



ENERGY STAR Program Requirements Product Specification for Commercial Water Heaters

Eligibility Criteria Version 1.0: Updated Final Draft

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7 Following is the **Updated Final Draft** Version 1.0 product specification for ENERGY STAR qualified
8 commercial water heaters. A product shall meet all of the identified criteria if it is to earn the ENERGY
9 STAR.

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11 **1) Definitions:** Below are the definitions of the relevant terms in this document.

12 A. Commercial Water Heater: A product that utilizes gas or electricity to heat potable water for use
13 outside the heater upon demand, at a thermostatically controlled temperature, including:

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15 a. A storage type unit¹ which heats and stores water within the appliance at a
16 thermostatically controlled temperature for delivery on demand and that is industrial
17 equipment, including:

18 i. Gas storage water heaters with an input rate greater than 75,000 British thermal
19 units (Btu) per hour, and

20 ii. Electric heat pump water heaters designed to transfer thermal energy from one
21 temperature level to a higher temperature level for the purpose of heating water,
22 including both air-source and water-source units, with an input rate greater than
23 or equal to 1.6 kW.

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25 b. A gas instantaneous type unit¹, with an input rating not less than 4,000 Btu/hr per gallon
26 of stored water, and that is industrial equipment, including products meeting this
27 description that are designed to heat water to temperatures of 180 °F or higher.

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29 B. Energy Factor (EF)²: The ratio of useful energy output from the water heater to the total amount
30 of energy delivered to the water heater.

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32 C. Thermal Efficiency (TE)¹: The ratio of the heat energy (Btu/hr) transferred to the water flowing
33 through the water heater to the amount of energy (Btu/hr) consumed by the water heater.

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35 D. Standby Loss (SL)¹: The average hourly energy, expressed in Btu per hour, required to maintain
36 the stored water temperature.

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38 E. Manufacturer Limited Warranty: An assurance by the manufacturer to the consumer that the
39 water heater, including purchased system equipment and components, is guaranteed to work for
40 a defined period of time.

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42 F. Basic Model¹: All units of a given type of covered product (or class thereof) manufactured by one
43 manufacturer, having the same primary energy source, and which have essentially identical
44 electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption,
45 energy efficiency, water consumption, or water efficiency.

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¹ 10 CFR Part 431 Subpart G

² Based on definition in 10 CFR 430, Subpart B, Appendix E

Note: In the previous Final Draft, EPA clarified the definition for gas instantaneous water heaters by defining “industrial equipment” as units that have an input rate greater than 200,000 Btu/hr. However, this change unintentionally excluded a certain class of water heaters i.e., instantaneous water heaters less than 200,000 Btu/hr designed to heat water above 180F and sold for commercial applications. EPA does not intend to exclude these products and is proposing to remove the language “input rate greater than 200,000 Btu/hr” from the instantaneous water heater definition.

EPA has also added a definition for Energy Factor since some water heaters with input rates less than 200,000 Btu/hr must be rated using Energy Factor under the U.S. Department of Energy (DOE) test method, i.e., 10 CFR 430 Subpart B.

2) Scope:

- A. Included Products: Only products that meet the definition of a commercial water heater, as specified herein, which are marketed for sale in the commercial market are eligible for ENERGY STAR qualification.
- B. Excluded Products: The following products are not eligible for qualification under this specification:
 - a. Products that are covered under other ENERGY STAR product specifications. The list of specifications currently in effect can be found at www.energystar.gov/specifications.
 - b. Oil fired water heaters.
 - c. Combined heating, cooling and hot water systems.
 - d. Storage water heaters with greater than 140 gallons of capacity.

3) Qualification Criteria:

- A. Product Performance Requirements for Gas Water Heaters:

Table 1: Requirements for Qualified Gas Water Heaters

Criteria	Type	ENERGY STAR Requirements
Thermal Efficiency or Energy Factor	Storage; Instantaneous	TE ≥ 0.94 or EF ≥ 0.93
Maximum Standby Loss ³	Storage	≤ 0.84 * [(Input Rate / 800) + 110(Volume _r) ^{1/2}] (Btu/hr)
	Instantaneous	N/A
Minimum Manufacturer Limited Warranty	Storage; Instantaneous	3 years on tank and/or heat exchanger and 1 year on parts

³ Volume is the rated volume in gallons. Input Rate is the nameplate input rate in Btu/hr.

