



ENERGY STAR® Program Requirements Product Specification for Clothes Washers

Eligibility Criteria Final Draft, Version 8.0

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9 Following is the **Final Draft, Version 8.0** product specification for ENERGY STAR certified clothes washers. A
10 product shall meet all of the identified required criteria if it is to earn the ENERGY STAR.

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12 1) **Definitions:** Below are the definitions of the relevant terms in this document. Where noted below, definitions
13 are identical to the definitions in the U.S. Department of Energy (DOE) test procedure at Title 10 Code of
14 Federal Regulations (CFR) 430, Subpart B, Appendix J2, or in 10 CFR 430.2 and 10 CFR 431.152. When in
15 conflict, the definitions in the CFR take precedence.
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17 A. Residential Clothes Washer¹: A consumer product designed to clean clothes, utilizing a water solution of
18 soap and/or detergent and mechanical agitation or other movement, and must be one of the following
19 classes: automatic clothes washers, semi-automatic clothes washers, and other clothes washers.
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21 1. Compact Residential Clothes Washer: A Residential Clothes Washer that has a clothes container
22 capacity of less than 1.6 ft³ (45 L).
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24 2. Residential Clothes Washer with Heated Drying Functionality: A Residential Clothes Washer that
25 cleans and dries clothes in a single tumble-type drum; a drying cycle cannot be performed without first
26 performing a wash cycle. Drying is accomplished in the wash drum through use of a heat source and
27 forced air circulation.
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29 3. Residential Clothes Washer with Supplementary Wash System: A consumer product that meets the
30 definition of a Residential Clothes Washer and includes a supplementary wash system that cleans
31 clothes in an integrated, separate drum and also meets the definition of a Compact Residential
32 Clothes Washer. The primary clothes washer and the supplementary wash system are powered by a
33 single electric power source.
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35 B. Commercial Clothes Washer²: A soft-mounted front-loading or soft-mounted top-loading clothes washer
36 that is designed for use in applications in which the occupants of more than one household will be using
37 the clothes washer, such as multi-family housing common areas and coin laundries.
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39 C. Combination All-in-One Washer-Dryer: A consumer product that meets the definition of a Residential
40 Clothes Washer and Electric Clothes Dryer or Gas Clothes Dryer, which cleans and dries clothes in a
41 single tumble-type drum; a drying cycle can be performed independently without first performing a wash
42 cycle.
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44 D. Laundry Center: A consumer product that meets the definition of a Residential Clothes Washer and
45 Electric Clothes Dryer or Gas Clothes Dryer, which cleans and dries clothes in separate, stacked drums.
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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.”

- 47 E. Modified Energy Factor (MEF J2)³: The quotient of the cubic foot (or liter) capacity of the clothes
48 container divided by the total clothes washer energy consumption per cycle, with such energy
49 consumption expressed as the sum of the machine electrical energy consumption, the hot water energy
50 consumption, and the energy required for removal of the remaining moisture in the wash load.
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- 52 F. Integrated Modified Energy Factor (IMEF)⁴: The quotient of the cubic foot (or liter) capacity of the clothes
53 container divided by the total clothes washer energy consumption per cycle, with such energy
54 consumption expressed as the sum of the machine electrical energy consumption, the hot water energy
55 consumption, the energy required for removal of the remaining moisture in the wash load, and the
56 combined low-power mode energy consumption.
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- 58 G. Integrated Water Factor (IWF)⁴: The quotient of the total weighted per-cycle water consumption for all
59 wash cycles in gallons divided by the cubic foot (or liter) capacity of the clothes washer.
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- 61 H. Basic Model⁵: All units of a given type of covered product (or class thereof) manufactured by one
62 manufacturer, having the same primary energy source, and which have essentially identical electrical,
63 physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency,
64 water consumption, or water efficiency.
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66 **Note:** EPA received one comment on its use of a different definition than DOE for commercial clothes washers.
67 EPA notes that in the Version 7.0 clothes washer specification, it proposed a change to the commercial clothes
68 washer definition in response to stakeholder feedback indicating the specification should not be applied to larger
69 washer-dryer extractors used in commercial facilities, i.e., hospitals. EPA continues to believe that this
70 amendment to the definition is the clearest and most straightforward way to clarify the scope.
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72 EPA is also adding a definition for residential clothes washers with supplementary wash systems, in addition to
73 clarifying the requirements to certify under this definition. Products meeting this definition will offer additional
74 flexibility to the user by supplementing the washing of the primary washer. To support this addition, EPA is also
75 adding the definition of a Compact Residential Clothes Washer found in [10 CFR 430, Subpart B, Appendix J2](#).
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77 2) **Scope:**

