



ENERGY STAR® Program Requirements Product Specification for Residential Refrigerators

Eligibility Criteria Final Draft Version 5.0

Following is the **Final Draft Version 5.0** product specification for ENERGY STAR qualified residential refrigerators. A product shall meet all of the identified criteria to earn the ENERGY STAR.

Note: Please share comments on the Final Draft Version 5.0 specification for residential refrigerators via email to appliances@energystar.gov no later than April 12, 2012.

- 1) Definitions:** Below are the definitions of the relevant terms in this document. Unless otherwise specified, these definitions are harmonized with definitions in the DOE test procedures at 10 CFR 430, Subpart B, Appendix A or in 10 CFR Subpart A, Section 430.2.
- A. **Electric Refrigerator:** A cabinet designed for the refrigerated storage of food, designed to be capable of achieving storage temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C), and having a source of refrigeration requiring single phase, alternating current electric energy input only. An electric refrigerator may include a compartment for the freezing and storage of food at temperatures below 32 °F (0 °C), but does not provide a separate low temperature compartment designed for the freezing and storage of food at temperatures below 8 °F (-13.3 °C).
 - B. **Freezer:** A cabinet designed as a unit for the freezing and storage of food at temperatures of 0 °F (-17.8 °C) or below, and having a source of refrigeration requiring single phase, alternating current electric energy input only.
 - C. **Electric Refrigerator-Freezer:** A cabinet which consists of two or more compartments with at least one of the compartments designed for the refrigerated storage of food and designed to be capable of achieving storage temperatures above 32 °F (0 °C) and below 39°F (3.9 °C), and with at least one of the compartments designed for the freezing and storage of food at temperatures below 8 °F (-13.3 °C) which may be adjusted by the user to a temperature of 0 °F (-17.8 °C) or below. The source of refrigeration requires single phase, alternating current electric energy input only.
 - D. **Adjusted Volume (AV):** The sum of the fresh food compartment volume in cubic feet, and the product of an adjustment factor and the net freezer compartment volume. Volumes shall be calculated as described in 10 CFR 430 Appendix A. Volume adjustment factors shall be as prescribed in 10 CFR 430 Appendix A § 6.1.
 - E. **Compact refrigerator/refrigerator-freezer/freezer:** Any refrigerator, refrigerator-freezer or freezer with total volume less than 7.75 cubic feet (220 liters) (rated volume as determined in Appendix A and B of 10 CFR 430 subpart B).
 - F. **Built-in refrigerator/refrigerator-freezer/freezer:** Any refrigerator, refrigerator-freezer, or freezer with 7.75 cubic feet or greater total volume and 24 inches or less depth not including doors, handles, and custom front panels; with sides which are not finished and not designed to be visible after installation; and that is designed, intended, and marketed exclusively (1) to be installed totally encased by cabinetry or panels that are attached during installation, (2) to be securely fastened to adjacent cabinetry, walls or floor, and (3) to either be equipped with an integral factory-finished face or accept a custom front panel.
 - G. **Basic Model:** All units of a given type of product (or class thereof) manufactured by one manufacturer,

52 having the same primary energy source, and which have essentially identical electrical, physical, and
53 functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water
54 consumption, or water efficiency.

55 **Note:** EPA has made minor edits to the definitions for Compact refrigerator/refrigerator-freezer/freezer and Electric
56 refrigerator-freezer, to harmonize these definitions with the 2014 federal standard definitions. Additional
57 clarification is provided in the Adjusted Volume definition to make clear that volume must be calculated using
58 Appendix A, rather than Appendix A1.

59 2) Scope:

- 60
- 61
- 62 A. Included Products: Products that meet the definition of (i) an Electric Refrigerator, Electric Refrigerator-
63 Freezer, or Freezer, including compact and built-in products, as specified herein and (ii) the definition of a
64 consumer product as specified in 10 CFR § 430.2 are eligible for ENERGY STAR qualification.
65
- 66 B. Excluded Products: Commercial refrigeration equipment (as defined in 10 CFR § 431.62), Freezers, and
67 Refrigerators, and Refrigerator-Freezers with a total refrigerated volume exceeding 39 cubic feet are not
68 eligible for ENERGY STAR. Products that are covered under other ENERGY STAR product specifications
69 (e.g. Commercial Refrigerators) are not eligible for qualification under this specification. Wine refrigerators
70 or other products that do not meet the definition of an Electric Refrigerator or Electric Refrigerator-Freezer
71 are not eligible for qualification under this specification.