89 **Note:** To include smaller gas instantaneous water heaters, and in light of the fact that the U.S.
 90 Department of Energy (DOE) requires that some instantaneous water heaters sold in the commercial
 91 market with input rates less than 200,000 Btu/hr be rated using the Energy Factor (EF) metric while
 92 others are required to be rated using Thermal Efficiency (TE), EPA is proposing that manufacturers who
 93 seek ENERGY STAR certification use EF or TE as required by the federal standard. EPA is proposing
 94 that products with input rates less than 200,000 Btu/hr certifying using EF, meet or exceed a rating of .93.
 95 Products that meet this EF rating will deliver essentially equivalent efficiency in use to the previously
 96 vetted level of .94 set for products certified using TE. This level also ensures that top performers across
 97 all product types covered by this specification are eligible for the ENERGY STAR. EPA sought
 98 stakeholder input on a EF level that would be comparable to the proposed 0.94 TE level. There was
 99 broad agreement among stakeholders that the EF rating is typically about one point lower. There are
 100 several reasons why EF rating is typically lower than TE on a system: 1) energy losses experienced
 101 during the six draws of the 24 hour EF test as a result of the system experiencing multiple fire-up/cool-
 102 down cycles; 2) inherent system efficiencies at steady state full fired draw as required for the TE test
 103 compared to the EF test that requires 3 full fire draws and 3 minimum fire draws; and 3) additional
 104 electrical draw being accounted for in the EF metric.
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 106 EPA received stakeholder recommendations to either set the standby loss requirement at the federal
 107 standard level or to remove it from the specification. The purpose of ENERGY STAR is to provide
 108 differentiation in the marketplace and adopting the federal standard level does not support this guiding
 109 principle. EPA believes that the proposed standby loss requirement as proposed in the Final Draft
 110 recognizes manufacturer efforts to reduce energy consumption while in standby and provides sufficient
 111 product differentiation in the marketplace.

112 B. Product Performance Requirements for Electric Heat Pump Water Heaters:
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Table 2: Criteria for Qualified Electric Heat Pump Water Heaters

Criteria	ENERGY STAR Requirements
Efficiency Metric TBD	TBD
Minimum Manufacturer Limited Warranty	TBD

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 117 C. Product Safety Requirements:
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Table 3: Safety Requirements for Qualified Water Heaters

Product	ENERGY STAR Requirements
Gas Water Heaters	ANSI Z21.10.3/CSA 4.3
Electric Heat Pump Water Heaters	TBD

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127 D. Significant Digits and Rounding:

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a. All calculations shall be carried out with directly measured (unrounded) values.

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b. Unless otherwise specified below, compliance with specification limits shall be evaluated using directly measured or calculated values without any benefit from rounding.

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c. Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit. SL shall be rounded to the nearest whole number.

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Note: EPA has deleted the guidance on the TE metric, as there is generic guidance available that the reported value should be rounded to the nearest significant digit as expressed in the corresponding specification limit.

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4) Test Requirements:

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A. One of the following sampling plans shall be used for purposes of testing for ENERGY STAR qualification:

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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. Results of the tested unit may be used to qualify additional individual model variations within a basic model as long as the definition for basic model provided in Section 1, above, is met; or

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b. Units are selected for testing and results calculated according to the sampling requirements defined in 10 CFR Part 429, Subpart B § 429.44. The certified rating must be equal to or better than the ENERGY STAR specification requirements. Results of the tested unit may be used to qualify additional model variations within a basic model as long as the definition for basic model provided in Section 1, above, is met. Further, all individual models within a basic model must have the same certified rating based on the applicable sampling criteria per DOE's regulations in Part 429 and this rating must be used for all manufacturer literature, the qualified product list, and certification of compliance to DOE standards.

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B. When testing commercial water heaters, the following test methods shall be used to determine ENERGY STAR qualification:

Table 4: Test Methods for ENERGY STAR Qualification

ENERGY STAR Requirement	Test Method Reference	Applicable Products
Thermal Energy	10 CFR Part 431.106	Gas Storage and Instantaneous Water Heaters \geq 200,000 Btu/hr; and some Gas Instantaneous $<$ 200,000 Btu/hr input rate
Standby Loss		
Energy Factor	10 CFR Part 430, subpart B, Appendix E	Some Gas Instantaneous $<$ 200,000 Btu/hr input rate
TBD	TBD	Heat Pump Water Heaters

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Note: EPA added the federal test method for EF, 10 CFR Part 430, subpart B, Appendix E, to the test methods table. This test method is applicable to some instantaneous water heaters with less than 200,000 Btu/hr input rate. This change would allow manufacturers who seek ENERGY STAR certification for instantaneous water heaters with less than 200,000 Btu/hr to use EF or TE as required by the federal standard.

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5) Effective Date:

The ENERGY STAR Commercial Water Heater specification shall take effect February x, 2013. 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 on which a unit is considered to be completely assembled.

Note: EPA aims to finalize the Version 1.0 Commercial Water Heaters specification in the first week of February. EPA received stakeholder comments to choose an effective date that provides a nine-month transition. EPA would like to reiterate that the transition period is afforded for revised specifications to allow for appropriate time to update the product literature or any other related material. But for new specifications, no such transition is required. As such, the Version 1.0 specification will take effect immediately upon its publication.

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6) Future Criteria 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 the ENERGY STAR qualification is not automatically granted for the life of a product model.