing rinse on and with it off.
Test Conduct	Stakeholders recommend that manufacturers be given the option to allow the machine to be repaired in the field instead of terminating the testing on that machine.	Language clarifiying that field servicing and component replacements with identical model numbers are allowed is included in the Draft Final Test Method (Rev. Apr-2012). However, additional language specifies that if the manufacturer elects to have a unit repaired by servicing or replacing a component, the manufacturer may not request that a new unit be tested unless the unit is inoperable subsequent to the repair.
Test Conduct	If a unit could revert back to an Idle Mode from Energy Saver Mode, would Energy Saver Mode be allowed to be enabled? If not, is there a way to encourage manufacturers to include Energy Saver Mode?	The Draft Final Test Method (Rev. Apr-2012) requires that Energy Saver Mode be disabled during testing to provide data based on a worst case scenario; however, EPA is considering ways to provide users with information about Energy Saver Mode and its potential to save energy. EPA will address this comment in the final draft specification.

Test Setup	The resolution of the scale for weighing water should be 0.1 lb rather than 0.01 lb. The difference of 0.1 lb equates to approximately 1.5 ounces of water. This difference is easily within the error of dripping water or water retained in the tank or drain lines during the test.	The scale resolution for weighing water has been modified from 0.01 lb to 0.1 lb in the Draft Final Test Method (Rev. Apr-2012).
Test Setup	For the stopwatch, the accuracy should be +/- 2% of the time being measured. Typical stopwatch accuracy calibrations are done at 0.002% of 1 hr. This is approximately 0.072 seconds. If the stopwatch is being used to measure a 10 second rinse time on a door machine, 0.2% of that is 0.02 seconds which is lower than 0.072. We do not want to replace all of our existing stopwatches with precision devices, if they are available.	The accuracy of the stopwatch has been modified from +/- 0.2% to +/- 2% in the Draft Final Test Method (Rev. Apr-2012).
Test Setup	The description for the gas thermocouple probe in Section 5)B)5)c) be revised to clarify that the probe is used to measure the gas temperature at the meter rather than the dishwasher tank temperature.	This description for the gas thermocouple probe has been modified to include the additional clarification that the temperature sensor is for measuring the gas temperature at the meter in the Draft Final Test Method (Rev. Apr-2012).
Test Setup	The requirements for the stopwatch in Section 5)B)6)a) do not match those of Section 5)A)3).	The requirements are the same except that the referenced ASTM test method does not include an accuracy requirement. DOE has added the accuracy requirement to the section that references the ASTM test method in the Draft Final Test Method (Rev. Apr-2012) for consistency.
Test Setup	Section 5)C)4)a) states the supply of water shall be within +/- 2 °F of its manufacturer specified input temperature. Many manufacturers specify incoming water temperature from 70 to 140 °F. Granted, for the idle energy tests these values are inconsequential. However, when conducting the operating energy consumption tests, the amount of energy consumed by the internal booster is significantly different when changing from 140 to 70 °F. One suggestion is to measure the energy consumption at both ends of the range specified by the manufacturer. As discussed during the ASTM standard revision process, the building hot water heater savings for energy recovery systems must be credited for reporting of these types of machines.	The +/-2 °F tolerance has been removed in the Draft Final Test Method (Rev. Apr-2012) to account for units with a range of incoming water temperatures. Operating energy consumption tests are not conducted for ENERGY STAR qualification at this time; therefore, temperature values are not specified in the ENERGY STAR test method for Commercial Dishwashers.
Test Setup	Section 5)C)5)a) should allow inlet water temperature at +/- 2 °F rather than 1 °F. This is more reasonable and in line with current practice.	This revision has been made in the Draft Final Test Method (Rev. Apr-2012).
Test Setup	Section 5)D)1)a)i.) should state the test shall be run at the cycle time that results in the worst-case water consumption value. There may be some situations where the water consumption at the shortest cycle time is actually lower than a different cycle time.	DOE acknowledges that longer cycle times may provide higher energy consumption; however, to maintain consistency with sanitation testing, the Draft Final Test Method (Rev. Apr-2012) continues to specify use of the shortest cycle time during testing.