72 **Note:** This final draft specification relays the Agency's decision to maintain freezers within the scope of the
73 ENERGY STAR program for Residential Refrigerator/Freezers and, thus, includes qualification criteria in Section
74 3 for all freezers. Multiple stakeholders provided data supporting the continued inclusion of residential freezers in
75 the ENERGY STAR program. Further discussion on freezers may be found in Section 3.

76 3) Qualification Criteria:

77 A. Energy Use Requirements

- 78
- 79
- 80
- 81 1. Annual Energy Consumption (AEC) shall be less than or equal to Maximum Annual Energy
82 Consumption (AEC_{MAX}), as calculated per Equation 1.
83

84 **Equation 1. Calculation of Maximum Annual Energy Consumption Requirement**

$$85 \quad AEC_{MAX} = AEC_{BASE} + \sum_{i=1}^n AEC_{ADD_i}$$

86 *where,*

87 AEC_{BASE} is the annual energy consumption base allowance, per Table 1; and

88 AEC_{ADD_i} is an annual energy functional adder, per Table 2
89
90
91
92

Table 1: Annual Energy Consumption Base Allowances

Product Class	Annual Energy Consumption Base Allowance, AEC_{BASE} (kWh/year)	% Less Energy than Federal Standard ¹
<i>Full-Size Refrigerators and Refrigerator-freezers</i>		
1. Refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost	7.19 * AV + 202.5	10%
1A. All-refrigerators—manual defrost	6.11 * AV + 174.2	10%
2. Refrigerator-freezers—partial automatic defrost	7.19 * AV + 202.5	10%
3. Refrigerator-freezers—automatic defrost with top-mounted freezer without through-the-door ice service —automatic defrost	7.26 * AV + 210.3	10%
3–BI. Built-in refrigerator-freezer—automatic defrost with top-mounted freezer without an automatic icemaker	8.24 * AV + 238.4	10%
3I. Refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker without through-the-door ice service	7.26 * AV + 294.3	10%
3I–BI. Built-in refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker without through-the-door ice service	8.24 * AV + 322.4	10%
3A. All-refrigerators—automatic defrost	6.36 * AV + 181.4	10%
3A–BI. Built-in All-refrigerators—automatic defrost	7.22 * AV + 205.7	10%
4. Refrigerator-freezers—automatic defrost with side-mounted freezer without through-the-door ice service	7.66 * AV + 268.0	10%
4–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer without an automatic icemaker	9.20 * AV + 321.7	10%
4I. Refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker without through-the-door ice service	7.66 * AV + 352.0	10%
4I–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker without through-the-door ice service	9.20 * AV + 405.7	10%
5. Refrigerator-freezers—automatic defrost with bottom-mounted freezer without through-the-door ice service	7.97 * AV + 285.3	10%
5–BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer without an automatic icemaker	8.46 * AV + 303.2	10%
5I. Refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker without through-the-door ice service	7.97 * AV + 369.3	10%
5I–BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker without through-the-door ice service	8.46 * AV + 387.2	10%
5A. Refrigerator-freezers—automatic defrost with bottom-mounted freezer with through-the-door ice service	8.33 * AV + 427.9	10%
5A–BI. Built-in refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service	8.85 * AV + 449.9	10%
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service	7.56 * AV + 346.9	10%
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service	7.69 * AV + 389.5	10%

