



Building Standards and Codes

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CODE INTERPRETATION – 2022-01

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Source Document: 19 NYCRR Part 1240 – State Energy Conservation Construction Code²

Topic: Energy Efficiency Metric in Table C404.2 of the 2020 Energy Conservation Construction Code of New York State

Question: The DOE has replaced the Energy Factor (EF) with the Uniform Energy Factor (UEF) as the metric used to report the performance of water-heating equipment. Can compliance with the service water-heating equipment performance requirements of Section C404.2 of the 2020 ECCCNY be demonstrated by using DOE's updated table instead of Table C404.2?

Interpretation: **Yes.** Water heaters, as defined in 10 CFR §430.2, must comply with the minimum uniform energy factor (UEF) for water heaters set forth in Table [10 CFR §430.32\(d\)](#).

The 2020 Energy Conservation Construction Code of New York State (2020 ECCCNY) is a derivative work of the 2018 International Energy Conservation Construction Code (2018 IECC). Table C404.2 (Minimum Performance of Water-Heating Equipment) of the 2018 IECC is based on the table developed by the Department of Energy (DOE) in accordance with 10 CFR Part 430, Subpart B, Appendix E (Uniform Test Method for measuring the Energy Consumption of Water Heaters) and it forms the basis for Table C404.2 of the 2020 ECCCNY.

On December 18, 2012, the American Energy Manufacturing Technical Corrections Act (AEMTCA), Public Law 112-210, amended the Energy Policy and Conservation Act of 1975 (EPCA), 42 U.S.C. 6291-6309, to require DOE to establish a uniform efficiency descriptor and accompanying test methods for consumer water heaters and certain commercial water heating equipment. In July 2014, DOE amended its test procedure for consumer and certain commercial water heaters and developed a uniform efficiency descriptor known as “uniform energy factor” (UEF) to replace the energy factor (EF), thermal efficiency (TE), and standby loss (SL) metrics. See [79 FR 40541](#). In December 2016, DOE established a mathematical conversion factor between the values determined using the EF, TE, and SL test procedures and the values that would be determined using the UEF test procedure. See [81 FR 96204](#). According to the Summary, “*the standards denominated in UEF are neither more nor less stringent than the EF-denominated standards for consumer water heaters and for commercial water-heating equipment based on the thermal efficiency and standby loss metrics.*” The conversion factor formulas could be used for

¹ The “Code Effective Date” for this Code Interpretation is May 12, 2020, which is the effective date of the 2020 update of the Energy Conservation Construction Code of New York State (the Energy Code).

² The Energy Code is contained in Title 19 of the Official Compilation of Codes, Rules and Regulations of the State of New York (NYCRR) Part 1240 and the publications incorporated by reference into that Part, including, but not limited to the 2020 NYS specific code book which is based on the 2018 International Energy Code and the publication entitled *ANSI/ASHRAE/IES Standard 90.1-2016, Energy Standard for Buildings Except Low-Rise Residential Buildings* published by American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.

making representations regarding energy efficiency or energy use until December 29, 2017. After that, all representations regarding energy efficiency or energy use must be based on the updated testing and using UEF.

Section C404.2 of the 2020 ECCCNY provides as follows:

C404.2 Service water-heating equipment performance efficiency. *Water-heating equipment and hot water storage tanks shall meet the requirements of Table C404.2. The efficiency shall be verified through data furnished by the manufacturer of the equipment or through certification under an approved certification program. Water-heating equipment intended to be used to provide space heating shall meet the applicable provisions of Table C404.2.*

Table C404.2 of the 2020 ECCCNY contains obsolete efficiency metrics in the “PERFORMANCE REQUIRED” column. Specifically, footnotes a and b to Table C404.2 provide as follows:

- a. *Energy factor (EF) and thermal efficiency (Et) are minimum requirements. In the EF equation, V is the rated volume in gallons.*
- b. *Standby loss (SL) is the maximum Btu/h based on a nominal 70°F temperature difference between stored water and ambient requirements. In the SL equation, Q is the nameplate input rate in Btu/h. In the equations for electric water heaters, V is the rated volume in gallons and Vm is the measured volume in gallons. In the SL equation for oil and gas water heaters and boilers, V is the rated volume in gallons.*

The “TEST PROCEDURE” column of Table C404.2 refers to “DOE 10 CFR Part 430.” Chapter 6 [CE] of the 2020 ECCCNY references the 2015 version of 19 CFR Part 430 as the referenced standard cited in Table C404.2. Accordingly, although Table C404.2 requires the “TEST PROCEDURE” of water heaters to comply with DOE’s updated testing procedure, the “PERFORMANCE REQUIRED” values are not expressed using the updated uniform efficiency descriptor value of UEF.

