



ENERGY STAR® Program Requirements Product Specification for Clothes Washers

Partner Commitments

Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR qualified products. The ENERGY STAR Partner must adhere to the following partner commitments:

Qualifying Products

1. Comply with current ENERGY STAR Eligibility Criteria, which define performance requirements and test procedures for clothes washers. A list of eligible products and their corresponding Eligibility Criteria can be found at www.energystar.gov/specifications.
2. **Prior to associating the ENERGY STAR name or mark with any product**, obtain written certification of ENERGY STAR qualification from a Certification Body recognized by EPA for clothes washers. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform clothes washer testing. A list of EPA-recognized laboratories and Certification Bodies can be found at www.energystar.gov/testingandverification.

Using the ENERGY STAR Name and Marks

3. Comply with current ENERGY STAR Identity Guidelines, which define how the ENERGY STAR name and marks may be used. Partner is responsible for adhering to these guidelines and ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance. The ENERGY STAR Identity Guidelines are available at www.energystar.gov/logouse.
4. Use the ENERGY STAR name and marks only in association with qualified products. Partner may not refer to itself as an ENERGY STAR Partner unless at least one product is qualified and offered for sale in the U.S. and/or ENERGY STAR partner countries.
5. Provide clear and consistent labeling of ENERGY STAR qualified clothes washers.
 - 5.1. The ENERGY STAR mark must be clearly displayed on the top/front of the product (by placement of the ENERGY STAR logo on the FTC's EnergyGuide label, on product labels, and/or as a permanent mark), in product literature (i.e., user manuals, spec sheets, etc.), and on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed.
 - 5.2. It is also recommended that the mark appear on the product packaging.

Verifying Ongoing Product Qualification

6. Participate in third-party verification testing through a Certification Body recognized by EPA for clothes washers, providing full cooperation and timely responses. EPA/DOE may also, 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 the government's request.

Providing Information to EPA

7. Provide unit shipment data or other market indicators to EPA annually to assist with creation of ENERGY STAR market penetration estimates, as follows:

- 7.1. Partner must submit the total number of ENERGY STAR qualified clothes washers shipped in the calendar year or an equivalent measurement as agreed to in advance by EPA and Partner. Partner shall exclude shipments to organizations that rebrand and resell the shipments (unaffiliated private labelers).
- 7.2. Partner must provide unit shipment data segmented by meaningful product characteristics (e.g., type, capacity, presence of additional functions) as prescribed by EPA.
- 7.3. Partner must submit unit shipment data for each calendar year to EPA or an EPA-authorized third party, preferably in electronic format, no later than March 1 of the following year.

Submitted unit shipment 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.

8. Report to EPA any attempts by recognized laboratories or Certification Bodies (CBs) to influence testing or certification results or to engage in discriminatory practices.
9. Notify EPA of a change in the designated responsible party or contacts within 30 days using the My ENERGY STAR Account tool (MESA) available at www.energystar.gov/mesa.

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:

- 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.
- Consider energy efficiency improvements in company facilities and pursue benchmarking buildings through the ENERGY STAR Buildings program.
- 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.
- Feature the ENERGY STAR mark(s) on Partner website and other promotional materials. If information concerning ENERGY STAR is provided on the Partner website as specified by the ENERGY STAR Web Linking Policy (available in the Partner Resources section of the ENERGY STAR website), EPA may provide links where appropriate to the Partner website.
- Ensure the power management feature is enabled on all ENERGY STAR qualified displays and computers 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 products.
- 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, and communicate Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR website, etc. The plan may be as simple as providing a list of planned activities or milestones of which Partner would like EPA to be aware. For example, activities may include: (1) increasing the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrating the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) providing information to users (via the website and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products; and (4) building awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event.
- Join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. The SmartWay Transport Partnership works with freight carriers, shippers, and other stakeholders in the goods movement industry to reduce fuel consumption, greenhouse gases, and air pollution. For more information on SmartWay, visit www.epa.gov/smartway.