Test Setup	Section 5)D)1)a)iv.) states requirements for machines with a final rinse pressure less than 5 psi. NSF 3 requires all fresh water rinse machines to be 5 to 30 psi. This paragraph should be removed.	The referenced paragraph specifies a *range* of less than or equal to 5 psig, not a *rating* of less than or equal to 5 psig. The referenced paragraph is consistent with the requirements in NSF/ANSI 3-2010.
Test Setup	Water at 120 °F should not be used for the water consumption test. Running the test with water at such a high temperature can be dangerous when the catch and weigh method is used.	The water temperature requirement for the water consumption test has been removed in the Draft Final Test Method (Rev. Apr-2012) because several stakeholders expressed concern. Removal of this requirement should not affect test results since a density value has already been specified in the Draft Test Method (Rev. Jan-2012) for the water consumption calculations.
Test Method	Section 6.1 requires the capture vessel to be dried between test runs. If the vessel retains some water but this amount is compensated during the tare process, it should be insignificant and would allow easier test runs.	Due to potential evaporation and water splashing, DOE retained the requirement to dry the capture vessel in the Draft Final Test Method (Rev. Apr-2012) to ensure consistent results between tests.
Test Method	Also, this [water consumption] test method can be problematic for door type machines with a large wash tank. The water level in the tank must be exactly at the overflow stand-pipe when the final rinse comes on to ensure all of the additional final rinse water enters the drain. However, when the wash pump turns on, there is a large amount of water that is cycling through the wash system, clinging to the interior of the machine or splashing out through gaps in the door or tabling. For these reasons it may be worthwhile to consider the flow meter method of measuring the exact amount of water consumed during multiple cycles. Some conveyor machines drain a significant amount of water after the wash pump motors cycle off and the wash water falls out of suspension. This is caused by topping off the tank during the wash and then having too much water in the tank when the pumps shut off. There is not much clearance between the drain and capture vessel for large machines, especially flight type. Larger machines produce a large amount of water, which might make weighing difficult. Flow meters have been used and been accurate for larger conveyor type machines. Flow meters should not be used on smaller stationary type units as the water does not flow long enough for stabilization to occur.	DOE has replaced the catch and weigh test method with a flow meter test method in the Draft Final Test Method (Rev. Apr-2012) for conveyor machines. The flow meter test specifies the use of a calibrated flow meter with a resolution of 0.1 gallons per minute and an accuracy of +/- 1.5%. The flow will be measured for one minute of continuous operation five times and the average flow value will be used to determine water consumption.However, for stationary rack machines, DOE will retain the original catch and weigh method since variable flow can cause inaccuracy in flow meter readings.

Test Method	Section 6.2)3)d)ii.) states that the test shall be terminated if the difference between the recorded value and the manufacturer specified input is greater than 5%. However, the term “manufacturer specified input” is not clearly defined. Many manufacturers do not include the heater kW rating on the data plate. Even if they do, the machine could be rated for a range of voltages such as 208-240. If the data plate is marked 7,200 kW for the 240 volt operation and the test is performed at 208 volts, the variance will be much greater than 5%. Also, if the kW rating is not marked on the machine, what value is used for “manufacturer specified input”? One solution is to use the engineering details specified on the print for the heating element and document this in the descriptive report for verification inspection purposes.	The Draft Final Test Method (Rev. Apr-2012) has been revised so that the nameplate rating or a rating printed on the heating element is used for the maximum energy input rate test.
Test Method	How was the value of 5% for the difference between the recorded and manufacturer specified values for Maximum Energy Input Rate determined by ASTM?	This value has been in place since the ASTM procedures were originally written. ASTM believes it was chosen as a reasonable tolerance.
Test Method	Sections 6.2)3)c)iv.) and 6.2)3)e) describe the methods for maximum energy input rate of machines with steam coil tank heat. We have not performed enough tests on these configurations to be able to provide useful comments at this time. However, we are concerned that the energy consumption for steam machines will be much higher than the equivalent electric heat machines due to the fact that the heat input is only limited by the capacity of the condensate trap.	The Version 2.0 specification is intended to only cover electric designs. However, EPA is interested in covering steam and gas product types under the next version of the specification, which will address total energy consumption of the machine. Therefore, manufacturers are encouraged to use this ENERGY STAR test method once final to collect data on steam and gas dishwasher performance.
Test Method	It is difficult to establish the time delay between inlet and outlet. Steam traps don’t open until enough water has accumulated.	An alternate method has been added to the Draft Final Test Method (Rev. Apr-2012) that allows an estimate of the time delay based on the volume of the heat exchanger divided by the average steam flow rate during the first complete heater “on” cycle.
Test Method	Ensure that a requirement for quality of the steam is included in the test method.	The Draft Test Method (Rev. Jan.-2012) specifies “For machines with steam coil tank heat, using an appropriately sized vessel that is completely dry, catch all water from the outlet during the test. Weigh the filled vessel, subtracting the weight of the capture vessel to calculate the weight of the water. Calculate the total mass of the inlet steam during the test and confirm that it is within 5% of the mass of water measured from the outlet stream. If the difference is greater than 5%, adjust the quality of the steam until the difference is less than 5% and rerun the tank heater “maximum energy input rate” (i.e. maximum power) test.” This language has been maintained in the Draft Final Test Method (Rev. Apr-2012).

