ADDENDA

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

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

Approved by ASHRAE and by the American National Standards Institute on November 28, 2025; and by the Illuminating Engineering Society on November 13, 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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ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

ASHRAE Standards are prepared by a Project Committee appointed specifically for the purpose of writing the Standard. The Project Committee Chair and Vice-Chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Standard. Every effort is made to balance the concerned interests on all Project Committees.

The Senior Manager of Standards of ASHRAE should be contacted for

a. interpretation of the contents of this Standard,
b. participation in the next review of the Standard,
c. offering constructive criticism for improving the Standard, or
d. permission to reprint portions of the Standard.

(This foreword 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.)

FOREWORD

Gas-fired heat pumps for water heating is an emerging technology that can reduce natural gas or propane consumption for users. This equipment can achieve a coefficient of performance (COP) greater than 100%, even in cold temperatures, which exceeds even the most efficient service water-heating boilers. The existing language in the standard does not recognize gas-fired heat pumps in either Section 7.5.3, "Large Gas-Fired Service Water-Heating Systems," which requires higher than minimum efficiencies for large-capacity systems, or the energy credits in Section 11.5.2.3.1, "Improved Service Water-Heating Effectiveness."

Addendum dm,

- *adds ANSI/ASHRAE Standard 118.1-2022 and ANSI/ASHRAE Standard 118.2-2022 as testing methods for gas-fired heat-pump water heaters, with the rating point at 50°F;*
- *inserts text into Section 7.5.3 that allows the use of gas-fired heat pumps to meet the requirements of that section; and*
- *expands Section 11.5.2.3.1 to allow the use of gas-fired heat-pump water heaters, and provides a path for additional credits for equipment that exceeds the 95 E_t threshold.*

This addendum provides an additional path to meet high-efficiency gas service water-heating requirements and does not increase the cost of construction unless users select gas-fired heat-pump water heaters.

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 dm to Standard 90.1-2022

Modify Section 3.2 as shown.

high-capacity gas-fired service water-heating equipment: gas-fired instantaneous water heaters with a rated input both greater than 200,000 Btu/h (56.8 kW) and not less than 4000 Btu/h per gallon (310 W per liter) 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 4000 Btu/h per gallon (310 W per liter) of stored water, and gas-fired heat-pump water heaters with an input capacity greater than 50,000 Btu/h (14.2 kW).

Add new Section 7.4.7 to Section 7.4 (I-P and SI) as follows:

7.4.7 Performance Rating of Gas-Fired Heat-Pump Water Heaters. The COP of gas-fired heat-pump water heaters with an input capacity greater than 20,000 Btu/h (21.1 MJ/h) shall be rated at 50°F (10°C) ambient air temperature in accordance with ASHRAE Standard 118.1. The COP of gas-fired heat-pump water heaters with an input capacity of not more than 20,000 Btu/h (21.1 MJ/h) shall be rated at 67.5°F (19.7°C) ambient air temperature in accordance with ANSI/ASHRAE 118.2.

[. . .]

7.5.3 Large Gas-Fired Service Water-Heating Systems. New buildings with service water-heating systems with a total installed input capacity of 1,000,000 Btu/h (293 kW) or greater, provided by *high-capacity gas-fired service water-heating equipment* not installed in individual dwelling units, shall meet ~~either or both~~ the following requirements:

a. Where a single unit of ~~high-capacity gas-fired~~ *high-capacity gas-fired service water-heating equipment* is installed, it shall have a minimum thermal efficiency (E_t) of 92%.

b. Multiple units of ~~high-capacity gas-fired~~ *high-capacity gas-fired service water-heating equipment* connected to the same service water-heating system shall have a total input capacity-weighted average thermal efficiency (E_t) of ~~at least~~ not less than 90%, and a minimum of 30% of the input of the ~~high-capacity gas-fired~~ *high-capacity gas-fired water-heating equipment* in the service water heating system shall have a thermal efficiency (E_t) of ~~at least~~ not less than 92%.

c. Where gas-fired heat-pump water heaters are used, they shall be rated in accordance with Section 7.4.7 and, for the purpose of this section, E_t shall be the rated COP expressed in percent.

~~High-capacity gas-fired service water-heating equipment comprises gas-fired instantaneous water heaters with a rated input both greater than 200,000 Btu/h and not less than 4000 Btu/h per gallon of stored water, and gas-fired storage water heaters with a rated input both greater than 105,000 Btu/h and less than 4000 Btu/h per gallon of stored water.~~

~~Exceptions to 7.5.3:~~

1. ~~Water heaters installed in individual dwelling units.~~
2. ~~Individual gas water heaters with input capacity not greater than 100,000 Btu/h.~~

[. . .]

