



ENERGY STAR® Program Requirements Product Specification for Refrigerated Beverage Vending Machines

Eligibility Criteria Final Draft Version 4.0

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8 Following is the **Final Draft Version 4.0** product specification for ENERGY STAR certified refrigerated
9 beverage vending machines. A product must meet all of the identified criteria if it is to earn the ENERGY
10 STAR.

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12 **1) Definitions:** Below are the definitions of the relevant terms in this document. Where applicable, the
13 cited definitions are identical with the definitions in the U.S. Department of Energy’s (DOE) regulations
14 found in 10 Code of Federal Regulations (CFR) Part 431, Subpart Q, §431.292 and Appendix B. The
15 definitions from the CFR have been reprinted for ease of use, however, the CFR definitions take
16 precedence and may be modified by DOE during the rulemaking process.

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18 A. Refrigerated Beverage Vending Machine: A commercial refrigerator that cools bottled and/or
19 canned beverages and dispenses the bottled and/or canned beverages on payment. *Bottled or*
20 *canned beverages* means a beverage in a sealed container.

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22 a. Class A Machine¹: A refrigerated bottled and/or canned beverage vending machine that is not
23 a combination vending machine and in which 25 percent or more of the surface area on the
24 front side of the beverage vending machine is transparent.

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26 b. Class B Machine¹: Any refrigerated bottled and/or canned beverage vending machine not
27 considered to be Class A, and is not a combination vending machine.

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29 B. Combination Vending Machine¹: A bottled and/or canned beverage vending machine containing
30 two or more compartments separated by a solid partition, that may or may not share a product
31 delivery chute, in which at least one compartment is designed to be refrigerated, as demonstrated
32 by the presence of temperature controls, and at least one compartment is not.

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34 a. Combination A Machine¹: A combination vending machine where 25 percent or more of the
35 surface area on the front side of the beverage vending machine is transparent.

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37 b. Combination B Machine¹: A combination vending machine that is not considered to be
38 Combination A.

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40 C. Refrigerated Food Vending Machine: A refrigerated food vending machine that holds and/or
41 prepares mechanically distributed refrigerated food products that are perishable or potentially
42 hazardous; or a combination machine containing refrigerated food products that are perishable or
43 potentially hazardous and refrigerated bottled and/or canned beverage products.

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45 D. Rebuilt Refrigerated Beverage Vending Machine: An Underwriters Laboratory (UL) Listed or
46 Classified refrigerated beverage vending machine that has been previously in use and subjected
47 to various degrees of retrofitting, remanufacturing, refurbishing, repairing, or reconditioning for
48 resale or reuse. For purposes of ENERGY STAR certification, rebuilt models shall include the
49 machine and energy efficiency components or kit installed to meet ENERGY STAR requirements.

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51 E. Rebuilding Kit: A combination of components that may be installed in a previously used vending
52 machine at a refurbishment center.

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¹ 10 CFR §431.292.