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- 79 A. Included Products: Products that meet the definition of a Residential Clothes Washer or Commercial
80 Clothes Washer as specified herein are eligible for ENERGY STAR certification, with the exception of
81 products listed in Section 2.B.
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- 83 B. Excluded Products: The following products are not eligible for ENERGY STAR certification:
84 i) products with a primary clothes washer drum volume of less than 1.6 cubic feet;
85 ii) products configured in any way other than a front- or top-loading design;
86 iii) Combination All-in-One Washer-Dryers;
87 iv) Residential Clothes Washers with Heated Drying Functionality; and
88 v) Commercial Clothes Washers with a clothes container volume larger than 8.0 cubic feet.
89 vi) Commercial Clothes Washer with top-loading design
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91 **Note:** Recognizing that Combination All-in-One Washer-Dryers are a niche product and there is a lack of
92 agreement on and method for testing water use, EPA has determined that pursuing this product for inclusion in
93 the ENERGY STAR program is not practical for Version 8.0.
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95 EPA is expanding the scope to allow Commercial Clothes Washers with container volume greater than 8.0 cubic
96 feet. Two stakeholders expressed concern whether the current DOE test method in Appendix J2 is appropriate

³ 10 CFR 430, Subpart B, Appendix J2

⁴ 10 CFR 430, Subpart B, Appendix J2

⁵ 10 CFR 430, Subpart A, Section 430.2

97 for commercial clothes washers with a capacity greater than 8.0 cubic feet. EPA notes that DOE has granted a
98 waiver to test residential clothes washers with capacities greater than 6.0 cubic feet. Further, DOE has
99 determined that since the differences between residential and commercial clothes washers are relatively minor,
100 the table from the DOE waiver is applicable to the commercial extension. EPA is including the test load size table
101 from the DOE waiver in the final specification to provide clarity to stakeholders. Regarding inflated energy and
102 water efficiencies, EPA has not seen evidence that energy and water efficiency test results would be inflated.
103 DOE notes that its test procedure requires testing each clothes washer using a range of load sizes (minimum,
104 average, and maximum); so that the final IMEF and IWF values are reflective of a clothes washer's performance
105 across the entire range of consumer-relevant load sizes.

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107 Recognizing lack of ample availability of commercial top loading models that meet leadership efficiency levels and
108 there being performance concerns with the very limited models that do meet current ENERGY STAR
109 requirements, EPA is excluding commercial top-load models from the program's scope at this time. Therefore,
110 only commercial front-load clothes washers will be included in the commercial clothes washer scope. If there is a
111 demonstrated improvement in efficiency and performance, EPA will consider bringing commercial top-load clothes
112 washers back into the scope of the clothes washer program.