11.5.2.3.1 Improved Service Water Heating Effectiveness. *Service water heating* effectiveness *energy* credits are permitted to be achieved in *building* use types where credits are available in Section 11.5.3 for one of the following:

[. . .]

b. **W02: Electric Heat-Pump Water Heater.** To achieve this credit, electric air source heat-pump *water heater*s shall be installed according to the *manufacturer*'s instructions, and at least 30% of design end-use *service water heating* requirements shall be met using only heat-pump heating at an ambient condition of 67.5°F (19.7°C) db without supplemental *electric resistance* or *fossil fuel* heating. For a hybrid heat-pump *water heater*, the heat-pump-only capacity shall be deemed at 40% of the first hour draw. Where the heat-pump-only capacity exceeds 50% of the design end-use load, excluding *recirculating system* losses, the credits from the Section 11.5.3 tables shall be prorated as follows:

$$EC_{W02\_calc} = EC_{W02\_base} \times \frac{Cap_{HPWH}}{EndLoad \times 0.5} \qquad \text{(not greater than 2)}$$

where

EC_{W02_calc} = *energy* credits achieved for heat-pump *water heater*

EC_{W02_base} = W02 base *energy* credit from Section 11.5.3

Cap_{HPWH} = heat-pump-only capacity at 50°F (10°C) entering air and 70°F (21°C) without supplemental *electric resistance* or *fossil fuel* heat, Btu/h (*kW*)

EndLoad = end-use peak hot-water load, excluding load for *heat trace* or recirculation, Btu/h (*kW*)

The heat-pump *service water heating system* shall comply with the following requirements:

1. For central *systems* with an installed total output capacity of more than 100,000 Btu/h (30 *kW*) at an ambient condition of 67.5°F (19.7°C) db, a preheat storage tank with ≥0.75 gal per 1000 Btu/h (9.7 L/*kW*) of design end-use *service water heating* requirements shall be heated only with heat-pump heating when the ambient temperature is~~>~~ more than 45°F (7.2°C).
2. For *systems* with *piping* temperature maintenance, either a *heat trace system* or a separate *water heater* in series for *recirculating system* and final heating shall be installed.
3. Heat-pump *water heater efficiency* shall meet or exceed one of the following:
   i. Output-capacity-weighted-average uniform *energy factor* (UEF) of 3.0 with a medium draw pattern in accordance with 10 CFR 430 Appendix E.
   ii. Output-capacity-weighted-average COP of not less than 4.0 tested at 50°F (10°C) entering air and 70.0°F (21.1°C) entering water in accordance with AHRI Standard 1300 (AHRI Standard 1301).

   Informative Note: *Service water heating system* control settings and operating temperatures should be determined in accordance with the ASHRAE Standard 188 *building* water *systems* water management program for the *building* or with *generally accepted engineering standards* and guidance (e.g., ASHRAE Guideline 12).

c. **W03: Efficient Gas Water Heater.** To achieve this credit, the combined input-capacity-weighted-average *equipment* rating of all gas water heating *equipment* in the *building* shall be not less than 95% E_t or 0.93 UEF. Gas-fired heat-pump water heaters shall be rated in accordance with Section 7.4.7. For the purpose of this section, the E_t of gas-fired heat-pump water heaters with an input capacity of more than 20,000 Btu/h (5.68 kW) shall be the rated COP expressed in percent.

Buildings required to comply with Section 7.5.3 shall receive 29.6% of the Section 11.5.3 W03 credit. *Buildings* where the installed *service water heating* capacity is less than 200,000 Btu/h (59 *kW*) and weighted UEF is not less than 0.82 shall achieve 25% of the base table W03 credit.

For gas-fired water heating equipment that exceeds 95% E_t or 0.93 UEF, credits shall be adjusted according to the following equation:

$$EC_{W03\_adj} = EC_{W03\_base} \times E_{t,des} / E_{t,min}$$

where

EC_{W03_adj} = adjusted energy credits

EC_{W03_base} = base energy credits from Tables 11.5.3-1 through 11.5.3-9

$E_{t,des}$ = rated efficiency of proposed water heating equipment

$E_{t,min}$ = 95% E_t or 0.93 UEF as applicable to the gas-fired service water heating equipment

d. Combination *service water heating systems* shall achieve credits as follows:
   1. (W01 + W02) Where *service water heating* employs both *energy* recovery and heat-pump water heating, W01 is permitted to be combined with W02 and receive the sum of both credits.
   2. (W01 + W03) Where *service water heating* employs both *energy* recovery and efficient gas water heating, W01 is permitted to be combined with W03 and receive the sum of the W01 credit and the portion of the W03 credit based on item (4).
   3. (W02 + W03) Where *service water heating* employs both heat-pump water heating and efficient gas water heating, W02 is permitted to be combined with W03 and receive the sum of the W02 credit and the portion of the W03 credit based on item (4).
   4. For items (2) and (3), the portion of W03 credit shall be the Section 11.5.3 W03 credit multiplied by the share of total water heating installed capacity served by gas water heating with not less than 95% E_t or 0.93 UEF. In no case shall it exceed 60% of the W03 credit in Section 11.5.3. In *buildings* that have a *service water heating* design generating capacity greater than 900,000 Btu/h (260 *kW*), that proportioned W03 credit shall be further multiplied by 29.6%.

Modify Section 13 as shown (I-P and SI).

Reference		Section
[. . .]		
ASHRAE **180 Technology Parkway, Peachtree Corners, GA 30092**		
[. . .]		
ANSI/ASHRAE 118.1-2022	Method of Testing for Rating Commercial Gas, Electric, and Oil Service Water-Heating Equipment	7.4.7
ANSI/ASHRAE 118.2-2022	Method of Testing for Rating Residential Water Heaters and Residential-Duty Commercial Water Heaters	7.4.7
[. . .]		

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating Standards and Guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

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As an industry leader in research, standards writing, publishing, certification, and continuing education, ASHRAE and its members are dedicated to promoting a healthy and sustainable built environment for all, through strategic partnerships with organizations in the HVAC&R community and across related industries.

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11/25