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ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2023
Standard for the Design of High-Performance Green Buildings
Except Low-Rise Residential Buildings

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NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

(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

Standard 189.1 was originally published in 2009 through collaboration between ASHRAE, the Illuminating Engineering Society (IES), and the U.S. Green Building Council (USGBC). In 2015, the International Code Council (ICC) was added as an additional cosponsor of the standard, which reflected a Memorandum of Understanding signed in 2014 by ASHRAE, the American Institute of Architects (AIA), ICC, IES, and USGBC to better align green building goals through Standard 189.1, the International Green Construction Code (IgCC), and the LEED certification system. As part of that agreement, the 2023 edition of Standard 189.1 serves as the technical content of the 2024 IgCC. Prior to this agreement, the 2012 and the 2015 versions of the IgCC included Standard 189.1 as a project compliance option. This agreement only applies in the U.S. and Canada. Standard 189.1-2023 stands alone and is available as a separate document in other countries.

Like its predecessors, the 2023 edition of the standard is written in code-intended (mandatory and enforceable) language so that it may be referenced or adopted by enforcement authorities as the minimum acceptable design criteria within their jurisdiction. States and local jurisdictions within the United States that wish to adopt Standard 189.1 into law may wish to review applicable federal laws regarding preemption and related waivers available from the U.S. Department of Energy (https://energy.gov/eere/state-petitions-exemption-federalpreemption).

Building projects, which are defined in the standard to include both the building and structures and their systems, result in significant energy and environmental impacts through their design, construction, and operation. According to the United Nations Environment Programme (UNEP), the buildings and construction sector in 2021 accounted for around 37% of energy- and process-related CO_2 emissions and over 34% of energy demand globally. In a USGBC-conducted survey of green building professionals in June of 2023, responders cited passive design principles and energy efficient equipment as the most efficient strategies for building decarbonization. Building development frequently converts land from biologically diverse natural habitat (that helps manage rainwater) to impervious hardscape with reduced biodiversity. While buildings consume energy and have other environmental impacts, they exist primarily to serve occupants who live, work, and otherwise use buildings, providing significant contributions to national economies. Based on a combination of research and practical experience, it is clear that buildings can provide these services with reduced energy use, greenhouse gas emissions, water use, construction waste, heat island and light pollution effects, and impacts on the atmosphere and other resources. Analysis by the Rocky Mountain Institute (RMI) highlights a 14% reduction in carbon sequestration due to a decrease in the rate of net carbon accumulation in forests as well as an increase in CO_2 emissions from urbanization.

The far-reaching influence of buildings, and the benefits provided by high-performance green buildings, has led many organizations to pursue efforts to reduce their energy and environmental impacts as well as begin their decarbonization journey. ASHRAE and the other cosponsors are working together to support such actions. Standing Standard Project Committee (SSPC) 189.1 has contributed to building sustainability and decarbonization goals by updating this standard in response to input from the building community, the public at large, and project committee members. Compliance with the updated standard will further reduce energy and environmental impacts and accelerate decarbonization efforts. Through high-performance building design, construction, and operation, providing indoor environments that support the activities, health, and comfort of building occupants, buildings can contribute positively to local economies by providing high-quality jobs and conserving natural resources.

The project committee considers a variety of factors in developing the provisions of this standard, including published research, justification for proposals received from outside the committee, and ultimately the committee members' professional judgment. Cost-benefit assessment, while an important consideration, is not a necessary criterion for inclusion of any given requirement in the standard. However, the practicality and existing application of any new requirements are considered before they are included.

Standard 189.1 addresses site sustainability, water use efficiency, energy use efficiency, indoor environmental quality, materials and resources, and construction and plans for operation. The 2023 edition incorporates changes made by 60 separate addenda to the 2020 edition. Highlights among these changes are as follows:

a. ***General:*** *The scope of Standard 189.1 is revised to clarify its application to sites and the demolition and deconstruction of buildings. Scope is expanded to regulate, as defined by the* International Building

Code*, changes of occupancy or use in buildings, and "structures" are added to regulated elements. Standard 189.1 now includes language that the authority have jurisdiction can use to disallow improper installation of equipment in a building project. This language requires that all equipment, appliances, and devices be installed in accordance with manufacturer's instructions and the conditions of any listing. The standard also now provides direction for the regulation of used materials and equipment.*

