ANSI/ASHRAE/ICC/USGBC/IES Addendum ai to ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2017

Standard for the Design of High-Performance Green Buildings

Except Low-Rise Residential Buildings

The Complete Technical Content of the International Green Construction Code®

Approved by the ASHRAE Standards Committee on February 1, 2020; by the ASHRAE Board of Directors on February 5, 2020; by the International Code Council on January 17, 2020; by the U.S. Green Building Council on February 4, 2020; by the Illuminating Engineering Society on January 24, 2020; and by the American National Standards Institute on February 6, 2020.

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 (www.ashrae.org/continuous-maintenance).

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FOREWORD

ASHRAE/IES Standard 90.1, Section 7.5.3, sets the efficiency of high-capacity service hot-water equipment at 0.90 E_t. While federal minimums and boiler markets have advanced since this provision was introduced into Standard 90.1, this provision has not been updated. Therefore, the performance premium that this provision requires has eroded over time. This creates a particular issue in Standard 189.1 because the requirements in Table B-6 for the Alternate Renewables Approach fall below the requirement for high-capacity systems in all cases. Additionally, at the committee hearings for the 2021 IECC held in Albuquerque in May, the commercial committee voted to approve a proposal that updates the high-capacity service hot-water efficiency requirement from 0.90 to 0.92 E_t, effectively raising the base code above Standard 189.1.

The underlying requirement from Standard 90.1 has two additional issues. First, it is restricted to gas equipment. Second, it is structured to specifically exclude water heaters in dwelling units and water heaters smaller than a standard residential water heater. While multiple boilers with a combined capacity trigger the Standard 90.1 requirement, multiple individual water heaters or boilers limited to single dwelling units do not. This has a substantial impact on multifamily applications. Water heating is one of the largest loads in R-1 (hotels) and R-2 (multifamily) occupancies. It comprises around 25% to 35% of the total building load in typical multifamily buildings. As a consequence, under Standard 90.1, multifamily buildings with individual water heaters have substantially less-efficient water heating systems than multifamily buildings with large central gas boilers.

Addendum ai addresses these issues. It raises the requirement for gas-fired equipment and eliminates the exception for small water heaters or water heaters in dwelling units, expanding the application to multifamily and hotel projects with individual water heaters. For projects that exceed the whole-building threshold, regardless of whether it is using gas or electric equipment and regardless of whether it is using central or distributed equipment, the equipment will need to meet a higher efficiency requirement. However, it retains the 1,000,000 Btu/h threshold used in Standard 90.1 for consistency.

The requirement for gas-fired high-capacity water heating equipment in Standard 90.1 exceeds the minimums from Table 7.8 by 12.5%. This requirement increases that performance premium to 15%, i.e., 92% E_t. This improvement can be met without making major technology shifts, because achieving a 90% E_t already generally requires condensing technology. Of the 2782 listed boilers that meet the 1,000,000 Btu/h threshold, 852 meet the existing 90% requirement and 792 meet a requirement of 92% E_t, so market availability will be only minimally impacted. The efficiency levels for other equipment types are consistent with the same 15% performance premium. The target COP of 2.0 for larger heat-pump water heaters was based on a Washington state proposal setting similar requirements for large water heating equipment.

Like Standard 90.1, this addendum maintains an exception for renewable energy but adds solar thermal and waste heat recovery. The exception in this new provision includes language that precludes double-counting renewable energy for both this exception and for the pending onsite renewable energy requirements of Section 7.4.1.1.

Savings for this proposal are significant. Using the high-rise multifamily model developed by Pacific Northwest National Lab's determination study of the 2015 IECC, savings from this addendum would range from 2.3% to 4.0% whole-building energy savings, depending on climate zone for buildings with large gas-fired boilers already subject to the 0.90 E_t requirement. For other projects, the savings are even more significant. When applied to the IECC-2015 midrise multifamily model developed by PNNL, savings for similar performance premiums resulted in 4% to 13%, depending on climate zone. Because the Standard 189.1 baseline is significantly more stringent than IECC-2015, the savings for Standard 189.1 could be even greater.

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 ai to Standard 189.1-2017

Add new Section 7.4.4.2 and renumber subsequent sections.

7.4.4.2 Buildings with High-Capacity Service Water Heating Systems. This section supersedes ANSI/ASHRAE/IES Standard 90.1, Section 7.5.3. New buildings with *service water heating* systems with a total installed water heating input capacity of 1,000,000 Btu/h (300 kW) or greater shall meet the following:

a. Fuel-burning water heating equipment shall have a minimum rated efficiency of 0.92 E_t or 0.92 UEF.
b. Electric water heating equipment shall have a minimum rated efficiency of 2.4 UEF or 2.0 COP.

Multiple units of water heating equipment of the same type, fuel-burning or electric, shall be allowed to meet this requirement based on an input-capacity-weighted average of rated efficiency.

Exceptions to 7.4.4.2:

1. Buildings provided with any combination of *on-site renewable energy systems* or waste heat recovery systems capable of providing not less than 25% of the total water heating load, not including *on- site renewable energy system* capacity used for compliance with any other section of this standard.
2. Water heaters installed in individual dwelling units.

7.4.4.~~2~~3 Insulation for Spa Pools

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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.

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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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Standard 189.1 and the International Green Construction Code

Standard 189.1 serves as the complete technical content of the International Green Construction Code® (IgCC). The IgCC creates a regulatory framework for new and existing buildings, establishing minimum green requirements for buildings and complementing voluntary rating systems. For more information, visit www.iccsafe.org.

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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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