# ENERGY STAR® Program Requirements
# Product Specification for Clothes Washers

## Eligibility Criteria
## Draft 1 Version 6.0

Following is the **Draft 1 Version 6.0** product specification for ENERGY STAR qualified clothes washers. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

**Note:** In May 2010, the Environmental Protection Agency (EPA) informed stakeholders of its intention to discontinue qualification of combination all-in-one washer-dryers (hereafter, referred to as combination W/Ds) under the ENERGY STAR clothes washer specification. In the absence of an ENERGY STAR performance specification for residential clothes dryers, EPA concluded it was inappropriate to associate the ENERGY STAR label with combination W/Ds. Since that time, EPA worked with stakeholders to identify an approach that would provide these products the opportunity to demonstrate high efficiency performance on a whole-product basis.

The first step of this process was completed on September 21, 2010 when EPA issued a notice to stakeholders specifying an interim test procedure for combination W/Ds through which manufacturers would test and report washing and drying functions separately. Under this approach, washing energy- and water- performance would be tested using the current U.S. Department of Energy (DOE) test procedure (10 CFR § 430 Subpart B Appendix J1), and drying performance would be assessed in accordance with the final revised test procedure for clothes dryers published by the DOE pursuant to the June 2010 Supplemental Notice of Propose Rulemaking. DOE subsequently issued this final rule in January 2011 (new clothes dryer test procedure located at 10 CFR § 430 Subpart B Appendix D1). Following this final rule, EPA convened a stakeholder conference call in January 2011 to notify stakeholders of this final rule and discuss the information needed in order for EPA to consider new performance levels for combination W/D. EPA has since received test data from several stakeholders and in this Draft 1 is proposing new requirements for combination W/Ds, including performance criteria and a reporting requirement, which would enable a combination W/D to qualify for ENERGY STAR based on whole product performance. In this draft 1 specification, EPA is also proposing new definitions.

The text boxes below discuss the changes that are being proposed for combination W/Ds and EPA's rationale. . Please send comments via email to appliances@energystar.gov no later than November 11, 2011.

*Note:* Through a separate stakeholder process, EPA is also revising the criteria for commercial clothes washers covered in the ENERGY STAR clothes washer program. EPA issued a Draft 1 proposal for commercial washers on July 28, 2011. For clarity, the changes that were proposed in that Draft 1 for commercial washers are shown in red font, while the changes being proposed in this Draft 1 for combination W/Ds are shown in blue font. EPA plans to eventually combine changes from both revision processes into a final Version 6.0 specification document.

1) **Definitions**: Below are the definitions of the relevant terms in this document.

A. Residential Clothes Washer: A consumer product designed to clean clothes, utilizing a water solution of soap and/or detergent and mechanical agitation or other movement, and must be one of the following classes: automatic clothes washers, semi-automatic clothes washers, and other clothes washers.

B. Commercial Clothes Washer: A soft-mounted front-loading or soft-mounted top-loading clothes washer that:
(1) Has a clothes compartment that:
(i) For horizontal-axis clothes washers, is not more than 3.5 cubic feet; and
(ii) For vertical-axis clothes washers, is not more than 4.0 cubic feet; and
(2) Is defined for use in:
(i) Applications in which the occupants of more than one household will be using the clothes washer, such as multi-family housing common areas and coin laundries; or
(ii) Other commercial applications.

C. Combination All-in-One Washer-Dryer: A consumer product designed to clean and dry fabrics in a single drum, where drying is accomplished through use of electricity or gas as a heat source and forced air circulation.

D. Combined Energy Factor: Combined Energy Factor ("CEF") is the energy efficiency measure for clothes dryers. It is calculated as the clothes dryer test load weight in pounds divided by the sum of "active mode" per-cycle energy use and "inactive mode" per-cycle energy use in kWh.

**Note:** In order for the ENERGY STAR program to include separate performance criteria for combination W/Ds, EPA needs to integrate a definition for a combination W/D into the specification. To this end, EPA consulted manufacturers and reviewed industry test procedures to collect any relevant industry definitions. EPA was unable to identify an existing definition and therefore, has developed one that relies on the above mentioned research/consultation. EPA's proposed definition for Combination All-in-One Washer-Dryer takes into account that these products are:

*(1) Designed to wash and dry fabric in a single drum.* A combination W/D is distinct from other conventional laundry washer and dryer pairs because it has a single drum that is used for both washing and drying.

