

**ANSI/ASHRAE/ICC/USGBC/IES Addendum ai to  
ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2020**

# 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 ASHRAE and the American National Standards Institute on April 28, 2023; by the International Code Council on March 23, 2023; by U.S. Green Building Council on March 29, 2023; and by the Illuminating Engineering Society on April 5, 2023.

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](http://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.

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## FOREWORD

*Standard 189.1 Section 7, “Energy Efficiency, is in addition to or supersedes the requirements in Standard 90.1. Addendum ai updates Standard 189.1 to account for the changes to Standard 90.1-2022, which includes a new additional efficiency energy credit section (Section 11). The value of one credit is the reduction of total building energy cost by 0.1% based on national average energy prices used for Standard 90.1 analysis. For most new buildings, the target is 50 points, or an added 5% in energy efficiency (i.e., a 5% reduction in operational energy cost). The energy credit requirements are justified based on selection of a package of measures that meet the requirement and are cost effective for each building use type and climate zone. The changes in Standard 90.1 are similar to the additional efficiency requirements in Section C406 of IECC, which was introduced in 2012 and has been updated to a points based approach since 2021.*

*The added efficiency requirements will usually increase the cost of the building; however, combination of credits available were found to be cost effective for all building types and climate zones<sup>1</sup>.*

*Addendum ai adds a new Section 7.5 to Standard 189.1 that describes the modifications to the additional energy efficiency credit requirements in Standard 90.1 Section 11, so the additional efficiency credits are additional to the Standard 189.1 baseline. Current Standard 189.1 Section 7.5, “Performance Method,” is renumbered Section 7.6. The modifications to new Standard 90.1 Section 7.5 are necessary, as several additional efficiency measures in Standard 90.1 receive credit that are already required as mandatory or prescriptive requirements in Standard 189.1. Because the measures are already in the base Standard 189.1, they do not receive credit in Section 7.5. Examples include lighting controls for multifamily buildings, efficient kitchen equipment, and load management controls. The credit associated with other additional efficiency measures are modified so that the additional efficiency is calculated relative to a higher efficiency base case. As an example, the lighting power densities in Standard 189.1 are more stringent than those in Standard 90.1; as a result, the credit for lighting power reduction is with respect to the lighting power densities in Standard 189.1 and not those in Standard 90.1.*

*Addendum ai is an add-on to the prescriptive path. Also added is a jurisdictional option that would require 110% of the points required by Standard 90.1 (i.e., 55 points instead of the 50 points required by Standard 90.1 for most occupancies). This jurisdictional option is similar to many local reach codes, which have higher levels of stringency to align with local efficiency policies.*

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

## Addendum ai to Standard 189.1-2020

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1. More information on the development of the credit points and cost effectiveness can be found in *90.1 Energy Credits Analysis Documentation: 90.1-2019 Addendum AP* ([www.energycodes.gov/sites/default/files/2022-01/901-TSD\\_Energy-Credits\\_PNNL-32516.pdf](http://www.energycodes.gov/sites/default/files/2022-01/901-TSD_Energy-Credits_PNNL-32516.pdf)).

**Revise Section 4, Table 4.2 as shown.**

**Table 4.2 Requirements Determined by the Jurisdiction** (Normative in the IgCC)

Section	Section Title, Description and Directives	Jurisdictional Requirement
[...]		
7.5.1.1	Higher Energy Credits Required	<input type="checkbox"/> No
<del>7.5.4</del>	Energy Simulation Aided Design	<input type="checkbox"/> No
[...]		

**Revise Section 7 as shown (sections not shown are not changed by this addendum):**

**7. ENERGY EFFICIENCY**

**7.1 Scope.** This section specifies requirements for energy efficiency for buildings and appliances, for *on-site renewable energy systems*, and for energy measuring.

**7.2 Compliance.** The energy systems shall comply with Section 7.3, “Mandatory Provisions,” and either

- a. Section 7.4, “Prescriptive Option” and Section 7.5, “Modified Additional Energy Requirements” or
- b. Section ~~7.6~~ 7.5, “Performance Option.”

