ADDENDA

ANSI/ASHRAE/IES Addendum cj to
ANSI/ASHRAE/IES Standard 90.1-2022

Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings

Approved by ASHRAE and the American National Standards Institute on December 16, 2025, and by the Illuminating Engineering Society on December 12. 2025.

This addendum was approved by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. Instructions for how to submit a change can be found on the ASHRAE® website (https://www.ashrae.org/continuous-maintenance).

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FOREWORD

ANSI/ASHRAE/IES Standard 90.1-2022 includes energy efficiency requirements for residential products that are defined directly by DOE in the U.S. Code of Federal Regulations, 10 CFR 430. Although Standard 90.1 does not have responsibility to define efficiency requirements for residential products sold in the U.S., they are still used in commercial buildings and have been included in Standard 90.1 requirements in Informative Appendix F. The residential product requirements are also duplicated in Sections 6 and 7 for products sold outside the U.S. and DOE control.

The efficiency requirements for residential products are directly defined by DOE per the authorization defined in the National Appliance Energy Conservation Act (NAECA) and are subject to preemption. Standard 90.1, for completeness and ease of use, has included the U.S. residential product efficiencies with the understanding that if DOE revised the requirements then those revisions would preempt what is included in Standard 90.1. Typically, DOE allows three or more years for implementation, and, with Standard 90.1 updated every three years, the requirements can stay aligned.

The SSPC 90.1 MSC subcommittee reviewed with DOE the current practice of separating DOE controlled residential product efficiencies in an informative appendix and concluded that separation of residential and outside U.S. residential and commercial product requirements is not needed. Therefore, the Appendix F tables and Sections 6 and 7 can be combined, which will simplify the standard and make it easier to use. It should be noted that DOE requirements are already duplicated in Sections 6 and 7 for products sold outside the U.S. With all the requirements in one location AHJ's and other users will see the requirements for a given product in one common table. We also have reformatted some of the information to group common products together.

Some addenda have already been developed to integrate the DOE residential product requirements in Section 6.

- ***Addendum bq** was approved by the SSPC to update the room air-conditioner requirements, which are controlled by DOE and documented in Table F-3. Outside U.S. requirements are also defined in Table 6.8.1-4. Addendum bq merged the requirements for U.S. and outside U.S. into one new common Table 6.8.1-22.*
- ***Addendum be** was developed to move the requirements in Table F-1 for U.S. application single-phase air conditioners and heat pumps out of Appendix F and into Tables 6.8.1-1 and 6.8.1-2 along with other commercial equipment changes and the result of new metrics and negotiated ASRAC rules.*

Addendum cj makes the following additional changes to Standard 90.1:

- *Overall, the addendum reformats and reorganizes tables, but a few DOE efficiency updates for pool heaters and boilers are included to align the standard with recent DOE requirements. Some footnotes are also updated to clarify and align Sections 6 and 7 and former Informative Appendix F.*
- *The content of Informative Appendix is deleted in its entirety but the appendix is reserved for future use. Appendix F tables are combined with tables in Sections 6 and 7. The elimination of Appendix F also impacts other sections, and this addendum updates references to the deleted appendix in the standard.*
- *Formatting and editorial changes are made to Sections 6.4.1.1 and 6.4.1.2.1, including some marking requirements for chiller efficiency compliance. For ease of use, the long list of prescriptive efficiency tables is converted into a master table, and notes are added specifiying which are covered by preemption—a common question from users.*
- *Table F-2 minimum energy efficiency requirements for water heaters and pool heaters are moved from Appendix F and combined with Table 7.4.1 so that all residential and commercial water heaters are provided in one table. Changes are made to water heating efficiency requirements to align with recent DOE final rules for water heating equipment.*
- *The minimum efficiencies for room air conditions defined in Table F-3 were addressed by Addendum bq, where the requirements were updated in a new Table 6.8.1-22 that covers both U.S. and outside U.S. requirements. But addendum bq did not delete Table F-3, so Addendum cj does. Note, the efficiencies in Table F-3 are out of date, and Addendum bq made changes to Table 6.8.1-22 efficiency requirements to align them with a recent DOE final rule.*

- *Residential furnaces minimum efficiency requirements for U.S. applications are moved out of Table F-4 and combined with Table 6.8.1-5 so that all residential and commercial furnace efficiency requirements appear in one table. Some changes are made to align with recent DOE final rules. Some changes are made to formatting and footnotes to improve clarity and ease of use.*
- *U.S. residential boiler minimum efficiency requirements are moved out of Table F-5 and combined with Table 6.8.1-6 so that all residential and commercial boiler efficiency requirements appear in one table. Some changes are made to align with recent DOE final rules. Some changes are made to formatting and footnotes to improve clarity and ease of use.*
- *Ceiling fan efficiency requirements for U.S. applications are moved out of Table F-6 and combined with the commercial requirements in Table 6.8.1-21. No changes are made to efficiency requirements. Some editorial changes are made to improve the use of the tables. No efficiency requirements are made.*

For most of the addendum, there are no changes to the efficiency requirements and, therefore, no economic justification is needed. For the DOE controlled efficiency requirement changes, the economic justification is available in the DOE documentation. The primary purpose of this addendum is to improve the usability of the standard and make a few corrections to align with DOE controlled efficiency requirements.

Informative Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum cj to Standard 90.1-2022

Delete Informative Appendix F (I-P and SI, only I-P is shown), which covers DOE residential efficiency requirements, including all text and Tables F-1, F-2, F-3, F-4, F-5, and F-6. Note: Addendum bq addressed the requirements in Table F-3, "Minimum Efficiency Requirements for Room Air Conditioners for U.S. Applications" but did not delete Table F-3. Also, Addendum be deleted Table F-1 and added the requirements to ables 6.8.1-1 and 6.8.1-2, but Table F-1 is included below for completeness.

(This appendix is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

INFORMATIVE APPENDIX F

(RESERVED FOR FUTURE USE)

~~**U.S. DEPARTMENT OF ENERGY MINIMUM ENERGY EFFICIENCY REQUIREMENTS, TEST PROCEDURES, AND DEFINITIONS**~~

~~In the United States, the U.S. Department of Energy (U.S. DOE) establishes *efficiency* standards for products that it defines as "residential covered products." Since these products are used in *buildings* covered by this standard, U.S. DOE *efficiency* requirements are shown here for convenience. All U.S. DOE *efficiency* requirements for *residential* products are found in the U.S. *Code of Federal Regulations*, 10 CFR 430.32.~~

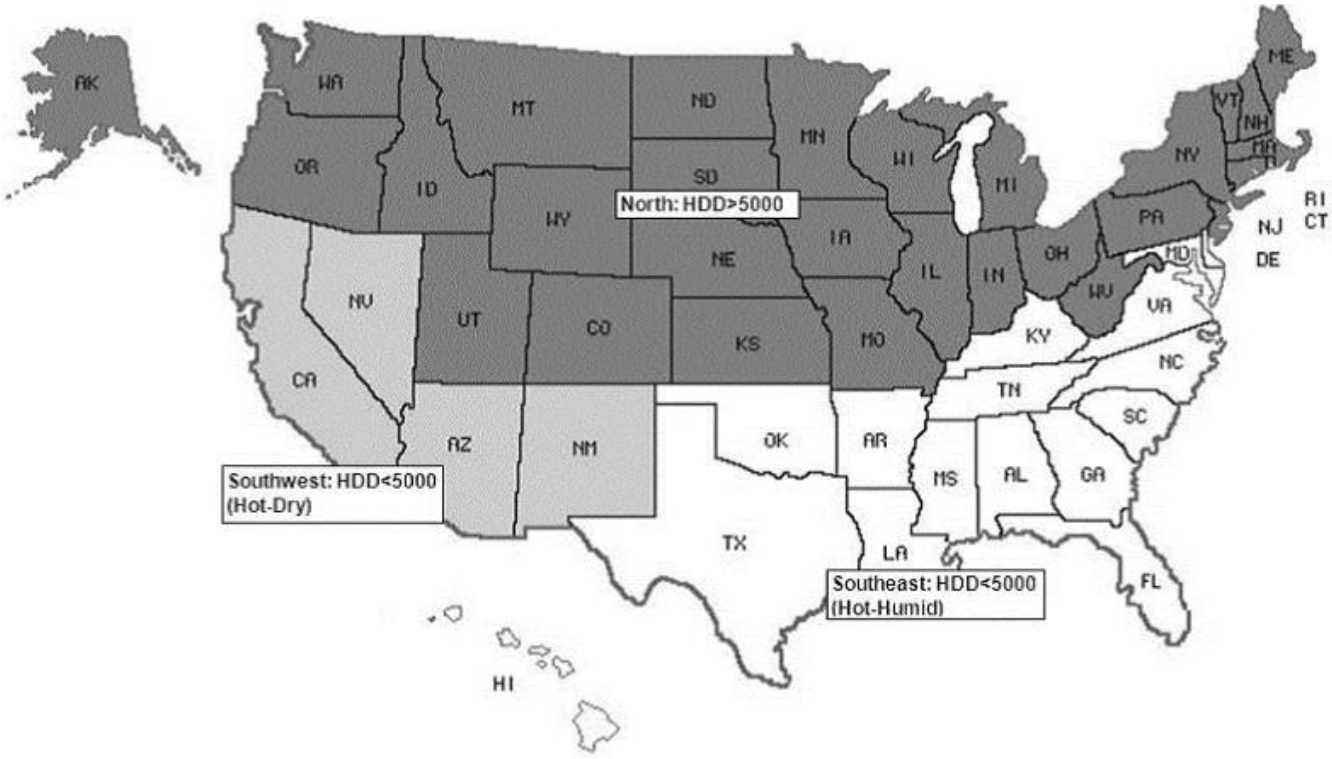
~~DOE also establishes definitions and test procedures for covered products. These are found in 10 CFR 430.2 and 10 CFR 430.23, respectively.~~

~~**F1. U.S. DOE MINIMUM ENERGY EFFICIENCY REQUIREMENTS FOR SINGLE PHASE AIR CONDITIONERS AND HEAT PUMPS**~~

~~These standards became effective on January 1, 2015. In the United States, some of the standards are regional in nature. The U.S. has been divided into 3 regions: (a) the north, comprising states with a population weighted heating *degree days* (HDD) equal to or greater than 5000; (b) the southeast, comprising states with a population weighted HDD less than 5000; and (c) the southwest, comprising Arizona, California, Nevada, and New Mexico. The regions are shown in Figure F-1.~~

~~The U.S. federal minimum *energy efficiency* standards for single-phase air conditioners and heat pumps are shown in Table F-1. The standards apply to *residential* single-phase air conditioners and heat pumps that are rated at less than 65,000 Btu/h of cooling capacity.~~

~~**F2. U.S. DOE MINIMUM ENERGY EFFICIENCY REQUIREMENTS FOR WATER HEATERS AND POOL HEATERS**~~



~~**Figure F-1 Map of the regions for the analysis of central air conditioners and heat pumps.**~~
(Source: ~~*Federal Register* 76 FR 37431, June 7, 2018~~)

~~These standards for Uniform Energy Factor became effective on December 29, 2017, and apply to products manufactured on or after that date and the thermal *efficiency* requirements for gas fired *pool* heaters manufactured on or after April 16, 2013 (Table F-2).~~

~~F3. U.S. DOE TEST PROCEDURE AND DEFINITIONS FOR CEILING FANS~~

~~U.S. DOE definitions for *ceiling fans* are found in 10 CFR 430.2 and 10 CFR Part 430, Subpart B, Appendix U. On or after January 23, 2017, *manufacturers* of *ceiling fans* must make any representations with respect to *energy* use or *efficiency* in accordance with the test procedure in 10 CFR Part 430, Subpart B, Appendix U. DOE also specifies, in 10 CFR 430.32, design requirements for *ceiling fans*, and for *ceiling fans* manufactured on or after January 21, 2020, minimum *efficiency* requirements.~~

Table F-1 Minimum Efficiency Requirements for Single-Phase Central Air Conditioners and Heat Pumps for Applications in the U.S.

Product Class	Capacity Range	National Standards	Southeastern Region Standards[a]	Southwestern Region Standards[b]	Test Procedure[f]
Central Air Conditioners and Heat Pumps[e]					
Split-system air conditioners for U.S. applications	<45,000 Btu/h *single phase*	*SEER* = 13.0 $P_{W,OFF} \le 30$ W before 1/1/2023 *SEER2* = 13.4 $P_{W,OFF} \le 30$ W after 1/1/2023	*SEER* = 14.0 $P_{W,OFF} \le 30$ W before 1/1/2023 *SEER2* = 14.3 $P_{W,OFF} \le 30$ W after 1/1/2023	*SEER* = 14.0 *EER* = 12.2 $P_{W,OFF} \le 30$ W before 1/1/2023 *SEER2* = 14.3 *EER2* = 11.7/9.8[d] $P_{W,OFF} \le 30$ W after 1/1/2023	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
Split-system air conditioners	≥45,000 Btu/h and <65,000 Btu/h *single phase*	*SEER* = 13.0 $P_{W,OFF} \le 30$ W before 1/1/2023 *SEER2* = 13.4 $P_{W,OFF} \le 30$ W after 1/1/2023	*SEER* = 14.0 $P_{W,OFF} \le 30$ W before 1/1/2023 *SEER2* = 13.8 $P_{W,OFF} \le 30$ W after 1/1/2023	*SEER* = 14.0 *EER* = 11.7[d] $P_{W,OFF} \le 30$ W before 1/1/2023 *SEER2* = 13.8 *EER2* = 11.2/9.8[e] $P_{W,OFF} \le 30$ W after 1/1/2023	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
Split-system heat pumps	<65,000 Btu/h *single phase*	*SEER* = 14.0 *HSPF* = 8.2 $P_{W,OFF} \le 33$ W before 1/1/2023 *SEER2* = 14.3 *HSPF2* = 7.5 $P_{W,OFF} \le 33$ W after 1/1/2023	*SEER* = 14.0 *HSPF* = 8.2 $P_{W,OFF} \le 33$ W before 1/1/2023 *SEER2* = 14.3 *HSPF2* = 7.5 $P_{W,OFF} \le 33$ W after 1/1/2023	*SEER* = 14.0 *HSPF* = 8.2 $P_{W,OFF} \le 33$ W before 1/1/2023 *SEER2* = 14.3 *HSPF2* = 7.5 $P_{W,OFF} \le 33$ W after 1/1/2023	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
Single-package air conditioners	<65,000 Btu/h *single phase*	*SEER* = 14.0 $P_{W,OFF} \le 30$ W before 1/1/2023 *SEER2* = 13.4 $P_{W,OFF} \le 30$ W after 1/1/2023	*SEER* = 14.0 $P_{W,OFF} \le 30$ W before 1/1/2023 *SEER2* = 13.4 $P_{W,OFF} \le 30$ W after 1/1/2023	*SEER* = 14.0 *EER* = 11.0 $P_{W,OFF} \le 30$ W before 1/1/2023 *SEER2* = 13.4 *EER2* = 10.6 $P_{W,OFF} \le 30$ W after 1/1/2023	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
Single-package heat pumps	<65,000 Btu/h *single phase*	*SEER* = 14.0 *HSPF* = 8.0 $P_{W,OFF} \le 33$ W before 1/1/2023 *SEER2* = 13.4 *HSPF2* = 6.7 $P_{W,OFF} \le 33$ W after 1/1/2023	*SEER* = 14.0 *HSPF* = 8.0 $P_{W,OFF} \le 33$ W before 1/1/2023 *SEER2* = 13.4 *HSPF2* = 6.7 $P_{W,OFF} \le 33$ W after 1/1/2023	*SEER* = 14.0 *HSPF* = 8.0 $P_{W,OFF} \le 33$ W before 1/1/2023 *SEER2* = 13.4 *HSPF2* = 6.7 $P_{W,OFF} \le 33$ W after 1/1/2023	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023

a. The Southeastern region for central air conditioners and heat pumps contains the following States: Alabama, Arkansas, Delaware, Florida, Georgia, Hawaii, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia, and the District of Columbia.

b. The Southwestern region for central air conditioners contains the States of Arizona, California, Nevada, and New Mexico.

c. *SEER* is *seasonal energy efficiency ratio*; *EER* is *energy efficiency ratio*; *HSPF* is *heating seasonal performance factor*; and Btu/h is British thermal units per hour. *SEER2* is *seasonal energy efficiency ratio* reflecting the new higher static that is effective 1/1/2023; *EER2* is *energy efficiency ratio* also reflecting the higher static; and *HSPF2* is new *heating seasonal performance factor* reflecting the new higher static and load line. Test and rating procedure defined in AHRI 210/240-2017 for *EER*, *SEER*, and *HSPF* and AHRI 210/240-2023 for *EER2*, *SEER2*, and *HSPF2*. The added "2" in the metric names reflects the new higher static (all metrics) and load line (*HSPF2* only) for the new metrics effective 1/1/2023.

d. The 11.7 *EER2* standard applies to products with a certified *SEER2* less than 15.2. The 9.8 *EER2* standard applies to products with a certified *SEER2* greater than or equal to 15.2.

e. The 11.2 *EER2* standard applies to products with a certified *SEER2* less than 15.2. The 9.8 *EER2* standard applies to products with a certified *SEER2* greater than or equal to 15.2.

f. Section 13 contains a complete specification of the referenced test procedures, including the referenced year version of the test procedure.