- Join EPA's Green Power Partnership. EPA's Green Power Partnership encourages organizations to buy green power as a way to reduce the environmental impacts associated with traditional fossil fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune 500 companies, small and medium businesses, government institutions as well as a growing number of colleges and universities. For more information on Green Power, visit www.epa.gov/greenpower.



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

Eligibility Criteria Version 7.0

Following is the **Version 7.0** product specification for ENERGY STAR certified clothes washers. A product shall meet all of the identified required criteria if it is to earn the ENERGY STAR.

- 1) **Definitions:** Below are the definitions of the relevant terms in this document. Where noted below, definitions are identical to the definitions in the U.S. Department of Energy (DOE) test procedure at 10 CFR 430, Subpart B, Appendix J1, Appendix J2 or in 10 CFR 430.2 and 10 CFR 431.152. When in conflict, the definitions in the Code of Federal Regulations (CFR) take precedence.
- A. Residential Clothes Washer¹: 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.
 - 1. 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 Washer²: A soft-mounted front-loading or soft-mounted top-loading clothes washer that is designed for use in 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.
 - 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 (MEF)³: 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.
 - E. Integrated Modified Energy Factor (IMEF)⁴: 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, the energy required for removal of the remaining moisture in the wash load, and the combined low-power mode energy consumption.
 - F. Water Factor (WF)³: The quotient of the total weighted per-cycle water consumption for cold wash divided by the cubic foot (or liter) capacity of the clothes washer.
 - G. Integrated Water Factor (IWF)⁴: The quotient of the total weighted per-cycle water consumption for all wash cycles in gallons divided by the cubic foot (or liter) capacity of the clothes washer.
 - H. Basic Model⁵: All 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,

¹10 CFR 430 Subpart A, Section 430.2

² The ENERGY STAR definition of a commercial clothes washer differs from the DOE commercial clothes washer definition by: 1) not specifying a maximum capacity; and 2) not covering "other commercial applications."

³ 10 CFR 430, Subpart B, Appendix J1

⁴ 10 CFR 430, Subpart B, Appendix J2

⁵ 10 CFR 430, Subpart A, Section 430.2

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 or Commercial Clothes Washer as specified herein are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2B.
- B. **Excluded Products:** The following products are not eligible for ENERGY STAR qualification:
 - i) products with a clothes container volume of less than 1.6 cubic feet,
 - ii) products configured in any way other than a front- or top-loading design,
 - iii) Combination All-in-One Washer-Dryers,
 - iv) Residential Clothes Washers with an Optional Dry Cycle, and
 - v) Commercial Clothes Washers with a clothes container volume larger than 6.0 cubic feet.

3) **Qualification Criteria:**

- A. **Modified Energy Factor (MEF) or Integrated Modified Energy Factor (IMEF):**
MEF shall be greater than or equal to the Minimum MEF (MEF_{MIN}), as calculated per Equation 1.

Alternatively, IMEF shall be greater than or equal to the Minimum IMEF ($IMEF_{MIN}$), as calculated per equation 2.

Equation 1. Calculation of Minimum MEF

$$MEF_{MIN} = MEF_{BASE}$$

where,

MEF_{BASE} is the base MEF, per Table 1

Equation 2. Calculation of Minimum IMEF

$$IMEF_{MIN} = IMEF_{BASE} - IMEF_{Adder_Connected}$$

where,

$IMEF_{BASE}$ is the base IMEF, per Table 1

$IMEF_{Adder_Connected}$ is the IMEF connected allowance, per Table 2

Table 1: Base MEF/IMEF

Product Type	MEF_{BASE}	$IMEF_{BASE}$
Residential Clothes Washers, Front-loading (> 2.5 cu-ft)	NA	2.38
Residential Clothes Washers, Top-loading (> 2.5 cu-ft)	NA	2.06
Residential Clothes Washers (\leq 2.5 cu-ft)	NA	2.07
Commercial Clothes Washers	2.2 ¹	NA

¹ Value based on 10 CFR 430, Subpart B, Appendix J1.