Table 1 (cont.): Annual Energy Consumption Base Allowances

Product Class	Annual Energy Consumption Base Allowance, AECBASE (kWh/year)	% Less Energy than Federal Standard ¹
7-BI. Built-in refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service	9.23 * AV + 452.3	10%
Full-Size Freezers		
8. Upright freezers with manual defrost	5.01 * AV + 174.3	10%
9. Upright freezers with automatic defrost	7.76 * AV + 205.5	10%
9I. Upright freezers with automatic defrost with an automatic icemaker.	7.76 * AV + 289.5	10%
9-BI. Built-In Upright freezers with automatic defrost without an automatic icemaker.	8.87 * AV + 234.8	10%
9I-BI. Built-in upright freezers with automatic defrost with an automatic icemaker.	8.87 * AV + 318.8	10%
10. Chest freezers and all other freezers except compact freezers	6.56 * AV + 97.0	10%
10A. Chest freezers with automatic defrost.	9.22 * AV + 133.3	10%
Compact Refrigerators and Refrigerator-Freezers		
11. Compact refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost	8.13 * AV + 227.1	10%
11A. Compact all-refrigerators—manual defrost	7.06 * AV + 197.2	10%
12. Compact refrigerator-freezer—partial automatic defrost.	5.32 * AV + 302.2	10%
13. Compact refrigerator-freezers—automatic defrost with top-mounted freezer	10.62 * AV + 305.3	10%
13I. Compact refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker	10.62 * AV + 389.3	10%
13A. Compact all-refrigerators—automatic defrost	8.25 * AV + 233.4	10%
14. Compact refrigerator-freezers—automatic defrost with side-mounted freezer	6.14 * AV + 411.2	10%
14I. Compact refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker	6.14 * AV + 495.2	10%
15. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer	10.62 * AV + 305.3	10%
15I. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker	10.62 * AV + 389.3	10%
16. Compact upright freezers with manual defrost	7.79 * AV + 203.1	10%
17. Compact upright freezers with automatic defrost	9.15 * AV + 316.7	10%
18. Compact chest freezers	8.33 * AV + 123.1	10%

¹ 10 CFR 430.32A – Amended Federal minimum standards, effective September 14, 2014

99
100
101
102
103

Table 2: Annual Energy Functional Adders

Description	Product Class	Annual Energy Consumption Allowance, AEC _{ADD_i} (kWh/year) ²
Connected	All product classes in Table 1 ¹	0.05 x AEC _{BASE}

¹ To be eligible for the allowance, the product must be qualified using the final and validated ENERGY STAR Program Requirements Product Specification for Residential Refrigerators Test Method to Validate Demand Response.

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

104
105
106
107
108
109
110
111
112
113
114

Note: EPA has retained the efficiency levels proposed in Draft 3 for the majority of refrigerator and refrigerator-freezer product classes. For product classes with automatic icemakers, EPA has amended the levels in the Final Draft such that ENERGY STAR levels are based on the baseline energy consumption. In doing so, EPA is harmonizing with DOE's approach, which the Agency believes is technically sound as the ENERGY STAR levels are tied to the DOE standards. Additionally, based on stakeholder comment and further review of data, EPA has adjusted the level for built-in products, requiring models in these classes to use at least 10% less energy use than the 2014 DOE standard. Based on the translation between the current test procedure and the test procedure that will be required in 2014 in the most recent DOE Final Rule Technical Support Document, EPA estimates the proposed V5.0 levels for built-in products are approximately equivalent to reductions of 20% to 26% less energy use than the current Federal standard. EPA believes that the proposed criteria will differentiate energy efficient built-in models in the market, helping consumers save energy and money.

115
116
117
118
119
120
121

In Draft 3, EPA proposed to sunset all residential freezer categories because EPA analysis suggested that greater efficiency in freezers could not be delivered in a cost effective manner. In response to this proposal, EPA received feedback from multiple manufacturers demonstrating that efficiency beyond that required by the 2014 federal standards could be delivered in a cost effective manner. With the data available to EPA at this time, the Agency believes that consumers will be able to recoup any price premium on an ENERGY STAR Freezer through energy bill savings within a reasonable period of time. As such, EPA intends to maintain residential freezers in this specification and has established eligibility criteria of 10% more efficient than the 2014 federal standard.