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115 **3) Qualification Criteria:**

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117 A. Modified Energy Factor (MEF J2) or Integrated Modified Energy Factor (IMEF):

118 MEF J2 shall be greater than or equal to the Minimum MEF J2 ($MEF_{J2_{MIN}}$), as calculated per Equation 1.

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

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123 **Equation 1. Calculation of Minimum MEF J2**

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$$MEF_{J2_{MIN}} = MEF_{J2_{BASE}}$$

126 where,

127 $MEF_{J2_{BASE}}$ is the base MEF J2, per Table 1

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130 **Equation 2. Calculation of Minimum IMEF**

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

133 where,

134 $IMEF_{BASE}$ is the base IMEF, per Table 1

135 $IMEF_{Adder_Connected}$ is the IMEF connected allowance, per Table 2

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Table 1: Base IMEF/MEF J2

Product Type	IMEF _{BASE}	MEF J2 _{BASE}
Residential Clothes Washers, Front-loading (> 2.5 cu-ft)*	2.76	NA
Residential Clothes Washers, Top-loading (> 2.5 cu-ft)*	2.06	NA
Residential Clothes Washers (≤ 2.5 cu-ft)	2.07	NA
Commercial Clothes Washers	NA	2.20

* Those products meeting the definition of a laundry center must meet the appropriate IMEF and IWF, as outlined in Table 1 and Table 3, as well as the current ENERGY STAR criteria for clothes dryers.

**Those products meeting the definition of a Residential Clothes Washer with Supplementary Wash System: The primary washer must meet the appropriate IMEF and IWF to certify for ENERGY STAR as if it were a stand-alone product, as outlined in Table 1 and Table 3. The supplementary washer must meet the relevant minimum efficiency standard.

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Table 2: Connected Allowance

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

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

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

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140 B. Integrated Water Factor (IWF):
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Table 3: IWF

Product Type	Maximum IWF
Residential Clothes Washers, Front-loading (> 2.5 cu-ft)	3.2
Residential Clothes Washers, Top-loading (> 2.5 cu-ft)	4.3
Residential Clothes Washers (≤ 2.5 cu-ft)	4.2
Commercial Clothes Washers	4.0

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143 **Note:** EPA is aware that residential clothes washers with a supplementary wash system that meets the
144 definition of a compact residential clothes washers are entering the U.S. market. In order for these products to
145 be eligible for the ENERGY STAR program, EPA has added a definition and notes the applicability of the Version
146 8 requirements to this product. For clarity, EPA has added a permanent note to the final draft that clarifies the
147 requirements to certify under this definition. The primary washer must meet the appropriate IMEF and IWF to
148 certify for ENERGY STAR as if it were a stand-alone product, as outlined in Table 1 and Table 3. The
149 supplementary washer must meet the relevant minimum efficiency standard.

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151 EPA and DOE are enclosing the test method to measure the cleaning performance of residential clothes
152 washers. Finalizing this test method is consistent with the government and many stakeholders' interest in
153 ensuring that as energy and water efficiency increase, performance is not compromised. EPA and DOE's
154 interest is to advance a mechanism by which cleaning performance can be demonstrated in a repeatable and
155 reproducible manner. To that end, in lieu of an immediate reference to the test procedure in the Version 8.0
156 Clothes Washer specification, EPA will invite partners to participate in pilot use of the test. Partners interested in
157 participating are encouraged to contact us.

158
159 Further, in response to stakeholder concerns regarding the test, DOE offers the following. A stakeholder is
160 concerned that DOE has not demonstrated that the test procedure proposed is accurate, repeatable, and
161 reproducible. DOE notes that the proposed test method is based on AHAM's HLW-1-2013 test method; with the
162 exception of using DOE test cloth instead of 100% cotton towels, sheets, and pillowcases as the load material.
163 (Further discussion about test materials is provided below). DOE also notes that the AHAM HLW-1-2013 test
164 method is derived from the IEC 60456 test method⁶, which is used by the European Union (EU) and other
165 regions for measuring clothes washer performance. HLW-1-2013 and IEC 60456 are among the best available
166 and well-established test methods in the world for measuring clothes washer cleaning performance.
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⁶ the International Electrotechnical Commission (IEC) Standard: Clothes washing machines for household use ("IEC 60456")