Table 2: Connected Allowance

Description	Product Type	IMEF _{Adder_Connected} ²
Connected	Residential Clothes Washers ¹	0.05 x IMEF _{BASE}

¹ Product must be certified using the final and validated ENERGY STAR Clothes Washer Test Method to Validate Demand Response (TBD) to use the allowance.

² Calculated allowance shall be rounded down to the nearest hundredth before being applied in Equation 1.

B. Water Factor (WF) or Integrated Water Factor (IWF):

Table 3: WF/IWF

Product Type	Maximum WF	Maximum IWF
Residential Clothes Washers, Front-loading (> 2.5 cu-ft)	NA	3.7
Residential Clothes Washers, Top-loading (> 2.5 cu-ft)	NA	4.3
Residential Clothes Washers (≤ 2.5 cu-ft)	NA	4.2
Commercial Clothes Washers	4.5 ¹	NA

¹ Value based on 10 CFR 430, Subpart B, Appendix J1.

C. Significant Digits and Rounding: All calculations shall be carried out as specified in 10 CFR 430, Subpart B, Appendix J1 or Appendix J2, and 10 CFR Part 430.23(j).

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

4) **Connected Criteria:**

The following optional connected criteria are applicable to Included Products, Section 2A, that meet the definition of a Residential Clothes Washer.

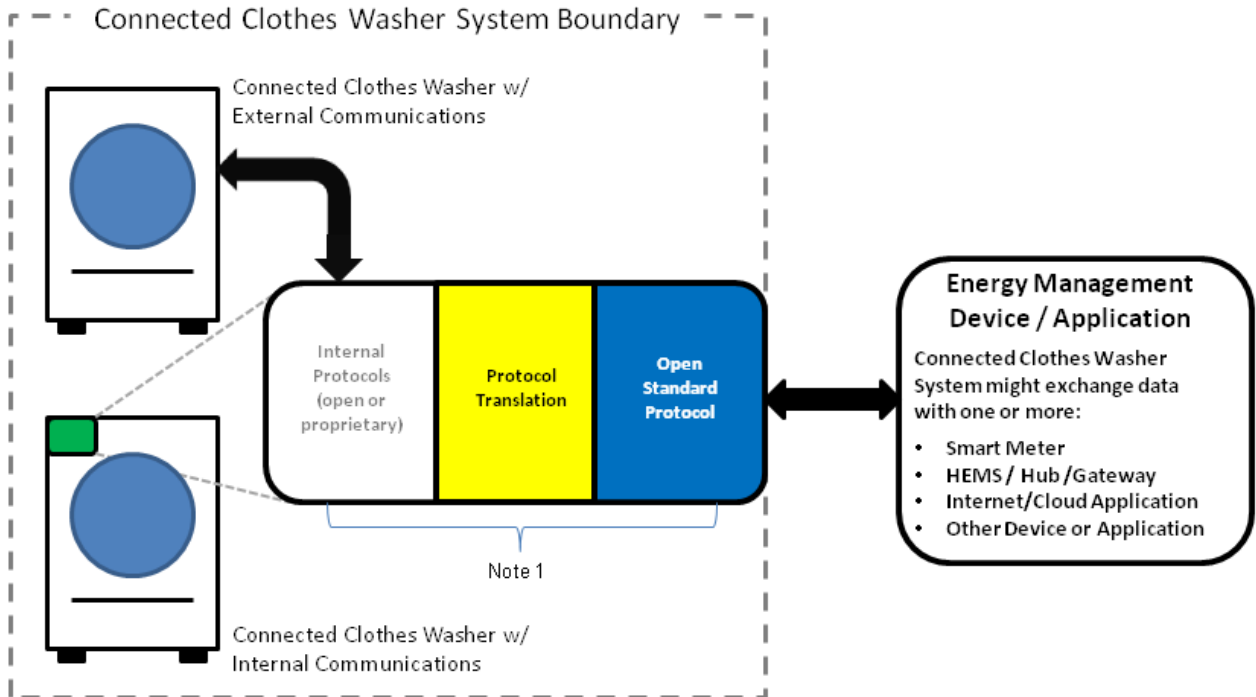
A. Connected Clothes Washer System

To be recognized as connected and to be eligible for the connected allowance, a “connected clothes washer system” (Connected Clothes Washer System, as shown in Figure 1) shall include the base appliance plus all elements (hardware, software) required to enable communication in response to consumer-authorized energy related commands (*not including third-party remote management which may be made available solely at the discretion of the manufacturer*). These elements may be resident inside or outside of the base appliance. This capability shall be supported through one or more means, as identified in section 4B2.

