ENERGY STAR® Program Requirements Product Specification for Consumer Refrigeration Products

Eligibility Criteria Draft Version 5.1

Note: EPA is proposing to rename this specification to "Product Specification for Consumer Refrigeration Products" from "Product Specification for Residential Refrigerators and Freezers" to align with DOE. Defined in Section 1A, consumer refrigeration products include refrigerators, refrigerator-freezers, freezers, and miscellaneous refrigeration products.

Following is the **Version 5.1** product specification for ENERGY STAR certified consumer refrigeration products. A product shall meet all of the identified criteria to earn the ENERGY STAR.

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 Code of Federal Regulations (CFR) 430, Subpart B, Appendix A or in 10 CFR § 430.2.

   A. Consumer Refrigeration Product: A refrigerator, refrigerator-freezer, freezer, or miscellaneous refrigeration product.

   B. Refrigerator: A cabinet, used with one or more doors, that has a source of refrigeration that requires single-phase, alternating current electric energy input only and is capable of maintaining compartment temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C) as determined according to 10 CFR § 429.14(d)(2). A refrigerator may include a compartment capable of maintaining compartment temperatures below 32 °F (0 °C), but does not provide a separate low temperature compartment capable of maintaining compartment temperatures below 8 °F (−13.3 °C) as determined according to 10 CFR § 429.14(d)(2). However, the term does not include: (1) any product that does not include a compressor and condenser unit as an integral part of the cabinet assembly; (2) a cooler; or (3) Any miscellaneous refrigeration product that must comply with an applicable miscellaneous refrigeration product energy conservation standard.

   C. Freezer: A cabinet, used with one or more doors, that has a source of refrigeration that requires single-phase, alternating current electric energy input only and is capable of maintaining compartment temperatures of 0 °F (−17.8 °C) or below as determined according to the provisions in § 429.14(d)(2) of this chapter. It does not include any refrigerated cabinet that consists solely of an automatic ice maker and an ice storage bin arranged so that operation of the automatic icemaker fills the bin to its capacity. However, the term does not include: (1) Any product that does not include a compressor and condenser unit as an integral part of the cabinet assembly; or (2) Any miscellaneous refrigeration product that must comply with an applicable miscellaneous refrigeration product energy conservation standard.

   D. Refrigerator-Freezer: A cabinet, used with one or more doors, that has a source of refrigeration that requires single-phase, alternating current electric energy input only and consists of two or more compartments where at least one of the compartments is capable of maintaining compartment temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C) as determined according to §429.14(d)(2) of this chapter, and at least one other compartment is capable of maintaining compartment temperatures of 8 °F (−13.3 °C) and may be adjusted by the user to a temperature of 0 °F (−17.8 °C) or below as determined according to 10 CFR § 429.14(d)(2). However, the term does not include: (1) Any product that does not include a compressor and condenser unit as an integral part of the cabinet assembly; or (2) (2) Any miscellaneous refrigeration product that must comply with an applicable miscellaneous refrigeration

product energy conservation standard.

E. All-Refrigerator: A refrigerator that does not include a compartment capable of maintaining compartment temperatures below 32 °F (0 °C). An all-refrigerator may include a compartment of 0.50 cubic-foot capacity (14.2 liters) or less for the freezing and storage of ice.

F. Miscellaneous Refrigeration Product: A consumer refrigeration product other than a refrigerator, refrigerator-freezer, or freezer, which includes coolers and combination cooler refrigeration products.

G. Cooler: A cabinet, used with one or more doors, that has a source of refrigeration capable of operating on single-phase, alternating current and is capable of maintaining compartment temperatures either (1) no lower than 39 °F (3.9 °C); or (2) in a range that extends no lower than 37 °F (2.8 °C) but at least as high as 60 °F (15.6 °C) as determined according to the applicable provisions in 10 CFR §429.61(d)(2).

H. Combination Cooler Refrigeration Product: Any cooler-refrigerator, cooler-refrigerator-freezer, or cooler-freezer as defined in 10 CFR § 430.2.

I. Adjusted Volume (AV): The sum of the fresh food compartment volume in cubic feet, the cooler 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, Subpart B, Appendix A. Volume adjustment factors shall be as prescribed in 10 CFR 430, Subpart B, Appendix A and Appendix B.