Table F-1 Minimum Efficiency Requirements for Single-Phase Central Air Conditioners and Heat Pumps for Applications in the U.S.

Product Class	Capacity Range	National Standards	Southeastern Region Standards[a]	Southwestern Region Standards[b]	Test Procedure[f]
Central Air Conditioners and Heat Pumps[e]					
Small-duct high-velocity *systems*	<65,000 Btu/h *single phase*	*SEER* = 12.0 *HSPF* = 7.2 $P_{W,OFF}$ ≤ 30 W before 1/1/2023 *SEER2* = 12.0 *HSPF2* = 6.1 $P_{W,OFF}$ ≤ 30 W after 1/1/2023	*SEER* = 12.0 *HSPF* = 7.2 $P_{W,OFF}$ ≤ 30 W before 1/1/2023 *SEER2* = 12.0 *HSPF2* = 6.1 $P_{W,OFF}$ ≤ 30 W after 1/1/2023	*SEER* = 12.0 *HSPF* = 7.2 $P_{W,OFF}$ ≤ 30 W before 1/1/2023 *SEER2* = 12.0 *HSPF2* = 6.1 $P_{W,OFF}$ ≤ 30 W after 1/1/2023	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
Space-constrained products— air conditioners[a]	<65,000 Btu/h *single phase*	*SEER* = 12.0 $P_{W,OFF}$ ≤ 30 W before 1/1/2023 *SEER2* = 11.7 $P_{W,OFF}$ ≤ 30 W after 1/1/2023	*SEER* = 12.0 $P_{W,OFF}$ ≤ 30 W before 1/1/2023 *SEER2* = 11.7 $P_{W,OFF}$ ≤ 30 W after 1/1/2023	*SEER* = 12.0 $P_{W,OFF}$ ≤ 30 W before 1/1/2023 *SEER2* = 11.7 $P_{W,OFF}$ ≤ 30 W after 1/1/2023	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
Space-constrained products— heat pumps[a]	<65,000 Btu/h *single phase*	*SEER* = 12.0 *HSPF* = 7.4 $P_{W,OFF}$ ≤ 33 W before 1/1/2023 *SEER2* = 11.9 *HSPF2* = 6.3 $P_{W,OFF}$ ≤ 33 W after 1/1/2023	*SEER* = 12.0 *HSPF* = 7.4 $P_{W,OFF}$ ≤ 33 W before 1/1/2023 *SEER2* = 11.9 *HSPF2* = 6.3 $P_{W,OFF}$ ≤ 33 W after 1/1/2023	*SEER* = 12.0 *HSPF* = 7.4 $P_{W,OFF}$ ≤ 33 W before 1/1/2023 *SEER2* = 11.9 *HSPF2* = 6.3 $P_{W,OFF}$ ≤ 33 W after 1/1/2023	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023

a. The Southeastern region for central air conditioners and heat pumps contains the following States: Alabama, Arkansas, Delaware, Florida, Georgia, Hawaii, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia, and the District of Columbia.

b. The Southwestern region for central air conditioners contains the States of Arizona, California, Nevada, and New Mexico.

c. *SEER* is *seasonal energy efficiency ratio*; *EER* is *energy efficiency ratio*; *HSPF* is *heating seasonal performance factor*; and Btu/h is British thermal units per hour. *SEER2* is *seasonal energy efficiency ratio* reflecting the new higher static that is effective 1/1/2023; *EER2* is *energy efficiency ratio* also reflecting the higher static; and *HSPF2* is new *heating seasonal performance factor* reflecting the new higher static and load line. Test and rating procedure defined in AHRI 210/240-2017 for *EER*, *SEER*, and *HSPF* and AHRI 210/240-2023 for *EER2*, *SEER2*, and *HSPF2*. The added "2" in the metric names reflects the new higher static (all metrics) and load line (*HSPF2* only) for the new metrics effective 1/1/2023.

d. The 11.7 *EER2* standard applies to products with a certified *SEER2* less than 15.2. The 9.8 *EER2* standard applies to products with a certified *SEER2* greater than or equal to 15.2.

e. The 11.2 *EER2* standard applies to products with a certified *SEER2* less than 15.2. The 9.8 *EER2* standard applies to products with a certified *SEER2* greater than or equal to 15.2.

f. Section 13 contains a complete specification of the referenced test procedures, including the referenced year version of the test procedure.

Table F-2 Minimum Energy Efficiency Requirements for Water Heaters and Pool Heaters

Source: 10 CFR Part 430, Energy Conservation Program: Energy Conservation Standards for Water Heaters

Product Class	Rated Storage Volume and input Rating (if applicable)	Draw Pattern	Uniform Energy Factor (UEF) or Thermal Efficiency (E_t)	Test Procedure
Gas-fired storage water heater	≥20 gal and ≤55 gal	Very small	UEF = 0.3456 – (0.0020 × V_r)	10 CFR 430 Appendix E
		Low	UEF = 0.5982 – (0.0019 × V_r)	
		Medium	UEF = 0.6483 – (0.0017 × V_r)	
		High	UEF = 0.6920 – (0.0013 × V_r)	
	>55 gal and ≤100 gal	Very small	UEF = 0.6470 – (0.0006 × V_r)	10 CFR 430 Appendix E
		Low	UEF = 0.7689 – (0.0005 × V_r)	
		Medium	UEF = 0.7897 – (0.0004 × V_r)	
		High	UEF = 0.8072 – (0.0003 × V_r)	
Oil-fired storage water heater	≤50 gal	Very small	UEF = 0.2509 – (0.0012 × V_r)	10 CFR 430 Appendix E
		Low	UEF = 0.5330 – (0.0016 × V_r)	
		Medium	UEF = 0.6078 – (0.0016 × V_r)	
		High	UEF = 0.6815 – (0.0014 × V_r)	

Table F-2 Minimum Energy Efficiency Requirements for Water Heaters and Pool Heaters

Source: 10 CFR Part 430, Energy Conservation Program: Energy Conservation Standards for Water Heaters

Product Class	Rated Storage Volume and input Rating (if applicable)	Draw Pattern	Uniform Energy Factor (UEF) or Thermal Efficiency (E_t)	Test Procedure
Electric storage water heaters	≥20 gal and ≤55 gal	Very small	UEF = 0.8808 − (0.0008 × V_r)	10 CFR 430 Appendix E
		Low	UEF = 0.9254 − (0.0003 × V_r)	
		Medium	UEF = 0.9307 − (0.0002 × V_r)	
		High	UEF = 0.9349 − (0.0001 × V_r)	
	>55 gal and ≤120 gal	Very small	UEF = 1.9236 − (0.0011 × V_r)	10 CFR 430 Appendix E
		Low	UEF = 2.0440 − (0.0011 × V_r)	
		Medium	UEF = 2.1171 − (0.0011 × V_r)	
		High	UEF = 2.2418 − (0.0011 × V_r)	
Tabletop water heater	≥20 gal and ≤120 gal	Very small	UEF = 0.6323 − (0.0058 × V_r)	10 CFR 430 Appendix E
		Low	UEF = 0.9188 − (0.0031 × V_r)	
		Medium	UEF = 0.9577 − (0.0023 × V_r)	
		High	UEF = 0.9884 − (0.0016 × V_r)	
Instantaneous gas-fired water heater	<2 gal and >50,000 Btu/h	Very small	UEF = 0.80	10 CFR 430 Appendix E
		Low	UEF = 0.81	
		Medium	UEF = 0.81	
		High	UEF = 0.81	
Instantaneous electric water heater	<2 gal	Very small	UEF = 0.91	10 CFR 430 Appendix E
		Low	UEF = 0.91	
		Medium	UEF = 0.91t	
		High	UEF = 0.92	
Grid-enabled water heaters	>75 gal	Very small	UEF = 1.0136 − (0.0028 × V_r)	10 CFR 430 Appendix E
		Low	UEF = 0.9984 − (0.0014 × V_r)	
		Medium	UEF = 0.9853 − (0.0010 × V_r)	
		High	UEF = 0.9720 − (0.0007 × V_r)	
Pool heater gas			82% E_t	10 CFR 430 Appendix P

a. V_r is the rated storage volume (in gallons), as determined pursuant to 10 CFR 429.17.

b. Standards for electric storage water heaters apply to both *electric resistance* water heaters and heat pump water heaters.

Table F-3 Minimum Efficiency Requirements for Room Air Conditioners for U.S. Applications

Product Class	Capacity Range	Efficiency Requirements[a]	Test Procedure[b]
Room air conditioners without reverse cycle with louvered sides	<6,000 Btu/h	*CEER* = 11.0	10 CFR 430 Appendix F
	≥6,000 Btu/h and <8,000 Btu/h	*CEER* = 11.0	
	≥8,000 Btu/h and <14,000 Btu/h	*CEER* = 10.9	
	≥14,000 Btu/h and <20,000 Btu/h	*CEER* = 10.7	
	≥20,000 Btu/h and <28,000 Btu/h	*CEER* = 9.4	
	≥28,000 Btu/h	*CEER* = 9.0	

Table F-3 Minimum Efficiency Requirements for Room Air Conditioners for U.S. Applications

Product Class	Capacity Range	Efficiency Requirements[a]	Test Procedure[b]
Room air conditioners without reverse cycle without louvered sides	<6,000 Btu/h	*CEER* = 10.0	10 CFR 430 Appendix F
	≥6,000 Btu/h and <8,000 Btu/h	*CEER* = 10.0	
	≥8,000 Btu/h and <11,000 Btu/h	*CEER* = 9.6	
	≥11,000 Btu/h and <14,000 Btu/h	*CEER* = 9.5	
	≥14,000 Btu/h and <20,000 Btu/h	*CEER* = 9.3	
	≥20,000 Btu/h	*CEER* = 9.4	
Room air conditioners with reverse cycle with louvered sides	<20,000 Btu/h	*CEER* = 9.8	10 CFR 430 Appendix F
	≥20,000 Btu/h	*CEER* = 9.3	
Room air conditioners with reverse cycle without louvered sides	<14,000 Btu/h	*CEER* = 9.3	10 CFR 430 Appendix F
	≥14,000 Btu/h	*CEER* = 8.7	
Room air conditioners, casement only	All	*CEER* = 9.5	10 CFR 430 Appendix F
Room air conditioners, casement slider	All	*CEER* = 10.4	10 CFR 430 Appendix F

a. Source: Federal Register 76 FR 37431, June 27, 2011.
b. Section 13 contains a complete specification of the referenced test procedures.

Table F-4 Residential Furnaces—Minimum Efficiency Requirements for U.S. Applications (see 10 CFR 430)

Product Class	Size Category (input)	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Furnace, gas fired	<225,000 Btu/h	Nonweatherized excluding mobile home	80% AFUE	10 CFR 430 Appendix N
		Nonweatherized mobile home	80% AFUE	
		Weatherized	81% AFUE	
Furnace oil fired	<225,000 Btu/h	Nonweatherized excluding mobile home	83% AFUE $P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	10 CFR 430 Appendix N
		Nonweatherized mobile home	75% AFUE $P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	
		Weatherized	78% AFUE	
Electric furnace	<225,000 Btu/h	All	78% AFUE $P_{W,SB}$ ≤ 10 W $P_{W,OFF}$ ≤ 10 W	10 CFR 430 Appendix N

a. Section 13 contains a complete specification of the referenced test procedure.

Table F-5 Residential Boiler[a] Minimum Efficiency Requirements for U.S. Applications (see 10 CFR 430)

Product Class	Minimum Efficiency[b]	Standby Mode and Off-Mode Power Consumption	Design Requirements
Gas-fired hot-water *boiler*	84% AFUE	$P_{W,SB}$ ≤ 9 W $P_{W,OFF}$ ≤ 9 W	Constant burning pilot not permitted. Automatic means for adjusting water temperature required (except for *boilers* equipped with tankless domestic water heating coils)[d].
Gas-fired steam *boiler*	82% AFUE	$P_{W,SB}$ ≤ 8 W $P_{W,OFF}$ ≤ 8 W	Constant burning pilot not permitted.
Oil-fired hot-water *boiler*	86% AFUE	$P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	Automatic means for adjusting temperature required (except for *boilers* equipped with tankless domestic water heating coils)[d].

Table F-5 Residential Boiler[a] Minimum Efficiency Requirements for U.S. Applications (see 10 CFR 430)

Product Class	Minimum Efficiency[b]	Standby Mode and Off-Mode Power Consumption	Design Requirements
Oil-fired steam *boiler*	85% AFUE	$P_{W,SB} \leq 11$ W $P_{W,OFF} \leq 11$ W	None
Electric hot-water *boiler*	None	$P_{W,SB} \leq 8$ W $P_{W,OFF} \leq 8$ W	Automatic means for adjusting temperature required (except for *boilers* equipped with tankless domestic water heating coils)[d].
Electric steam *boiler*	None	$P_{W,SB} \leq 8$ W $P_{W,OFF} \leq 8$ W	None

a. Has a heat input rate of less than 300,000 Btu per hour for electric boilers and low-pressure steam or hot-water boilers (per § 430.2).
b. Annual Fuel Utilization Efficiency, as determined in § 430.23(n)(2).
c. Standby mode and off-mode electric power consumption as determined in § 430.23(n)(5).
d. See § 430.32(e)(2)(iv) for additional details regarding automatic means for adjusting water temperature.

Table F-6 Ceiling Fan Efficiency Requirements for U.S. Applications (see 10 CFR 430)

Equipment Type	Size Category	Minimum Efficiency	Test Procedure
Large-diameter ceiling fan	Blade span ≥ 84.5 in.	*CFEI* ≥ 1.00 at high (maximum) speed; and *CFEI* ≥ 1.31 at 40% of high speed or the nearest speed that is not less than 40% of high speed	10 CFR 430 Appendix U

Update the references to Appendix F in Section 11 as show (I-P and SI).