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In the EU, the IEC 60456 cleaning performance measurement was used to support a product labeling program and subsequently a mandatory cleaning performance requirement for all clothes washers on the European market. IEC 60456 was first introduced in 1974 and has undergone five major revisions; work on version 6.0 is ongoing. IEC 60456 provided the foundation for the EU's performance labeling requirements that were enacted in May 1995, which required each clothes washer's washing performance score to be reported on its label along with energy and water consumption. (Commission Directive 95/12/EC) In 2010, the EU further revised its regulations to require that, beginning December 2011, all household clothes washers achieve a minimum washing performance score. (Commission Regulation 1015/2010, implementing Directive 2009/125/EC). By referencing these EU regulations, DOE and EPA are not suggesting or proposing that an equivalent scheme will be enacted in the U.S.

HLW-1-2013 was initially published in 1987 and was revised in 2002, 2006, 2007, 2010, and 2013, with each major revision providing continuous improvements in repeatability and reproducibility, among other changes. For example, the 2013 version implemented significant improvements to the rinsing effectiveness test compared to the 2010 version. As stated above, the current version of HLW-1-2013 largely mirrors IEC 60456 version 5.0 (with some minor differences regarding use of the reference machine and the final score calculation), and overall represents the same general approach to measuring clothes washer cleaning performance.

By basing its test method on HLW-1-2013, which in turn is derived from IEC 60456, DOE is leveraging the decades of testing and experience that have gone into the development of these test methods. To the extent that concerns regarding repeatability and reproducibility persist in the current versions of these test methods, DOE expects that the IEC and AHAM procedures will continue to undergo regular revisions to provide further improvements in the test measurements. Such improvements would then be reflected in the DOE test method by updating DOE's references to the latest version of the AHAM test method.

On the topic of assessing uncertainty, DOE notes that the approximate uncertainty associated with the IEC (and by extension, AHAM) cleaning performance scores is suggested by the following:

The EU performance score label requirement⁷ established washing performance "classes", letters A through G, representing ranges of performance scores in increments of 0.03. (e.g. class A represents a score of > 1.03; class B represents a score of 1.00–1.03; class C represents a score of 0.97–1.00; and so forth).

IEC Technical Report 62617 provides an "expanded uncertainty value" of +/- 0.04 (i.e. around 4%) for the IEC 60456 cleaning performance measurement for front-loading washers. This expanded uncertainty value represents a confidence interval, which allows for the calculation of a minimum and maximum value around an average measured result, when the measurement is performed at multiple laboratories following reproducibility conditions. The expanded uncertainty value for top-loading washers is not provided. (Table 2 and Table 3 of IEC TR 62617)

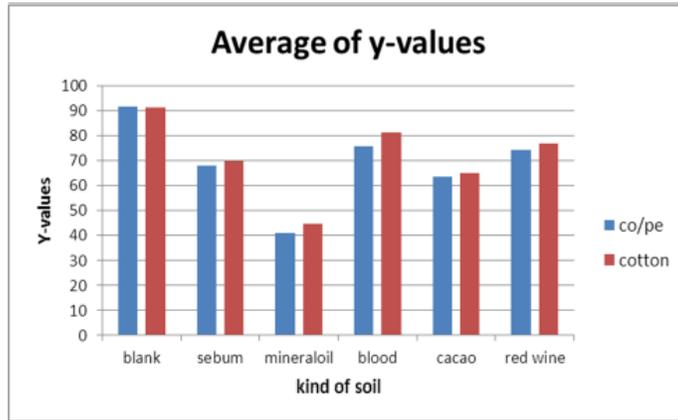
EU verification requirements allow a 4% tolerance on the measured cleaning performance score (Commission Regulation 1015/2015, Annex III, Table 1).

While these tolerances may not provide a fully comprehensive assessment of repeatability and reproducibility of the IEC 60456 test method (and by extension, HLW-1-2013), they provide a useful order-of-magnitude estimate regarding the expected repeatability and reproducibility of results.