Test Method	Section 6.2)4)a) states that the booster and other heater loads shall be compared to the total power consumption rating. If the machine is rated in amps only and not kW, this should not be used to determine the maximum energy input rating. The total amps marked on a machine rating plate may be inflated to account for additional loads such as chemical feeders.	Language specifying that amps may be used has been removed from the Draft Final Test Method (Rev. Apr-2012) because the rated amps do not necessarily represent the actual amps used by the machine.
Test Method	The electric booster heater on time for door type machines is often very short, especially during the idle test. Allowing the start and stop time of the power monitoring to vary +/- 2 seconds could skew the results. If the heater on time is 15 seconds, being off by 4 seconds could skew the results by up to 25%. Typically, these meters automatically monitor the on/off time and are nearly instantaneous. (Section 6.2)4)b)ii.))	The time tolerance for monitoring has been removed from the Draft Final Test Method (Rev. Apr-2012). Language clarifying that the unit should be continuously monitored and data used in calculations should be chosen from as close to the start and end of the cycle as possible has been added.
Test Method	(Section 6.2)5)a)) Door type machines typically allow the final rinse water to flow for about 10 seconds during a 1 minute operating cycle. When the final rinse comes on, the water in the manifold where the temperature sensing device is located has dropped to well below 180 °F. When the rinse turns on, it is not unusual for the temperature to display numbers 10 or 20 °F below the minimum for the first couple of seconds. It seems to me the better method for door type machines is to state the *maximum* temperature shall not exceed 182 °F. Current practice allows +/- 2 °F.	The Draft Final Test Method (Rev. Apr-2012) has been revised so that the *average* temperature is between 180 and 195 °F for consistency with ASTM. Specifying a maximum value of 182 °F is too restrictive since the temperature fluctuates within a wider range than 180 to 182 °F.
Test Method	When performing the idle tank temperature measurement in Section 6.2)6)b), the procedure states the thermostat should be adjusted per the manufacturer's instructions if the temperature is not correct. The temperature should only be adjusted if there is a user adjustment available. Most machines provide thermostats factory set and not adjustable by the user. If a factory set thermostat must be adjusted to meet this criteria, that setting must be carried over to the production line so the energy consumption will be consistent. The adjustment procedure in Section 6.3)5)b)should only be used if the booster heater is provided with a user adjustable thermostat. If the internal thermostat is not user adjustable, any change made must be documented and implemented on all production dishmachines.	The Draft Final Test Method (Rev. Apr-2012) has been revised so that the thermostat may only be adjusted if it is user adjustable. A proposed definition for user adjustable is also included: "A feature is user adjustable if it may be adjusted by the machine operator without aid from a technician or manufacturer".
Test Method	Stakeholders believe booster heater idle energy rates should be included in the reporting process as long as the machines are adequately identified on the qualified product list as to whether or not the booster is internal or external. That way a consumer can make an informed decision based on like models.	Language clarifying that internal booster heater idle energy should be separately reported has been added to the Draft Final Test Method (Rev. Apr-2012). External booster heaters are sometimes separately sold from the dishwasher, however. Therefore ratings for external booster heaters should not be included with specific dishwasher models. In addition, an external booster heater test method has not been validated.

Test Method	The idle test should allow for the machine to completely heat the surrounding metal parts of the machine. If they have not completely heated up with the water at the correct tank temperature (>nameplate – 1 °F), then the machine idle rate result could be compromised.	The Draft Final Test Method (Rev. Apr-2012) has been modified from two tank heater "on" cycles to a one hour idle period before the start of the test to allow adequate time for the machine to completely heat up.
Test Method	If the booster heater is required to operate for 10 on cycles similar to the wash tank heater, this will take over 8 hours for many machines (Section 6.2)7)b)iv.)). We are not certain why the booster heater must cycle for the same number of cycles as the wash tank heater.	The booster heater is not required to cycle for the same number of cycles as the wash tank heater. Rather, the Draft Test Method (Rev. Jan-2012) specifies that "If the booster heater idle energy cannot be simultaneously measured with the Dishwasher idle energy, the booster heater idle energy may be monitored at a different time; however, the test must include the same number of booster heater 'on' cycles that were in the Dishwasher idle energy test". The intention of this step is to ensure that, when separately monitored, the booster heater idle energy is the same as it was when the total Dishwasher idle energy was measured so that the calculations are accurate and consistent. This language has been retained in the Draft Final Test Method (Rev. Apr-2012).
Test Method	Requiring units to finish 10 cycles during testing may cause test to run as long as 8 hours. Would Energy Saver Mode be applicable in this case?	Requiring 10 cycles reduces the chance of test inconsistencies if the test ends during a partial cycle within the three hour period. An alternate method would be to require replicate tests. However, the 10 cycle test is less burdensome in terms of technician time. Energy Saver Mode would not be applicable in this case because an accurate reading of the Idle Energy Mode is needed.
Test Method	The paragraph in Section 6.3)1)e) says to note which components are included in the manufacturer's power consumption ratings and monitor only those components. This seems to imply that a manufacturer can rate the machine based on a tank heater only and not include other loads such as controls or cooling fans and be able to claim a lower idle rate than what is actually being consumed. This is not in compliance with the ENERGY STAR intent.	The Draft Final Test Method (Rev. Apr-2012) specifies "In Section 9.4, the watt-hour meters shall be connected so that all idle energy (including tank heater(s), motors, and controls) is monitored". The paragraph in Section 6.3)1)e) has been deleted in the Draft Final Test Method (Rev. Apr-2012) to avoid misinterpretation of which components are included in the Maximum Energy Rate test versus those that are included in the Idle Energy Rate test.
Test Method	The booster heater maximum energy input rate does not include provisions for steam coil booster heaters. These are common on steam heated conveyor machines and must be added. The method would essentially be the same as the tank heater steam coil test.	The Draft Final Test Method (Rev. Apr-2012) has been revised to include steam coil booster heaters.
Test Method	If the water for the post-sanitizing rinse is cold water from the tap, should it be included in the final water consumption, since water consumption was originally intended as a replacement for total energy consumption and is used to size heaters?	A new section has been added in the Draft Final Test Method (Rev. Apr-2012) to clarify that the water consumption test for post-sanitizing rinse machines must be performed and reported both with the post-sanitizing rinse on and with it off.