11.5.2.2.2 H02: HVAC Heating Performance Improvement.

[. . .]

where

HM_{des} = design heating *efficiency* metric, part-load or annualized where available

HM_{min} = minimum required heating *efficiency* metric, part-load or annualized where available from Section 6.8.1 or Informative Appendix F

Informative Note: An example of an annualized or part-load heating *efficiency* is *AFUE* rather than E_t or E_c. Where only one efficiency rating is provided for equipment in Section 6.8.1 or Informative Appendix F, use that metric.

11.5.2.2.3 H03: HVAC Cooling Performance Improvement. To achieve this credit, *space* cooling equipment shall exceed the minimum cooling efficiency requirements by 5% or more than listed in the tables in Section 6.8.1 or Informative Appendix F. For water-cooled chiller plants, heat rejection *efficiency* shall also exceed the minimum *efficiency* listed in Table 6.8.1-7 by at least the percentage improvement in the chiller *efficiency*. The measure energy credit (EC_{CE}) for cooling efficiency improvement shall be determined as follows:

[. . .]

where

CM_{min} = minimum required cooling *efficiency* metric, part-load or annualized where available from Section 6.8.1 or Informative Appendix F

CM_{des} = design cooling *efficiency* metric, part-load or annualized where available

[. . .]

Informative Note: An example of an annualized or part-load cooling *efficiency* is *IEER* rather than *EER*,or *IPLV kW*/ton rather than FL *kW*/ton. Where only one *efficiency* rating is provided for *equipment* in Section 6.8.1 or Informative Appendix F, use that metric.

Revise Sections 6.4.1.1 and 6.4.1.2.1 (I-P and SI) to convert the list of efficiency tables to new Table 6.4.1.1. An additional change is made to eliminate chiller markings because the requirements for labeling are unique for chillers in Section 6.4.1.1 and require update every time the standard is published and are proposed to be eliminated. Note: The text below includes changes previously made to the text by Adendum bq.

[. . .]

6.4 Mandatory Provisions

6.4.1 Equipment Efficiencies, and Verification~~, and Labeling~~ Requirements

6.4.1.1 Minimum Equipment Efficiencies—Listed Equipment—Standard Rating and Operating Conditions. *Equipment* shown in ~~Tables 6.8.1-1 through 6.8.1-21~~ Table 6.4.1.1 shall have a minimum performance at the specified rating conditions when tested in accordance with the specified test procedure. Where multiple rating conditions or performance requirements are provided, the *equipment* shall satisfy all stated requirements unless otherwise exempted by footnotes in the table. *Equipment* covered under the Federal *Energy* Policy Act of 1992 (EPACT) shall have no minimum *efficiency* requirements for operation at minimum capacity or other than standard rating conditions. *Equipment* used to provide *service water-heating* functions as part of a com- bination *system* shall satisfy all stated requirements for the appropriate *space* heating or cooling category. Efficiency requirements apply to all climate zones unless specifically noted in the table.

~~Tables are as follows:~~

~~a. Table 6.8.1-1, "Electrically Operated Unitary Air Conditioners and Condensing Units—Minimum Efficiency Requirements"~~

~~b. Table 6.8.1-2, "Electrically Operated Air Cooled Unitary Heat Pumps—Minimum Efficiency Requirements"~~

~~c. Table 6.8.1-3, "Liquid-Chilling Packages—Minimum Efficiency Requirements" (See Section 6.4.1.2 for liquid-cooled centrifugal liquid-chilling packages that are designed to operate at nonstandard conditions.)~~

~~d. Table 6.8.1-4, "Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single Package Vertical Air Conditioners, Single Package Vertical Heat Pumps, Room Air Conditioners, and Room Air Conditioner Heat Pumps—Minimum Efficiency Requirements"~~

~~e. Table 6.8.1-5, "Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements"~~

~~f. Table 6.8.1-6, "Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements"~~

~~g. Table 6.8.1-7, "Performance Requirements for Heat-Rejection Equipment—Minimum Efficiency Requirements"~~

~~h. Table 6.8.1-8, "Electrically Operated Variable-Refrigerant-Flow Air Conditioners—Minimum Efficiency Requirements"~~

~~i. Table 6.8.1-9, "Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps—Minimum Efficiency Requirements~~

~~j. Table 6.8.1-10, "Floor-Mounted Air Conditioners and Condensing Units Serving Computer Rooms—Minimum Efficiency Requirements"~~

~~k. Table 6.8.1-11, "Commercial Refrigerators, Commercial Freezers, and Refrigeration—Minimum Efficiency Requirements"~~

~~l. Table 6.8.1-12, "Vapor-Compression-Based Indoor Pool Dehumidifiers—Minimum Efficiency Requirements"~~

~~m. Table 6.8.1-13, "Electrically Operated DX-DOAS Units, Single Package and Remote Condenser, without Energy Recovery—Minimum Efficiency Requirements"~~

~~n. Table 6.8.1-14, "Electrically Operated DX-DOAS Units, Single-Package and Remote Condenser, with Energy Recovery—Minimum Efficiency Requirements"~~

~~o. Table 6.8.1-15, "Electrically Operated Water-Source Heat Pumps—Minimum Efficiency Requirements"~~

~~p. Table 6.8.1-16, "Heat Pump and Heat Recovery Water-Chilling Packages—Minimum Efficiency Requirement"~~

~~q. Table 6.8.1-17, "Ceiling-Mounted Computer-Room Air Conditioners—Minimum Efficiency Requirements"~~

~~r. Table 6.8.1-18, "Walk-In Cooler and Freezer Display Door Efficiency Requirements"~~

~~s. Table 6.8.1-19, "Walk-In Cooler and Freezer Nondisplay Door Efficiency Requirements"~~

~~t. Table 6.8.1-20, "Walk-In Cooler and Freezer Refrigeration System Efficiency Requirements"~~

~~u. Table 6.8.1-21, "Ceiling Fan Efficiency Requirements"~~

~~v. Table 6.8.1-22, "Room Air Conditioners and Room Air Conditioner Heat Pumps Installed Outside the United States—Minimum Efficiency Requirements"~~

Table 6.4.1.1 Equipment Minimum Efficiency Requirements

Table Number	Table Description	DOE Preemption[a]
6.8.1-1	Electrically Operated Unitary Air Conditioners and Condensing Units	Partial
6.8.1-2	Electrically Operated Air-Cooled Unitary Heat Pumps	Partial
6.8.1-3	Liquid-Chilling Packages	No
6.8.1-4	Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps	Yes
6.8.1-5	Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters	Yes
6.8.1-6	Gas- and Oil-Fired Boilers	Yes
6.8.1-7	Performance Requirements for Heat Rejection Equipment	No
6.8.1-8	Electrically Operated Variable-Refrigerant-Flow Air Conditioners	Yes
6.8.1-9	Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps	Yes
6.8.1-10	Floor-Mounted Air Conditioners and Condensing Units Serving Computer Rooms	Yes
6.8.1-11	Commercial Refrigerators, Commercial Freezers, and Refrigeration	Yes
6.8.1-12	Vapor-Compression-Based Indoor Pool Dehumidifiers	No
6.8.1-13	Electrically Operated DX-DOAS Units, Single-Package and Remote Condenser, without Energy Recovery	Yes
6.8.1-14	Electrically Operated DX-DOAS Units, Single-Package and Remote Condenser, with Energy Recovery	Yes
6.8.1-15	Electrically Operated Water-Source Heat Pumps	Yes
6.8.1-16	Heat Pump and Heat Recovery Water-Chilling Packages	No
6.8.1-17	Ceiling-Mounted Computer-Room Air Conditioners	Yes
6.8.1-18	Walk-In Cooler and Freezer Display Door	Yes
6.8.1-19	Walk-In Cooler and Freezer Nondisplay Door	Yes
6.8.1-20	Walk-In Cooler and Freezer Refrigeration System	Yes
6.8.1-21	Ceiling Fan	Yes
6.8.1-22	Room Air Conditioners and Room Air-Conditioner Heat Pumps	Yes

a. Products that are covered by DOE include a preemption requirement where new effective efficiency requirements preempt prior efficiency levels included in ANSI/ASHRAE/IES Standard 90.1 and efficiency levels adopted by local city and state U.S. building codes.

Delete the following requirement (I-P and SI) in Section 6.4.1.2.1 for labeling chillers for performance compliance and the unique requirements for labeling chillers. Chiller performance is always part of the chiller performance submittal package and is reviewed by the AHJ. This requirement is unique to chillers.

~~*Manufacturers* shall calculate the FL.IP$_{adj}$ and PLV.IP$_{adj}$ before determining whether to label the chiller per Section 6.4.1.5. Compliance with the most recent Standard 90.1 2007, 2010, 2013, 2016, 2019, 2022 version, or combination or prior versions (multiple versions) thereof, shall be *labeled* on chilling packages within the scope of the standard.~~

Delete existing Table 7.4.1 (I-P and SI). Note, only the current I-P table is shown for reference.

Table 7.4.1 Performance Requirements for Water Heating Equipment—Minimum Efficiency Requirements

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Performance Required[a]	Test Procedure[b,c]
Electric table-top *water heaters*	≤12 *kW*	<4000 (Btu/h)/gal ≥20 gal and ≤120 gal	For applications outside U.S., see footnote (h). For U.S. applications, see footnote (g).	10 CFR 430 Appendix E
Electric storage *water heaters*	≤12 *kW*	<4000 (Btu/h)/gal ≥20 gal and ≤55 gal	For applications outside U.S., see footnote (h). For U.S. applications, see footnote (g).	10 CFR 430 Appendix E
		<4000 (Btu/h)/gal >55 gal and ≤120 gal	For applications outside U.S., see footnote (h). For U.S. applications, see footnote (g).	10 CFR 430 Appendix E
	>12 *kW*	<4000 (Btu/h)/gal	SL ≤ 0.3 + 27/V_m %/h	10 CFR 431.106
Electric instantaneous *water heaters*	≤12 *kW*	≥4000 (Btu/h)/gal <2 gal	For applications outside US, see footnote (h). For US applications, see footnote (g).	10 CFR 430 Appendix E
	>12 *kW* and ≤58.6 *kW*[e]	≥4000 (Btu/h)/gal ≤2 gal ≤180°F	Very small DP: UEF = 0.80 Low DP: UEF = 0.80 Medium DP: UEF = 0.80 High DP: UEF = 0.80	10 CFR 430 Appendix E
	>58.6 *kW*[e]	≥4000 (Btu/h)/gal <10 gal	No requirement	
		≥4000 (Btu/h)/gal ≥10 gal	No requirement	
Gas storage water heaters	≤75,000 Btu/h	<4000 (Btu/h)/gal ≥20 gal and ≤55 gal	For applications outside U.S., see footnote (h). For U.S. applications, see footnote (g).	10 CFR 430 Appendix E
		<4000 (Btu/h)/gal >55 gal and ≤100 gal	For applications outside U.S., see footnote (h). For U.S. applications, see footnote (g).	10 CFR 430 Appendix E
	>75,000 Btu/h and ≤105,000 Btu/h[d]	<4000 (Btu/h)/gal ≤120 gal ≤180°F	Very small DP: UEF = 0.2674 − (0.0009 × V_r) Low DP: UEF = 0.5362 − (0.0012 × V_r) Medium DP: UEF = 0.6002 − (0.0011 × V_r) High DP: UEF = 0.6597 − (0.0009 × V_r)	10 CFR 430 Appendix E
	>105,000 Btu/h[d,f]	<4000 (Btu/h)/gal	80% E_t SL ≤ (Q/800 + 110$\sqrt{V}$), Btu/h	10 CFR 431.106
Gas instantaneous water heaters	>50,000 Btu/h and ≤200,000 Btu/h	≥4000 (Btu/h)/gal <2 gal	For applications outside U.S., see footnote (h). For U.S. applications, see footnote (g).	10 CFR 430 Appendix E
	≥200,000 Btu/h[d,f]	≥4000 (Btu/h)/gal <10 gal	80% E_t	10 CFR 431.106
	≥200,000 Btu/h[f]	≥4000 (Btu/h)/gal ≥10 gal	80% E_t SL ≤ (Q/800 + 110$\sqrt{V}$), Btu/h	

a. Thermal *efficiency* (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons. Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL." Draw pattern (DP) refers to the water draw profile in the uniform *energy factor* (UEF) test. UEF and *energy factor* (*EF*) are minimum requirements. In the UEF standard equations, V_r refers to the rated volume in gallons.

b. Section 13 contains a complete specification, including the year version, of the referenced test procedure.

c. Electric instantaneous water heaters with input capacity >12 kW and ≤58.6 kW must comply with the requirements for the 58.6 kW if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.

d. Gas storage water heaters with input capacity >75,000 Btu/h and ≤105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power

e. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power

f. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous *water heaters* and gas *hot-water supply boilers*.

g. *Water heaters* or gas *pool* heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.

h. Where this standard is being applied to a building outside the U.S. and Canada and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE efficiency requirements shown in Informative Appendix F, Table F-2.

Table 7.4-1 Performance Requirements for Water Heating Equipment—Minimum Efficiency Requirements *(Continued)*

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Performance Required [a]	Test Procedure [b,c]
Oil storage water heaters	≤105,000 Btu/h	<4000(Btu/h)/gal ≤50 gal	For applications outside U.S., see footnote (h). For U.S. applications, see footnote (g).	10 CFR 430 Appendix E
	>105,000 Btu/h and ≤140,000 Btu/h [e]	≤120 gal <4000 (Btu/h)/gal ≤180°F	Very small DP: UEF = 0.2932 − (0.0015 × V_r) Low DP: UEF = 0.5596 − (0.0018 × V_r) Medium DP: UEF = 0.6194 − (0.0016 × V_r) High DP: UEF = 0.6740 − (0.0013 × V_r)	10 CFR 430 Appendix E
	>140,000 Btu/h	<4000 (Btu/h)/gal	80% E_t SL ≤ (Q/800 + 110$\sqrt{V}$), Btu/h	10 CFR 431.106
Oil instantaneous water heaters	≤210,000 Btu/h	≥4000 (Btu/h)/gal <2 gal	80% E_t EF ≥ 0.59 − 0.0005 × V	10 CFR 430 Appendix E
	>210,000 Btu/h	≥4000 (Btu/h)/gal <10 gal	80% E_t	10 CFR 431.106
	>210,000 Btu/h	≥4000 (Btu/h)/gal ≥10 gal	78% E_t SL ≤ (Q/800 + 110$\sqrt{V}$), Btu/h	
Hot water supply boilers, gas and oil [f]	≥300,000 Btu/h and <12,500,000 Btu/h	≥4000 (Btu/h)/gal <10 gal	80% E_t	10 CFR 431.106
Hot water supply boilers, gas [f]	≥300,000 Btu/h and <12,500,000 Btu/h	≥4000 (Btu/h)/gal ≥10 gal	80% E_t SL ≤ (Q/800 + 110$\sqrt{V}$), Btu/h	10 CFR 431.106
Hot water supply boilers, oil	≥300,000 Btu/h and <12,500,000 Btu/h	≥4000 (Btu/h)/gal ≥10 gal	78% E_t SL ≤ (Q/800 + 110$\sqrt{V}$), Btu/h	10 CFR 431.106
Pool heaters, gas	All		82% E_t for commercial *pool* heaters and for applications outside U.S. For U.S. applications, see footnote (g).	10 CFR 430 Appendix P
Heat pump *pool* heaters	All	50°F db 44.2°F wb *outdoor air* 80.0°F entering water	4.0 *COP*	10 CFR 430 Appendix P
Unfired storage tanks	All		R-12.5	(none)

a. Thermal *efficiency* (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons. Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL." Draw pattern (DP) refers to the water draw profile in the uniform *energy factor* (UEF) test. UEF and *energy factor* (*EF*) are minimum requirements. In the UEF standard equations, V_r refers to the rated volume in gallons.

b. Section 13 contains a complete specification, including the year version, of the referenced test procedure.

c. Electric instantaneous water heaters with input capacity >12 kW and ≤58.6 kW must comply with the requirements for the 58.6 kW if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.

d. Gas storage water heaters with input capacity >75,000 Btu/h and ≤105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power

e. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power

f. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous *water heaters* and gas *hot water supply boilers*.

g. *Water heaters* or gas *pool* heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.

h. Where this standard is being applied to a building outside the U.S. and Canada and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE efficiency requirements shown in Informative Appendix F, Table F-2.

