



ENERGY STAR® Program Requirements Product Specification for Clothes Washers

Eligibility Criteria Draft 2 Version 7.0

Following is the **Draft 2 Version 7.0** product specification for ENERGY STAR qualified clothes washers. A product shall meet all of the identified required criteria if it is to earn the ENERGY STAR.

Note: In the Draft 2 Version 7.0 clothes washer specification, based on stakeholder feedback, the Environmental Protection Agency (EPA) is proposing a number of key changes that are discussed in greater detail throughout the document, including:

- Separate product categories for front- and top-loading residential clothes washers greater than 2.5 cu-ft, and revised energy and water criteria for both categories.
- A separate product category for smaller residential clothes washers in light of the unique customer need met by this space saving product, and revised energy and water criteria.
- New optional connected criteria for residential clothes washers that build upon the connected functionality in the Version 5.0 Residential Refrigerators and Freezers specification.
- A new reporting requirement for cleaning and rinse performance applicable to models certified to ENERGY STAR after DOE finishes developing the new ENERGY STAR cleaning and rinse test procedure.

In light of delay in releasing the Draft 2 specification, EPA is proposing a Version 7.0 clothes washer effective date that aligns with the federal test procedure change on March 7, 2015. While a later effective date may be warranted in this circumstance, it does present an added challenge in terms of anticipating advances in the clothes washer market such that the new performance levels will effectively distinguish the highest performers when it goes into effect in 2015. EPA welcomes information that might supplement our current clothes washer data, both on expected efficiency improvements and reductions in the incremental cost associated with those improvements. The Agency recognizes that potential advances in efficiency may be constrained by cleaning and rinse performance considerations.

Please share comments on the Draft 2 Version 7.0 specification for clothes washers via email to appliances@energystar.gov no later than July 3, 2013.

1) **Definitions:** Below are the definitions of the relevant terms in this document. Where noted below, definitions are identical to the definitions in the DOE test procedure at 10 CFR 430, Subpart B, 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.

¹10 CFR 430 Subpart A, Section 430.2

- 45 B. Commercial Clothes Washer²: A soft-mounted front-loading or soft-mounted top-loading clothes washer
46 that is defined for use in applications in which the occupants of more than one household will be using the
47 clothes washer, such as multi-family housing common areas and coin laundries.
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- 49 C. Combination All-in-One Washer-Dryer: A consumer product designed to clean and dry fabrics in a single
50 drum, where a separate drying cycle uses electricity or gas as a heat source and forced air circulation.
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- 52 D. Modified Energy Factor (MEF)³: The quotient of the cubic foot (or liter) capacity of the clothes container
53 divided by the total clothes washer energy consumption per cycle, with such energy consumption
54 expressed as the sum of the machine electrical energy consumption, the hot water energy consumption,
55 and the energy required for removal of the remaining moisture in the wash load.
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- 57 E. Integrated Modified Energy Factor (IMEF)³: The quotient of the cubic foot (or liter) capacity of the clothes
58 container divided by the total clothes washer energy consumption per cycle, with such energy
59 consumption expressed as the sum of the machine electrical energy consumption, the hot water energy
60 consumption, the energy required for removal of the remaining moisture in the wash load, and the
61 combined low-power mode energy consumption.
62
- 63 F. Water Factor (WF)³: The quotient of the total weighted per-cycle water consumption divided by the cubic
64 foot (or liter) capacity of the clothes washer.
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- 66 G. Integrated Water Factor (IWF)³: The quotient of the total weighted per-cycle water consumption for all
67 wash cycles in gallons divided by the cubic foot (or liter) capacity of the clothes washer.
68
- 69 H. Basic Model⁴: Units of a given type of covered product (or class thereof) manufactured by one
70 manufacturer, having the same primary energy source, and which have essentially identical electrical,
71 physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency,
72 water consumption, or water efficiency.
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74 **Note:** In Draft 2, EPA has proposed a revised effective date of March 7, 2015 for the Version 7.0 specification. In
75 light of this, EPA is expressing the Version 7.0 efficiency requirements for residential clothes washers using the
76 new DOE metrics: Integrated Modified Energy Factor (IMEF) and Integrated Water Factor (IWF). In support, the
77 Agency added definitions for IMEF and IWF from the DOE test procedure found in 10 CFR 430 Subpart B
78 Appendix J2, to Section 1.
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80 Associated with the Version 6.0 clarification of maximum testable capacity of 6.0 cu ft, EPA received stakeholder
81 feedback that indicated that washer-extractors would be able to qualify. The feedback further indicated that when
82 placed into service in health-care facilities and the like, these washer-extractors as programmed and operated will
83 consume water and energy in excess of ENERGY STAR criteria. As it is important that ENERGY STAR products
84 deliver on consumer expectations for savings, EPA is proposing to amend the definition of Commercial Clothes
85 Washers by deleting “other commercial applications.” EPA is interested in further stakeholder input as to whether
86 this change will be effective in ensuring this specification covers only clothes washers that will deliver savings, as
87 installed and operated, and whether there are any unintended consequences from this proposed change.
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89 Additionally, with the aim of providing better clarity for stakeholders, EPA has added new footnotes to a number of
90 definitions, providing the Code of Federal Regulations (CFR) citation for a DOE definition and noting where and
91 how one ENERGY STAR program definition differs from a DOE regulatory program definition. In addition, to
92 ensure greater consistency where EPA’s intention is to harmonize with a DOE regulatory definition, the Agency
93 has added language that states when in cases of conflict, the definition in the CFR takes precedence. EPA and
94 DOE welcome stakeholder feedback on these changes.
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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 J2