*(2) Rely on the use of an electric or gas heat source to aid drying.* EPA is aware there are clothes washers available on the U.S. market with a cycle that can wash and then dry a small load or begin to dry a regular load, through tumbling and air circulation. Based on review of product literature, EPA believes these models have a more limited drying functionality (e.g., much longer drying time, intended as a convenience feature for small loads only) than conventional dryers and do not introduce heat from an electric element or gas burner during drying. In contrast, most combination W/Ds sold in the U.S. are condensing electric dryers that circulate air in the drum between an electric heater and a water-cooled condensing coil. EPA's proposed definition helps differentiate combination W/D from washers with a wash-dry cycle, by defining combination W/Ds as relying on an electric or gas heat source to aid drying.

EPA is also proposing to add a definition for Combined Energy Factor (CEF). This definition was taken from the DOE Direct Final Rule published in the Federal Register on April 21, 2011.

EPA welcomes stakeholder comment on the proposed definitions.

EPA also notes that within the separate process to revise the commercial clothes washer levels, stakeholders have recommended a number of changes to definitions including Modified Energy Factor (MEF), Water Factor (WF) and Commercial Clothes Washer. These edits are under consideration and are being addressed separately in the commercial clothes washer revision process. Stakeholders interested in participating in that revision process are encouraged to contact: appliances@energystar.gov.

E. Modified Energy Factor: Modified Energy Factor ("MEF") is the present energy efficiency measure for all clothes washers. MEF is the quotient of the cubic foot capacity of the clothes container divided by the total clothes washer energy consumption per cycle, with such energy consumption expressed as the sum of the machine electrical energy consumption, the hot water energy consumption, and the energy required for removal of the remaining moisture in the wash load. The units are cubic feet per kilowatt-hours (kWh) per cycle ($ft^3$/kWh/cycle). The higher the value, the more efficient the clothes washer.

F. Water Factor: Water factor ("WF") is the present water efficiency calculation that allows the comparison of clothes washer water consumption independent of clothes washer capacity. The term is expressed as gallons per cycle per cubic feet. WF is the quotient of the total weighted per-cycle water consumption divided by the capacity of the clothes washer. The lower the value, the more efficient the clothes washer.

G. Basic Model: Units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

2) **Scope**:

A. Included Products: Products that meet the definition of a residential clothes washer, commercial clothes washer, and/or combination all-in-one washer-dryer as specified herein are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.B.

B. Excluded Products: Clothes washers with a capacity of less than 1.6 $ft^3$ and/or are configured in any way other than a front- or top-loading design are not eligible for ENERGY STAR. ~~Also, all-in-one washer dryers" are not eligible for ENERGY STAR.~~

3) **Qualification Criteria**:

A. MEF, WF, and CEF Requirements:

**Table 1: ENERGY STAR Criteria for Clothes Washers**

| | |
|---|---|
| Residential Clothes Washers | MEF $\geq$ 2.0<br>WF $\leq$ 6.0 |
| Commercial Clothes Washers | MEF $\geq$ 2.2<br>WF $\leq$ 4.5 |
| Combination All-in-One Washer-Dryers | MEF $\geq$ 2.0<br>WF $\leq$ 6.0<br>CEF $\geq$ 2.5 |

B. Water Consumption Reporting Requirement (For Combination All-in-One Washer-Dryers Only):

Water consumption during the dryer test shall be measured and the average water consumption (in gallons per cycle) across units tested shall be reported.

**Note:** Based on test data on combination W/D performance that has been received, EPA is proposing a set of criteria for combination W/Ds that address whole-product performance. For the washing functionality of a combination W/D, EPA is proposing MEF and WF levels shown in Table 1. These levels are consistent with the current energy and water criteria for ENERGY STAR clothes washers. To address drying performance, EPA is proposing a new minimum Combined Energy Factor (CEF) of 2.5. CEF is the energy efficiency measure for clothes dryers established by DOE. It is calculated as the clothes dryer test load weight in pounds divided by the sum of "active mode" per-cycle energy use and "inactive mode" per-cycle energy use in kWh. Based on the data EPA has received, several combination W/D models would be eligible under these proposed levels.

Most combination W/Ds available on the North American market do not have or require an exhaust vent. Instead, they use condensing electric dryers that circulate air in the drum between an electric heater and a water-cooled condensing coil. EPA is also aware of at least one vented combination W/D available on the market; test data EPA has received suggests the CEF performance of this model is comparable to a ventless model. Therefore, EPA has proposed a single CEF performance requirement for all combination W/Ds, irrespective of venting. EPA welcomes additional information and/or data that would enable the Agency to further assess whether separate performance requirements are warranted for vented and ventless combination W/Ds.

In combination W/Ds that use water-cooled condensing, tap water is drawn for the condenser cooling and then discarded. The data EPA has received suggests there is significant variation among models in the amount of water used during drying, ranging from 0.1 to 7.7 gallons per cycle. (Note: EPA believes the model that was reported to consume 0.1 gallon per cycle may use an air to air condenser, which would explain why this model uses so little water compared with other models that likely use water-cooled condensing). Due to this variation, and to enable the Agency to track and further assess any opportunity for savings in this area, EPA is proposing combination W/D's water consumption (in gallons per cycle), as measured during the dryer energy test cycle, be reported.