J. Compact Refrigerator/Refrigerator-Freezer/Freezer: Any refrigerator, refrigerator-freezer or freezer with a total refrigerated volume of less than 7.75 cubic feet (220 liters) (total refrigerated volume as determined in 10 CFR 430, Subpart B, Appendix A and Appendix B).

K. 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.

L. Freestanding Cooler: Any cooler, excluding built-in coolers, with a total refrigerated volume of 7.75 cubic feet or greater.

M. Freestanding Compact Cooler: Any cooler, excluding built-in compact coolers, with a total refrigerated volume less than 7.75 cubic feet.

N. Built-in Cooler: Any cooler with a total refrigerated volume of 7.75 cubic feet or greater and no more than 24 inches in depth, excluding doors, handles, and custom front panels; that is designed, intended, and marketed exclusively to be: (1) installed totally encased by cabinetry or panels that are attached during installation; (2) securely fastened to adjacent cabinetry, walls or floor; (3) equipped with unfinished sides that are not visible after installation; and (4) equipped with an integral factory-finished face or built to accept a custom front panel.

O. Built-in Compact Cooler: Any cooler with a total refrigerated volume less than 7.75 cubic feet and no more than 24 inches in depth, excluding doors, handles, and custom front panels, that is designed, intended, and marketed exclusively to be: (1) installed totally encased by cabinetry or panels that are attached during installation; (2) securely fastened to adjacent cabinetry, walls or floor; (3) equipped with unfinished sides that are not visible after installation; and (4) equipped with an integral factory-finished face or built to accept a custom front panel.

P. Basic Model: All units of a given type of product (or class thereof) manufactured by one manufacturer; having the same primary energy source; and which have essentially identical electrical, physical, and

functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Note: EPA is proposing to add definitions for Consumer Refrigeration Product, All-Refrigerator, Miscellaneous Refrigeration Product, Cooler, Combination Cooler Refrigeration Product, Freestanding Cooler, Freestanding Compact Cooler, Built-in Cooler, and Built-in Compact Cooler. To align with DOE definitions in 10 CFR § 430.2, EPA is proposing to update definitions for Refrigerator (formerly Electric Refrigerator), Freezer, Refrigerator-Freezer (formerly Electric Refrigerator-Freezer), and Compact Refrigerator/Refrigerator-Freezer/Freezer. To align with DOE calculations for adjusted volumes in 10 CFR 430, Subpart B, Appendix A, EPA is proposing to update the definition for Adjusted Volume.

EPA believes these definition additions and updates will not change product classifications for existing models. EPA requests any information on models with classes or ENERGY STAR certifications that may change due to these definition additions and updates.

2. Scope:

A. Included Products: Products that meet (i) the definition of a Refrigerator, Refrigerator-Freezer, Freezer, or Cooler, including compact and built-in products, as specified herein and (ii) the definition of a consumer product as specified in 10 CFR § 430.2 are eligible for ENERGY STAR certification, with the exception of products listed in Section 2B.

B. Excluded Products: The following products are not eligible for ENERGY STAR certification under this specification:
   (i) commercial refrigeration equipment (as defined in 10 CFR § 431.62)
   (ii) products with a total refrigerated volume exceeding 39 cubic feet
   (iii) Combination Cooler Refrigeration Products
   (iv) products that do not meet the definition of a Refrigerator, Refrigerator-Freezer, Freezer, or Cooler
   (v) products that are covered under other ENERGY STAR product specifications (e.g. Commercial Refrigerators)

Note: EPA is proposing to amend the scope to include coolers while continuing to exclude combination cooler refrigeration products. The compliance period for the first federal standard for miscellaneous refrigeration products began in October 2019. Using the DOE's Compliance Certification Management System, EPA has identified savings potential and distinction within coolers.

3. Certification Criteria:

A. Energy Use Requirements

1. Annual Energy Consumption (AEC) shall be less than or equal to Maximum Annual Energy Consumption (AEC_{MAX}), as calculated per Equation 1.