		EPA recognizes the relationship between water and energy consumption. In lieu of an energy consumption metric, EPA chose final rinse water consumption as an alternative to recognize energy efficient machines under the Version 1.0 specification. However, EPA also believes that end users and other stakeholders are interested in the water consumption of these machines as resources are strained and utility costs rise, particularly in some areas of the country. Therefore, EPA continues to be interested in, at the very least, providing this information to the end user. It is EPA and DOE's understanding that NSF requires that total water consumption include that attributed to the post-sanitizing rinse when certifying to NSF 3 and is considering the same approach. However, EPA and DOE are open to discuss further with manufacturers of these machines.
Test Method	Regarding a potential steam injection test method, tank overflow would include other elements of water consumption during active mode testing. This could alter the water temperature such that it does not reflect the steam outlet temperature. Final rinse overflow water will not be an issue for Idle Mode testing; however there may be turbulence in the water due to the steam entering the water. A one hour period before taking readings should help to reduce this turbulence.	Since only the idle mode is being tested at this time, the overflow water would not include other elements of water consumption. A one hour stabilization period has been added for all units (i.e. steam coil, electric, and gas tank heat) in the Draft Final Test Method (Rev. Apr-2012). However, a steam injection test method will not be included since DOE did not receive enough feedback to determine how the steam injection test method would be accurately run. For steam injection units to be included, DOE would need a method for measuring the temperature of the water in the tank; however, DOE understands that the temperature can vary greatly within the tank. DOE believes that steam injection units should be excluded for the following reasons: there is a small market percentage of units with steam injection tank heat, the majority of the steam coil test method was newly introduced in the Draft Test Method (Rev. Jan-2012), and stakeholders have little to no experience testing steam units. However, steam injection units may be considered in a future revision if more information can be obtained.
Test Method	A fresh water sanitizing rinse would most likely be paired with a fresh water post-sanitizing rinse and a pumped water sanitizing rinse would most likely be paired with a pumped water post-sanitizing rinse. There could not be a unit with a fresh water Sanitizing Rinse and a pumped water Post-sanitizing Rinse, and there would likely not be a unit with a pumped water Sanitizing Rinse and fresh water Post-sanitizing Rinse. However, there is no need to restrict designs in the test method.	DOE has retained the language from the Draft Test Method (Rev. Jan-2012) in the Draft Final Test Method (Rev. Apr-2012) that allows testing for these different design options.
Test Method	A stationary rack machine with different spray systems for the sanitizing and post-sanitizing rinse does not exist, however, there is no need to restrict designs in the test method.	DOE has retained will retain the language from the Draft Test Method (Rev. Jan-2012) in the Draft Final Test Method (Rev. Apr-2012) that allows testing for these different design options.

Test Method	A Post-sanitizing Rinse would most likely be activated with a solenoid.	DOE has retained the language from the Draft Test Method (Rev. Jan-2012) in the Draft Final Test Method (Rev. Apr-2012) that allows solenoid activation during testing.
Calculations	Equation 7 should use the water consumption per cycle rather than per rack. Some machines may be able to fit two racks but when calculating for the area of the rack, the number of racks is immaterial.	The number of racks is addressed in Equation 6 , which normalizes the data. Therefore, no changes were made to the calculations in the Draft Final Test Method (Rev. Apr-2012).
Calculations	The description for $E_{Electric}$ in Equation 12 does not have units associated with it.	Units of Btu have been added in the Draft Final Test Method (Rev. Apr-2012).