The discrepancy is limited to the Commercial provisions of the 2020 ECCCNY since the provisions found in ASHRAE 90.1 and in the Residential provisions of the 2020 ECCCNY reference the DOE requirements. Section R403.7 of the 2020 ECCCNY provides in relevant part that “*new or replacement heating and cooling equipment shall have an efficiency rating equal to or greater than the minimum required by federal law for the geographic location where the equipment is installed.*” Footnote g of Table 7.8 of ASHRAE 90.1-2016 provides that “*in the U.S., the efficiency requirements for water heaters or gas pool heaters in this category or subcategory are specified by the U.S. Department of Energy. Those requirements and applicable test procedures are found in the Code of Federal Regulations 10 CFR Part 430.*”

10 CFR Part 430 sets forth the energy conservation standards for covered product classes including but not limited to the minimum uniform energy factor of water heaters. See [10 CFR §430.32\(d\)](#). “Water heater” is defined in 10 CFR §430.2 as follows:

Water heater means a product which utilizes oil, gas, or electricity to heat potable water for use outside the heater upon demand, including—

- (1) Storage type units which heat and store water at a thermostatically controlled temperature, including gas storage water heaters with an input of 75,000 Btu per hour or less, oil storage water heaters with an input of 105,000 Btu per hour or less, and electric storage water heaters with an input of 12 kilowatts or less;*
- (2) Instantaneous type units which heat water but contain no more than one gallon of water per 4,000 Btu per hour of input, including gas instantaneous water heaters with an input of 200,000 Btu per hour or less, oil instantaneous water heaters with an input of 210,000 Btu per hour or less, and electric instantaneous water heaters with an input of 12 kilowatts or less; and*
- (3) Heat pump type units, with a maximum current rating of 24 amperes at a voltage no greater than 250 volts, which are products designed to transfer thermal energy from one temperature level to a higher temperature level for the purpose of heating water, including all ancillary equipment such as fans, storage tanks, pumps, or controls necessary for the device to perform its function.*

10 CFR §430.33(a) provides that any State regulation providing for an energy conservation standard or other requirement with respect to the energy efficiency or energy use of a covered product that is not identical to a Federal standard in effect under Subpart C is preempted by that standard. Subpart D of 10 CFR Part 430 prescribes the procedures to be followed in connection with petitions requesting a rule that a State regulation prescribing an energy conservation standard or other requirement respecting energy efficiency or energy use of a covered product not be preempted. New York State has not filed a petition to be exempt from preemption with respect to the efficiency ratings of water heaters; therefore, the minimum energy conservation standards set forth in 10 CFR Part 430 are applicable to water heaters.

Therefore, water heaters, as defined in 10 CFR §430.2, must comply with the minimum uniform energy factor (UEF) for water heaters set forth in the [Table in 10 CFR §430.32\(d\)](#).

The Table in 10 CFR §430.32(d) is created by the DOE and published in [Federal Register/Vol. 81, No 250](#). It is reproduced below as a convenience to the users of the 2020 ECCCNYS. However, the legally binding provisions are found on the DOE website and are subject to change. For more information about how the values were obtained please consult [10 CFR Part 430 Appendix E](#).

Product class	Rated storage volume and input rating (if applicable)	Draw pattern	Uniform Energy Factor (UEF)
Gas-fired Storage Water Heater	≥20 gal and ≤55 gal	Very Small	$0.3456 - (0.0020 \times Vr)$
		Low	$0.5982 - (0.0019 \times Vr)$
		Medium	$0.6483 - (0.0017 \times Vr)$
		High	$0.6920 - (0.0013 \times Vr)$
	>55 gal and ≤100 gal	Very Small	$0.6470 - (0.0006 \times Vr)$
		Low	$0.7689 - (0.0005 \times Vr)$
		Medium	$0.7897 - (0.0004 \times Vr)$
		High	$0.8072 - (0.0003 \times Vr)$
Oil-fired Storage Water Heater	≤50 gal	Very Small	$0.2509 - (0.0012 \times Vr)$
		Low	$0.5330 - (0.0016 \times Vr)$
		Medium	$0.6078 - (0.0016 \times Vr)$
		High	$0.6815 - (0.0014 \times Vr)$
Electric Storage Water Heaters	≥20 gal and ≤55 gal	Very Small	$0.8808 - (0.0008 \times Vr)$
		Low	$0.9254 - (0.0003 \times Vr)$
		Medium	$0.9307 - (0.0002 \times Vr)$
		High	$0.9349 - (0.0001 \times Vr)$
	>55 gal and ≤120 gal	Very Small	$1.9236 - (0.0011 \times Vr)$
		Low	$2.0440 - (0.0011 \times Vr)$
		Medium	$2.1171 - (0.0011 \times Vr)$
		High	$2.2418 - (0.0011 \times Vr)$
Tabletop Water Heater	≥20 gal and ≤120 gal	Very Small	$0.6323 - (0.0058 \times Vr)$
		Low	$0.9188 - (0.0031 \times Vr)$
		Medium	$0.9577 - (0.0023 \times Vr)$
		High	$0.9884 - (0.0016 \times Vr)$
Instantaneous Gas-fired Water Heater	<2 gal and >50,000 Btu/h	Very Small	0.8
		Low	0.81
		Medium	0.81
		High	0.81
Instantaneous Electric Water Heater	<2 gal	Very Small	0.91
		Low	0.91
		Medium	0.91
		High	0.92

Grid-Enabled Water Heater	>75 gal	Very Small	$1.0136 - (0.0028 \times Vr)$
		Low	$0.9984 - (0.0014 \times Vr)$
		Medium	$0.9853 - (0.0010 \times Vr)$
		High	$0.9720 - (0.0007 \times Vr)$

* Vr is the Rated Storage Volume (in gallons), as determined pursuant to 10 CFR 429.17.



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