Equation 1: Calculation of Maximum Annual Energy Consumption Requirement

$$AEC_{MAX} = AEC_{BASE} + AEC_{ADD\_i}$$

where,

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

AEC_{ADD_i} is an annual energy functional adder, per Table 2

Table 1: Annual Energy Consumption Base Allowances

Product Class	Annual Energy Consumption Base Allowance, AEC_{BASE} (kWh/year)[1]	% Less Energy than Federal Standard Measured Energy Use[2]
Full-Size Refrigerators and Refrigerator-freezers		
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 an automatic icemaker.	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 an automatic icemaker.	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 + 436.3	10%
5A–BI. Built-in refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	8.85 * AV + 458.3	10%
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service.	7.56 * AV + 355.3	10%
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	7.69 * AV + 397.9	10%
7-BI. Built-in refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	9.23 * AV + 460.7	10%

1. AV = Total adjusted volume, expressed in ft^3 (as calculated in 10 CFR 430, Subpart B, Appendix A and Appendix B)
2. Refers to the measured energy consumption of the model according to the DOE test method (see Section 5B), without the application of any adders, such as for models with an automatic icemaker.

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

Product Class	Annual Energy Consumption Base Allowance, AEC_{BASE} (kWh/year)[1]	% Less Energy than Federal Standard Measured Energy Use[2]
Full-Size Freezers		
8. Upright freezers with manual defrost.	5.01 * AV + 174.3	10%
9. Upright freezers with automatic defrost without an automatic icemaker.	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%
Coolers		
1. Built-in compact	5.52 * AV + 109.1	30%
2. Built-in	5.52 * AV + 109.1	30%
3. Freestanding compact	6.30 * AV + 124.6	20%
4. Freestanding	7.09 * AV + 140.2	10%

1. AV = Total adjusted volume, expressed in ft^3 (as calculated in 10 CFR 430, Subpart B, Appendix A and Appendix B)
2. Refers to the measured energy consumption of the model according to the DOE test method (see Section 5B), without the application of any adders, such as for models with an automatic icemaker.

Table 2: Annual Energy Functional Adders

Description	Product Class	Annual Energy Consumption Allowance, AEC_{ADD_i} (kWh/year)[3]
Connected Functionality[1]	All Refrigerator, Refrigerator-Freezer, and Freezer (excluding Cooler) product classes in Table 1.	0.05 x AEC_{BASE}
Other[2]	All product classes in Table 1.	0

[1] To be eligible for the allowance, the model must satisfy the requirements described in Section 5D.
[2] All models that do not satisfy the requirements described in Section 5D.
[3] Calculated allowance shall be rounded down to the nearest tenth before being applied in Equation 1.

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 and Appendix B.

C. Significant Digits and Rounding:
   1. All calculations shall be carried out as specified in 10 CFR 430 Subpart B, Appendix A, Appendix B, and 10 CFR § 430.23(a)(5), (b)(5), and (ff)(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.

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

Note: EPA is proposing to include the four DOE-defined cooler product classes and to set the corresponding energy efficiency criteria similar to the existing criteria for refrigerators, refrigerator-freezers, and freezers. The new criteria will be expressed as an annual energy consumption base allowance and equivalent percent less energy than federal standard measured energy use.

With ENERGY STAR, EPA looks to recognize the more efficient models in each product class. After analyzing 852 models (393 base models) from the DOE's Compliance Certification Management System for miscellaneous refrigeration products, EPA is proposing to set energy efficiency criteria at 10-30% better than the federal standard, depending on the product class. There are 29 brands offering 83 base models meeting the proposed criteria and a model-weighted average pass rate of 23%. The model-weighted average unit electricity savings are 39 kWh/year, resulting in lifetime savings of over 455 kWh/year.

While utility interest in demand response programs for large loads such as water heaters is growing, EPA has observed dwindling interest in programs for residential refrigerators and most other traditional appliances. For this reason, EPA is shifting the Agency's technical and educational focus to demand response capability for larger loads. EPA believes the consumer value of connected appliances remains and the market will reward the best implementations. As such, EPA will not provide a credit for demand response capable coolers.