- 54 F. Basic Model¹: All units of a given type of covered product (or class thereof) manufactured by one
55 manufacturer, having the same primary energy source, and which have essentially identical
56 electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption,
57 energy efficiency, water consumption, or water efficiency.
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- 59 G. Low Power Mode²: A state in which a beverage vending machine's lighting, refrigeration, and/or
60 other energy-using systems are automatically adjusted (without user intervention) such that they
61 consume less energy than they consume in an active vending environment.
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- 63 H. Accessory Low Power Mode²: A state in which a beverage vending machine's lighting and/or other
64 energy-using systems are in low power mode, but that is not a refrigeration low power mode.
65 Functions that may constitute an accessory low power mode may include, for example, dimming
66 or turning off lights, but does not include adjustment of the refrigeration system to elevate the
67 temperature of the refrigerated compartment(s).
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- 69 I. Refrigeration Low Power Mode²: A state in which a beverage vending machine's refrigeration
70 system is in low power mode because of elevation of the temperature of the refrigerated
71 compartment(s). To qualify as low power mode, the unit must satisfy the requirements described
72 in Appendix B to Subpart Q, Part 431, Section 2.3.2.1.
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- 74 J. Standard Product²: The standard product shall be standard 12-ounce (355 ml) aluminum
75 beverage cans filled with a liquid with a density of 1.0 grams per milliliter (g/mL) ± 0.1 g/mL at 36
76 °F. For product storage racks that are not capable of vending 12-ounce cans, but are capable of
77 vending 20-ounce bottles, the standard product shall be 20-ounce plastic bottles filled with a liquid
78 with a density of 1.0 g/mL ± 0.1 g/mL at 36°F. For product storage racks that are not capable of
79 vending 12-ounce cans or 20-ounce bottles, the standard product shall be the packaging and
80 contents specified by the manufacturer in product literature as the standard product (i.e., the
81 specific merchandise the refrigerated bottled or canned beverage vending machine is designed to
82 vend).
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- 84 K. Vendible Capacity²: The vending capacity of refrigerated bottled or canned beverage vending
85 machine, as specified in the first paragraph of section 5 of the American National Standards
86 Institute (ANSI)/Association of Home Appliance Manufacturers (AHAM) Standard 32.1 - 2010,
87 "Methods of Testing for Rating Vending Machines for Bottled, Canned or Other Sealed
88 Beverages." For combination vending machines, the vending capacity includes only the capacity
89 of any portion of the refrigerated bottled or canned beverage vending machine that is refrigerated
90 and does not include the capacity of the non-refrigerated compartment(s).
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- 92 L. OEM: Original Equipment Manufacturer.
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- 94 M. Qualified component supplier (QCS): A company that produces components and/or rebuilding kits
95 for vending machines.
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- 97 N. Refurbishment Center (RC): A facility equipped to rebuild vending machines.
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Note: One stakeholder requested further clarification on the Combination Vending Machine definition in Section 1.B. of this specification. The Combination Vending Machine definition is intended to represent beverage vending machines with a minimum of two separate compartments, one section refrigerated and the other non-refrigerated.

Additionally, per stakeholder request, the Agency is providing additional clarification on the Combination Vending Machine definition in Section 1.B.a. Combination A machines must meet the Combination Vending Machine definition for ENERGY STAR eligibility, but to be considered Combination A, the transparent section of the refrigerated front panel must be the only partition between the exterior of that portion of the machine and the refrigerated beverage products, with no additional solid panel between the transparent section and the actual refrigerated compartment. Noting that the external surface areas

² 10 CFR 431 Subpart Q, Appendix B.

surrounding the non-refrigerated compartment(s) would not be considered when determining the percentage of transparent surface area per 81 CFR 1048, if 25% or more of the front panel surface is transparent and does not have a secondary partition such that refrigerated products are visible to the operator/customer, then the machine shall be classified as Combination A, otherwise it shall be classified as Combination B, assuming it meets the Combination Vending Machine definition as well.

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100 **2) Scope:**
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- 102 A. Included Products: Products that meet the definitions of a Refrigerated Beverage Vending
103 Machine and Class A, Class B, Combination A, or Combination B, including new and rebuilt, as
104 specified herein are eligible for ENERGY STAR certification, with the exception of products listed
105 in Section 2.B.
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107 B. Excluded Products: Products that do not meet the Refrigerated Beverage Vending Machine and/or
108 Class A, Class B, Combination A, or Combination B, as defined in Section 1 above; and
109 refrigerated food vending machines are not eligible for ENERGY STAR. The following product
110 categories are also excluded:
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112 a. Refrigerated beverage vending machines that offer operating temperatures that may be
113 selected by the end user that are lower than the DOE test procedure rating condition (i.e.,
114 36° F) are not eligible for ENERGY STAR.
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116 b. Larger refreshment centers that include modular refrigerated vending compartments are not
117 eligible for ENERGY STAR.
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119 c. Refrigerated beverage vending machines with dedicated heating systems for the sole
120 purpose of maintaining temperature in heated compartments.
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Note: EPA received feedback about certain products that would be excluded because they have refrigerated temperature settings lower than 36° F which can be adjusted by the operator. Per Section 2.B.a, above, refrigerated beverage vending machines that offer operating temperatures that may be selected by the end user that are lower than the DOE test procedure rating condition (i.e., the acceptable average integrated temperature of 36°±1°F, per Appendix B to Subpart Q of Part 431) are not eligible for ENERGY STAR. This is intended to limit the scope to refrigerated products, not frozen (i.e., products with temperature set-points lower than freezing point. If products pass the ENERGY STAR level at 36°F, but are user-adjustable to lower the temperature below the threshold, the end-user may not realize the expected energy savings associated with ENERGY STAR certified models, which is the rationale for excluding these products that have user-adjustable thermostats with lower temperature settings.