Insert new Table 7.4.1 (I-P), which combines old Tables 7.4.1 and F-2, as shown.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
Gas-Fired Storage Water Heaters					
Gas-fired storage *water heater*[h]	≤75,000 Btu/h	<4000 (Btu/h)/gal <20 gal	Very small	No requirements before 5/6/2029 UEF = 0.2062 – (0.0020 × V_{eff}) after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.4893 – (0.0027 × V_{eff}) after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.5758 – (0.0023 × V_{eff}) after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.6586 – (0.0020 × V_{eff}) after 5/6/2029	
	≤75,000 Btu/h	<4000 (Btu/h)/gal ≥20 and ≤55 gal	Very small	UEF = 0.3456 – (0.0020 × V_r)[b,l] before 5/6/2029 UEF = 0.3925 – (0.0020 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	UEF = 0.5982 – (0.0019 × V_r)[b,l] before 5/6/2029 UEF = 0.6451 – (0.0019 × V_{eff})[b,l] after 5/6/2029	
			Medium	UEF = 0.6483 – (0.0017 × V_r)[b,l] before 5/6/2029 UEF = 0.7046 – (0.0017 × V_{eff})[b,l] after 5/6/2029	
			High	UEF = 0.6920 – (0.0013 × V_r)[b,l] before 5/6/2029 UEF = 0.7424 – (0.0013 × V_{eff})[b,l] after 5/6/2029	
		<4000 (Btu/h)/gal >55 and ≤100 gal	Very small	UEF = 0.6470 – (0.0006 × V_r)[b,l] before 5/6/2029 UEF = 0.6470 – (0.0013 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	UEF = 0.7689 – (0.0005 × V_r)[b,l] before 5/6/2029 UEF = 0.7424 – (0.0013 × V_{eff})[b,l] after 5/6/2029	
			Medium	UEF = 0.7897 – (0.0004 × V_r)[b,l] before 5/6/2029 UEF = 0.7424 – (0.0013 × V_{eff})[b,l] after 5/6/2029	
			High	UEF = 0.8072 – (0.0003 × V_r)[b,l] before 5/6/2029 UEF = 0.7424 – (0.0013 × V_{eff})[b,l] after 5/6/2029	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_t is the rated storage volume in gallons, and V_{eff} is the effective storage volume in gallons, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons.
f. Standby loss for electric water heaters is in terms of %/*h* and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in Btu/h as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >75,000 Btu/h and ≤105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
i. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
	≤75,000 Btu/h	<4000 (Btu/h)/gal >100 gal	Very small	No requirements before 5/6/2029 UEF = 0.1482 – (0.0007 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.4342 – (0.0017 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.5596 – (0.0020 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.6658 – (0.0019 × V_{eff})[b,l] after 5/6/2029	
	>75,000 Btu/h and ≤105,000 Btu/h [h]	<4000 (Btu/h)/gal ≤120 gal ≤180°F	Very small	UEF = 0.2674 – (0.0009 × V_r)[b,l]	10 CFR 430 Appendix E
			Low	UEF = 0.5362 – (0.0012 × V_r)[b,l]	
			Medium	UEF = 0.6002 – (0.0011 × V_r)[b,l]	
			High	UEF = 0.6597 – (0.0009 × V_r)[b,l]	
	>105,000 Btu/h [h]	<4000 (Btu/h)/gal		80% E_t[e] and SL ≤ (Q/800 + 110 × $V_r^{0.5}$) Btu/h[f] before 10/6/2026 95% E_t[e] and SL ≤ 0.86 × (Q/800 + 110 × $V_r^{0.5}$) Btu/h[f] after 10/6/2026	10 CFR 431.106
Oil-Fired Storage Water Heaters					
Oil-fired storage *water heater*	≤105,000 Btu/h	<4000(Btu/h)/gal <50 gal	Very small	UEF = 0.2509 – (0.0012 × V_r)[b,l] before 5/6/2029 UEF = 0.2909 – (0.0012 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	UEF = 0.5330 – (0.0016 × V_r)[b,l] before 5/6/2029 UEF = 0.5730 – (0.0016 × V_{eff})[b,l] after 5/6/2029	
			Medium	UEF = 0.6078 – (0.0016 × V_r)[b,l] before 5/6/2029 UEF = 0.6478 – (0.0016 × V_{eff})[b,l] after 5/6/2029	
			High	UEF = 0.6815 – (0.0014 × V_r)[b,l] before 5/6/2029 UEF = 0.7215 – (0.0014 × V_{eff})[b,l] after 5/6/2029	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in gallons, and V_{eff} is the effective storage volume in gallons, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for <12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons.
f. Standby loss for electric water heaters is in terms of %/*h* and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in Btu/h as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >75,000 Btu/h and <105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
i. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
	≤105,000 Btu/h	<4000(Btu/h)/gal ≥50 gal	Very small	No requirements before 5/6/2029 UEF = 0.1580 – (0.0009 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.4390 – (0.0020 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.5389 – (0.0021 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.6172 – (0.0021 × V_{eff})[b,l] after 5/6/2029	
	>105,000 Btu/h and ≤140,000 Btu/h[i]	≤120 gal 4000 (Btu/h)/gal ≤180°F	Very small	UEF = 0.2932 – (0.0015 × V_r)[b,l]	10 CFR 430 Appendix E
			Low	UEF = 0.5596 – (0.0018 × V_r)[b,l]	
			Medium	UEF = 0.6194 – (0.0016 × V_r)[b,l]	
			High	UEF = 0.6740 – (0.0013 × V_r)[b,l]	
	>140,000 Btu/h [h]	<4000 (Btu/h)/gal		80% E_t[e] SL ≤ (Q/800 + 110 × $V_r^{0.5}$) Btu/h[f]	10 CFR 431.106
Electric and Heat-Pump Storage Water Heaters					
Very small electric storage *water heaters*	≤12 *kW*	<20 gal	Very small	No requirements before 5/6/2029 UEF = 0.5925 – (0.0059 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.8642 – (0.0030 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.9096 – (0.0020 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.9430 – (0.0012 × V_{eff})[b,l] after 5/6/2029	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in gallons, and V_{eff} is the effective storage volume in gallons, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons.
f. Standby loss for electric water heaters is in terms of %/*h* and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in Btu/h as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >75,000 Btu/h and ≤105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
i. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
Small electric storage *water heaters*	≤12 *kW*	≥20 and ≤35 gal	Very small	No requirements before 5/6/2029 UEF = 0.5925 – (0.0059 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.8642 – (0.0030 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.9096 – (0.0020 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.9430 – (0.0012 × V_{eff})[b,l] after 5/6/2029	
Electric storage and HP storage *water heaters*[d]	≤12 *kW*	<4000 (Btu/h)/gal ≥20 and ≤55 gal	Very small	UEF = 0.8808 – (0.0008 × V_r)[b,l] before 5/6/2029 UEF = 2.30[l] after 5/6/2029	10 CFR 430 Appendix E
			Low	UEF = 0.9254 – (0.0003 × V_r)[b,l] before 5/6/2029 UEF = 2.30[l] after 5/6/2029	
			Medium	UEF = 0.9307 – (0.0002 × V_r)[b,l] before 5/6/2029 UEF = 2.30[l] after 5/6/2029	
			High	UEF = 0.9349 – (0.0001 × V_r)[b,l] before 5/6/2029 UEF = 2.30[l] after 5/6/2029	
		<4000 (Btu/h)/gal >55 and ≤120 gal	Very small	UEF = 1.9236 – (0.0011 × V_r)[b,l] before 5/6/2029 UEF=2.50[l] after 5/6/2029	
			Low	UEF = 2.0440 – (0.0011 × V_r[b,l] before 5/6/2029 UEF=2.50[l] after 5/6/2029	
			Medium	UEF = 2.1171 – (0.0011 × V_r)[b,l] before 5/6/2029 UEF=2.50[l] after 5/6/2029	
			High	UEF = 2.2418 – (0.0011 × V_r)[b,l] before 5/6/2029 UEF=2.50[l] after 5/6/2029	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in gallons, and V_{eff} is the effective storage volume in gallons, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons.
f. Standby loss for electric water heaters is in terms of %/*h* and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in Btu/h as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >75,000 Btu/h and ≤105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
i. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
	≤12 *kW*	<4000 (Btu/h)/gal >120 gal	Very small	No requirements before 5/6/2029 UEF = 0.3574 – (0.0012 × V_{eff})[b,l] after 5/6/2029	
			Low	No requirements before 5/6/2029 UEF = 0.7897 – (0.0019 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.8884 – (0.0017 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.9575 – (0.0013 × V_{eff})[b,l] after 5/6/2029	
Electric storage *water heaters*	>12 kW	<4000 (Btu/h)/gal ≤140 gal		No efficiency requirements SL ≤ 0.3 + 27/V_m %/h[f]	10 CFR 431.106
		<4000 (Btu/h)/gal >140 gal		No requirements	
HP storage *water heaters*	>12 kW			No requirements	
Electric grid-enabled *water heaters*		≥2 and ≤75 gal	Very small	No requirements before 5/6/2029 UEF = 0.8086 – (0.0050 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.9123 – (0.0020 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.9252 – (0.0015 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.9350 – (0.0011 × V_{eff})[b,l] after 5/6/2029	
		>75 gal	Very small	UEF = 1.0136 – (0.0028 × V_r)[b,l] before 5/6/2029 UEF =1.0136 – (0.0028 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in gallons, and V_{eff} is the effective storage volume in gallons, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons.
f. Standby loss for electric water heaters is in terms of %/*h* and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in Btu/h as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >75,000 Btu/h and <105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
i. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
			Low	UEF = 0.9984 – (0.0014 × V_r)[b,l] before 5/6/2029 UEF = 0.9984 – (0.0014 × V_{eff})[b,l] after 5/6/2029	
			Medium	UEF = 0.9853 – (0.0010 × V_r)[b,l] before 5/6/2029 UEF = 0.9853 – (0.0010 × V_{eff})[b,l] after 5/6/2029	
			High	UEF = 0.9720 – (0.0007 × V_r)[b,l] before 5/6/2029 UEF = 0.9720 – (0.0007 × V_{eff})[b,l] after 5/6/2029	
Electric Tabletop *Water Heaters*					
Electric table-top *water heater*	≤12 *kW*	<20 gal	Very small	No requirements before 5/6/2029 UEF = 0.5925 – (0.0059 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.8642 – (0.0030 × V_{eff})[b,l] after 5/6/2029	
		≤4000 (Btu/h)/gal ≥20 and ≤120 gal	Very small	UEF = 0.6323 – (0.0058 × V_r)[b,l] before 5/6/2029 UEF = 0.8623 – (0.0058 × V_{eff})[b,l] after 5/6/2029	
			Low	UEF = 0.9188 – (0.0031 × V_r)[b,l] before 5/6/2029 UEF = 0.9188 – (0.0031 × V_{eff})[b,l] after 5/6/2029	
			Medium	UEF = 0.9577 – (0.0023 × V_r)[b,l] before 5/6/2029 No requirements after 5/6/2029	
			High	UEF = 0.9884 – (0.0016 × V_r)[b,l] before 5/6/2029 No requirements after 5/6/2029	
Instantaneous Gas *Water Heaters*					
Gas-fired instantaneous *water heater*[h]	>50,000 Btu/h and ≤200,000 Btu/h	≥4000 (Btu/h)/gal <2 gal	Very small	UEF = 0.80[l]	10 CFR 430 Appendix E
			Low	UEF = 0.81[l]	
			Medium	UEF = 0.81[l]	
			High	UEF = 0.81[l]	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in gallons, and V_{eff} is the effective storage volume in gallons, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons.
f. Standby loss for electric water heaters is in terms of %/*h* and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in Btu/h as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >75,000 Btu/h and <105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
i. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
	≥200,000 Btu/h	≥4000 (Btu/h)/gal ≤10 gal		80% E_t[e] and SL ≤ (Q/800 + 110 × $V_r^{0.5}$) Btu/h[f] before 10/06/2026 96% E_t[e] and SL ≤ (Q/800 + 110 × $V_r^{0.5}$) Btu/h[f] after 10/06/2026	10 CFR 431.106
		≥4000 (Btu/h)/gal >10 gal		80% E_t[e] SL ≤ (Q/800 + 110 × $V_r^{0.5}$) Btu/h[f] before 10/06/2026 96% E_t[e] SL ≤ (Q/800 + 110 × $V_r^{0.5}$) Btu/h[f] after 10/06/2026	
Oil-fired instantaneous *Water-heaters*					
Oil-fired instantaneous *water heater*	≥200,000 Btu/h	≥4000 (Btu/h)/gal ≤10 gal		80% E_t[e] and SL ≤ (Q/800 + 110 × $V_r^{0.5}$) Btu/h[f]	10 CFR 431.106
		≥4000 (Btu/h)/gal ≥10 gal		78% E_t[e] SL ≤ (Q/800 + 110 ×$V_r^{0.5}$) Btu/h[f]	
Instantaneous Electric *Water Heaters*					
Electric instantaneous *water heater*[d]	≤12 *kW*	≥4000 (Btu/h)/gal <2 gal	Very small	UEF = 0.91[l]	10 CFR 430 Appendix E
			Low	UEF = 0.91[l]	
			Medium	UEF = 0.91[l]	
			High	UEF = 0.92[l]	
	>12 *kW* and ≤58.6 *kW*[g]	≥4000 (Btu/h)/gal <2 gal ≤180 °F	Very small	UEF = 0.91[l]	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in gallons, and V_{eff} is the effective storage volume in gallons, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons.
f. Standby loss for electric water heaters is in terms of %/*h* and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in Btu/h as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >75,000 Btu/h and ≤105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
i. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
			Low	UEF = 0.91[l]	
			Medium	UEF = 0.91[l]	
			High	UEF = 0.92[l]	
	>58.6 *kW*	≥4000 (Btu/h)/gal ≤10 gal		80% E_t before 10/6/2026 80% E_t and SL ≤ (2.30 + 67/V_m), %/h[f] after 10/6/2026	
		≥4000 (Btu/h)/gal ≥10 gal		77% E_t before 10/6/2026 80% E_t and SL ≤ (2.30 + 67/V_m), %/h[f] after 10/6/2026	
Pool *Water Heaters*					
Gas-fired *pool* heater[k]	All			82% E_t[e]	10 CFR 430 Appendix P
Heat-pump *pool* heaters[k]	All	50°F db 44.2°F wb outdoor air 80.0°F entering water		4.0 *COP*	10 CFR 430 Appendix P
Hot-Water Supply Boilers and Tanks					
Gas-fired *hot-water supply boilers*[h]	≥300,000 Btu/h and ≤12,500,000 Btu/h	≥4000 (Btu/h)/gal ≤10 gal		80% E_t[e]	10 CFR 431.106
		≥4000 (Btu/h)/gal ≥10 gal		80% E_t[e] SL ≤ (Q/800 + 110 × $V^{0.5}$) Btu/h[f]	10 CFR 431.106
Oil-fired *hot-water supply boilers*	≥300,000 Btu/h and ≤12,500,000 Btu/h	≥4000 (Btu/h)/gal ≤10 gal		80% E_t[e]	10 CFR 431.106