⁴ 10 CFR 430, Subpart A, Section 430.2

97 2) **Scope:**

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99 A. Included Products: Products with a clothes container volume that is not more than 6.0 cubic feet and that
100 meet the definition of a Residential Clothes Washer or Commercial Clothes Washer as specified herein
101 are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2B.
102
103 B. Excluded Products: The following products are not eligible for ENERGY STAR qualification:
104 i) products with a clothes container volume of less than 1.6 cubic feet,
105 ii) products configured in any way other than a front- or top-loading design,
106 iii) Combination All-in-One Washer-Dryers, and
107 iv) Residential Clothes Washers with an Optional Dry Cycle.
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109 **Note:** EPA has not received additional data on combination all-in-one washer-dryers and as a result, is not
110 planning to further consider this category of products in Version 7.0 specification development effort.

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112 3) **Qualification Criteria:**

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

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117 Alternatively, for products tested and certified using 10 CFR 430, Subpart B, Appendix J2, IMEF shall be
118 greater than or equal to the Minimum IMEF ($IMEF_{MIN}$), as calculated per Equation 2.

119 **Equation 1. Calculation of Minimum MEF**

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

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121 where,

122 MEF_{BASE} is the base MEF, per Table 1
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124 **Equation 2. Calculation of Minimum IMEF**

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

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126 where,

127 $IMEF_{BASE}$ is the base IMEF, per Table 1

128 $IMEF_{Adder_Connected}$ is the IMEF connected allowance, per Table 2
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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	2.11
Residential Clothes Washers (≤ 2.5 cu-ft)	NA	2.07
Commercial Clothes Washers	2.2	NA

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Table 2: Connected Allowance

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

¹ Product must be qualified using the final and validated ENERGY STAR Test Method (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	NA

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Note: As noted earlier, EPA is proposing a revised effective date of March 7, 2015 that aligns with the upcoming changes to the DOE Federal standards and test procedure for residential clothes washers. As a result, EPA has expressed the proposed Draft 2 requirements (Tables 1 and 3) using the new metrics: IMEF and IWF. The proposed requirements, discussed below, were developed using an updated dataset of ENERGY STAR qualified clothes washers rated using the MEF and WF metrics. Revised MEF and WF requirements were identified and then translated to equivalent IMEF and IWF levels, as discussed in more detail below. EPA's data set, charts and supporting analysis are available to stakeholders through an Excel file posted to the ENERGY STAR Version 7.0 clothes washer specification development website.

