



**BSR/ASHRAE/IES Addendum ah
to ANSI/ASHRAE/IES Standard 90.1-2019**

Public Review Draft

Proposed Addendum ah to Standard 90.1-2019, Energy Standard for Buildings Except Low-Rise Residential Buildings

**First Public Review (May 2021)
(Draft Shows Proposed Changes to Current Standard)**

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FOREWORD

This addendum is to Section 7.5.3, which sets minimum thermal efficiency (E_t) requirements for high-capacity gas-fired water heaters in new buildings. It applies only when the total input capacity of that equipment exceeds 1,000,000 Btu/h (293 kW). The proposed changes include:

- Where a single high-capacity water heater supplies a system or there are multiple high-efficiency water heaters supplying a single system, the minimum E_t is now 92%.
- Left unchanged is the requirement that when there is a mix of high- and standard-efficiency water heaters supplying a system, the total input capacity-weighted E_t must be 90% or higher, but the language has been revised for clarity.

Clear criteria have been established for high-capacity water heaters.

Commercial water heaters that in the United States are regulated by the US Department of Energy (US DOE) under 10 CFR Part 431. These are the definitions of the products from the regulation:

- Gas-fired instantaneous water heaters with a rated input both greater than 200,000 Btu/h and not less than 4,000 Btu/h per gallon of stored water; or,
- Gas-fired storage water heaters with a rated input both greater than 105,000 Btu/h and less than 4,000 Btu/h per gallon of stored water.

These definitions are used to describe “high-capacity gas-fired service water heating equipment.” Service water heaters that are not included are consumer products regulated under 10 CFR Part 430 and “residential-duty commercial water heaters” as defined in 10 CFR Part 431. These products are rated using the Uniform Energy Factor, which cannot be readily compared to E_t .

Other changes:

- The abbreviation E_t is not a defined term, but has been improperly italicized as if it were in Section 3.3 and Section 7.5.3. This proposal removes the italicization. Future addenda will address other places where E_t is italicized.
- Editorial corrections for capitalization and hyphenation.
- The exception for buildings that use site-solar or on-site recovered energy has been deleted since there are now general provisions covering renewables in other parts of the standard.

Cost justification:

This proposal is not expected to increase the cost of construction. Neither US DOE’s Compliance Certification Database nor AHRI’s Certification Database includes any commercial gas-fired storage water heaters rated in the range from 90% to <92% thermal efficiency (E_t). There are only four model numbers of commercial gas-fired instantaneous water heaters rated in the range from 90% to <92% E_t . Three of these models are part of a

product line with a range of E_t from 87% to 90%, and the manufacturer's literature lists all models in that line at 87% E_t , leaving only one model number from one manufacturer. That model has a maximum input of 250,000 Btu/h.

A similar proposal was approved for the 2021 version of the International Energy Conservation Code. The proposal did not receive any public comments.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~striketrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum ah to 90.1-2019

Modify the standard as follows (I-P and SI Units)

Make the following changes in Section 3.3 - Abbreviations and Acronyms:

...
 ~~E_t~~ E_t thermal efficiency
...

Make the following changes in Section 7.5.3:

7.5.3 Large Buildings with High-Capacity Service Water-Heating Systems

New buildings with ~~gas service water-heating systems~~ with a total installed ~~gas water-heating~~ input capacity of 1,000,000 Btu/h (293 kW) or greater; provided by high-capacity ~~shall have gas-fired service water-heating equipment~~ service water-heating equipment shall meet either or both of the following requirements:

- a. Where a single unit of high-capacity gas-fired service water-heating equipment is installed, it shall have with a minimum thermal efficiency (E_t ~~E_t~~) of 92%.
- b. Multiple units of high-capacity gas-fired service water-heating water-heating equipment connected to the same service water-heating system shall have ~~are allowed to meet this requirement if the water-heating input provided by equipment with thermal efficiency (E_t) above and below 90% provides an total input capacity-weighted average thermal efficiency (E_t) of at least 90% and a minimum of 30% of the input of the high-capacity gas-fired service water-heating equipment in the service water heating-system shall have a thermal efficiency (E_t) of at least 92%.~~

High-capacity gas-fired service water-heating equipment is comprised of gas-fired instantaneous water heaters with a rated input both greater than 200,000 Btu/h (58.6 kW) and not less than 4,000 Btu/h per gallon (310 W per litre) of stored water, and gas-fired storage water heaters with a rated input both greater than 105,000 Btu/h (30.8 kW) and less than 4,000 Btu/h per gallon (310 W per litre) of stored water.

Exception to 7.5.3

- ~~1. Where 25% of the annual service water-heating requirement is provided by on-site renewable energy or site-recovered energy.~~
 1. Water heaters installed in individual dwelling units.
 2. Individual gas water heaters with input capacity not greater than 100,000 Btu/h (29.3 kW).
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