Furthermore, one stakeholder raised concern that products with heated compartments are ineligible for ENERGY STAR. In Draft 2 of this specification, EPA amended the language in Section 2.B.c. and included machines with dedicated heating systems for the sole purpose of maintaining temperature in heated compartments as ineligible for ENERGY STAR. The intent for this additional clarification was to reinforce that products that consume additional energy for heating a compartment in the refrigerated beverage vending machine are ineligible for certification. EPA encourages manufacturers to continue development of innovative approaches to meet end-user needs; however, since the associated additional power to maintain a warm holding temperature is not captured in the daily energy consumption test procedure, EPA is not in a position to recognize leadership performance with respect to this feature.

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124 **3) Certification Criteria:**
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- 126 A. Maximum Daily Energy Consumption (MDEC): To certify for ENERGY STAR, refrigerated
127 beverage vending machines shall consume equal to or less than the MDEC values, in kWh/day,
128 obtained using the equations below:
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130 a. Class A – New and Rebuilt Machines: $0.04836V + 2.2599$
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- 132 b. Class B – New and Rebuilt Machines: $0.04576V+1.936$
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134 c. Combination A – New and Rebuilt Machines: $0.07998V + 2.4738$
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136 d. Combination B - New and Rebuilt Machines: $0.09768V + 1.7952$
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138 Where, V = the refrigerated volume (ft³) of the refrigerated bottled or canned beverage vending
139 machine, as specified in Appendix C of the American National Standards Institute (ANSI)/
140 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard
141 32.1 - 2010, “Methods of Testing for Rating Vending Machines for Bottled, Canned or Other
142 Sealed Beverages.” For combination vending machines, the refrigerated volume does not include
143 any non-refrigerated compartments.²
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Note: EPA received mixed support from stakeholders on the proposed Draft 2 Maximum Daily Energy Consumption (MDEC) levels. While some stakeholders suggested the proposed equations remained too aggressive, others supported the amended levels.

Class A and Class B Machine Levels

The Version 4.0 Final Draft maintains the energy performance requirements as proposed in Draft 2. While several stakeholders expressed some concern about qualifying product availability, other stakeholders supported the Draft 2 performance requirements. Recognizing the challenges associated with the transition to climate-friendly, low-GWP refrigerants while facing placement restrictions for refrigerants classified as A2 and A3 (i.e. UL 541), EPA did not introduce a refrigerant requirement, other than reporting, to this Version 4.0 specification. EPA was informed that the proposed levels are achievable through the implementation of existing technology options discussed throughout this specification development process.

As noted in the published Draft 1 and Draft 2 data packets, EPA used a dataset consisting of daily energy performance data sourced from the June 2018 ENERGY STAR certified products list and the DOE’s Compliance Certification Management System (CCMS). Based on this dataset, the final draft levels reflect efficiency performance of the top 28% of Class A machines and 32% of Class B refrigerated beverage vending machines. The respective pass rates for Class A and Class B vending machines allow end-users options and offer product availability among different sizes and from various manufacturers. (Note that the Class A pass rate differs slightly from the Draft 2 reporting because EPA received information that one previously listed model is no longer in production and another available model that does not meet the Draft 2 Version 4.0 levels for Class A was missing from the dataset)

To further verify product availability, the Agency pulled an updated list of products registered in the CCMS as of May 2019. Comparing the registered products in CCMS against the ENERGY STAR levels, indicates that additional models, not included in the EPA dataset from June 2018, meet or exceed the Final Draft levels. This new data suggests that the industry is leveraging and implementing more advanced technologies and strategies allowing them to meet the proposed eligibility criteria by a significant margin. As such, EPA intends to finalize this specification with the Final Draft levels. Additional data EPA reviewed is located in tab ‘5. *Additional Data – May 2019*’ of the Final Draft data packet, which is [available here](#). Taking only this most recent DOE registered products list into consideration, Class A and Class B machine pass rates are 25% and 48%, respectively, confirming that even when considering the most recent products, purchasers will still have a selection of ENERGY STAR products from which to choose. Finally, with an effective date in the first quarter of 2020, more than a full year after the DOE standard effective date, EPA believes the proposed ENERGY STAR requirements are reasonable.