EPA welcomes feedback on the proposed CEF levels and water consumption reporting requirement for combination W/Ds.

C. Significant Digits and Rounding:

a. All calculations shall be carried out with directly measured (unrounded) values.

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

c. Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

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.

4) **Test Requirements**:

A. One of the following sampling plans shall be used to test for qualification to ENERGY STAR:

a. A representative unit shall be selected for testing based on the definition for Basic Model provided in Section 1. above; or

b. Units shall be selected for testing per the sampling requirements as defined in Table 2:

**Table 2: ENERGY STAR**
**Sampling Requirements for Clothes Washers**

| | |
|---|---|
| Residential Clothes Washers | 10 CFR § 429.20, which references 10 CFR § 429.11 |
| Commercial Clothes Washers | 10 CFR § 429.46, which references 10 CFR § 429.11 |
| Combination All-in-One Washer-Dryers | For MEF and WF rating:<br>10 CFR § 429.20, which references 10 CFR § 429.11<br><br>For CEF rating<br>10 CFR § 429.21, which references 10 CFR § 429.11 |

**Note:** The latest proposed revisions to the clothes washer specification incorporated explicit references to the DOE sampling procedures for purposes of qualification testing. For Combination W/Ds, EPA proposes to reference applicable DOE sampling procedures: 10 CFR § 429.20 (for purposes of rating energy- and water-performance of washing) and 10 CFR § 429.21 (for purposes of rating energy-performance of drying). EPA welcomes comments on this proposal.

B. When testing clothes washers, the following test methods shall be used to determine ENERGY STAR qualification:

**Table 3: Test Methods for ENERGY STAR Qualification**

| **Efficiency Requirement/ Reporting Requirement** | **Test Method Reference** |
|---|---|
| MEF | 10 CFR § 430, Subpart B, Appendix J1 |
| WF | |
| CEF | 10 CFR § 430, Subpart B, Appendix D1 |
| Water Consumption Reporting | Additional Test Parameters for Water Consumption Reporting:<br>a. A water meter shall be installed in both the hot and cold water lines to measure total water consumption. The water meter shall have a |

| | |
|---|---|
| | resolution no larger than 0.1 gallons (0.4 liters) and a maximum error no greater than 2 percent for the water flow rates being measured.<br>b. A water pressure gauge shall be installed in both the hot and cold water lines to measure water pressure. The water pressure gauge shall have a resolution of 1 pound per square inch gauge (psig) (6.9 kPa) and shall have an error no greater than 5 percent of any measured value.<br>c. The water temperature shall be 135°F +/- 5 °F and 60 °F +/- 5 °F for cold water. The static water pressure for a single water inlet connection shall be maintained at 35 psig +/- 2 psig.<br>d. The average water consumption across the units tested shall be reported. |

**Note:** The drying performance of combination W/Ds would be assessed using the recently amended DOE test method for clothes dryers, located in 10 CFR § 430, Subpart B, Appendix D1. In this new test procedure, DOE adopted provisions to clarify testing procedures for ventless dryers. Additionally, to support the proposed water consumption reporting requirement for combination W/Ds, EPA has included additional specificity regarding the water temperature, pressure, and water meter and pressure gauge instrumentation, during this dryer test. The additional test parameters to support the measurement of water consumption, included in Table 3, have been developed based on similar language in the DOE clothes washer test procedure (10 CFR 430, Subpart B, Appendix J1). EPA believes that the proposed language is applicable to the dryer water consumption testing and that manufacturers could utilize the same instruments that are used to test the water consumption of the clothes washer. EPA welcomes feedback on this proposal.

5) **Effective Date**: The ENERGY STAR Clothes Washer specification shall take effect on January 8, 2013. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on the model's 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:** In the Commercial Clothes Washer specification revision, EPA has proposed that the new criteria for commercial washers become effective on January 8, 2013, thus aligning with the date on which new Federal standards for commercial washers become effective. As discussed earlier, EPA plans that the final Version 6.0 specification will contain both revised criteria for commercial washers and new requirements for combination W/Ds, and that this Version 6.0 specification will become effective January 8, 2013. Manufacturers would be able to qualify combination W/Ds by having them certified to the Version 6.0 specification, as soon as it is final. EPA plans to finalize Version 6.0 in December 2011. EPA welcomes feedback on the proposed effective date for Version 6.0.

The residential clothes washer criteria are not being changed in Version 6.0 and thus residential washers will not need to be re-qualified.

6) **Future Criteria 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.