122
123
124
125
126
127
128
129
130
131

- B. Determination of Adjusted Volume: Adjusted Volume (AV) shall be calculated in accordance with the DOE test procedure in 10 CFR 430 Subpart B, Appendix A.
- C. Significant Digits and Rounding:
 1. All calculations shall be carried out as specified in 10 CFR 430 Subpart B, Appendix A and 10 CFR § 430.23(a)(5).
 2. The Maximum Annual Energy Consumption specification limit, as determined by Equation 1, shall be rounded off to the nearest kWh per year. If the calculation is halfway between the nearest two kWh per year values, the Maximum Annual Energy Consumption shall be rounded up to the higher of these values.

132
133

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

134

135 **4) Connected Product Criteria:**

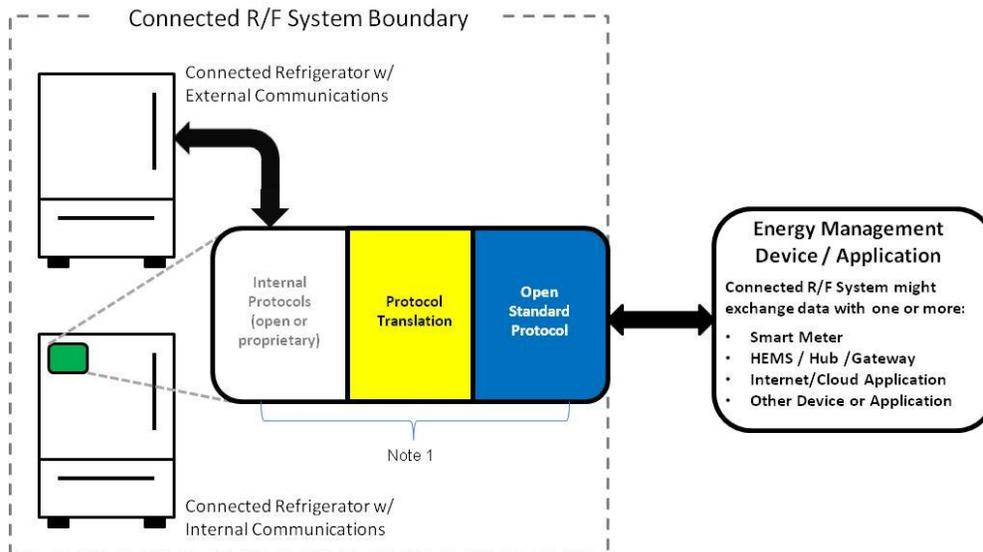
136
137 A. Connected Refrigerator or Refrigerator-Freezer System

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

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

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

154 **Figure 1.** Connected Refrigerator/Freezer System Boundary – Illustrative Example



158
159 *Note 1: Communication device(s), link(s) and/or processing that enables open standards-based communication between the*
160 *Connected R/F System and Energy Management Device/Application(s). These elements could be within the base appliance, and/or*
161 *an external communication module, a hub/gateway, or in the Internet/cloud.*
162

163 **Note:** In addressing connected functionality as part of this specification, EPA seeks to promote the well-proven
164 benefits of standardization – a level playing field for manufacturers, interoperability and thus convenience for
165 consumers, and reduced costs. Through close work with a range of stakeholders, EPA has developed connected
166 criteria that deliver immediate consumer utility as well as the promise of greater benefit as the use of variable
167 electricity rates increases.

168 In light of feedback on the Draft 3 specification, as well as on the updated Draft 3 connected criteria document;
169 EPA has concluded that the proposed requirement for a connected R/F system to include "...at least one
170 supported configuration that is capable of receiving and directly responding to open standards-based energy
171 related commands on the consumer's premises is overly prescriptive at this early stage in the market deployment
172 of connected functionality in refrigerator/freezers and may limit innovation and drive up costs. As an example, a
173 connected R/F system designed to use open standards (e.g., SEP 2.0) over Wi-Fi sends those signals to an IP
174 address. Whether that IP address is tied to a device on the premises or the cloud, an interconnecting 3rd party
175 such as a utility would not know the difference. Given the range of possible approaches and despite some
176 strongly held preconceptions, the Agency believes it is ultimately in the consumer's interest for the market to be
177 free to test a range of options, constrained only by the consumer-oriented objectives the ENERGY STAR program
178 is seeking to advance such as consumer control.