**Insert new Section 7.5 as shown. Renumber existing Section 7.5 as Section 7.6, and renumber subsections accordingly. Note: Underline is omitted from equations for readability. All equations are new text.**

**7.5 Modified Additional Efficiency Requirements** *Building projects shall be designed to comply with ANSI/ASHRAE/IES Standard 90.1 Section 11 with the modifications contained in this section.*

**7.5.1 Energy Credits Required.** Projects shall achieve not less than 105% of the total of credits required by ANSI/ASHRAE/IES Standard 90.1 Section 11.5.1.

**[JO] 7.5.1.1 Higher Energy Credits Required.** Projects shall achieve not less than 110% of the total of credits required by of ANSI/ASHRAE/IES Standard 90.1 Section 11.5.1.

**7.5.2 Energy Credits Achieved.** Energy credits achieved for the project shall be calculated in accordance with ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2, except where superseded by the requirements of this section.

**7.5.2.1 E01: Improved Envelope Performance.** To achieve this credit, *building envelope measures shall be installed to improve the energy performance of the project. Measure energy credits for improvement of the building envelope energy performance shall be determined based on the following:*

$$EC_{ENV} = 1000 \times \frac{EPF_B - EPF_P}{EPF_B}$$

where

$EC_{ENV}$  ≡ measure energy credits

$EPF_B$  ≡ *base envelope performance factor calculated in accordance with ANSI/ASHRAE/IES Standard 90.1 Appendix C but with opaque envelope and fenestration U-factors reduced by 5%, fenestration SHGC reduced by 5%, and air leakage rate of the building envelope ( $I_{75Pa}$ ) at a fixed building pressure differential of 75 Pa (0.30 in. of water) shall be 0.25 cfm/ft<sup>2</sup> (1.25 L/s·m<sup>2</sup>).*

$EPF_P$  ≡ *proposed envelope performance factor calculated in accordance with ANSI/ASHRAE/IES Standard 90.1 Appendix C*

**7.5.2.2 Improved HVAC Performance.** Same as ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.2 for all measures H01 through H06.

**7.5.2.3 Reduced Energy Use in Service Water Heating.** Same as ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.3 for all measures W01 through W09.

**7.5.2.4 P01: Energy Monitoring.** The energy credits for energy monitoring in ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.4 used for compliance with Section 7.5 shall be limited to buildings with an electrical service no greater than 200 kVA.

### **7.5.2.5 Lighting Efficiency Measures**

#### **7.5.2.5.1 L01: Lighting System Performance Improvement (Reserved)**

**7.5.2.5.2 L02: Continuous Dimming and High-End Trim Tuning.** Same as ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.5.2.

**7.5.2.5.3 L03: Occupancy Sensor Control Areas.** Same as ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.5.3.

**7.5.2.5.4 L04: Increased Daylighting Control Area.** For office buildings and education buildings, the energy credits in ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.5.4 shall not be used for compliance with Section 7.5. For all other building types, the energy credit is same as in ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.5.4.

**7.5.2.5.5 L05: Lighting Control for Multifamily Buildings.** The energy credits associated with lighting control for multifamily buildings in ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.5.5 shall not be used for compliance with Section 7.5.

**7.5.2.5.6 L06: Reduce Interior Lighting Power.** To achieve this credit, the *installed interior lighting power*, less any additional lighting allowed, shall be 95% or less than the *interior lighting power allowance*, less any additional lighting allowed. In multifamily, dormitory, hotel, and motel buildings, the credit is calculated for common areas other than *dwelling units* and guest rooms. Energy credits shall not be greater than three times the L06 base credit from ANSI/ASHRAE/IES Standard 90.1 Section 11.5.3 as follows:

$$EC_{LPA} = EC_5 \times 20 \times \frac{LPA_n - LP_n}{LPA_n}$$

where

$EC_{LPA}$  = additional energy credit for lighting power reduction

$LP_n$  = net installed interior lighting power calculated in accordance with ANSI/ASHRAE/IES Standard 90.1 Sections 9.1.3 and 9.14, in watts, less any additional lighting in ANSI/ASHRAE/IES Standard 90.1 Section 9.6.2

$LPA_n$  = net interior lighting power allowance calculated in accordance with the method used to meet the requirements of Section 7.4.6.1, in watts, less any additional interior lighting allowance in Section 7.4.6.1 or Section 7.4.6.1.2.