⁷ Commission Directive 95/12/EC

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Regarding the load material, as proposed in Draft 1, the DOE test method would use DOE test cloth rather than 100% cotton towels, sheets, and pillowcases defined in AHAM HLW-1-2013. DOE is aware that the IEC 60456 committee has been investigating the use of a cotton/polyester blended cloth as an alternative, or potential replacement for, the 100% cotton load currently defined. Preliminary data published by the University of Bonn⁸, in support of the IEC 60456 committee, demonstrated that a cotton/polyester blended cloth similar to DOE test cloth provided nearly identical cleaning performance results across the five individual stain swatches. This data is reproduced in the following figure⁹. The data in the figure is from a single front-loading clothes washer; therefore, its results may not be representative of all clothes washers. DOE is aware that IEC 60456 committee has since conducted additional comparison tests and is currently analyzing the results.



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In addition, following the release of Draft 1, DOE has analyzed confidential test data, which provides a comparison between DOE test cloth and AHAM 100% cotton load materials when performing the HLW-1-2013 test method. The test data yielded the following general conclusions:

The overall test results using DOE test cloth are extremely similar to results using AHAM 100% cotton load. The repeatability of test results is such that the measured range of performance scores across multiple clothes washers is sufficiently larger than the run-to-run variation on an individual unit; i.e., the test method adequately differentiates product performance to identify cleaning performance trends among different models on the market.

The variation of the data indicates a repeatability confidence interval of approximately +/- 0.05 (i.e. 5%). Reproducibility could not be assessed by DOE because all of the tests were performed at a single laboratory.

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- C. **Significant Digits and Rounding:** All calculations shall be carried out as specified in 10 CFR 430, Subpart B, Appendix J2, 10 CFR Part 430.23(j), and 10 CFR Part 429.20.
- D. **Model Numbers:** Model numbers used for ENERGY STAR certified product submissions shall be consistent with Federal Trade Commission (FTC) and DOE submissions.

4) **Connected Criteria:**

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

⁸ Nistrath, Marina and Stamminger, Rainer. "1st comparison of cotton load to a cotton-polyester load for IEC 60456." Presentation to IEC 60456 committee, May 2014

⁹ In the figure, the Y-values represent the reflectance measurements performed on each stain. A higher reflectance value means a greater level of optical whiteness; i.e., better cleaning result.

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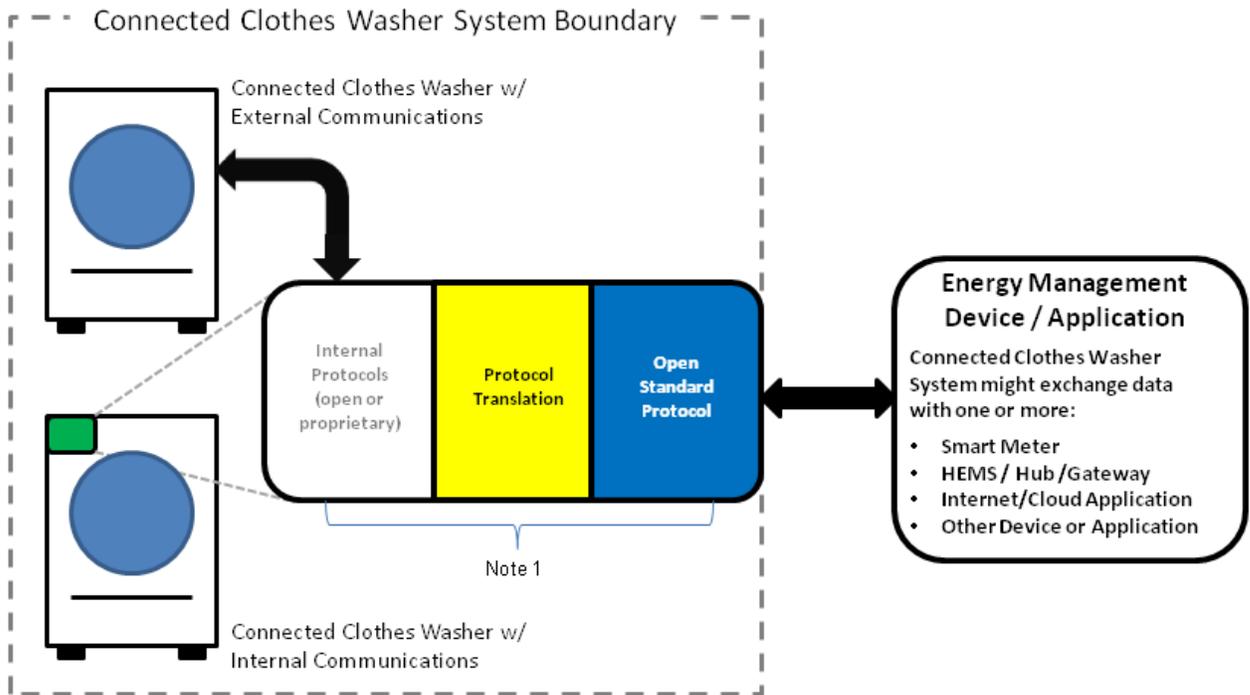
A. Connected Clothes Washer System