179
180 To this end, EPA has revised the language in Section 4A that stresses interoperability and the use of open
181 protocols. While a preference is expressed for implementation in the home, alternative approaches would also be
182 acceptable. Taking a more flexible approach that stresses interoperability and the use of open standards but
183 allows for multiple paths of implementation, provides the Agency a basis upon which to consider products with
184 connected functionality as they begin to enter the market and make more prescriptive changes to the
185 requirements, based on real-world market experience, as warranted.

186
187 For purposes of this specification, connected devices must be interoperable with other devices via open
188 communications protocol for critical functions including Delay Defrost and Demand Response as well as Energy
189 Consumption Reporting and Operational Status, User Settings, and Messages. In light of the limited utility a
190 consumer-authorized third party can offer that consumer regarding remote management of a refrigerator, EPA is
191 not requiring Remote Management to be held to the standards of interoperability and open communications
192 protocols (i.e., manufacturers may elect to be the exclusive provider of this functionality). This change is
193 reflected in Section 4A: Connected Refrigerator or Refrigerator-Freezer System, above and Section 4C: Open
194 Access below. EPA sees significant opportunity for consumer convenience, energy savings, and energy shifting
195 associated with consumer authorized-third party access to remote management for other products. As such, EPA
196 intends to consider inclusion of open access criteria for remote management on a product- by- product basis.

197
198 EPA will play a strong role in consumer education to help further the understanding of additional savings
199 opportunities associated with connected ENERGY STAR products, as well as how to best capture these savings
200 (e.g. use of energy saving modes / opportunities for Smart Grid interconnection) and in what scenarios these
201 savings will be realized.
202

203 204 B. Communications

- 205 1. Open Standards – Communication with entities outside the Connected R/F System that enables
206 connected functionality (sections 4D, 4F, 4G and 4H) must use, for all communication layers,
207 standards that are:
- 208 • Included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards,¹ and/or
 - 209 • Included in the NIST Smart Grid framework Tables 4.1 and 4.2, and/or
 - 210 • Adopted by the American National Standards Institute (ANSI) or another well-established
211 international standards organization such as the International Organization for Standardization
212 (ISO), International Electrotechnical Commission (IEC), International Telecommunication Union
213 (ITU), Institute of Electrical and Electronics Engineers (IEEE), or Internet Engineering Task Force
214 (IETF).
215
216

¹ http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PMO#Catalog_of_Standards_Processes

217 2. Communications Hardware Architecture – Communication with entities outside the Connected R/F
218 System that enables connected functionality (sections 4D through 4H) shall be enabled by any of the
219 following means, according to the manufacturer’s preference:

- 220 a. Built-in communication technology
- 221 b. Manufacturer-specific external communication module(s) and/or device(s)
- 222 c. Open standards-based communication port on the appliance combined with open standards-
223 based communications module
- 224 d. Open standards-based communication port(s) on the appliance in addition to a, b or c, above
225

226 If option b or c is used, the communication module/device(s) must be easy for a consumer to install
227 and shipped with the appliance, provided to the consumer at the time of sale, or provided to the
228 consumer in a reasonable amount of time after the sale.
229

230 C. Open Access

231 To enable interconnection with the product, in addition to section 4B1 that requires open-standards, an
232 interface specification, API or similar documentation shall be made available to interested parties that at a
233 minimum, allows transmission, reception, and interpretation of the following information:
234

- 235
- 236 ▪ Energy Consumption Reporting specified in section 4D (must include accuracy, units and
237 measurement interval);
- 238 ▪ Operational Status, User Settings & Messages specified in section 4F (if transmitted via a
239 communication link);
- 240 ▪ Communications required to enable Delay Defrost Capability specified in section 4G; and
- 241 ▪ Demand Response specified in section 4H.
242

243 D. Energy Consumption Reporting

244 In order to enable simple, actionable energy use feedback to consumers and consumer authorized
245 energy use reporting to 3rd parties, the product shall be capable of transmitting energy consumption data
246 via a communication link to energy management systems and other consumer authorized devices,
247 services, or applications. This data shall be representative of the product’s interval energy consumption. It
248 is recommended that data be reported in watt-hours for intervals of 15 minutes or less, however,
249 representative data may also be reported in alternate units and intervals as specified in the product
250 manufacturer’s interface specification or API detailed in section 4C.
251

