



ENERGY STAR[®] Program Requirements Product Specification for Clothes Washers

Eligibility Criteria Draft 2 Version 6.0

Following is the **Draft 2 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: 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 Final Draft proposal for commercial washers on November 4, 2011. For clarity, the changes that were proposed in that Final Draft for commercial washers are shown in red font, while the changes being proposed in this Draft 2 for combination all-in-one washer-dryers (combo W/Ds) are shown in blue font. As a final step, EPA plans to combine changes from both revision processes into a single final Version 6.0 specification document.

Please send comments via email to appliances@energystar.gov no later than February 24, 2012.

- 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.
 - i) **Residential Clothes Washer with Optional Dry Cycle:** A Residential Clothes Washer that has an optional add-on dry cycle, where drying is accomplished through use of electricity or gas as a heat source and forced air circulation; drying cannot be selected independently from a wash cycle.
 - B. **Commercial Clothes Washer:** A soft-mounted front-loading or soft-mounted top-loading clothes washer that 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 a separate drying cycle uses electricity or gas as a heat source and forced air circulation.
 - D. **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 (or liter) 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 (ft³/kWh/cycle) (or liters per kilowatt-hour per cycle). The higher the value, the more efficient the clothes washer.
 - E. **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 foot (or liter per cycle per liter). WF is the quotient of the total weighted per-cycle water consumption divided by the cubic foot (or liter) capacity of the clothes washer. The lower the value, the more efficient the clothes washer.
 - F. **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.

Note: Based on stakeholder feedback, EPA revised the combination all-in-one washer-dryer definition proposed in Draft 1. Based on further research and conversations with stakeholders, EPA understands that combo W/Ds provide consumers with options of: 1) independently washing; 2) independently drying; and 3) washing followed immediately by an add-on drying cycle (e.g., wash-to-dry cycle). EPA notes that the availability of a separate drying cycle selection has been implicitly assumed in the combo W/D test approach finalized in September 2010, since washing performance and dryer performance would be rated independently under the respective DOE test procedures. EPA welcomes comment on the amended definition.

In addition, based on conversations with stakeholders, EPA learned that a new clothes washer will be introduced in the U.S. that would offer consumers the option of adding a dry cycle to a selected wash cycle. However, unlike a combo W/D, consumers would not be able to select drying, independently from a wash cycle. Thus, it could not be tested using the approach being used for a combo W/D. EPA is proposing that a product with this feature be eligible to earn the ENERGY STAR as a clothes washer. However, given that this type of product is anticipated to have some of the functionality of a combo W/D (in particular, the option to dry a regular sized load, using a gas or electric heating element), EPA is also proposing that a manufacturer report information on the energy and water consumption of the add-on dry cycle to EPA. This reporting requirement is discussed further in Section 3. To support this requirement, EPA is proposing a new definition in Section 1 for a Residential Clothes Washer with Optional Dry Cycle. EPA welcomes comments on this new definition.

As discussed in greater detail in Section 3, based on stakeholder feedback received on the Draft 1, EPA is proposing to defer consideration of combo W/D performance requirements. This will provide the Agency with more time to collect and consider additional information on the water consumption of combo W/Ds during drying. Due to this, EPA has removed the Combined Energy Factor (CEF) definition proposed in Draft 1. EPA plans to further evaluate potential performance requirements for combo W/Ds when the ENERGY STAR residential clothes washer levels are next revised in 2012.

EPA also notes that within the separate process to revise the commercial clothes washer levels, stakeholders recommended several minor changes to definitions including Modified Energy Factor (MEF), Water Factor (WF) and Commercial Clothes Washer. These edits were incorporated into the November 4, 2011, Final Draft proposal for commercial clothes washers and for consistency, are shown above in red font.

2) **Scope:**

- A. Included Products: Products that meet the definition of a residential clothes washer or commercial clothes washer 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 ft³ and/or are configured in any way other than a front- or top-loading design are not eligible for ENERGY STAR. [Combination all-in-one washer dryers are not eligible for ENERGY STAR.](#)

Note: As noted above and discussed in more detail in Section 3, EPA is deferring further consideration of combo W/Ds requirements until a future specification development effort. In the interim, these products will continue to be ineligible to earn the ENERGY STAR, as specified in both the current Version 5.1 and in Version 6.0 Section 2B, above.

At this end of this spec development effort for Version 6.0, EPA plans to amend Version 5.1 to include the final two definitions and scope clarifications being proposed in this spec revision, and specifying that Residential Clothes Washers with Optional Dry Cycle won't be eligible for qualification under Version 5.1, but could be qualified to Version 6.0 provided they meet the reporting requirement.

3) **Qualification Criteria:**

- A. MEF and WF Requirements:

Table 1: ENERGY STAR Criteria for Clothes Washers

Residential Clothes Washers	MEF \geq 2.0 WF \leq 6.0
Commercial Clothes Washers	MEF \geq 2.2 WF \leq 4.5

B. Reporting Requirement for Residential Clothes Washers with Optional Dry Cycle:

Manufacturer must report the following information to EPA:

- Energy use (kWh/cycle) of the combined wash-dry cycle and the add-on dry cycle
- Water use (gallons/cycle) of the add-on dry cycle
- Summary of test approach used. At a minimum, this must include:
 - size of load (lb, bone dry weight);
 - initial and final remaining moisture content (RMC) associated with the add-on dry cycle and;
 - Dryer setting used (note: if product provides drying options, the highest heat setting should be selected and used) and wash cycle selected.