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 4. B.2.

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 4.D, 4.F, and 4.G. The capabilities shall be supported through one or more means, as identified in section 4.B.2. 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.

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B. Communications

1. Open Standards – Communication with entities outside the Connected Clothes Washer System that enables connected functionality (sections 4.D, 4.F, 4.G) must use, for all communication layers,

standards:

- a. Included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards,¹⁰ and/or
- b. Included in the NIST Smart Grid framework¹¹ 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).

Notes:

1. The Association of Home Appliance Manufacturers (AHAM) published a study in September 2010, AHAM Assessment of Communication Standards for Smart Appliances¹², which evaluates existing communication protocols designed for the smart grid. All standards listed in this document would be considered open standards.
 2. EPA recognizes that standardized messages to enable requisite connected functionality may not be available. In such cases, manufacturer-specific messaging is unavoidable, and is permitted by certain open standards. In cases where proprietary messaging is necessary, the API or similar documents must ensure open access to the connected functionalities outlined in Section 4.C.
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.

C. Open Access

To enable interconnection with the product, in addition to section 4.B.1 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 4.D (must include accuracy, units and measurement interval);
2. Operational Status, User Settings & Messages specified in section 4.F (if transmitted via a communication link);
3. Demand Response specified in section 4.G.

¹⁰ http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PMO#Catalog_of_Standards_Processes

¹¹ <http://www.nist.gov/smartgrid/upload/NIST-SP-1108r3.pdf>

¹² https://www.smartgrid.gov/document/assessment_communication_standards_smart_appliances_home_appliance_industrys_technical_eval

320 D. Energy Consumption Reporting

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

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329 The product may provide additional types of energy use feedback, such as:

- 330 • energy use feedback on the product itself, or
- 331 • energy use associated with the previous cycle

332 This additional reporting, if provided, may be in units and format chosen by the manufacturer (e.g.,
333 \$/month or KWh/cycle).

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335 E. Remote Management

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

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343 F. Operational Status, User Settings & Messages

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

357 G. Demand Response

358 A connected clothes washer shall have the capability to receive, interpret and act upon consumer-
359 authorized signals by automatically adjusting its operation depending on both the signal's contents and
360 settings from consumers. At a minimum, the product shall be capable of providing the following
361 capabilities for all cycle and setting combinations, except where otherwise noted (see Section 4.G.2):
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- 363 1. *Delay Appliance Load (DAL) Capability*: The capability of the product to respond to a signal in
364 accordance with consumer settings, except as permitted below, by delaying the start of an operating
365 cycle beyond the delay period.
 - 366 a. Default settings –The product shall ship with default settings that enable a response for at least 4
367 hours.
 - 368 b. Consumer override – The consumer shall be able to override the product's Delay Appliance Load
369 response at any time after the requesting signal has been received. If the consumer elects to
370 override, the product is not required to respond to subsequent DR signals requesting a response

371 in the current operational cycle. However, responses in subsequent operational cycles shall not
372 be automatically overridden.