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

254 E. Remote Management

255 The product shall be capable of receiving and responding to consumer authorized remote requests (*not*
256 *including third-party remote management which may be made available solely at the discretion of the*
257 *manufacturer*), via a communication link, similar to consumer controllable functions on the product. The
258 product is not required to respond to remote requests that would compromise performance and/or product
259 safety as determined by the product manufacturer.
260

261 F. Operational Status, User Settings & Messages

- 262 1. The product shall be capable of providing the following information to energy management systems
263 and other consumer authorized devices, services, or applications via a communication link:
264
- 265 • Demand Response (DR) status (e.g., normal operation, delay appliance load, temporary appliance
266 load reduction).
267
268

269 2. The product shall be capable of providing the following information on the product and/or to energy
270 management systems and other consumer authorized devices, services, or applications via a
271 communication link:

- 272 • At least two types of messages relevant to the energy consumption of the product. For example,
273 messages for refrigerators, refrigerator-freezers and freezers, might address: door left open
274 notification, a notification that product lost power, a reminder to clean refrigerator coils, or report
275 of energy consumption that is outside the product's normal range.
276

277 G. Delay Defrost Capability

278 When interconnected with an energy management system or other consumer authorized device, service,
279 or application via a communication link, products with automatic defrost shall have a delay defrost
280 capability active by default, where the consumer can input or the product itself shall identify, the time of
281 day, and the product shall automatically move the defrost function outside of a 4-hour deferral period.
282 The default deferral period is seasonal and has been defined to align with both summer and winter peak
283 energy demand periods, as follows:

- 284 • 6am to 10am – November 1 through April 30
- 285 • 3pm to 7pm – May 1 through October 31

286 The product shall provide an option for the consumer and/or consumer authorized 3rd party to modify
287 scheduling and functional status of this capability in order to, for example: respond to a short term request
288 from the utility, align defrost avoidance periods with on-peak periods for their utility, or enable/disable the
289 capability.

290 In the event of a power outage, after power is restored the product shall not require any interaction from
291 the consumer to maintain this defrost deferral feature with the same settings as prior to the power outage.

292 Exceptions:

- 293 • Once the consumer enrolls in a program that sends consumer-authorized signals to the R/F System,
294 the Delay Defrost capability, as defined in this section, shall be disabled. The product may include an
295 optional transition period of up to 24-hours after enrollment, during which the R/F System is not
296 required to provide either Delay Defrost capability or DR capability as defined in Section 4H.
- 297 • A refrigerator, refrigerator-freezer or freezer with manual defrost or partial automatic defrost is not
298 required to provide Delay Defrost Capability.
299

300 **Note:** EPA has clarified that the specified dates/times are defaults, which may be modified by the consumer
301 and/or consumer authorized 3rd party.

302 H. Demand Response

303 A connected refrigerator, freezer or refrigerator-freezer shall have the capability to receive, interpret and
304 act upon consumer-authorized signals by automatically adjusting its operation depending on both the
305 signal's contents and settings from consumers. At a minimum, the product shall be capable of providing
306 the following:
307

- 308 1. *Delay Appliance Load Capability:* The capability of the product to respond to a signal by providing a
309 moderate load reduction for the duration of a delay period.
310
 - 311 a. Upon receipt of signal and in accordance with consumer settings, except as permitted below, the
312 product shall:
 - 313 i. Shift its defrost cycle(s) beyond the delay period, and

314 ii. Either shift ice maker cycles beyond the delay period or reduce its average power draw
315 during the delay period by at least 13% relative to the average power draw drawn during an
316 average load over a 24-hour period as defined by the DOE Baseline in the Test Method to
317 Validate Demand Response.

