

ANSI/ASHRAE/ICC/USGBC/IES Addendum t 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 the ASHRAE Standards Committee on July 26, 2023; by the International Code Council on July 24, 2023; by the the Illuminating Engineering Society on July 25, 2023; by U.S. Green Building Council on July 20, 2023; and by the American National Standards Institute on August 30, 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).

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ISSN 1041-2336



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Cognizant TC: 2.8 Building Environmental Impacts and Sustainability

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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

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- offering constructive criticism for improving the Standard, or
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FOREWORD

Indoor agriculture energy use is projected to grow significantly nationwide in this decade, driven in large part by state legalization of medical and recreational marijuana and growing demand for locally grown produce. In 2017, a total of 20 million square feet of building space was dedicated to growing crops indoors, which can have energy use intensities that rival data centers. Energy use in these facilities is dominated by lighting systems, which accounts for 25% to 70% of the facilities energy use, and HVAC and dehumidification systems, which accounts for the bulk of the remaining energy use. Addendum t addresses the energy use of these facilities in three ways.

- a. *Adds additional lighting efficacy and renewable energy requirements to these facilities. Lighting in non-stacked indoor operations operate on average 4600 hours per year, or 12 hours per day. Proposed Addendum ar to ASHRAE/IES Standard 90.1, which concluded its first public review November of 2021, establishes efficacy requirements for lighting in indoor horticulture at 1.9 PPE and 1.7 PPE for greenhouses. This change increases the efficacy requirement to 2.1 PPE. 92% of LED products that meet the design light consortium criteria already meet an efficacy of 2.1 PPE, which is a 10% savings over a 1.9 PPE standard and 20% savings over a 1.7 PPE standard. This change also requires lighting from these facilities be provided by renewable energy to account for increased carbon emissions from indoor grow and greenhouse facilities compared with growing crops outdoors. This measure will increase construction costs but reduce operating costs.*
- b. *Adds a compliance option pointing to Section 7.4.1.2 and 7.4.1.3 for the purchase of renewable energy to offset the additional energy use in greenhouses or indoor grow spaces. This change will not increase the cost of construction.*
- c. *The committee ultimately decided not to include an exception to the renewable energy requirement for greenhouses and grow facilities dedicated to food for human consumption.*

Informative 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 t to Standard 189.1-2020

Modify Section 3 as shown.

greenhouse: a space with a skylight roof ratio of 50% or more above the growing area, used exclusively for horticultural production, cultivation, or maintenance by utilizing a sunlit environment, that is erected for a period of 180 days or more.

horticultural lighting: electric lighting used for horticultural production, cultivation, or maintenance with either cord-and-plug or hard-wired connections for electric power.

indoor grow space: a space, other than a greenhouse, used exclusively for horticultural production, cultivation, or maintenance.

photosynthetic photon efficacy (PPE): photosynthetic photon flux between 400 and 700 nm emitted by a light source divided by its electrical input power, expressed in units of micromoles per second per watt ($\mu\text{mol/s/W}$) (micromoles per joule [$\mu\text{mol/J}$]) as defined by ANSI/ASABE S640.

Add new Section 7.3.6 as shown.

7.3.6 Energy Systems for Horticulture

7.3.6.1 Horticultural Lighting. Luminaires in indoor grow spaces and greenhouses used for horticultural lighting shall have a photosynthetic photon efficacy (PPE) of not less than 2.1 $\mu\text{mol/J}$.

7.3.6.2 Additional Renewable Energy. Additional renewable energy for horticultural lighting shall be provided and sized to provide the amount of adjusted renewable energy calculated in accordance with Section 7.4.1.2 and qualified in accordance with Section 7.4.1.3. The adjusted renewable energy shall be equal to or greater than the installed horticultural lighting wattage multiplied by 4600 full load hours per year for

indoor grow spaces, and the installed horticultural lighting wattage multiplied by 2100 full load hours per year for greenhouses.

Modify Section 11 as shown.

Reference	Title	Section
American Society of Agricultural and Biological Engineers (ASABE) 2950 Niles Road St. Joseph, MI 49085 USA 1-269-429-0300; www.asabe.org		
<u>ANSI/ASABE S640-2017</u>	<u>Quantities and Units of Electromagnetic Radiation for Plants (Photosynthetic Organisms)</u>	<u>3</u>

**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[®] (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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Founded in 1894, ASHRAE is a global professional society committed to serve humanity by advancing the arts and sciences of heating, ventilation, air conditioning, refrigeration, and their allied fields.

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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