- 373 c. The product shall be able to provide at least one Delay Appliance Load response per consumer
374 initiated operating cycle.

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376 2. *Temporary Appliance Load Reduction (TALR) Capability:* The capability of the product to respond to
377 a signal by providing load reduction for a short time period, typically 10 minutes. Upon receipt of
378 signal and in accordance with consumer settings, except as permitted below, the product shall restrict
379 its average power draw during the load reduction period to no more than 50 watts.

- 380 a. Default settings – The product shall ship with default settings that enable a response period of at
381 least 10 minutes.

- 382 b. The product is not required to provide a response if the consumer selected wash cycle, as
383 indicated in the product user documentation and/or on the product itself, is explicitly designed or
384 primarily intended for:

- 385 • sanitization, such as those in cycles compliance with NSF Protocol P172 “Sanitization
386 Performance of Residential and Commercial, Family-Sized Clothes Washers,” or
- 387 • allergen reduction, such as those cycles in compliance with NSF Protocol P351 “Allergen
388 Reduction Performance of Residential and Commercial, Family-Sized Clothes Washers,” or
- 389 • laundering of hand-wash wool articles, such as those cycles in compliance with Woolmark
390 Blue (formerly Gold) or Woolmark Green (formerly Platinum)

391 Note: EPA encourages products to provide Temporary Appliance Load Reduction responses in
392 these cycles whenever consumer expectations would not be impacted.

- 393 c. Consumer override – The consumer shall be able to override the product’s Temporary Appliance
394 Load Reduction response at any time after the requesting signal has been received. If the
395 consumer elects to override, the product is not required to respond to subsequent DR signals
396 requesting a response in the current operational cycle.

- 397 d. The product shall be able to provide at least one Temporary Appliance Load Reduction response
398 per consumer initiated operating cycle.

399 Illustrative DR Examples:

- 400 1. The product receives a DAL signal with a 10-hour delay period. The consumer overrides and starts a
401 load. The product need not respond to subsequent DAL or TALR signals during that cycle. However,
402 after this cycle completes, the consumer must initiate a 2nd override in order to start a second cycle
403 without delay.
- 404 2. While running a cycle, the product receives and responds to a TALR signal. During its response, the
405 product receives a DAL signal with a 4-hour delay period. Since the consumer has elected to
406 override, the product does not need to respond to the DAL signal in the current cycle. However, after
407 this cycle completes, if within the DAL delay period; the consumer must initiate an override in order to
408 start a subsequent cycle without delay.
- 409 3. While running a cycle, the product receives and responds to a TALR signal. After its response and
410 within the same operational cycle, the product receives a second TALR signal. Since the product is
411 required to provide one TALR response per operating cycle, it does not need to respond to the
412 second signal.

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414 H. Information to Consumers

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416 If additional modules, devices, services and/or infrastructure are part of the configuration required to
417 activate the product’s communications capabilities, prominent labels or other forms of consumer

418 notifications with instructions shall be displayed at the point of purchase and in the product literature.
 419 These shall provide specific information on what consumers must do to activate these capabilities (e.g.
 420 “This product has Wi-Fi capability and requires Internet connectivity and a wireless router to enable
 421 interconnection with an Energy Management System, and/or with other external devices, systems or
 422 applications.”).

Note: One stakeholder believes the changes made in the specification under demand response (Section G.1.b) in both drafts limit the consumer's capability to override to one cycle, and requests the language be changed to allow a four-hour period after the initial override cycle to allow a consumer to wash subsequent loads without having to respond to additional override requests. EPA is retaining the Demand Response criteria proposed previously (Section 4.G). This language reflects EPA's original intent with respect to the demand response criteria in the final V7.1 specification, which was clarified in the ENERGY STAR Connected Criteria Q&A. The criteria continue to keep consumers in control of their appliances at all times. In the example where multiple wash loads take place in a single, long-duration DAL period, the consumer will simply need to override at the start of each wash load.