The specific design and implementation of the Connected Clothes Washer System is at the manufacturer’s discretion provided it is interoperable with other devices via open communications protocol and enables economical consumer-authorized third party access to the functionalities provided for in sections 4D, 4F, and 4G. The capabilities shall be supported through one or more means, as identified in section 4B2. A product that enables economical and direct, on-premises, open-standards based interconnection is the preferred option for meeting this requirement, but alternative approaches are also acceptable.

The product must continue to comply with the applicable product safety standards – the addition of the functionality described below shall not override existing safety protections and functions. The appliance must meet manufacturer’s internal minimum performance guidelines, e.g., cleaning performance.

Figure 1. Connected Clothes Washer System Boundary – Illustrative Example



Note 1: Communication device(s), link(s) and/or processing that enables open standards-based communication between the Connected Clothes Washer System and Energy Management Device/Application(s). These elements could be within the base appliance, and/or an external communication module, a hub/gateway, or in the Internet/cloud.

B. Communications

1. Open Standards – Communication with entities outside the Connected Clothes Washer System that enables connected functionality (sections 4D, 4F, 4G) must use, for all communication layers, standards:
 - a. Included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards,⁶ and/or
 - b. Included in the NIST Smart Grid framework Tables 4.1 and 4.2, and/or
 - c. Adopted by the American National Standards Institute (ANSI) or another well-established international standards organization such as the International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), International Telecommunication Union (ITU), Institute of Electrical and Electronics Engineers (IEEE), or Internet Engineering Task Force (IETF).
2. Communications Hardware Architecture – Communication with entities outside the Connected Clothes Washer System that enables connected functionality shall be enabled by any of the following means, according to the manufacturer’s preference:
 - a. Built-in communication technology
 - b. Manufacturer-specific external communication module(s) and/or device(s)
 - c. Open standards-based communication port on the appliance combined with open standards-based communications module
 - d. Open standards-based communication port(s) on the appliance in addition to a, b or c, above

If option b or c is used, the communication module/device(s) must be easy for a consumer to install and shipped with the appliance, provided to the consumer at the time of sale, or provided to the consumer in a reasonable amount of time after the sale.

⁶ http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PMO#Catalog_of_Standards_Processes

C. Open Access

To enable interconnection with the product, in addition to section 4B1 that requires open-standards, an interface specification, Application Programming Interface (API) or similar documentation shall be made available to interested parties that at a minimum, allows transmission, reception and interpretation of the following information:

1. Energy Consumption Reporting specified in section 4D (must include accuracy, units and measurement interval);
2. Operational Status, User Settings & Messages specified in section 4F (if transmitted via a communication link);
3. Demand Response specified in section 4G.

D. Energy Consumption Reporting

In order to enable simple, actionable energy use feedback to consumers and consumer authorized energy use reporting to 3rd parties, the product shall be capable of transmitting energy consumption data via a communication link to energy management systems and other consumer authorized devices, services, or applications. This data shall be representative of the product's interval energy consumption. It is recommended that data be reported in watt-hours for intervals of 15 minutes or less, however, representative data may also be reported in alternate units and intervals as specified in the product manufacturer's interface specification or API detailed in section 4C.

The product may also provide energy use feedback to the consumer on the product itself. On-product feedback, if provided, may be in units and format chosen by the manufacturer (e.g., \$/month).

E. Remote Management

The product shall be capable of receiving and responding to consumer authorized remote requests (*not including third-party remote management which may be made available solely at the discretion of the manufacturer*), via a communication link, similar to consumer controllable functions on the product. The product is not required to respond to remote requests that would compromise performance and/or product safety as determined by the product manufacturer.