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_t is the rated storage volume in gallons, and V_{eff} is the effective storage volume in gallons, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons.
f. Standby loss for electric water heaters is in terms of %/*h* and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in Btu/h as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >75,000 Btu/h and <105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
i. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
		>4000 (Btu/h)/gal ≥10 gal		78% E_t[e] SL ≤ (Q/800 + 110 × $V^{0.5}$) Btu/h[f]	10 CFR 431.106
Unfired storage tanks	All			R-12.5	10 CFR 431.106

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in gallons, and V_{eff} is the effective storage volume in gallons, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons.
f. Standby loss for electric water heaters is in terms of %/*h* and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in Btu/h as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >2 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >75,000 Btu/h and ≤105,000 Btu/h must comply with the requirements for the >105,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
i. Oil storage water heaters with input capacity >105,000 Btu/h and ≤140,000 Btu/h must comply with the requirements for the >140,000 Btu/h if the water heater either (1) has a storage volume >120 gal; (2) is designed to provide outlet hot water at temperatures greater than 180°F; or (3) uses three-phase power
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Insert new Table 7.4.1 (SI), which combines old Tables 7.4.1 and F-2, as shown.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (SI)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
Gas-Fired Storage *Water Heaters*					
Gas-fired storage *water heater*[h]	≤22 *kW*	<309 W/L <76 L	Very small	No requirements before 5/6/2029 UEF = 0.2062 – (0.0076 × V_{eff}) after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.4893 – (0.0102 × V_{eff}) after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.5758 – (0.0087 × V_{eff}) after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.6586 – (0.0076 × V_{eff}) after 5/6/2029	
	≤22 *kW*	<309 W/L ≥76 and ≤208 L	Very small	UEF = 0.3456 – (0.0076 × Vr)[b,l] before 5/6/2029 UEF = 0.3925 – (0.0076 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	UEF = 0.5982 – (0.0072 × Vr)[b,l] before 5/6/2029 UEF = 0.6451 – (0.0072 × V_{eff})[b,l] after 5/6/2029	
			Medium	UEF = 0.6483 – (0.0064 × Vr)[b,l] before 5/6/2029 UEF = 0.7046 – (0.0064 × V_{eff})[b,l] after 5/6/2029	
			High	UEF = 0.6920 – (0.0049 × Vr)[b,l] before 5/6/2029 UEF = 0.7424 – (0.0049 × V_{eff})[b,l] after 5/6/2029	
		<309 W/L >208 and ≤379 L	Very small	UEF = 0.6470 – (0.0023 × Vr)[b,l] before 5/6/2029 UEF = 0.6470 – (0.0049 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	UEF = 0.7689 – (0.0019 × V_r)[b,l] before 5/6/2029 UEF = 0.7424 – (0.0049 × V_{eff})[b,l] after 5/6/2029	
			Medium	UEF = 0.7897 – (0.0015 × V_r)[b,l] before 5/6/2029 UEF = 0.7424 – (0.0049 × V_{eff})[b,l] after 5/6/2029	
			High	UEF = 0.8072 – (0.0011 × V_r)[b,l] before 5/6/2029 UEF = 0.7424 – (0.0049 × V_{eff})[b,l] after 5/6/2029	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in liters, and V_{eff} is the effective storage volume in liters, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in liters and Q is the nameplate input rate in kWh. V_m is the measured volume in the tank in liters.
f. Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in *kW* as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >8 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >22 *kW* and ≤31 *kW* must comply with the requirements for the >31 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
i. Oil storage water heaters with input capacity >31 *kW* and ≤41 *kW* must comply with the requirements for the >41 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (SI)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
	≤22 *kW*	<309 W/L >379 L	Very small	No requirements before 5/6/2029 UEF = 0.1482 – (0.0026 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.4342 – (0.0064 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.5596 – (0.0076 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.6658 – (0.0072 × V_{eff})[b,l] after 5/6/2029	
	>22 *kW* and ≤31 *kW*[h]	<309 W/L ≤454 L ≤82°C	Very small	UEF = 0.2674 – (0.0034 × V_r)[b,l]	10 CFR 430 Appendix E
			Low	UEF = 0.5362 – (0.0045 × V_r)[b,l]	
			Medium	UEF = 0.6002 – (0.0042 × V_r)[b,l]	
			High	UEF = 0.6597 – (0.0034 × V_r)[b,l]	
	>31 *kW*[h]	<309 W/L		80% E_t[e] and SL ≤ (Q/234 + 214 × $V_r^{0.5}$) *kW*[f] before 10/6/2026 95% E_t[e] and SL ≤ 0.86 × (Q/800 + 214 × $V_r^{0.5}$) *kW*[f] after 10/6/2026	10 CFR 431.106
Oil-Fired Storage *Water Heaters*					
Oil-fired storage *water heater*	≤31 *kW*	<309 W/L <189 L	Very small	UEF = 0.2509 – (0.0045 × V_r)[b,l] before 5/6/2029 UEF = 0.2909 – (0.0045 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	UEF = 0.5330 – (0.0061 × V_r)[b,l] before 5/6/2029 UEF = 0.5730 – (0.0061 × V_{eff})[b,l] after 5/6/2029	
			Medium	UEF = 0.6078 – (0.0061 × V_r)[b,l] before 5/6/2029 UEF = 0.6478 – (0.0061 × V_{eff})[b,l] after 5/6/2029	
			High	UEF = 0.6815 – (0.0053 × V_r)[b,l] before 5/6/2029 UEF = 0.7215 – (0.0053 × V_{eff})[b,l] after 5/6/2029	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in liters, and V_{eff} is the effective storage volume in liters, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in liters and Q is the nameplate input rate in kWh. V_m is the measured volume in the tank in liters.
f. Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in *kW* as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >8 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >22 *kW* and ≤31 *kW* must comply with the requirements for the >31 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
i. Oil storage water heaters with input capacity >31 *kW* and ≤41 *kW* must comply with the requirements for the >41 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (SI)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
	≤31 *kW*	≤309 W/L ≥189 L	Very small	No requirements before 5/6/2029 UEF = 0.1580 – (0.0034 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.4390 – (0.0076 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.5389 – (0.0079 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.6172 – (0.0079 × V_{eff})[b,l] after 5/6/2029	
	>31 *kW* and ≤41 *kW*[i]	≤454 L ≤309 W/L ≤82°C	Very small	UEF = 0.2932 – (0.0057 × V_r)[b,l]	10 CFR 430 Appendix E
			Low	UEF = 0.5596 – (0.0068 × V_r)[b,l]	
			Medium	UEF = 0.6194 – (0.0061 × V_r)[b,l]	
			High	UEF = 0.6740 – (0.0049 × V_r)[b,l]	
	>41 *kW*[h]	≤310 W/L		80% E_t[e] SL ≤ (Q/234 + 214 × $V_r^{0.5}$) *kW*[f]	10 CFR 431.106
Electric and Heat-Pump Storage *Water Heaters*					
Very small electric storage *water heaters*	≤12 *kW*	<76 L	Very small	No requirements before 5/6/2029 UEF = 0.5925 – (0.0223 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.8642 – (0.0114 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.9096 – (0.0076 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.9430 – (0.0045 × V_{eff})[b,l] after 5/6/2029	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in liters, and V_{eff} is the effective storage volume in liters, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in liters and Q is the nameplate input rate in kWh. V_m is the measured volume in the tank in liters.
f. Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in *kW* as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >8 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >22 *kW* and ≤31 *kW* must comply with the requirements for the >31 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
i. Oil storage water heaters with input capacity >31 *kW* and ≤41 *kW* must comply with the requirements for the >41 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (SI)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
Small electric storage *water heaters*	≤12 *kW*	≥76 and ≤132 L	Very small	No requirements before 5/6/2029 UEF = 0.5925 – (0.0223 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.8642 – (0.0114 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.9096 – (0.0076 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.9430 – (0.0045 × V_{eff})[b,l] after 5/6/2029	
Electric storage and HP storage *water heater*[d]	≤12 *kW*	<309 W/L ≥76 and ≤208 L	Very small	UEF = 0.8808 – (0.0030 × V_r)[b,l] before 5/6/2029 UEF = 2.30[l] after 5/6/2029	10 CFR 430 Appendix E
			Low	UEF = 0.9254 – (0.0011 × V_r)[b,l] before 5/6/2029 UEF = 2.30[l] after 5/6/2029	
			Medium	UEF = 0.9307 – (0.0008 × V_r)[b,l] before 5/6/2029 UEF = 2.30[l] after 5/6/2029	
			High	UEF = 0.9349 – (0.0004 × V_r)[b,l] before 5/6/2029 UEF = 2.30[l] after 5/6/2029	
		<309 W/L >208 and ≤454 L	Very small	UEF = 1.9236 – (0.0042 × V_r)[b,l] before 5/6/2029 UEF=2.50[l] after 5/6/2029	
			Low	UEF = 2.0440 – (0.0042 × V_r)[b,l] before 5/6/2029 UEF=2.50[l] after 5/6/2029	
			Medium	UEF = 2.1171 – (0.0042 × V_r)[b,l] before 5/6/2029 UEF=2.50[l] after 5/6/2029	
			High	UEF = 2.2418 – (0.0042 × V_r)[b,l] before 5/6/2029 UEF=2.50[l] after 5/6/2029	
	≤12 *kW*	<309 W/L >454 L	Very small	No requirements before 5/6/2029 UEF = 0.3574 – (0.0045 × V_{eff})[b,l] after 5/6/2029	
			Low	No requirements before 5/6/2029 UEF = 0.7897 – (0.0072 × V_{eff})[b,l] after 5/6/2029	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in liters, and V_{eff} is the effective storage volume in liters, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in liters and Q is the nameplate input rate in kWh. V_m is the measured volume in the tank in liters.
f. Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in *kW* as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >8 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >22 *kW* and ≤31 *kW* must comply with the requirements for the >31 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
i. Oil storage water heaters with input capacity >31 *kW* and ≤41 *kW* must comply with the requirements for the >41 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (SI)

Equipment Type	Size Category (Input)	Subcategory or |Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
			Medium	No requirements before 5/6/2029 UEF = 0.8884 – (0.0064 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.9575 – (0.0049 × V_{eff})[b,l] after 5/6/2029	
Electric storage water heaters	>12 *kW*	<309 W/L <530 L		No efficiency requirements SL ≤ 0.3 + 7.13/V_m %/h[f]	10 CFR 431.106
		<309 W/L >530 L		No requirements	
HP storage *water heaters*	>12 *kW*			No requirements	
Electric grid-enabled *water heaters*		≥8 and ≤284 L	Very small	No requirements before 5/6/2029 UEF = 0.8086 – (0.0189 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	No requirements before 5/6/2029 UEF = 0.9123 – (0.0076 × V_{eff})[b,l] after 5/6/2029	
			Medium	No requirements before 5/6/2029 UEF = 0.9252 – (0.0057 × V_{eff})[b,l] after 5/6/2029	
			High	No requirements before 5/6/2029 UEF = 0.9350 – (0.0042 × V_{eff})[b,l] after 5/6/2029	
		>284 L	Very small	UEF = 1.0136 – (0.0106 × V_r)[b,l] before 5/6/2029 UEF =1.0136 – (0.0106 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	UEF = 0.9984 – (0.0053 × V_r)[b,l] before 5/6/2029 UEF = 0.9984 – (0.0053 × V_{eff})[b,l] after 5/6/2029	
			Medium	UEF = 0.9853 – (0.0038 × V_r)[b,l] before 5/6/2029 UEF = 0.9853 – (0.0038 × V_{eff})[b,l] after 5/6/2029	
			High	UEF = 0.9720 – (0.0026 × V_r)[b,l] before 5/6/2029 UEF = 0.9720 – (0.0026 × V_{eff})[b,l] after 5/6/2029	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in liters, and V_{eff} is the effective storage volume in liters, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in liters and Q is the nameplate input rate in kWh. V_m is the measured volume in the tank in liters.
f. Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in *kW* as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >8 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >22 *kW* and ≤31 *kW* must comply with the requirements for the >31 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
i. Oil storage water heaters with input capacity >31 *kW* and ≤41 *kW* must comply with the requirements for the >41 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (SI)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
Electric Tabletop *Water Heaters*					
Electric tabletop *water heater*	≤12 *kW*	<76 L	Very small	No requirements before 5/6/2029 UEF = 0.5925 – (0.0223 × V_{eff})[b,l] after 5/6/2029	
			Low	No requirements before 5/6/2029 UEF = 0.8642 – (0.0114 × V_{eff})[b,l] after 5/6/2029	
		≤309 W/L ≥76 and ≤454 L	Very small	UEF = 0.6323 – (0.0220 × V_r)[b,l] before 5/6/2029 UEF = 0.8623 – (0.0220 × V_{eff})[b,l] after 5/6/2029	10 CFR 430 Appendix E
			Low	UEF = 0.9188 – (0.0117 × V_r)[b,l] before 5/6/2029 UEF = 0.9188 – (0.0117 × V_{eff})[b,l] after 5/6/2029	
			Medium	UEF = 0.9577 – (0.0087 × V_r)[b,l] before 5/6/2029 No requirements after 5/6/2029	
			High	UEF = 0.9884 – (0.0061 × V_r)[b,l] before 5/6/2029 No requirements after 5/6/2029	
Instantaneous Gas *Water Heaters*					
Gas-fired instantaneous *water heater*[h]	>15 *kW* and ≤59 *kW*	≥309 W/L <8 L	Very small	UEF = 0.80[l]	10 CFR 430 Appendix E
			Low	UEF = 0.81[l]	
			Medium	UEF = 0.81[l]	
			High	UEF = 0.81[l]	
	≥59 *kW*	≥309 W/L <38 L		80% E_t[e] and SL ≤ (Q/234 + 214 × $V_r^{0.5}$) *kW*[f] before 10/06/2026 96% E_t[e] and SL ≤ (Q/234 + 214 × $V_r^{0.5}$) *kW*[f] after 10/06/2026	10 CFR 431.106

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in liters, and V_{eff} is the effective storage volume in liters, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in liters and Q is the nameplate input rate in kWh. V_m is the measured volume in the tank in liters.
f. Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in *kW* as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >8 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >22 *kW* and ≤31 *kW* must comply with the requirements for the >31 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
i. Oil storage water heaters with input capacity >31 *kW* and ≤41 *kW* must comply with the requirements for the >41 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (SI)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
		≥309 W/L >38 L		80% E_t[e] SL ≤ (Q/234 + 214 × $V_r^{0.5}$) kW[f] before 10/06/2026 96% E_t[e] SL ≤ (Q/234 + 214 × $V_r^{0.5}$) kW[f] after 10/06/2026	
Oil-Fired Instantaneous *Water-heaters*					
Oil-fired instantaneous *water heater*	?59 *kW*	≥309 W/L <38 L		80% E_t[e] and SL ≤ (Q/234 + 214 × $V_r^{0.5}$) kW[f]	10 CFR 431.106
		≥309 W/L ≥38 L		78% E_t[e] SL ≤ (Q/234 + 214 × $V_r^{0.5}$) kW[f]	
Instantaneous Electric *Water Heaters*					
Electric instantaneous *water heater*-	≤12 *kW*	≥309 W/L <8 L	Very small	UEF = 0.91[l]	10 CFR 430 Appendix E
			Low	UEF = 0.91[l]	
			Medium	UEF = 0.91[l]	
			High	UEF = 0.92[l]	
	>12 *kW* and <58.6 *kW*[g]	≥309 W/L <8 L <82°C	Very small	UEF = 0.91[l]	
			Low	UEF = 0.91[l]	
			Medium	UEF = 0.91[l]	
			High	UEF = 0.92[l]	
	>58.6 *kW*	≥309 W/L <38 L		80% E_t before 10/6/2026 80% E_t and SL ≤ (2.30 + 17.7/V_m), %/h[f] after 10/6/2026	