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Clothes Washers ≤ 2.5 cu-ft: In response to the Draft 1 proposal, several stakeholders recommended EPA consider separate criteria for smaller residential clothes washers (≤ 2.5 cu-ft) which tend to have smaller dimensions (24" wide vs. the standard 27") since they are used in more space-constrained spaces such as condominiums and apartment buildings. For ENERGY STAR Most Efficient, EPA established separate levels for clothes washers less than or equal to 2.5 cu-ft in recognition of the consumer need met by this space saving product. Based on additional analysis of product efficiency, EPA is proposing new, separate levels for residential clothes washers ≤ 2.5 cu-ft equivalent to MEF ≥ 2.45 and WF ≤ 4.0. The cross-walked IMEF and IWF values are shown in Tables 1 and 3. This proposal currently recognizes five models offered by two manufacturers. Relative to the 40 basic models list in the DOE certification database (between 1.6 and 2.5 cu-ft), this represents, approximately, 13% of products in the market. In light of the extended timeline for Version 7.0, EPA anticipates additional products are likely to become available by 2015, expanding the number of options available for consumers. EPA welcomes feedback on the proposed levels for residential clothes washers ≤ 2.5 cu-ft.

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Clothes Washers > 2.5 cu-ft: After considering stakeholder feedback, in Draft 2 EPA is proposing revised levels, including two separate product classes for top-loading and front-loading models, larger than 2.5 cu-ft. In Draft 1, EPA proposed levels of MEF ≥ 2.60 and WF ≤ 3.7 applicable to both top- and front-loading models. In Draft 2 EPA is proposing strengthened levels equivalent to MEF ≥ 2.80 and WF ≤ 3.50 for front-loading clothes washers. For top-loading clothes washers, EPA is proposing to modestly relax levels to an equivalent of MEF ≥ 2.55 and WF ≤ 3.8. As noted earlier, all Draft 2 requirements for residential clothes washers (Tables 1 and 3) have been expressed in terms of IMEF and IWF. The crosswalk is discussed below and also presented in a supplemental Excel data file.

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169 **Note (cont.):** As a general principle, the ENERGY STAR program seeks to make it easy for consumers to find the
170 most efficient product, regardless of technology, that performs the desired function (e.g. washing clothes). In
171 some instances, the Agency sub-divides product categories so that products with enhanced features or
172 functionality can be compared with each other rather than more basic models. Because top-loading and front-
173 loading clothes washers perform the same basic function, EPA proposed in Draft 1, that they be considered
174 together for purposes of ENERGY STAR qualification. Upon further review and based on feedback on Draft 1,
175 the Agency believes there may be enough of a difference in functionality, particularly wash-time, to warrant two
176 separate categories. Appliance manufacturers have indicated that consumers are increasingly seeking energy-
177 efficient top-load washers and have noted that customers who previously purchased a front load clothes washer
178 are now returning and purchasing a high efficiency top load washer. Through additional research, EPA has found
179 that top-loading clothes washers can offer some additional consumer amenities such as, on average, shorter
180 cycle time and less vibration. As part of the Federal standard rulemaking process, DOE established two product
181 classes for front- and top-loading washers based on differences in the length of wash-time. Given these
182 considerations, EPA believes there seems to be enough difference in functionality and in particular, wash-time,
183 that to warrant two categories. EPA welcomes stakeholder comment on the proposed change to set separate
184 levels front-loading clothes washers and top-loading clothes.

185 EPA's data analysis from the ENERGY STAR qualified product list shows the revised proposal for clothes
186 washers > 2.5 cu-ft captures 134 currently available models, including 36 top-loading washers and 98 front-
187 loading washers, from five different manufactures. Using the number of clothes washer basic models > 2.5 cu-ft
188 that are listed in the DOE certification database (552) as an estimate for the total number of models, EPA found
189 that this selection of products represents approximately 24% of products on the market. A limited review of
190 current pricing indicates that ENERGY STAR certified models would be available at this performance level with a
191 payback of less than 3 years. In light of the delayed effective date for this revision, EPA expects that a higher
192 percentage of models achieving the new performance levels will be available when they go into effect. The
193 Agency welcomes comments on the proposed levels and additional information stakeholders might provide in
194 terms of what is likely to be available in the market by the time this specification becomes effective. EPA
195 recognizes that potential advancements in efficiency may be constrained by cleaning and rinse performance
196 considerations.