F. Operational Status, User Settings & Messages

1. The product shall be capable of providing the following information to energy management systems and other consumer authorized devices, services or applications via a communication link:
 - Operational / Demand Response (DR) status (e.g., off/standby, cycle in process, delay appliance load, temporary appliance load reduction).
2. The product shall be capable of providing the following information on the product and/or to energy management systems and other consumer authorized devices, services or applications via communication link:
 - At least two types of messages relevant to the energy consumption of the product. For example, messages for clothes washers might address performance issues or report of energy consumption that is outside the product's normal range.

G. Demand Response

A connected clothes washer shall have the capability to receive, interpret and act upon consumer-authorized signals by automatically adjusting its operation depending on both the signal's contents and settings from consumers. At a minimum, the product shall be capable of providing the following:

1. *Delay Appliance Load Capability*: The capability of the product to respond to a signal in accordance with consumer settings, except as permitted below, by delaying the start of an operating cycle beyond the delay period.

- a. Default settings –The product shall ship with default settings that enable a response in accordance with 4G1 for at least 4 hours.
- b. Consumer override – The consumer shall be able to override the product’s Delay Appliance Load response before or during a delay period.
- c. The product shall be able to provide at least one Delay Appliance Load response per consumer initiated operating cycle.

2. *Temporary Appliance Load Reduction Capability: TBD*

H. Information to Consumers

If additional modules, devices, services and/or infrastructure are part of the configuration required to activate the product’s communications capabilities, prominent labels or other forms of consumer notifications with instructions shall be displayed at the point of purchase and in the product literature. These shall provide specific information on what consumers must do to activate these capabilities (e.g. “*This product has Wi-Fi capability and requires Internet connectivity and a wireless router to enable interconnection with an Energy Management System, and/or with other external devices, systems or applications.*”).

5) **Test Requirements:**

- A. One of the following sampling plans shall be used to test for qualification to ENERGY STAR:
 - 1. A representative unit shall be selected for testing based on the definition for Basic Model provided in Section 1 above; or
 - 2. Units shall be selected for testing per the sampling requirements as defined in Table 4:

**Table 4: 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

- B. When testing the energy and water efficiency of clothes washers, the following test method shall be used to determine ENERGY STAR qualification:

Table 5: Test Methods for ENERGY STAR Qualification

Efficiency Requirement	Test Method Reference
Residential Clothes Washers: IMEF and IWF	10 CFR 430, Subpart B, Appendix J2 ¹
Commercial Clothes Washers: MEF and WF	10 CFR 430, Subpart B, Appendix J1 ¹

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>*

- C. Compliance with Connected functionality, as specified in Section 4, shall be through examination of product and/or product documentation. In addition, demand response functionality shall be evaluated using the **TBD** ENERGY STAR Clothes Washers Test Method to Validate Demand Response in order to be eligible for the connected allowance.
- 6) **Effective Date:** The ENERGY STAR Clothes Washer specification shall take effect on **March 7, 2015**. 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 on which a unit is considered to be completely assembled.

7) **Future Criteria Revisions:**

- A. 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.

- B. Performance: As discussed during the Version 7.0 stakeholder process, stakeholders have expressed concern that clothes washer efficiency may be reaching a point at which a product's performance (e.g., cleaning, rinse) could be negatively impacted. After considering this feedback, EPA proposed a cleaning and rinse performance reporting requirement in Version 7.0 that would be required for certification once an ENERGY STAR test procedure was available. The data, once collected, would enable EPA to better understand how cleaning performance varies with energy and water use, providing the necessary information to more fully evaluate cleaning performance, energy and water use concurrently during future specification revisions. However, in response to manufacturers' more recent concerns about explicitly addressing clothes washer performance in the specification and in light of current uncertainty around testing this performance, EPA removed the reporting requirement placeholder from Version 7.0. EPA and DOE plan to provide additional opportunity for discussion with industry and other stakeholders on how best to move forward with test procedure development and cleaning/rinse performance data collection.