318 b. Exceptions:

- 319 i. The product is not required to provide a response in accordance with 4H1(a) if the signal
320 requests the delay load period to begin while a defrost heater is engaged. That defrost cycle
321 may finish, however, no additional defrost cycle(s) shall occur during the delay period, and/or
322 ii. The product is not required to provide a response in accordance with 4H1(a)(ii) if the delay
323 appliance load signal requests the delay load period to begin while the product is in an ice-
324 maker harvest/refill cycle. The product must however, continue to provide a response in
325 accordance with 4H1(a)(i).

326 c. Default settings –The product shall ship with default settings that enable a response in
327 accordance with 4H1(a) for at least 4 hours.

328 d. Consumer override – The consumer shall be able to override the product’s Delay Appliance Load
329 response before or during a delay period.

330 e. The product shall be able to provide at least one Delay Appliance Load response in a rolling 24-
331 hour period.

332 2. *Temporary Appliance Load Reduction Capability*: The capability of the product to respond to a signal
333 by providing an aggressive load reduction for a short time period, typically 10 minutes.

335 a. Upon receipt of signal and in accordance with consumer settings, except as permitted below, the
336 product shall restrict its average power draw during the load reduction period to no more than
337 50% of the average power draw during an average load over a 24-hour period as defined by the
338 DOE Baseline in the Test Method to Validate Demand Response.

339 b. Exceptions – Under the following conditions, the product is not required to provide a response in
340 accordance with 4H2(a):

- 341 i. If a signal is received while a defrost heater is engaged, that defrost cycle may finish.
342 However, no additional defrost cycle(s) shall occur during the time period, and/or
343 ii. If there is a consumer-initiated function such as a door opening or ice/water dispensing
344 during the load reduction period.

345 c. Default settings - The product shall ship with default settings that enable a response in
346 accordance with 4H2(a) for a time period of least 10 minutes.

347 d. Consumer override – The consumer shall be able to override the product’s Temporary Appliance
348 Load Reduction response before or during a load reduction period.

349 e. The product shall be able to provide at least one Temporary Appliance Load Reduction response
350 in a rolling 24-hour period.

351
352 **Note:** EPA has clarified exception language to Delay Appliance Load Capability and Temporary Appliance
353 Load Reduction Capability.

354
355 I. Information to Consumers

356
357 If additional modules, devices, services, and/or infrastructure are part of the configuration required to
358 activate the product’s communications capabilities, prominent labels, or other forms of consumer
359 notifications with instructions shall be displayed at the point of purchase and in the product literature.
360 These shall provide specific information on what consumers must do to activate these capabilities (e.g.
361 “This product has WiFi 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 energy performance 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 defined in 10 CFR § 429.14.
- B. When testing energy consumption of residential refrigerators, the following test methods shall be used to determine ENERGY STAR qualification:

Table 3: Test Methods for ENERGY STAR Qualification

ENERGY STAR Requirement	Test Method Reference
Energy Consumption (kWh/year)	10 CFR 430, Subpart B Appendix A – Residential Refrigerators
	10 CFR 430, Subpart B Appendix B – Residential Freezers

- C. When determining energy performance for purposes of ENERGY STAR certification, the principles of interpretation, contained in 10 CFR § 430.23 (a) (10), should be applied to the test procedure.
- D. 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 verified using the ENERGY STAR Test Method to Validate Demand Response (Rev. TBD) in order to be eligible for the connected allowance.

Note: DOE has released the Draft Final ENERGY STAR Connected Refrigerators Test Method to Validate Demand Response with this distribution. DOE plans to publish the Final Test Method in mid-2013.

With EPA reintroducing freezers into the ENERGY STAR specification, EPA has added the residential freezer test procedure to Table 3.

- 6) Effective Date:** The ENERGY STAR Residential Refrigerator and Freezer specification shall take effect on **March 1, 2014**. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on the model’s date of manufacture. The date of manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is considered to be completely assembled.

Note: After careful consideration of the comments received in response to the Draft 3 proposed effective date, EPA has retained the proposal of March 1, 2014. Maintaining ENERGY STAR’s role as an effective differentiator of highly efficient products in the market is a priority for the Agency. An effective date of March 1, 2014, addresses the need for greater differentiation during the critical, peak refrigerator buying season (summer months).

- 7) Future Specification Revisions:** EPA 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 ENERGY STAR qualification is not automatically granted for the life of a product model.