197 *Crosswalk:* As noted above, the Draft 2 levels are expressed using the IMEF and IWF metrics. EPA used the
198 existing dataset of ENERGY STAR certified clothes washers (rated using MEF and WF) to identify MEF and WF
199 levels used in the Draft 2 proposal. EPA worked with DOE to translate the current metrics into IMEF and IWF
200 using test data collected by DOE during their rulemaking process. The translated IMEF and IWF requirements
201 have been incorporated into Table 1 and Table 3 for stakeholder review and the cross-walk analysis is included in
202 the supplemental data file posted to the ENERGY STAR website. EPA noted that all of the currently certified
203 ENERGY STAR models less than 2.5 cu-ft. are front-loading units and therefore used the front-loading crosswalk.
204 EPA and DOE appreciate comments on any of the crosswalk values presented.

205 *Connected allowance:* EPA has also corrected the note that the calculated IMEF connected adder should be
206 rounded down to the nearest hundredth place, instead of to the nearest tenth, before being applied in Equation 1.
207 This aligns with the proposed IMEF requirements that are rounded to the nearest hundredth place.

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209 C. Reporting Requirements for Residential Clothes Washer Cleaning and Rinse Performance: TBD
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211 **Note:** Consistent with ENERGY STAR Guiding Principles, EPA believes it is important to ensure product
212 performance is maintained as efficiency requirements become more stringent. In Draft 1, EPA and DOE sought
213 stakeholder feedback on the possibility of integrating performance requirements (cleaning and/or rinse) into future
214 ENERGY STAR clothes washer specifications. This would first require the development of a new ENERGY
215 STAR test procedure to characterize cleaning and/or rinse performance. A number of stakeholder comments
216 received in response were supportive. One stakeholder cautioned that high energy and water performance
217 requirements would mitigate any net efficiency and cost savings that consumers expect if product performance is
218 not satisfactory since consumers would compensate by selecting more energy and water intensive cycles, and
219 submitted supporting data on the increase in energy and water use under different soil settings. Another
220 stakeholder pointed out that while many high-efficiency ENERGY STAR models receive high ratings from
221 Consumers Union, a number of others received somewhat lower ratings ("good" or "fair"), suggesting there would
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Note (cont.): be value in ensuring the ENERGY STAR label is not associated with products with lower performance. In Draft 1, the Agency noted many of the most energy and water-efficient clothes washers have received high performance ratings by Consumers Union (CU). A stakeholder commented that the CU tests are not carried out using the same cycle settings as the DOE energy and water test. Test data provided to EPA showed a number of units tested will use more energy and water use during a CU cycle, than in the DOE test procedure. EPA believes the CU ratings remain a relevant indicator of clothes washer performance, but acknowledges that results from CU's more intensive cleaning cycle may not be representative of the cleaning performance under the "Normal" cycle used by the DOE test procedure. To further assess potential performance impacts from the proposed Version 7.0 energy and water-efficiency criteria, EPA reviewed manufacturer and retailer claims and online consumer product reviews. Many manufacturers are promoting excellent cleaning performance of models that meet/exceed the proposed Version 7.0 requirements. EPA also noted many of the highly efficient products received good/excellent reviews.

Overall, after considering all the feedback received, EPA believes it will be important for future specification revisions to more comprehensively consider data on energy efficiency, water efficiency, and cleaning and rinse performance to ensure that ENERGY STAR continues to provide the consumer with comparable performance to that of non ENERGY STAR products, along with energy and water savings. Therefore, EPA is planning to consider minimum cleaning and rinse performance requirements in a future clothes washer specification.

To support this, DOE is initiating the test procedure development for cleaning and rinsing performance of clothes washers at this time. Factoring in development time, EPA is proposing (Section 3C) a reporting requirement for cleaning and rinse performance in Version 7.0 that would be applicable to all residential models certified after the ENERGY STAR test procedure is completed. This reporting requirement will also allow EPA to build a representative dataset that can be used to consider future minimum cleaning and rinse performance requirements along with potential new efficiency levels, in subsequent specification revisions. EPA does not plan to consider a minimum cleaning and rinse performance requirements in the Version 7.0 specification. The Agency welcomes comments on the proposed reporting requirement for cleaning and rinse performance.

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

E. 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) **Connected Criteria:**

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

Note: EPA has added the language in Section 4 to make clear the Agency's intent to develop optional connected criteria in this specification for residential clothes washers, only.