Combination Machine Levels

Stakeholders expressed concerns on setting levels for Combination A and Combination B machines with limited performance data. The Agency has aligned Combination A and Combination B machines with the same percentage reduction from DOE’s MDEC limits for Class A and Class B, respectively, which are reflected in the MDEC equations in Section 3.A.c-d., above. EPA will monitor the performance of Combination A and Combination B machines as it becomes available and amend the MDEC limits in a subsequent revision, as needed.

EPA anticipates that as manufacturers reconfigure their refrigerated beverage vending machines in order

to comply with the amended federal standard, there will be opportunities to reduce the incremental cost to achieve ENERGY STAR by leveraging existing technologies, design options, and components.

Payment Mechanisms

One stakeholder expressed concern over Appendix B to Subpart Q of Part 431, Section 2.2.5.1. regarding accounting for a payment mechanism in testing refrigerated beverage vending machines. Appendix B allows multiple options such that refrigerated beverage vending machines can be tested with no payment mechanism in place, in-place but de-energized, or in-place but set to the lowest energy consuming state. In any case, the default payment mechanism energy consumption value of 0.20 kWh/day is added to the sum of the primary rated energy consumption per day. The Agency notes that this approach is consistent with that of Appendix A and has been in place for numerous years. All currently ENERGY STAR certified products and those non-certified models in CCMS have followed this guidance. As such, EPA does not consider this concern to warrant a change to the MDEC levels prescribed in this specification.

Refrigerants

EPA received comments reiterating concerns over the implementation of Federal and State refrigerant restrictions applicable to refrigerated beverage vending machines. In light of these concerns, EPA reduced the stringency of the MDEC levels in Draft 2. EPA maintains that with the amended levels included in the Final Draft, a wide selection of products will meet and exceed the proposed ENERGY STAR Version 4.0 levels.

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B. Low Power Mode:

- a. Refrigeration low power mode: A 3% credit would apply to the calculated daily energy consumption used to determine compliance with the DOE standards for products with a low-power refrigeration mode³. The ENERGY STAR specification also applies the 3% credit to products with the refrigeration low-power mode. Refrigeration low power mode must undergo validation testing per Appendix B to Subpart Q, Part 431, Section 2.3.2.1.
- b. Accessory low power mode: Machines capable of accessory low power modes will be highlighted on the ENERGY STAR Product Finder if the features are reported at time of certification.
- c. The EPA encourages partners to train vending machine installers to provide information to host sites on the low power mode capabilities of their machines so that these capabilities may be enabled as desired by the host site. Machines that house vending temperature sensitive products, such as milk, shall not have the refrigeration low power state enabled on site by the vending operator or machine owner due to the risk of product spoilage.

4) Test Requirements:

- A. One of the following sampling plans shall be used to test energy performance for ENERGY STAR certification:
 - a. A single unit is selected, obtained, and tested. The measured performance of this unit and of each subsequent unit manufactured must be equal to or better than the ENERGY STAR specification requirements. Note that to determine the represented value per 10 CFR Part 429, Subpart B § 429.52, additional testing outside of ENERGY STAR is required. The represented value must also be equal to or better than the ENERGY STAR specification requirements; or
 - b. At least two units are selected, obtained and tested. The represented value is calculated from the test results according to the sampling requirements defined in 10 CFR Part 429, Subpart B § 429.52. The represented value must be equal to or better than the ENERGY STAR specification requirements.

³ The DOE's rulemaking analysis considered refrigeration low-power modes as a design option (TSD Section 5.5.4.11).