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in liters, and V_{eff} is the effective storage volume in liters, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in liters and Q is the nameplate input rate in kWh. V_m is the measured volume in the tank in liters.
f. Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in *kW* as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >8 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >22 *kW* and ≤31 *kW* must comply with the requirements for the >31 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
i. Oil storage water heaters with input capacity >31 *kW* and ≤41 *kW* must comply with the requirements for the >41 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Table 7.4.1 Performance Requirements for Water Heaters and Pool Heaters—Minimum Efficiency Requirements (SI)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Draw Pattern (DP)[c]	Minimum Performance Required	Test Procedure[a]
		≥309 W/L ≥38 L		77% E_t before 10/6/2026 80% E_t and SL ≤ (2.30 + 17.7/V_m), %/h[f] after 10/6/2026	
Pool *Water Heaters*					
Gas-fired *pool* heater[k]	All			82% E_t[e]	10 CFR 430 Appendix P
Heat-pump *pool* heaters[k]	All	10°C db 6.78°C wb outdoor air 27°C entering water		4.0 *COP*	10 CFR 430 Appendix P
Hot-Water Supply Boilers and Tanks					
Gas-fired *hot-water supply boilers*[h]	≥88 *kW* and <3,664 *kW*	≥310 W/L <38 L		80% E_t[e]	10 CFR 431.106
		≥310 W/L ≥38 L		80% E_t[e] SL ≤ (Q/234 + 214 × $V^{0.5}$) *kW*[f]	10 CFR 431.106
Oil-fired *hot-water supply boilers*	≥88 *kW* and <3,664 *kW*	≥310 W/L <38 L		80% E_t[e]	10 CFR 431.106
		≥310 W/L ≥38 L		78% E_t[e] SL ≤ (Q/234 + 214 × $V^{0.5}$) *kW*[f]	10 CFR 431.106
Unfired storage tanks	All			R-12.5	10 CFR 431.106

a. Section 13 contains a complete specification, including the year version, of the referenced test procedure.
b. V_r is the rated storage volume in liters, and V_{eff} is the effective storage volume in liters, as determined pursuant to 10 CFR 429.17.
c. Draw pattern (DP) refers to the water draw profile in the uniform energy factor (UEF) test. UEF are minimum requirements.
d. Standards for ≤12 *kW* electric storage water heaters apply to both *electric resistance water heaters* and heat-pump water heaters.
e. Thermal efficiency (E_t) is a minimum requirement, while standby loss is a maximum requirement. In the standby loss equation, V is the rated volume in liters and Q is the nameplate input rate in kWh. V_m is the measured volume in the tank in liters.
f. Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term "SL". V_m is the measured storage volume and Q is the rated input in *kW* as determined pursuant to 10 CFR 49.44
g. Electric instantaneous water heaters with input capacity >12 *kW* and ≤58.6 *kW* must comply with the requirements for the 58.6 *kW* if the water heater either (1) has a storage volume >8 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
h. Gas storage water heaters with input capacity >22 *kW* and ≤31 *kW* must comply with the requirements for the >31 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
i. Oil storage water heaters with input capacity >31 *kW* and ≤41 *kW* must comply with the requirements for the >41 *kW* if the water heater either (1) has a storage volume >454 L; (2) is designed to provide outlet hot water at temperatures greater than 82°C; or (3) uses three-phase power.
j. Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
k. All *water heaters* or gas pool heaters in this category or subcategory are regulated as consumer products by the U.S. DOE as defined in 10 CFR 430.
l. Where this standard is being applied to a building outside the U.S. and Canada, and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the U.S. DOE residential requirements shown in this table.

Delete current Table 6.8.1-5 (I-P and SI). Note, only the current I-P table is shown for reference.

Table 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements

Equipment Type							Minimum Efficiency [b]	Test Procedure [a]
Description	Fuel	Electric Power Phase	Application Location	Heating Capacity (input), Btu/h [b]	Combo Unit Cooling Capacity, Btu/h	Subtype		
Warm-Air Gas Furnaces								
Warm-air furnace	Gas	1	Inside U.S.	<225,000	<65,000	Nonweatherized not including mobile home	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N [f]
						Nonweatherized mobile home	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	
						Weatherized	81% *AFUE*	
Warm-air furnace	Gas	1	Inside U.S.	<225,000	≥65,000	Nonweatherized	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N [f]
						Weatherized	81% *AFUE* or 80% E_t [e]	10 CFR 430 Appendix N [f]
								ANSI Z21.47
Warm-air furnace	Gas	1	Outside U.S.	<225,000	All	Nonweatherized	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N [f]
						Weatherized	81% *AFUE* or 80% E_t [e]	10 CFR 430 Appendix N [f]
								ANSI Z21.47
Warm-air furnace	Gas	3	All	<225,000	All	Nonweatherized	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N [f]
						Weatherized	81% *AFUE* or 80% E_t [e]	10 CFR 430 Appendix N [f]
								ANSI Z21.47
Warm-air furnace	Gas	All	All	≥225,000 and ≤400,000	All	All	81% E_t [e]	ANSI Z21.47

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced version (year) of the test procedure. For this table, the following apply:
- Appendix N = 10 CFR 430 Appendix N
- ANSI Z21.47 = Section 2.39, Thermal Efficiency, ANSI Z21.47
- ANSI Z83.3 = Section 2.10, Efficiency, ANSI Z83.3
- UL 727 = Section 42, Combustion, UL 727
- UL 731 = Section 40, Combustion, UL 731

b. Compliance of multiple firing rate units shall be at the maximum firing rate.

c. E_t = thermal *efficiency*. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a *flue damper*. A *vent damper* is an acceptable alternative to a *flue damper* for those furnaces where combustion air is drawn from the *conditioned space*.

d. E_c = combustion *efficiency* (100% less flue losses). See test procedure for detailed discussion.

e. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an *automatic flue damper*.

f. 10 CFR 430 is limited to single-phase equipment that is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 65,000 Btu/h but for the test and rating procedures are not impacted for three-phase and can be used for *AFUE* ratings for ASHRAE/IES Standard 90.1 three-phase products and single-phase products with a cooling capacity greater than 65,000 Btu/h.

Table 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements

Equipment Type							Minimum Efficiency [b]	Test Procedure [a]
Description	Fuel	Electric Power Phase	Application Location	Heating Capacity (input), Btu/h [b]	Combo Unit Cooling Capacity, Btu/h	Subtype		
Warm-air furnace	Gas	All	Inside U.S.	≥400,000	All	All	81% E_t [e]	ANSI Z21.47
Warm-air furnace	Gas	All	Outside U.S.	≥400,000	All	All	81% E_t [e]	ANSI Z21.47 or ANSI Z83.8
Warm-Air Oil Furnace								
Warm-air furnace	Oil	1	Inside U.S.	<225,000	<65,000	Nonweatherized not including mobile home	83% *AFUE* $P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	10 CFR 430 Appendix N
						Nonweatherized mobile home	75% *AFUE* [f] $P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	
						Weatherized	78% *AFUE* [f]	
Warm-air oil furnace	Oil	1	Inside U.S.	<225,000	≥65,000	Nonweatherized	83% *AFUE*	10 CFR 430 Appendix N [f]
						Weatherized	78% *AFUE* or 80% E_t [e]	10 CFR 430 Appendix N [f]
								Section 42 UL 727
Warm-air furnace	Oil	1	Outside U.S.	<225,000	All	Nonweatherized	83% *AFUE*	10 CFR 430 Appendix N [f]
						Weatherized	78% *AFUE* or 80% E_t [e]	10 CFR 430 Appendix N [f]
								Section 42 UL 727
Warm-air furnace	Oil	3	Outside U.S.	<225,000	All	Nonweatherized	83% *AFUE*	10 CFR 430 Appendix N [f]
						Weatherized	78% *AFUE* or 80% E_t [e]	10 CFR 430 Appendix N [f]
								Section 42 UL 727
Warm-air furnace	Oil	All	All	≥225,000	All	All	82% E_t [e]	Section 42 UL 727

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced version (year) of the test procedure. For this table, the following apply:
- Appendix N = 10 CFR 430 Appendix N
- ANSI Z21.47 = Section 2.39, Thermal Efficiency, ANSI Z21.47
- ANSI Z83.3 = Section 2.10, Efficiency, ANSI Z83.3
- UL 727 = Section 42, Combustion, UL 727
- UL 731 = Section 40, Combustion, UL 731

b. Compliance of multiple firing rate units shall be at the maximum firing rate.

c. E_t = thermal *efficiency*. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a *flue damper*. A *vent damper* is an acceptable alternative to a *flue damper* for those furnaces where combustion air is drawn from the *conditioned space*.

d. E_c = combustion *efficiency* (100% less flue losses). See test procedure for detailed discussion.

e. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an *automatic flue damper*.

f. 10 CFR 430 is limited to single-phase equipment that is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 65,000 Btu/h but for the test and rating procedures are not impacted for three-phase and can be used for *AFUE* ratings for ASHRAE/IES Standard 90.1 three-phase products and single-phase products with a cooling capacity greater than 65,000 Btu/h.

Table 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements

Equipment Type								
Description	Fuel	Electric Power Phase	Application Location	Heating Capacity (input), Btu/h [b]	Combo Unit Cooling Capacity, Btu/h	Subtype	Minimum Efficiency [b]	Test Procedure [a]
Warm-Air Electric Furnace								
Warm-air furnace	Electric	1	Inside U.S.	<225,000	<65,000	All	78% *AFUE* $P_{W,SB} \leq 10$ W $P_{W,OFF} \leq 10$ W	10 CFR 430 Appendix N [f]
Warm-air furnace	Electric	1	Inside U.S.	<225,000	≥65,000	All	96% *AFUE*	Appendix N [f]
Warm-air furnace	Electric	1	Outside U.S.	<225,000	All	All	96% *AFUE*	Appendix N [f]
Warm-air furnace	Electric	3	All	<225,000	All	All	96% *AFUE*	Appendix N [f]
Warm-Air Duct Gas Furnace								
Warm-airduct furnaces	Gas	All	All	All	All	All	80% E_e [d]	ANSI Z83.8
Warm-air unit heaters	Gas	All	All	All	All	All	80% E_e [d,e]	ANSI Z83.8
Warm-Air Duct Oil Furnace								
Warm-air unit heaters	Oil	All	All	All	All	All	80% E_e [d,e]	Section 40 UL 731

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced version (year) of the test procedure. For this table, the following apply:
- Appendix N = 10 CFR 430 Appendix N
- ANSI Z21.47 = Section 2.39, Thermal Efficiency, ANSI Z21.47
- ANSI Z83.3 = Section 2.10, Efficiency, ANSI Z83.3
- UL 727 = Section 42, Combustion, UL 727
- UL 731 = Section 40, Combustion, UL 731

b. Compliance of multiple firing rate units shall be at the maximum firing rate.

c. E_t = thermal *efficiency*. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a *flue damper*. A *vent damper* is an acceptable alternative to a *flue damper* for those furnaces where combustion air is drawn from the *conditioned space*.

d. E_e = combustion *efficiency* (100% less flue losses). See test procedure for detailed discussion.

e. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an *automatic flue damper*.

f. 10 CFR 430 is limited to single-phase equipment that is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 65,000 Btu/h but for the test and rating procedures are not impacted for three-phase and can be used for *AFUE* ratings for ASHRAE/IES Standard 90.1 three-phase products and single-phase products with a cooling capacity greater than 65,000 Btu/h.

Insert new Table 6.8.1-5 (I-P), which combines old Tables 6.8.1-5 and F-4, as shown.

Table 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type							Minimum Efficiency[b]	Test Procedure[a]
Description	Fuel	Electric Power Phase	Application Location	Heating Capacity (input) Btu/h[b]	Combo-Unit Cooling Capacity Btu/h	Subtype		
Warm-Air Gas Furnaces								
Warm-air furnace	Gas	1	Inside U.S.	<225,000	<65,000	Nonweatherized not including mobile home	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N[f]
						Nonweatherized mobile home	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	
						Weatherized	81% *AFUE*	
Warm-air furnace	Gas	1	Inside U.S.	<225,000	≥65,000	Nonweatherized	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N[f]
						Weatherized	81% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f] ANSI Z21.47
Warm-air furnace	Gas	1	Outside U.S.	<225,000	All	Nonweatherized	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N[f]
						Weatherized	81% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f] ANSI Z21.47
Warm-air furnace	Gas	3	All	<225,000	All	Nonweatherized	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N[f]
						Weatherized	81% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f] ANSI Z21.47
Warm-air furnace	Gas	All	All	≥ 225,000 and < 400,000	All	All	81% E_t[c]	ANSI Z21.47
Warm-air furnace	Gas	All	Inside U.S.	> 400,000	All	All	81% E_t[c]	ANSI Z21.47
Warm-air furnace	Gas	All	Outside U.S.	> 400,000	All	All	81% E_t[c]	ANSI Z21.47 or ANSI Z83.8

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. For this table, the following applies:
- Appendix N = 10 CFR 430 Appendix N
- ANSI Z21.47 = Section 2.39, Thermal *Efficiency*, ANSI Z21.47
- ANSI Z83.3 = Section 2.10, *Efficiency*, ANSI Z83.3
- UL 727 = Section 42, Combustion, UL 727
- UL 731 = Section 40, Combustion, UL 731

b. Compliance of multiple firing rate units shall be at the maximum firing rate.

c. E_t = thermal *efficiency*. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a *flue damper*. A *vent damper* is an acceptable alternative to a *flue damper* for those furnaces where combustion air is drawn from the *conditioned space*.

d. E_c = combustion *efficiency* (100% less flue losses). See test procedure for detailed discussion.e.

e. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an *automatic flue damper*.

f. 10 CFR 430 is limited to single-phase equipment that is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 65,000 Btu/h but for the test and rating procedures are not impacted for three-phase and can be used for *AFUE* ratings for ANSI/ASHRAE/IES Standard 90.1 three-phase products and single-phase products with a cooling capacity greater than 65,000 Btu/h.