A. Connected Clothes Washer System

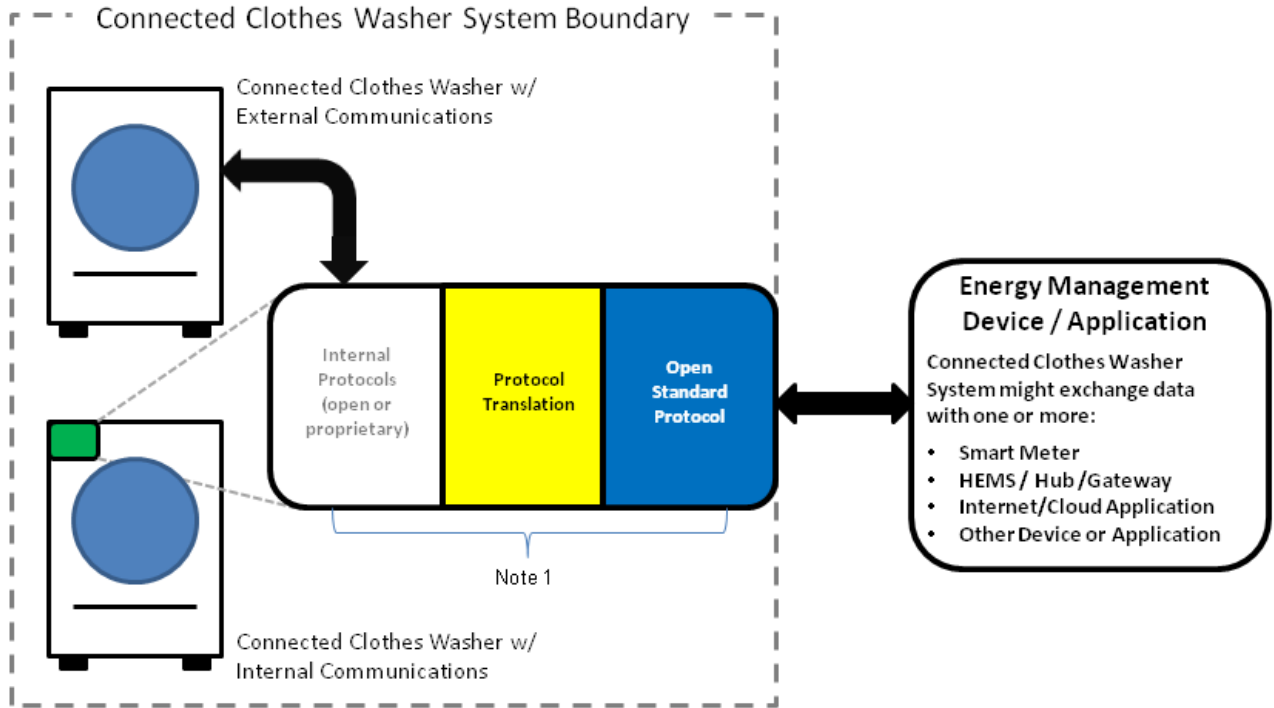
To be recognized as connected and to be eligible for the connected allowance, a "connected clothes washer system" (Connected Clothes Washer System, as shown in Figure 1) shall include the base appliance plus all elements (hardware, software) required to enable communication in response to consumer-authorized 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

278 based interconnection is the preferred option for meeting this requirement, but alternative approaches are
279 also acceptable.

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281 The product must continue to comply with the applicable product safety standards – the addition of the
282 functionality described below shall not override existing safety protections and functions. The appliance
283 must meet manufacturer’s internal minimum performance guidelines, e.g., cleaning performance.
284

285 **Figure 1.** Connected Clothes Washer System Boundary – Illustrative Example
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288 *Note 1: Communication device(s), link(s) and/or processing that enables open standards-based communication between the*
289 *Connected Clothes Washer System and Energy Management Device/Application(s). These elements could be within the base*
290 *appliance, and/or an external communication module, a hub/gateway, or in the Internet/cloud.*
291

292 **Note:** EPA’s ENERGY STAR program is helping advance the market for products with intelligent features in ways
293 that deliver immediate consumer benefit as well as support a low-carbon electricity grid over the long-term. As
294 part of this, EPA hopes to:

- 295
- 296 – Offer consumers new functionality that can enable immediate energy savings and convenience
297 opportunities such as:
 - 298 - receiving a message there is a performance issue with your clothes washer and enabling a service
299 center to make an initial assessment of the problem remotely and come prepared with necessary parts;
 - 300 - receiving a message that your refrigerator door didn’t close;
 - 301 - being able to remotely turn the room ac off and later turn it back on, just before returning home; and
 - 302 - learning how much energy you might save from lowering your room ac’s setting a few degrees.
 - 303
 - 304 – Help ensure the consumer is being considered on the product side of smart grid deployment (e.g.,
305 ensuring consumers have the ability to override any response); and
 - 306
 - 307 – Encourage manufacturers to begin to make available, products with future-oriented demand response
308 capabilities that could support a reliable, lower emissions electric grid (e.g., by enabling greater penetration
309 of variable renewable energy sources).
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311 Through extended and close work with a range of ENERGY STAR refrigerator/freezer stakeholders, EPA
312 developed the first set of connected criteria for an ENERGY STAR product. The proposed connected criteria for
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314 **Note (cont.):** clothes washers included in this Draft 2 are built on the connected criteria for refrigerators and
315 freezers, which were developed through extensive stakeholder engagement. The connected criteria stress
316 interoperability and the use of open protocols while also reflecting a more flexible approach that allows for multiple
317 paths of implementation. This approach provides the Agency a basis upon which to consider products with
318 connected functionality as they begin to enter the market and make more prescriptive changes to the
319 requirements, based on real-world market experience, as warranted.
320

321 EPA plans to also play a role in consumer education to help further the understanding of additional savings
322 opportunities associated with ENERGY STAR products that have connected functionality, as well as how to best
323 capture these savings (e.g. use of energy saving modes / opportunities for smart grid interconnection) and in what
324 scenarios these savings will be realized.
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326 EPA encourages stakeholder feedback on the connected criteria proposed in Section 4.
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328 B. Communications

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- 330 1. Open Standards – Communication with entities outside the Connected Clothes Washer System that
331 enables connected functionality (sections 4D, 4F, 4G) must use, for all communication layers,
332 standards:
 - 333 a. Included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards,⁵ and/or
 - 334 b. Included in the NIST Smart Grid framework Tables 4.1 and 4.2, and/or
 - 335 c. Adopted by the American National Standards Institute (ANSI) or another well-established
336 international standards organization such as the International Organization for Standardization
337 (ISO), International Electrotechnical Commission (IEC), International Telecommunication Union
338 (ITU), Institute of Electrical and Electronics Engineers (IEEE), or Internet Engineering Task Force
339 (IETF).
 - 340 2. Communications Hardware Architecture – Communication with entities outside the Connected
341 Clothes Washer System that enables connected functionality shall be enabled by any of the following
342 means, according to the manufacturer's preference:
 - 343 a. Built-in communication technology
 - 344 b. Manufacturer-specific external communication module(s) and/or device(s)
 - 345 c. Open standards-based communication port on the appliance combined with open standards-
346 based communications module
 - 347 d. Open standards-based communication port(s) on the appliance in addition to a, b or c, above
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349
350 If option b or c is used, the communication module/device(s) must be easy for a consumer to install
351 and shipped with the appliance, provided to the consumer at the time of sale, or provided to the
352 consumer in a reasonable amount of time after the sale.
353

354 C. Open Access

355 To enable interconnection with the product, in addition to section 4B1 that requires open-standards, an
356 interface specification, API or similar documentation shall be made available to interested parties that at a
357 minimum, allows transmission, reception and interpretation of the following information:
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- 359 1. Energy Consumption Reporting specified in section 4D (must include accuracy, units and
360 measurement interval);
- 361 2. Operational Status, User Settings & Messages specified in section 4F (if transmitted via a
362 communication link);
- 363 3. Demand Response specified in section 4G.

⁵ http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PMO#Catalog_of_Standards_Processes

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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, delay start, 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.

Note: After further consideration of the nascent state of standardization for both price signaling and for price-responsive devices, EPA has elected not to include specific criteria for price signal responsiveness in Version 7.0. In addition, stakeholders have informed EPA that at a system level, price responsiveness may be implemented that uses the Section G Demand Response functionality. Finally, EPA believes the importance of price responsiveness is well recognized by EPA, the appliance industry and utilities alike. As such, EPA expects the market will drive development of appliances that are capable of tailoring their consumption in response to a dynamic pricing environment. EPA will continue to monitor the marketplace and related technical developments and welcomes stakeholder feedback on this approach.