4. Connected Product Criteria:

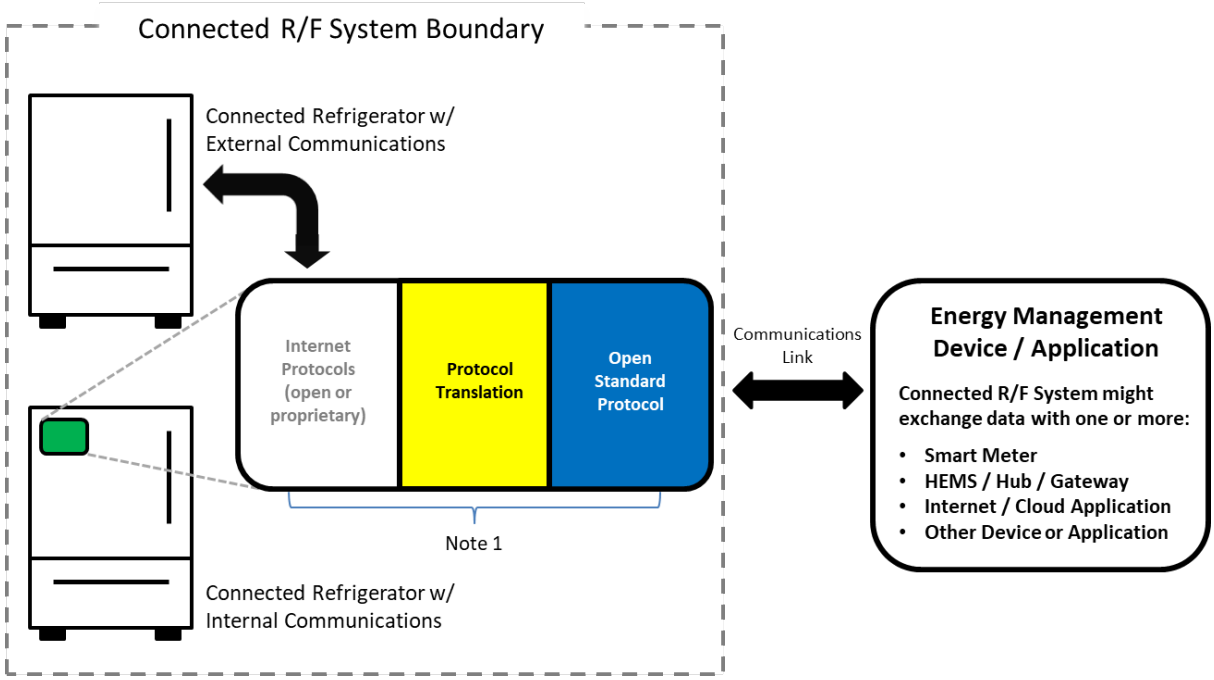
A. Connected Refrigerator, Freezer, or Refrigerator-Freezer System

To be recognized as connected and to be eligible for the connected allowance, a "connected refrigerator, freezer, or refrigerator-freezer system" (Connected R/F System, as shown in Figure 1.) shall include the base refrigerator, freezer, or refrigerator-freezer 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 R/F 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, 4G and 4H The capabilities shall be supported through one or more means, as identified in Section 4B2. A product that enables economical and direct, on-premises, open- standards based interconnection is the preferred option for meeting this requirement, but alternative approaches are also acceptable.

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

Figure 1: Connected Refrigerator/Freezer System Boundary – Illustrative Example



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

B. Communications

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

2. Communications Hardware Architecture – Communication with entities outside the Connected R/F System that enables connected functionality (Sections 4D through 4H) 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 4B1 that requires open-standards, an interface specification, API or similar documentation shall be made available to interested parties that at a minimum, allows transmission, reception, and interpretation of the following information:

1. Energy Consumption Reporting specified in Section 4D (must include accuracy, units and measurement interval);
2. Operational Status, User Settings & Messages specified in Section 4F (if transmitted via a communication link);
3. Communications required to enable Delay Defrost Capability specified in Section 4G; and
4. Demand Response specified in Section 4H.

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).