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180 Results of the tested unit(s) may be used to certify additional individual model variations within a
181 Basic Model as long as the definition for Basic Model provided in Section 1, above, and in 10 CFR
182 Part 431.292 is met.

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184 B. When testing refrigerated beverage vending machines, the following test methods shall be used
185 to determine ENERGY STAR certification:

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188 **Table 1: Test Standards for ENERGY STAR Certification**

ENERGY STAR Requirement	Test Method Reference
MDEC and Refrigerated Volume	10 CFR Part 431 Subpart Q, Appendix B

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190 C. Represented Value: The represented value is the identical value certified to the DOE, listed on the
191 ENERGY STAR QPL, and shown on consumer facing materials.

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193 D. Significant Digits and Rounding: All calculations shall be carried out as specified in Appendix B to
194 Subpart Q of Part 431.

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196 E. Additional Reporting Requirement a. Report the type of refrigerant used in the respective Vending
197 model, for example: R-404A, R290, or R-134a.

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Note: EPA received support in aligning with DOE's test method. One stakeholder requested that EPA clarify how the ENERGY STAR specification would be impacted by future changes to the DOE standard.

EPA will continue to track any changes to the standard and work with DOE on their ongoing and future activities as they relate to refrigerated beverage vending machines. When or if DOE decides to amend the current standards for this product category, EPA will amend the Version 4.0 specification accordingly.

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201 **5) Effective Date:** The Version 4.0 ENERGY STAR Product Specification for Refrigerated Beverage
202 Vending Machines shall take effect on **April 29, 2020**. For ENERGY STAR certification, a product
203 model shall meet the ENERGY STAR specification in effect on the model's date of manufacture. The
204 date of manufacture is specific to each unit and is the date on which a unit is considered to be
205 completely assembled.

Note: Stakeholders reiterated that EPA should consider postponing the Version 4.0 effective date until 2022 to allow manufacturers additional time to further address the transition to low-GWP classified refrigerants classified as A2 and A3 or until UL 541, CSA 128, and ASHRAE 15 standards are amended such that placement restrictions are reduced or removed. Alternatively, it was proposed that EPA could consider taking a graduated approach, effectively reducing the MDEC levels in steps (e.g., beginning with 2% more stringent in 2021 and become more stringent in subsequent steps or years) to allow manufacturers time to address flammable refrigerant restrictions and energy reduction efforts.

The Agency understands that the industry is working on solutions to the challenges inclusive of shifting to R-290 refrigerants and compliance of the safety regulation in the event of a refrigerant leak. EPA appreciates the measures manufacturers and other stakeholders in the industry are taking to address these barriers and will monitor progress assessing the need for future revisions as additional information becomes available. Recognizing that new federal minimum efficiency standards took effect in January and exceed or meet the ENERGY STAR requirements, EPA believes it is essential that the Agency update the eligibility criteria as soon as possible. EPA did ease the initially proposed eligibility criteria with the intention of phasing in more stringent requirements. EPA is committed to delivering meaningful savings to purchasers and believes the Final Draft levels balance time and savings in an acceptable manner.

EPA is on track to finalize this specification revision in July 2019. Once this specification is finalized, brand

owners may work with their respective certification body to certify products to it immediately. Products that are currently certified will remain on the list of certified products until the effective date of the Version 4.0, at which point only those Refrigerated Beverage Vending Machines certified to Version 4.0 will be listed.

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6) Future Specification Revisions: The 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 stakeholder 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.

Note: One stakeholder requested clarification on whether the same model number could be used for ENERGY STAR certification if changes to that model are made in order to meet new ENERGY STAR criteria.

Partners who modify models to meet ENERGY STAR specifications are responsible for associating the label only with the certified units. Changing model numbers when modifying units is best practice for ensuring all units produced under a model number meet the certified performance. In the case that the same model number is used, Partners must ensure that the ENERGY STAR label is not associated with old units that are no longer certified. EPA typically provides a transition time of nine months when program requirements change, allowing brand owners the necessary time to ensure accurate labeling of models and associated units.

Note that any product re-engineering or componentry changes will require retesting the model in addition to recertification to the new specification version. The ENERGY STAR brand owner webpage was recently updated to provide more clarity – the webpage is located [here](#).

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