$EC_5$  = L06 base credit from ANSI/ASHRAE/IES Standard 90.1 Section 11.5.3

**7.5.2.6 R01: On-Site Renewable Energy.** To achieve this credit, the total minimum ratings of *on-site renewable energy* systems in addition to the requirements of Section 10.5.1.1 shall be not less than 0.1 W/ft<sup>2</sup> (1.1 W/m<sup>2</sup>) of *gross floor area*. Additional energy credits shall be determined as follows:

$$AEC_{RRa} = AEC_{0.1} \times \frac{RR_t - RR_r}{0.1 \times BGFA}$$

where

$AEC_{RRa}$  = achieved energy credits for this project

$RR_t$  = actual total minimum rating of on-site renewable energy systems, W

$RR_r$  = minimum rating of on-site renewable energy systems required by Section 7.3.2, in watts, without exception

$BGFA$  = project gross floor area

$AEC_{0.1}$  = ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.6 base credits from ANSI/ASHRAE/IES Standard 90.1 Section 11.5.3

**Informative Note:** Onsite renewable energy may include thermal service water heating or pool water heating, in which case ratings in Btu/h can be converted to W, where  $W = \text{Btu/h}/3.413$ .

### **7.5.2.7 Equipment Efficiency Measures**

**7.5.2.7.1 O01: Efficient Elevator Equipment.** The energy credits for efficient elevator equipment available for compliance with Section 7.5 shall be limited to buildings where all elevators have a rise of less than 75 ft (23 m). Equipment qualifications and energy credits shall be the same as in ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.7.1.

**7.5.2.7.2 O02: Efficient Kitchen Equipment.** The energy credits for energy monitoring in ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.7.2 shall not be used for compliance with Section 7.5.

**7.5.2.7.3 O03: Fault Detection and Diagnostics System.** The energy credits for fault detection and diagnostics in ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.7.3 used for compliance with Section 7.5 shall be limited to buildings with a gross floor area less than 25,000 ft<sup>2</sup> (2500 m<sup>2</sup>) or residential buildings with less than 10,000 ft<sup>2</sup> (1000 m<sup>2</sup>) of common area.

#### **7.5.2.8 Load Management Systems**

**7.5.2.8.1 G01: Lighting Load Management.** The energy credits associated with lighting load management in ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.8.1 used for compliance with Section 7.5 shall be limited to buildings with a gross conditioned floor area less than 5000 ft<sup>2</sup> (500 m<sup>2</sup>).

**7.5.2.8.2 G02: HVAC Load Management.** The energy credits associated with HVAC load management in ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.8.2 used for compliance with Section 7.5 shall be limited to buildings with a gross conditioned floor area less than 5000 ft<sup>2</sup> (500 m<sup>2</sup>).

**7.5.2.8.3 G03: Automated Shading Load Management.** Same as ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.8.3.

**7.5.2.8.4 G04: Electric Energy Storage.** Same as ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.8.4.

**7.5.2.8.5 G05: HVAC Cooling Energy Storage.** Same as ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.8.5.

**7.5.2.8.6 G06: Service Hot-Water Thermal Storage.** Same as ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.8.6.

**7.5.2.8.7 G07: Building Thermal Mass.** Same as ANSI/ASHRAE/IES Standard 90.1 Section 11.5.2.8.7.

**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.

### **Standard 189.1 and the International Green Construction Code**

Standard 189.1 serves as the complete technical content of the International Green Construction Code<sup>®</sup> (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](http://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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