Table 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type							Minimum Efficiency[b]	Test Procedure[a]
Description	Fuel	Electric Power Phase	Application Location	Heating Capacity (input) Btu/h[b]	Combo-Unit Cooling Capacity Btu/h	Subtype		
Warm-Air Oil Furnace								
Warm-air furnace	Oil	1	Inside U.S.	<225,000	<65,000	Nonweatherized not including mobile home	83% *AFUE* $P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	10 CFR 430 Appendix N
						Nonweatherized mobile home	75% *AFUE*[f] $P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	
						Weatherized	78% *AFUE*[f]	
Warm-air oil furnace	Oil	1	Inside U.S.	<225,000	≥65,000	Nonweatherized	83% *AFUE*	10 CFR 430 Appendix N[f]
						Weatherized	78% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f]
								Section 42 UL 727
Warm-air furnace	Oil	1	Outside U.S.	<225,000	All	Nonweatherized	83% *AFUE*	10 CFR 430 Appendix N[f]
						Weatherized	78% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f]
								Section 42 UL 727
Warm-air furnace	Oil	3	Outside U.S.	<225,000	All	Nonweatherized	83% *AFUE*	10 CFR 430 Appendix N[f]
						Weatherized	78% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f]
								Section 42 UL 727
Warm-air furnace	Oil	All	All	≥225,000	All	All	82% E_t[c]	Section 42 UL 727
Warm Air Electric Furnace								
Warm-air furnace	Electric	1	Inside U.S.	<225,000	<65,000	All	78% AFUE $P_{W,SB}$ ≤ 10 W $P_{W,OFF}$ ≤ 10 W	10 CFR 430 Appendix N[f]
Warm-air furnace	Electric	1	Inside U.S.	<225,000	≥65,000	All	96% *AFUE*	Appendix N[f]
Warm-air furnace	Electric	1	Outside U.S.	<225,000	All	All	96% *AFUE*	Appendix N[f]
Warm-air furnace	Electric	3	All	<225,000	All	All	96% *AFUE*	Appendix N[f]

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. For this table, the following applies:
- Appendix N = 10 CFR 430 Appendix N
- ANSI Z21.47 = Section 2.39, Thermal *Efficiency*, ANSI Z21.47
- ANSI Z83.3 = Section 2.10, *Efficiency*, ANSI Z83.3
- UL 727 = Section 42, Combustion, UL 727
- UL 731 = Section 40, Combustion, UL 731

b. Compliance of multiple firing rate units shall be at the maximum firing rate.

c. E_t = thermal *efficiency*. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a *flue damper*. A *vent damper* is an acceptable alternative to a *flue damper* for those furnaces where combustion air is drawn from the *conditioned space*.

d. E_c = combustion *efficiency* (100% less flue losses). See test procedure for detailed discussion.e.

e. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an *automatic flue damper*.

f. 10 CFR 430 is limited to single-phase equipment that is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 65,000 Btu/h but for the test and rating procedures are not impacted for three-phase and can be used for *AFUE* ratings for ANSI/ASHRAE/IES Standard 90.1 three-phase products and single-phase products with a cooling capacity greater than 65,000 Btu/h.

Table 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements (I-P)

Equipment Type							Minimum Efficiency[b]	Test Procedure[a]
Description	Fuel	Electric Power Phase	Application Location	Heating Capacity (input) Btu/h[b]	Combo-Unit Cooling Capacity Btu/h	Subtype		
Warm-Air Duct Gas Furnace								
Warm-air duct furnaces	Gas	All	All	All	All	All	80% E_c[d]	ANSI Z83.8
Warm-air unit heaters	Gas	All	All	All	All	All	80% E_c[d,e]	ANSI Z83.8
Warm-Air Duct Oil Furnace								
Warm-air unit heaters	Oil	All	All	All	All	All	80% E_c[d,e]	Section 40 UL 731

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. For this table, the following applies:
- Appendix N = 10 CFR 430 Appendix N
- ANSI Z21.47 = Section 2.39, Thermal *Efficiency*, ANSI Z21.47
- ANSI Z83.3 = Section 2.10, *Efficiency*, ANSI Z83.3
- UL 727 = Section 42, Combustion, UL 727
- UL 731 = Section 40, Combustion, UL 731

b. Compliance of multiple firing rate units shall be at the maximum firing rate.

c. E_t = thermal *efficiency*. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a *flue damper*. A *vent damper* is an acceptable alternative to a *flue damper* for those furnaces where combustion air is drawn from the *conditioned space*.

d. E_c = combustion *efficiency* (100% less flue losses). See test procedure for detailed discussion.e.

e. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an *automatic flue damper*.

f. 10 CFR 430 is limited to single-phase equipment that is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 65,000 Btu/h but for the test and rating procedures are not impacted for three-phase and can be used for *AFUE* ratings for ANSI/ASHRAE/IES Standard 90.1 three-phase products and single-phase products with a cooling capacity greater than 65,000 Btu/h.

Insert new Table 6.8.1-5 (SI), which combines old Tables 6.8.1-5 and F-4, as shown.

Table 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements (SI)

Equipment Type							Minimum Efficiency[b]	Test Procedure[a]
Description	Fuel	Electric Power Phase	Application Location	Heating Capacity (input) *kW*[b]	Combo-Unit Cooling Capacity *kW*	Subtype		
Warm-Air Gas Furnaces								
Warm-air furnace	Gas	1	Inside U.S.	<66	<19	Nonweatherized not including mobile home	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N[f]
						Nonweatherized mobile home	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	
						Weatherized	81% *AFUE*	
Warm-air furnace	Gas	1	Inside U.S.	<66	≥19	Nonweatherized	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N[f]
						Weatherized	81% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f] ANSI Z21.47
Warm-air furnace	Gas	1	Outside U.S.	<66	All	Nonweatherized	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N[f]
						Weatherized	81% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f] ANSI Z21.47
Warm-air furnace	Gas	3	All	<66	All	Nonweatherized	80% *AFUE* before 12/18/2028 95% *AFUE* after 12/18/2028	10 CFR 430 Appendix N[f]
						Weatherized	81% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f] ANSI Z21.47
Warm-air furnace	Gas	All	All	≥66 and ≤117	All	All	81% E_t[c]	ANSI Z21.47
Warm-air furnace	Gas	All	Inside U.S.	>117	All	All	81% E_t[c]	ANSI Z21.47
Warm-air furnace	Gas	All	Outside U.S.	>117	All	All	81% E_t[c]	ANSI Z21.47 or ANSI Z83.8

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. For this table, the following applies:
- Appendix N = 10 CFR 430 Appendix N
- ANSI Z21.47 = Section 2.39, Thermal *Efficiency*, ANSI Z21.47
- ANSI Z83.3 = Section 2.10, *Efficiency*, ANSI Z83.3
- UL 727 = Section 42, Combustion, UL 727
- UL 731 = Section 40, Combustion, UL 731

b. Compliance of multiple firing rate units shall be at the maximum firing rate.

c. E_t = thermal *efficiency*. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a *flue damper*. A *vent damper* is an acceptable alternative to a *flue damper* for those furnaces where combustion air is drawn from the *conditioned space*.

d. E_c = combustion *efficiency* (100% less flue losses). See test procedure for detailed discussion.

e. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an *automatic flue damper*.

f. 10 CFR 430 is limited to-single phase equipment that is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 19 *kW* but for the test and rating procedures are not impacted for three-phase and can be used for *AFUE* ratings for ASHRAE/IES Standard 90.1 three-phase products and single-phase products with a cooling capacity greater than 19 *kW*.

Table 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements (SI)

Equipment Type							Minimum Efficiency[b]	Test Procedure[a]
Description	Fuel	Electric Power Phase	Application Location	Heating Capacity (input) *kW*[b]	Combo-Unit Cooling Capacity *kW*	Subtype		
Warm Air Oil Furnace								
Warm-air furnace	Oil	1	Inside U.S.	<66	<19	Nonweatherized not including mobile home	83% *AFUE* $P_{W,OFF} \leq 11$ W $P_{W,OFF} \leq 11$ W	10 CFR 430 Appendix N
						Nonweatherized mobile home	75% *AFUE*[f] $P_{W,OFF} \leq 11$ W $P_{W,OFF} \leq 11$ W	
						Weatherized	78% *AFUE*[f]	
Warm-air oil furnace	Oil	1	Inside U.S.	<66	≥19	Nonweatherized	83% *AFUE*	10 CFR 430 Appendix N[f]
						Weatherized	78% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f]
								Section 42 UL 727
Warm-air furnace	Oil	1	Outside U.S.	<66	All	Nonweatherized	83% *AFUE*	10 CFR 430 Appendix N[f]
						Weatherized	78% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f]
								Section 42 UL 727
Warm-air furnace	Oil	3	Outside U.S.	<66	All	Nonweatherized	83% *AFUE*	10 CFR 430 Appendix N[f]
						Weatherized	78% *AFUE* or 80% E_t[c]	10 CFR 430 Appendix N[f]
								Section 42 UL 727
Warm-air furnace	Oil	All	All	≥66	All	All	82% E_t[c]	Section 42 UL 727
Warm Air Electric Furnace								
Warm-air furnace	Electric	1	Inside U.S.	<66	<19	All	78% AFUE $P_{W,SB} \leq 10$ W $P_{W,OFF} \leq 10$ W	10 CFR 430 Appendix N[f]
Warm-air furnace	Electric	1	Inside U.S.	<66	≥19	All	96% *AFUE*	Appendix N[f]
Warm-air furnace	Electric	1	Outside U.S.	<66	All	All	96% *AFUE*	Appendix N[f]
Warm-air furnace	Electric	3	All	<66	All	All	96% *AFUE*	Appendix N[f]

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. For this table, the following applies:
- Appendix N = 10 CFR 430 Appendix N
- ANSI Z21.47 = Section 2.39, Thermal *Efficiency*, ANSI Z21.47
- ANSI Z83.3 = Section 2.10, *Efficiency*, ANSI Z83.3
- UL 727 = Section 42, Combustion, UL 727
- UL 731 = Section 40, Combustion, UL 731

b. Compliance of multiple firing rate units shall be at the maximum firing rate.

c. E_t = thermal *efficiency*. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a *flue damper*. A *vent damper* is an acceptable alternative to a *flue damper* for those furnaces where combustion air is drawn from the *conditioned space*.

d. E_c = combustion *efficiency* (100% less flue losses). See test procedure for detailed discussion.

e. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an *automatic flue damper*.

f. 10 CFR 430 is limited to-single phase equipment that is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 19 *kW* but for the test and rating procedures are not impacted for three-phase and can be used for *AFUE* ratings for ASHRAE/IES Standard 90.1 three-phase products and single-phase products with a cooling capacity greater than 19 *kW*.

Table 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements (SI)

Equipment Type							Minimum Efficiency[b]	Test Procedure[a]
Description	Fuel	Electric Power Phase	Application Location	Heating Capacity (input) *kW*[b]	Combo-Unit Cooling Capacity *kW*	Subtype		
Warm Air Duct Gas Furnace								
Warm-air duct furnaces	Gas	All	All	All	All	All	80% E_c[d]	ANSI Z83.8
Warm-air unit heaters	Gas	All	All	All	All	All	80% E_c[d,e]	ANSI Z83.8
Warm Air Duct Oil Furnace								
Warm-air unit heaters	Oil	All	All	All	All	All	80% E_c[d,e]	Section 40 UL 731

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. For this table, the following applies:
- Appendix N = 10 CFR 430 Appendix N
- ANSI Z21.47 = Section 2.39, Thermal *Efficiency*, ANSI Z21.47
- ANSI Z83.3 = Section 2.10, *Efficiency*, ANSI Z83.3
- UL 727 = Section 42, Combustion, UL 727
- UL 731 = Section 40, Combustion, UL 731

b. Compliance of multiple firing rate units shall be at the maximum firing rate.

c. E_t = thermal *efficiency*. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a *flue damper*. A *vent damper* is an acceptable alternative to a *flue damper* for those furnaces where combustion air is drawn from the *conditioned space*.

d. E_c = combustion *efficiency* (100% less flue losses). See test procedure for detailed discussion.

e. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an *automatic flue damper*.

f. 10 CFR 430 is limited to-single phase equipment that is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 19 *kW* but for the test and rating procedures are not impacted for three-phase and can be used for *AFUE* ratings for ASHRAE/IES Standard 90.1 three-phase products and single-phase products with a cooling capacity greater than 19 *kW*.

Delete current Table 6.8.1-6 (I-P and SI). Note, only the current I-P table is shown for reference.

Table 6.8.1-6 Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements

Equipment Type[a]	Subcategory	Size Category (Input)	Efficiency Requirements	Test Procedure[a]
Gas-Fired Hot-Water Boilers				
Boilers, hot water	Gas fired	<300,000 Btu/h[g,h] for applications in U.S.	84% *AFUE* $P_{W,SB}$ ≤ 9 W $P_{W,OFF}$ ≤ 9 W	10 CFR 430 Appendix N[i,j,k]
		<300,000 Btu/h[g,h] for applications outside U.S.	84% *AFUE*	10 CFR 430 Appendix N[i,k]
		≥300,000 Btu/h and ≤2,500,000 Btu/h[e]	80% E_t[d]	10 CFR 431.86
		>2,500,000 Btu/h[e]	82% E_c[e]	
Oil-Fired Hot-Water Boilers				
Boilers, hot water	Oil fired[f]	<300,000 Btu/h[g,h] for applications in U.S.	86% *AFUE* $P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	10 CFR 430 Appendix N[i,j,k]
		<300,000 Btu/h[g,h] for applications outside U.S.	86% *AFUE*	10 CFR 430 Appendix N[i,k]
		≥300,000 Btu/h and ≤2,500,000 Btu/h[e]	82% E_t[d]	10 CFR 431.86
		>2,500,000 Btu/h[e]	84% E_c[e]	
Gas-Fired Steam Boilers				
Boilers, steam	Gas fired	<300,000 Btu/h[g,h] for applications in U.S.	85% *AFUE* $P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	10 CFR 430 Appendix N[i,j,k]
		<300,000 Btu/h[g,h] for applications outside U.S.	85% *AFUE*	10 CFR 430 Appendix N[i,k]
	Gas fired all, except natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h[e]	79% E_t[d]	10 CFR 431.86
		>2,500,000 Btu/h[e]	79% E_t[d]	
	Gas fired natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h[e]	79% E_t[d]	
		>2,500,000 Btu/h[e]	79% E_t[d]	
Oil-Fired Steam Boilers				
Boilers, steam	Oil fired[f]	<300,000 Btu/h[g,h] for applications in U.S.	85% *AFUE* $P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	10 CFR 430 Appendix N[i,j,k]
		<300,000 Btu/h[g,h] for applications outside U.S.	85% *AFUE*	10 CFR 430 Appendix N[i,k]
		≥300,000 Btu/h and ≤2,500,000 Btu/h[e]	81% E_t[d]	10 CFR 431.86
		>2,500,000 Btu/h[e]	81% E_t[d]	

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure
b. These requirements apply to *boilers* with rated input of 8,000,000 Btu/h or less that are not packaged *boilers* and to all packaged *boilers*. Minimum *efficiency* requirements for *boilers* cover all capacities of packaged *boilers*.
c. E_c = combustion *efficiency* (100% less flue losses). See reference document for detailed information.
d. E_t = thermal *efficiency*. See reference document for detailed information.
e. Maximum capacity—minimum and maximum ratings as provided for and allowed by the unit's controls.
f. Includes oil-fired (residual).
g. *Boilers* shall not be equipped with a constant burning pilot light.
h. A *boiler* not equipped with a tankless domestic water-heating coil shall be equipped with an *automatic* means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.
i. Annual Fuel Utilization Efficiency, as determined in § 430.23(n)(2).
j. Standby mode and off-mode electric power consumption as determined in § 430.23(n)(5).
k See § 430.32(e)(2)(iv) for additional details regarding automatic means for adjusting water temperature.