Notes: Given this product type does not provide an independent dry cycle, its anticipated that energy and water use would be determined from the start of the clothes washer cycle to the finish of the clothes dryer cycle, with minimum interruption.

The DOE clothes washer test (Appendix J1) uses the weighted-average of the results from a number of tests to determine MEF. However, for purposes of this reporting requirement, only one representative wash cycle needs to be tested.

The average load-size as specified in Appendix J1 for the product should be used. However, if the J1 specified average load-size is in conflict with the manufacturer's recommended load-size for a combined wash-dry cycle, the largest load size recommended by the manufacturer should be used.

Combined wash-dry cycle should be run until the product self-terminates (i.e., drying should not be ceased at 5% RMC).

Manufacturers are encouraged to discuss test approach with DOE and EPA, prior to testing.

Note: Following the release of the Draft 1, EPA received feedback from stakeholders expressing concern that the specification, as proposed, would not address a significant portion of the water consumption of a combo W/D. As was discussed in the Draft 1 specification document, the test data EPA has received from manufacturers suggests that water consumption of combo W/Ds can vary significantly; ranging from 0.1 to 7.7 gallons per cycle. EPA is also concerned that, as proposed, the ENERGY STAR eligibility criteria may not highlight for consumers products with the best overall energy and water performance. More specifically, data show that products use approximately, between 6 and 18 gallons per cycle for washing a load;¹ a model that uses 7.7 gallons for drying cycle would at best, increase the water use by about 30%, and at worst, could more than double the amount of total water needed, assuming equivalent number of wash- and dry- cycles. Given the potential for a significant increase in water use, EPA believes that an ENERGY STAR specification that covers combo W/Ds needs to include a minimum performance requirement for the water consumption associated with drying. EPA plans to further consider minimum performance requirements for combo W/Ds when the ENERGY STAR levels for residential washers are next revised later this year.

To support further consideration of this issue, EPA is seeking feedback on the following topics:

- 1) the technical feasibility and cost-effectiveness of designs that reduce the amount of water required by air-water heat exchangers; 2) any benefits (e.g., consumer value, energy efficiency) associated with designs that use water-cooled condensers; and, 3) information on market trends for different combo W/D configurations (vented vs. ventless; air-cooled vs. water-cooled condensers).

As mentioned earlier in this specification, EPA has also included a reporting requirement for clothes washers with an optional dry cycle. EPA is proposing that a manufacturer report to EPA the energy use of the combined wash-dry cycle and the optional add-on dry cycle that can not be accessed separately from the wash cycle (in kWh per cycle) and any water use associated with the add-on dry cycle (in gallons per cycle). Manufacturers would also need to provide information on the test approach used to collect the data, including load size and Remaining Moisture Content (RMC), to support EPA's interpretation and evaluation of the information received. Given that a washer with an option dry cycle would not contain an independent dry cycle, EPA is anticipating that manufacturers would determine energy and water use from the start of the wash cycle until the finish of the dryer cycle, with minimum interruption. EPA recognizes that the DOE clothes washer test procedure (J1) uses a weighted-average of the results from a number of tests to determine MEF. However, for the purposes of this reporting requirement, only one representative wash cycle would need to be tested. Thus, data collection for this combined wash-dry cycle reporting requirement would focus on a combined wash-dry cycle where a representative wash cycle is selected along with a drying cycle (highest heat setting, if different dryer options are offered).

It is EPA's intention to provide as much clarity around this reporting requirement as possible such that data can be effectively analyzed and products are reviewed on level playing field. As such, EPA seeks feedback on additional clarity that should be added to the above reporting requirement to ensure a level playing field.

Once EPA receives the information specified in the reporting requirement a manufacturer could qualify the clothes washer with an optional dry cycle, through their certification body. EPA does not plan to post the reported information to the ENERGY STAR Qualified Product List. The reporting requirement is intended to ensure EPA has information on the additional energy and water use associated with this new clothes washer function, and may be considered in future specification development efforts.

¹ Range based on: 6 gallons per cycle, calculated assuming WF of 3.5 and capacity of 1.6 cu-ft (the smallest combo W/D list in the CEC appliance database). 18 gallons per cycle calculated assuming WF of 5.0 and a capacity of 3.6 cu-ft (the largest combo W/D EPA is aware of, on the market).

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

Note: In this Final Draft, EPA is proposing to defer consideration on combo W/D ENERGY STAR performance requirements. Therefore, EPA has removed the sampling requirements proposed for combo W/Ds in Draft 1.

- 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	Test Method Reference
MEF	10 CFR § 430, Subpart B, Appendix J1 ¹
WF	

¹ *And in accordance with any applicable DOE issued test procedure guidance, listed here: <http://www1.eere.energy.gov/guidance/default.aspx?pid=2&spid=1>*

Note: Due to EPA's proposal to defer consideration on combo W/D performance requirements, EPA has removed the reference to the DOE clothes dryer test procedure (10 CFR 430 Subpart B, Appendix D1) and the proposed water consumption reporting guidance introduced in Draft 1. EPA appreciates the stakeholder comments received on this section, and will use it to inform any future specification development work for combo W/Ds.

- 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: No changes have been made to the proposed effective date.

- 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.