Another stakeholder is concerned that until a test method is complete, manufacturers have limited incentive to invest in developing new products and increasing their market penetration. The stakeholder suggests that EPA gather additional data on how connected products are used by the consumer. EPA understands this concern and is working to both understand the evolving market and build demand for connected products.

5) **Test Requirements:**

- A. One of the following sampling plans shall be used to test for certification 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 certification:

Table 5: Test Methods for ENERGY STAR Certification

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

* 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>

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Table 6: Test Load Sizes for Commercial Clothes Washers with Capacities >6.0 cubic feet*

Container Volume		Minimum Load		Maximum Load		Average Load	
<i>cu. ft.</i> ≥ <	<i>liter</i> ≥ <	<i>lb</i>	<i>kg</i>	<i>lb</i>	<i>kg</i>	<i>lb</i>	<i>kg</i>
6.00-6.10	169.9-172.7	3.00	1.36	24.80	11.25	13.90	6.30
6.10-6.20	172.7-175.6	3.00	1.36	25.20	11.43	14.10	6.40
6.20-6.30	175.6-178.4	3.00	1.36	25.60	11.61	14.30	6.49
6.30-6.40	178.4-181.2	3.00	1.36	26.00	11.79	14.50	6.58
6.40-6.50	181.2-184.1	3.00	1.36	26.40	11.97	14.70	6.67
6.50-6.60	184.1-186.9	3.00	1.36	26.90	12.20	14.95	6.78
6.60-6.70	186.9-189.7	3.00	1.36	27.30	12.38	15.15	6.87
6.70-6.80	189.7-192.6	3.00	1.36	27.70	12.56	15.35	6.96
6.80-6.90	192.6-195.4	3.00	1.36	28.10	12.75	15.55	7.05
6.90-7.00	195.4-198.2	3.00	1.36	28.50	12.93	15.75	7.14
7.00-7.10	198.2-201.0	3.00	1.36	28.90	13.11	15.95	7.23
7.10-7.20	201.0-203.9	3.00	1.36	29.30	13.29	16.15	7.33
7.20-7.30	203.9-206.7	3.00	1.36	29.70	13.47	16.35	7.42
7.30-7.40	206.7-209.5	3.00	1.36	30.10	13.65	16.55	7.51
7.40-7.50	209.5-212.4	3.00	1.36	30.60	13.88	16.80	7.62
7.50-7.60	212.4-215.2	3.00	1.36	31.00	14.06	17.00	7.71
7.60-7.70	215.2-218.0	3.00	1.36	31.40	14.24	17.20	7.80
7.70-7.80	218.0-220.9	3.00	1.36	31.80	14.42	17.40	7.89
7.80-7.90	220.9-223.7	3.00	1.36	32.20	14.61	17.60	7.98
7.90-8.00	223.7-226.5	3.00	1.36	32.60	14.79	17.80	8.07

*And in accordance with any applicable DOE issued test procedure guidance. Full DOE Test Waiver can be found here: <https://www.regulations.gov/document?D=EERE-2015-BT-WAV-0020-0005>

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- C. Compliance with Connected functionality, as specified in Section 4, shall be through examination of product and/or product documentation. In addition, upon publication of a final test method, demand response functionality shall be tested using the ENERGY STAR Test Method for Clothes Washers to Validate Demand Response. Once the final Test Method is published, it must be used to certify demand response functionality in order for a product to remain listed as having connected functionality on the Certified Product List, and to be eligible for any connected allowance.

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6) **Effective Date:**

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The ENERGY STAR Clothes Washer specification shall take effect on **January 1, 2018**. To certify 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.

Future Criteria Revisions:

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- 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

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revision, please note that the ENERGY STAR certification is not automatically granted for the life of a product model.