Table 6.8.1-6 Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements

Equipment Type[a]	Subcategory	Size Category (Input)	Efficiency Requirements	Test Procedure[a]
Electric Hot-Water Boilers				
Boiler, hot-water	Electric	<300,000 Btu/h,[g,h] for applications in U.S.	No efficiency $P_{W,SB} \leq 8$ W $P_{W,OFF} \leq 8$ W	10 CFR 430 Appendix N[i,j,k]
		<300,000 Btu/h[g,h] for applications outside U.S.	No efficiency	10 CFR 430 Appendix N[i,k]
Electric Steam Boilers				
Boiler, steam	Electric	<300,000 Btu/h[g,h] for applications in U.S.	No efficiency $P_{W,SB} \leq 8$ W $P_{W,OFF} \leq 8$ W	10 CFR 430 Appendix N[i,j,k]
		<300,000 Btu/h[g,h] for applications outside U.S.	No efficiency	10 CFR 430 Appendix N[i,k]

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure
b. These requirements apply to *boilers* with rated input of 8,000,000 Btu/h or less that are not packaged *boilers* and to all packaged *boilers*. Minimum *efficiency* requirements for *boilers* cover all capacities of packaged *boilers*.
c. E_c = combustion *efficiency* (100% less flue losses). See reference document for detailed information.
d. E_t = thermal *efficiency*. See reference document for detailed information.
e. Maximum capacity—minimum and maximum ratings as provided for and allowed by the unit's controls.
f. Includes oil-fired (residual).
g. *Boilers* shall not be equipped with a constant burning pilot light.
h. A *boiler* not equipped with a tankless domestic water-heating coil shall be equipped with an *automatic* means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.
i. Annual Fuel Utilization Efficiency, as determined in § 430.23(n)(2).
j. Standby mode and off-mode electric power consumption as determined in § 430.23(n)(5).
k See § 430.32(e)(2)(iv) for additional details regarding automatic means for adjusting water temperature.

Insert new Table 6.8.1-6 (I-P), which combines old Tables 6.8.1-6 and F-5, as shown.

Table 6.8.1-6 Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements (I-P)

Equipment Type[a]	Subcategory	Size Category (Input)	Efficiency Requirements	Test Procedure[a]
Gas-Fired Hot-Water Boilers				
Boilers, hot water	Gas-fired	<300,000 Btu/h[g,h] for applications in U.S.	84% *AFUE* $P_{W,SB} \leq 9$ W $P_{W,OFF} \leq 9$ W	10 CFR 430 Appendix N[i,j,k]
		<300,000 Btu/h[g,h] for applications outside U.S.	84% *AFUE*	10 CFR 430 Appendix N[i,k]
		≥300,000 Btu/h and ≤2,500,000 Btu/h[e]	80% E_t[d]	10 CFR 431.86
		>2,500,000 Btu/h[e]	82% E_c[c]	
Oil-Fired Hot-Water Boilers				
Boilers, hot water	Oil-fired[f]	<300,000 Btu/h[g,h] for applications in U.S.	86% *AFUE* $P_{W,SB} \leq 11$ W $P_{W,OFF} \leq 11$ W	10 CFR 430 Appendix N[i,j,k]
		<300,000 Btu/h[g,h] for applications outside U.S.	86% *AFUE*	10 CFR 430 Appendix N[i,k]
		≥300,000 Btu/h and ≤2,500,000 Btu/h[e]	82% E_t[d]	10 CFR 431.86
		>2,500,000 Btu/h[e]	84% E_c[c]	
Gas-Fired Steam Boilers				
Boilers, steam	Gas-fired	<300,000 Btu/h[g,h] for applications in U.S.	85% *AFUE* $P_{W,SB} \leq 11$ W $P_{W,OFF} \leq 11$ W	10 CFR 430 Appendix N[i,j,k]
		<300,000 Btu/h[g,h] for applications outside U.S.	85% *AFUE*	10 CFR 430 Appendix N[i,k]
	Gas-fired all, except natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h[e]	79% E_t[d]	10 CFR 431.86
		>2,500,000 Btu/h[e]	79% E_t[d]	
	Gas-fired natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h[e]	79% E_t[d]	
		>2,500,000 Btu/h[e]	79% E_t[d]	
Oil-Fired Steam Boilers				
Boilers, steam	Oil-fired[f]	<300,000 Btu/h[g,h] for applications in U.S	85% *AFUE* $P_{W,SB} \leq 11$ W $P_{W,OFF} \leq 11$ W	10 CFR 430 Appendix N[i,j,k]
		<300,000 Btu/h[g,h] for applications outside U.S.	85% *AFUE*	10 CFR 430 Appendix N[i,k]
		≥300,000 Btu/h and ≤2,500,000 Btu/h[e]	81% E_t[d]	10 CFR 431.86
		>2,500,000 Btu/h[e]	81% E_t[d]	

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. These requirements apply to *boilers* with rated input of 8,000,000 Btu/h or less that are not packaged *boilers*, and to all packaged *boilers*. Minimum *efficiency* requirements for *boilers* cover all capacities of packaged *boilers*.
c. E_c = combustion *efficiency* (100% less flue losses). See reference test procedure for detailed information.
d. E_t = thermal *efficiency*. See reference test procedure for detailed information.
e. Maximum capacity—minimum and maximum ratings as provided for and allowed by the unit's controls.
f. Includes oil-fired (residual).
g. *Boilers* shall not be equipped with a constant burning pilot light.
h. A *boiler* not equipped with a tankless domestic water-heating coil shall be equipped with an *automatic* means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.
i. Annual fuel utilization efficiency, as determined in § 430.23(n)(2).
j. Standby mode and off-mode electric power consumption, as determined in § 430.23(n)(5).
k. See § 430.32(e)(2)(iv) for additional details regarding automatic means for adjusting water temperature.

Table 6.8.1-6 Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements (I-P)

Equipment Type[a]	Subcategory	Size Category (Input)	Efficiency Requirements	Test Procedure[a]
Electric Hot-Water Boilers				
hot-water *boiler*	Electric	≤300,000 Btu/h,[g,h] for applications in U.S.	No efficiency $P_{W,SB}$ ≤ 8 W $P_{W,OFF}$ ≤ 8 W	10 CFR 430 Appendix N[i,j,k]
		≤300,000 Btu/h[g,h] for applications outside U.S.	No efficiency	10 CFR 430 Appendix N[i,k]
Electric Steam Boilers				
Steam *boiler*	Electric	≤300,000 Btu/h[g,h] for applications in U.S.	No efficiency $P_{W,SB}$ ≤ 8 W $P_{W,OFF}$ ≤ 8 W	10 CFR 430 Appendix N[i,j,k]
		≤300,000 Btu/h[g,h] for applications outside U.S.	No efficiency	10 CFR 430 Appendix N[i,j,k]

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. These requirements apply to *boilers* with rated input of 8,000,000 Btu/h or less that are not packaged *boilers*, and to all packaged *boilers*. Minimum *efficiency* requirements for *boilers* cover all capacities of packaged *boilers*.
c. E_c = combustion *efficiency* (100% less flue losses). See reference test procedure for detailed information.
d. E_t = thermal *efficiency*. See reference test procedure for detailed information.
e. Maximum capacity—minimum and maximum ratings as provided for and allowed by the unit's controls.
f. Includes oil-fired (residual).
g. *Boilers* shall not be equipped with a constant burning pilot light.
h. A *boiler* not equipped with a tankless domestic water-heating coil shall be equipped with an *automatic* means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.
i. Annual fuel utilization efficiency, as determined in § 430.23(n)(2).
j. Standby mode and off-mode electric power consumption, as determined in § 430.23(n)(5).
k. See § 430.32(e)(2)(iv) for additional details regarding automatic means for adjusting water temperature.

Insert new Table 6.8.1-6 (SI), which combines old Tables 6.8.1-6 and F-5, as shown.

Table 6.8.1-6 Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements (SI)

Equipment Type[a]	Subcategory	Size Category (Input)	Efficiency Requirements	Test Procedure[a]
Gas-Fired Hot-Water Boilers				
Boilers, hot-water	Gas-fired	<88 *kW*[g,h] for applications in U.S.	84% *AFUE* $P_{W,SB}$ ≤9 W $P_{W,OFF}$ ≤9 W	10 CFR 430 Appendix N[i,j,k]
		<88 *kW*[g,h] for applications outside U.S.	84% *AFUE*	10 CFR 430 Appendix N[i,k]
		≥88 *kW* and ≤733 *kW*[e]	80% E_t[d]	10 CFR 431.86
		>733 *kW*[e]	82% E_c[c]	
Oil-Fired Hot-Water Boilers				
Boilers, hot-water	Oil-fired[f]	<88 *kW*[g,h] for applications in U.S.	86% *AFUE* $P_{W,SB}$ ≤11 W $P_{W,OFF}$ ≤11 W	10 CFR 430 Appendix N[i,j,k]
		<88 *kW*[g,h] for applications outside U.S.	86% *AFUE*	10 CFR 430 Appendix N[i,k]
		≥300,000 Btu/h and ≤88 *kW*[e]	82% E_t[d]	10 CFR 431.86
		>733 *kW*[e]	84% E_c[c]	
Gas-Fired Steam Boilers				
Boilers, steam	Gas-fired	<88 *kW*[g,h] for applications in U.S.	85% *AFUE* $P_{W,SB}$ ≤11 W $P_{W,OFF}$ ≤11 W	10 CFR 430 Appendix N[i,j,k]
		<88 *kW*[g,h] for applications outside U.S.	85% *AFUE*	10 CFR 430 Appendix N[i,k]
	Gas-fired all, except natural draft	≥88 *kW* and ≤733 *kW*[e]	79% E_t[d]	10 CFR 431.86
		>733 *kW*[e]	79% E_t[d]	
	Gas-fired natural draft	≥88 *kW* and ≤733 *kW*[e]	79% E_t[d]	
		>733 *kW*[e]	79% E_t[d]	
Oil-Fired Steam Boilers				
Boilers, steam	Oil-fired[f]	<88 *kW*[g,h] for applications in U.S	85% *AFUE* $P_{W,SB}$ ≤ 11 W $P_{W,OFF}$ ≤ 11 W	10 CFR 430 Appendix N[i,j,k]
		<88 *kW*[g,h] for applications outside U.S.	85% *AFUE*	10 CFR 430 Appendix N[i,k]
		≥88 *kW* and ≤733 *kW*[e]	81% E_t[d]	10 CFR 431.86
		>733 *kW*[e]	81% E_t[d]	

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. These requirements apply to *boilers* with rated input of 2345 *kW* or less that are not packaged *boilers*, and to all packaged *boilers*. Minimum *efficiency* requirements for *boilers* cover all capacities of packaged *boilers*.
c. E_c = combustion *efficiency* (100% less flue losses). See reference test procedure for detailed information.
d. E_t = thermal *efficiency*. See reference test procedure for detailed information.
e. Maximum capacity—minimum and maximum ratings as provided for and allowed by the unit's controls.
f. Includes oil-fired (residual).
g. *Boilers* shall not be equipped with a constant burning pilot light.
h. A *boiler* not equipped with a tankless domestic water-heating coil shall be equipped with an *automatic* means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.
i. Annual fuel utilization efficiency, as determined in § 430.23(n)(2).
j. Standby mode and off-mode electric power consumption as determined in § 430.23(n)(5).
k. See § 430.32(e)(2)(iv) for additional details regarding automatic means for adjusting water temperature.

Table 6.8.1-6 Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements (SI)

Equipment Type[a]	Subcategory	Size Category (Input)	Efficiency Requirements	Test Procedure[a]
Electric Hot-Water Boilers				
Hot-water *boiler*	Electric	≤88 *kW*[g,h] for applications in U.S.	No efficiency $P_{W,SB} \leq 8$ W $P_{W,OFF} \leq 8$ W	10 CFR 430 Appendix N[i,j,k]
		≤88 *kW*[g,h] for applications outside U.S.	No efficiency	10 CFR 430 Appendix N[i,k]
Electric Steam Boilers				
Steam *boiler*	Electric	≤88 *kW*[g,h] for applications in U.S.	No efficiency $P_{W,SB} \leq 8$ W $P_{W,OFF} \leq 8$ W	10 CFR 430 Appendix N[i,j,k]
		≤88 *kW*[g,h] for applications outside U.S.	No efficiency	10 CFR 430 Appendix N[i,k]

a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. These requirements apply to *boilers* with rated input of 2345 *kW* or less that are not packaged *boilers*, and to all packaged *boilers*. Minimum *efficiency* requirements for *boilers* cover all capacities of packaged *boilers*.
c. E_c = combustion *efficiency* (100% less flue losses). See reference test procedure for detailed information.
d. E_t = thermal *efficiency*. See reference test procedure for detailed information.
e. Maximum capacity—minimum and maximum ratings as provided for and allowed by the unit's controls.
f. Includes oil-fired (residual).
g. *Boilers* shall not be equipped with a constant burning pilot light.
h. A *boiler* not equipped with a tankless domestic water-heating coil shall be equipped with an *automatic* means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.
i. Annual fuel utilization efficiency, as determined in § 430.23(n)(2).
j. Standby mode and off-mode electric power consumption as determined in § 430.23(n)(5).
k. See § 430.32(e)(2)(iv) for additional details regarding automatic means for adjusting water temperature.

Modify Table 6.8.1-21 as shown to add the table F-6 requirements (I-P).

Table 6.8.1-21 Ceiling Fan Efficiency Requirements[a]

Equipment Type	Size Category	Minimum Efficiency~~b~~	Test Procedure
Large-diameter ceiling fan for applications in the U.S.	Blade span ≥ 84.5 in.	*CFEI* ≥ 1.00 at high (maximum) speed; and *CFEI* ≥ 1.31 at 40% of high speed or the nearest speed that is not less than 40% of high speed	10 CFR 430 Appendix U
Large-diameter ceiling fan for applications outside the U.S.	Blade span ≥ 84.5 in.	*CFEI* ≥ 1.00 at high (maximum) speed; and *CFEI* ≥ 1.31 at 40% of high speed or the nearest speed that is not less than 40% of high speed	10 CFR 430 Appendix U or AMCA Standard 230 and AMCA Standard 208

a. The minimum *efficiency* requirements at both high speed and 40% of maximum speed must be met or exceeded to comply with this standard.
~~b. *Ceiling fans* are regulated in the U.S. as consumer products under 10 CFR 430. For U.S. applications of large-diameter ceiling fans, refer to Informative Appendix F, Table F-6, for the U.S. DOE minimum *efficiency* requirements.~~
be.Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

Modify Table 6.8.1-21 as shown to add the table F-6 requirements (SI).

Table 6.8.1-21 Ceiling Fan Efficiency Requirements[a]

Equipment Type	Size Category	Minimum Efficiency~~b~~	Test Procedure
Large-diameter ceiling fan for applications in the U.S.	Blade span ≥ 2.15 m	*CFEI* ≥ 1.00 at high (maximum) speed; and *CFEI* ≥ 1.31 at 40% of high speed or the nearest speed that is not less than 40% of high speed	10 CFR 430 Appendix U
Large-diameter ceiling fan for applications outside the U.S.	Blade span ≥ 2.15 m	*CFEI* ≥ 1.00 at high (maximum) speed; and *CFEI* ≥ 1.31 at 40% of high speed or the nearest speed that is not less than 40% of high speed	10 CFR 430 Appendix U or AMCA Standard 230 and AMCA Standard 208

a. The minimum *efficiency* requirements at both high speed and 40% of maximum speed must be met or exceeded to comply with this standard.
~~b. *Ceiling fans* are regulated in the U.S. as consumer products under 10 CFR 430. For U.S. applications of large-diameter ceiling fans, refer to Informative Appendix F, Table F-6, for the U.S. DOE minimum *efficiency* requirements.~~
be.Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

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12/25