Section 4F1, operational / demand response status reporting criteria includes additional reporting, above that specified for refrigerators and freezers. This change has been proposed to ensure those entities authorized to send demand response signals are able to assess the order of magnitude of dispatch-able clothes washer load prior to signaling. EPA expects that this change will be particularly important for products such as residential clothes dryers that, while having high peak power consumption, are primarily in off mode or standby mode.

EPA welcomes stakeholder feedback on the proposed operational / demand response status reporting criteria.

413 G. Demand Response

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

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- 418 1. *Delay Appliance Load Capability*: The capability of the product to respond to a signal in accordance
419 with consumer settings, except as permitted below, by delaying the start of an operating cycle beyond
420 the delay period.
 - 421 a. Default settings –The product shall ship with default settings that enable a response in
422 accordance with 4G1 for at least 4 hours.
 - 423 b. Consumer override – The consumer shall be able to override the product's Delay Appliance Load
424 response before or during a delay period.
 - 425 c. The product shall be able to provide at least one Delay Appliance Load response in a rolling 24-
426 hour period.
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 - 428 2. *Temporary Appliance Load Reduction Capability*: The capability of the product to respond to a signal
429 by providing load reduction for a short time period, typically 10 minutes. Upon receipt of signal and in
430 accordance with consumer settings, except as permitted below, the product shall restrict its average
431 power draw during the load reduction period to no more than 50% relative to average power draw
432 during this period in the operating cycle under DOE test conditions.
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 - 434 a. Default settings - The product shall ship with default settings that enable a response in
435 accordance with 4G2 for a time period of least 10 minutes.
 - 436 b. Consumer override – The consumer shall be able to override the product's Temporary Appliance
437 Load Reduction response before or during a load reduction period.
 - 438 c. The product shall be able to provide at least one Temporary Appliance Load Reduction response
439 in a rolling 24-hour period.
 - 440

441 **Note:** The demand response (DR) criteria proposed in Section 4G have been informed by the recommended
442 definition of a “smart” clothes washer included in the smart appliance petition submitted to ENERGY STAR by the
443 Association for Home Appliance Manufacturers (AHAM) and efficiency advocates, as well as additional
444 stakeholder comments on the connected criteria for ENERGY STAR refrigerators and freezers (R/F).
445

446 Similar to R/F, the proposed demand response criteria for clothes washers include default Delay Appliance Load
447 (DAL) and Temporary Appliance Load Reduction (TALR) capabilities that set *minimum* durations of 4 hours and
448 10 minutes, respectively. In doing so, manufacturers are also free to consider implementing default response
449 durations that exceed these minimums. The DAL & TALR capabilities also include a consumer override
450 requirement identical to that in the ENERGY STAR Version 5.0 R/F specification.
451

452 The current DAL criterion specifies a 4 hour minimum default response period as well as a minimum of one DAL
453 response per 24h period. Similarly, a TALR criterion specifies a 10-minute minimum default response period as
454 well as a minimum of one TALR response per 24 hour period. EPA encourages stakeholder feedback on both
455 the proposed minimum durations and the 24 hour response frequencies. Specifically, EPA is interested in
456 feedback on whether is there opportunity for clothes washers to enable additional and/or longer duration
457 DAL/TALR responses without impacting consumer expectations and what, if any, performance considerations
458 should be considered (e.g., adding detergent and/or bleach directly to the clothing but then waiting for 4 hours to
459 run the wash cycle).
460

461 EPA encourages stakeholder comment on the proposed DR criteria for clothes washers.
462
463

464 H. Information to Consumers

465
466 If additional modules, devices, services and/or infrastructure are part of the configuration required to
467 activate the product's communications capabilities, prominent labels or other forms of consumer
468 notifications with instructions shall be displayed at the point of purchase and in the product literature.
469 These shall provide specific information on what consumers must do to activate these capabilities (e.g.
470 "This product has Wi-Fi capability and requires Internet connectivity and a wireless router to enable
471 interconnection with an Energy Management System, and/or with other external devices, systems or
472 applications.").