[1] https://www.nist.gov/programs-projects/smart-grid-national-coordination/catalog-standards

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:

   - Demand Response (DR) status (e.g., normal operation, 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 a communication link:

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

G. Delay Defrost Capability

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

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

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

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

Exceptions:

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

H. Demand Response

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

1. *Delay Appliance Load Capability*: The capability of the product to respond to a signal by providing a moderate load reduction for the duration of a delay period.
   a. Upon receipt of signal and in accordance with consumer settings, except as permitted below, the product shall:
      i. Shift its defrost cycle(s) beyond the delay period, and
      ii. Either shift ice maker cycles beyond the delay period or reduce its average power draw during the delay period by at least 13% relative to the average power draw drawn during an average load over a 24-hour period as defined by the DOE Baseline in the ENERGY STAR Test Method to Validate Demand Response (May 2013).
   b. Exceptions:
      i. The product is not required to provide a response in accordance with Section 4H1(a) if the signal requests the delay load period to begin while a defrost heater is engaged. That defrost cycle may finish, however, no additional defrost cycle(s) shall occur during the delay period, and/or
      ii. The product is not required to provide a response in accordance with Section 4H1(a)(ii) if the delay appliance load signal requests the delay load period to begin while the product is in an ice-maker harvest/refill cycle. The product must however, continue to provide a response in accordance with Section 4H1(a)(i).
   c. Default settings –The product shall ship with default settings that enable a response in accordance with 4H1(a) for at least 4 hours.
   d. Consumer override – The consumer shall be able to override the product's Delay Appliance Load response before or during a delay period.
   e. The product shall be able to provide at least one Delay Appliance Load response in a rolling 24-hour period.

2. *Temporary Appliance Load Reduction Capability:* The capability of the product to respond to a signal by providing an aggressive load reduction for a short time period, typically 10 minutes.
   a. Upon receipt of signal and in accordance with consumer settings, except as permitted below, the product shall restrict its average power draw during the load reduction period to no more than 50% of the average power draw during an average load over a 24-hour period as defined by the DOE Baseline in the Test Method to Validate Demand Response.
   b. Exceptions – Under the following conditions, the product is not required to provide a response in accordance with Section 4H2(a):
      i. If a signal is received while a defrost heater is engaged, that defrost cycle may finish. However, no additional defrost cycle(s) shall occur during the time period, and/or
      ii. If there is a consumer-initiated function such as a door opening or ice/water dispensing during the load reduction period.
   c. Default settings - The product shall ship with default settings that enable a response in accordance with Section 4H2(a) for a time period of least 10 minutes.
   d. Consumer override – The consumer shall be able to override the product's Temporary Appliance Load Reduction response before or during a load reduction period.

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

I. Information to Consumers

If additional modules, devices, services, and/or infrastructure are part of the configuration required to activate the product's communications capabilities, prominent labels, or other forms of consumer notifications with instructions shall be displayed at the point of purchase and in the product literature. These shall provide specific information on what consumers must do to activate these capabilities (e.g. "*This product has 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 certification to ENERGY STAR:

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

2. Units shall be selected for testing per the sampling requirements defined in 10 CFR § 429.14 for consumer refrigerators, refrigerator-freezers and freezers or 10 CFR § 429.61 for consumer miscellaneous refrigeration products.

B. When testing energy consumption of residential refrigerators and freezers, the following test methods shall be used to determine ENERGY STAR certification:

Table 3: Test Methods for ENERGY STAR Certification

ENERGY STAR Requirement	Test Method Reference
Energy Consumption (kWh/year)	10 CFR 430, Subpart B, Appendix A – Uniform Test Method for Measuring the Energy Consumption of Refrigerators, Refrigerator-Freezers, and Miscellaneous Refrigeration Products 10 CFR 430, Subpart B, Appendix B – Uniform Test Method for Measuring the Energy Consumption of Freezers

C. When determining energy performance for purposes of ENERGY STAR certification, the principles of interpretation, contained in 10 CFR § 430.23 (a)(7), (b)(7), and (ff)(7), 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 (May 2013) in order to be eligible for the connected allowance.

Note: EPA is including the miscellaneous refrigeration sampling plan from 10 CFR § 429.61 and updating references to align with current sections of the CFR.

6. Effective Date: The ENERGY STAR Consumer Refrigeration Products specification (formerly the ENERGY STAR Residential Refrigerators and Freezers specification) shall take effect on **September 15, 2014**. 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 (e.g., month and year) on which a unit is considered to be completely assembled.

Note: This specification as amended will be effective immediately upon final publication.

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 certification is not automatically granted for the life of a product model.