473
474 5) **Test Requirements:**

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

- 476 1. A representative unit shall be selected for testing based on the definition for Basic Model provided in
477 Section 1 above; or
478 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

479
480
481 B. When testing the energy and water efficiency of clothes washers, the following test method shall be used
482 to determine ENERGY STAR qualification:
483

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	

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>

484
485 C. Compliance with Connected functionality, as specified in Section 4, shall be through examination of
486 product and/or product documentation. In addition, demand response functionality shall be evaluated
487 using the **TBD** ENERGY STAR clothes washers test method to validate Demand Response in order to be
488 eligible for the connected allowance.
489

490 **Note:** Since Version 7.0 specification would be effective in March 2015, EPA and DOE have updated the test
491 procedure reference in Table 5 to Appendix J2. All residential clothes washers must be tested and certified using
492 Appendix J2, to the IMEF and IWF criteria in Section 3. DOE and EPA have also updated the test procedure
493 reference for commercial clothes washers to Appendix J2 and plan to propose translations for the current
494 commercial clothes washer MEF and WF levels included in Section 3 (based on J1), to MEF and WF levels based
495 on Appendix J2, once DOE's crosswalk analysis is available.

496
497 DOE plans to develop a test method to validate the DR capabilities of residential clothes washers that will be
498 referenced in this specification. DOE's test method development will be dependent upon working with
499 manufacturers to obtain products for connected testing. DOE is initiating this effort now and anticipates
500 contacting manufacturers to obtain products for testing or working with them to witness connected product testing
501 in the near term. This test is anticipated to be a separate, add-on test method. Products would need to be
502 qualified using this final and validated ENERGY STAR test method to use the proposed allowance.
503

504 **Note (cont.):** In the meantime (prior to when this new ENERGY STAR test method for demand response is
505 available), qualified clothes washers with connected features, as specified in the future Section 4, would be
506 highlighted on the ENERGY STAR Qualified Product List.

- 507
508
509 6) **Effective Date:** The ENERGY STAR Clothes Washer specification shall take effect on March 7, 2015. To
510 qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on the
511 model's date of manufacture. The date of manufacture is specific to each unit and is the date on which a unit
512 is considered to be completely assembled.
513

514 **Note:** In 2011, when the ENERGY STAR criteria for residential clothes washers were last changed, the market
515 responded remarkably quickly, with over 60% of clothes washer shipments meeting the new requirements that
516 first year. Consistent with the EPA's commitment to maintain up-to-date ENERGY STAR specifications across all
517 product categories, EPA launched a new revision to the clothes washer specification last summer, with the intent
518 of making it effective by the end of 2013. This would have allowed EPA to address the current high market share
519 and maintain ENERGY STAR's relevancy as an indicator of high performance in this category, with a reasonable
520 amount of time before the change in federal test procedures scheduled for 2015. For various reasons, including
521 additional time required to finalize connected criteria that were to form the basis for the clothes washer connected
522 proposal, the release of this Draft 2 specification was delayed, such that the earliest possible effective date would
523 be less than a year before the federal test procedure change. In light of this, EPA is now proposing a Version 7.0
524 Clothes Washer effective date that aligns with the federal test procedure change on March 7, 2015.
525

526 As specifications are revised, EPA continues to balance a number of different factors including the timing of
527 changes to Federal minimum efficiency standard and production cycles, with the need to maintain ENERGY
528 STAR as an effective differentiator of highly efficient products in the market.
529

530 While a later effective date may be warranted in this circumstance, it does present an added challenge in terms of
531 anticipating advances in the clothes washer market such that the new performance levels will effectively
532 distinguish the highest performers when it goes into effect in 2015. EPA welcomes information that might
533 supplement our current clothes washer data, both on expected efficiency improvements and reductions in the
534 incremental cost associated with those improvements. The Agency recognizes that potential advances in
535 efficiency may be constrained by cleaning and rinse performance considerations.

- 536
537 7) **Future Criteria Revisions:** ENERGY STAR reserves the right to change the specification should
538 technological and/or market changes affect its usefulness to consumers, industry, or the environment. In
539 keeping with current policy, revisions to the specification are arrived at through industry discussions. In the
540 event of a specification revision, please note that the ENERGY STAR qualification is not automatically
541 granted for the life of a product model.