b. ***Site:*** *With respect to electric vehicle (EV) charging infrastructure, residential EV charging requirements are now separate from nonresidential requirements. New definitions are added and provisions made for EV-capable parking spaces, and compliance options are expanded based on percentage of total parking spaces. Greenfield sites now include flexible compliance options. The definition of "building project" is revised to remove "site" as a defined term due to its generic use throughout the standard. The definition of "native plants" is revised to better meet the intent of sustainable sites.*
c. ***Water:*** *The language for landscape design is simplified and reasonable exceptions are added for select site uses and settings. Electronic leak detection is now required for buildings and certain end uses. Hot-water efficiency requirements are updated by removing the need for pipe volume calculations. Commercial kitchens are made exempt from hot-water design requirements. The definition of potable water is now in alignment with the* International Plumbing Code*.*
d. ***Energy:*** *Standard 189.1 is aligned with Standard 90.1-2022 additional efficiency credits in a new Section 7.5. Higher credit targets and resetting baselines match the mandatory and prescriptive requirements of Standard 189.1. With additional efficiency credits, the redundant alternative renewables approach is removed. Increased lighting efficiency is reflected in lower but achievable lighting power density targets for nonresidential occupancies and high lighting efficacies required in dwelling units. A jurisdictional option is added for electric-ready that requires branch circuits or raceways to be installed where fuel-fired equipment is installed. Advanced lighting requirements for indoor grow spaces and greenhouses are added and the lighting is required to be powered by renewable energy. New requirements are added for electric-water-heater demand response.*
e. *The* ***Energy Performance Option*** *is moved to Section 7.6 and includes new CO_2e and Building Performance Factor data. Compliance with three metrics is now required: PCI (7.6.1), zCEF (7.6.2), and zEPI (7.6.3). A new long-run marginal emission rates (LRMER) jurisdictional option is added with the calculation guidelines and tables in Normative Appendix D.*
f. ***Indoor Environmental Quality:*** *Soil-gas control requirements are improved to reflect current industry practices that incorporate ANSI/AARST mandated soil-gas control measures in new building construction projects. This adds new requirements associated with soil-gas testing and mitigation standards for multifamily buildings. The resilience of a building is improved with the ability to adjust ventilation quickly and easily in response to air-quality-related emergency conditions. This requirement is for a control system that will provide a centralized method of either shutting down, minimizing, or maximizing the ventilation supplied to a building in response to conditions such as nearby wildfires or chemical spills (shutdown) or a pandemic (maximize). MERV 13 filters are now required in outdoor airstreams for all buildings located in nonattainment areas.*
g. ***Materials and Resources:*** *Prescriptive and performance paths are eliminated and are now alternatives under "Material Selection." A consideration for reusing materials is added to Section 9.3. Standard 189.1 now requires submittal of environmental product declarations (EPD) for products meeting specific criteria and the reporting of total global warming potential (GWP) from those products. Clarification is made that the scope of Section 9 applies only to building projects.*
h. ***Construction and Plans for Operation:*** *Building flush-out requirements are deleted, and additional ventilation is required to be provided prior to occupancy and during initial occupancy by running the HVAC system and temporarily disabling demand-controlled ventilation. Contaminant monitoring requires monitoring of two properties for air and four contaminants during initial occupancy and providing the owner a report with graphical trends and recommendations.*

SSPC 189.1 considers and administers changes to this continuous maintenance standard and provides interpretations as requested. Proposed changes to the standard may originate within or outside of the committee. The committee welcomes proposals for improving the standard using the ANSI-approved ASHRAE continuous maintenance procedure. A continuous maintenance proposal (CMP) form can be found online at https://www.ashrae.org/standards-research--technology/standards--guidelines/continuous-maintenance and may be completed and submitted at any time. The committee takes formal action on every proposal received, which may lead to changes to the published standard. ASHRAE posts approved addenda in publication notices on the ASHRAE website. To receive notice of all public reviews, approved and published addenda, errata, interpretations, and meeting notices, ASHRAE encourages interested parties to sign up for the free ASHRAE Internet Listserv for this standard (www.ashrae.org/technical-resources/free-resources/listserves).

1. PURPOSE

1.1 The purpose of this standard is to provide minimum requirements for the siting, design, construction, and plans for operation of *high-performance green buildings* to

a. reduce emissions, enhance occupant health and comfort, conserve water, protect local biodiversity and ecosystem services, promote sustainable and regenerative materials cycles, and enhance resilience; and
b. support the goal of development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

1.2 This standard provides comprehensive requirements that can be adopted by national and local jurisdictions.

2. SCOPE

2.1 This standard addresses site sustainability, water use efficiency, energy efficiency, indoor environmental quality (IEQ), materials and resources, and construction and plans for operation. It contains requirements that apply to the following:

a. New buildings and structures and their systems
b. New portions of buildings and structures and their systems
c. New systems and equipment in existing buildings
d. Relocated existing buildings
e. The site on which the building or structure is located
f. Demolition and deconstruction of buildings and their systems
g. Change of occupancy classification or use

2.2 The provisions of this standard do not apply to the following:

a. Single-family houses, multifamily structures of three stories or fewer above grade, manufactured houses (mobile homes), and manufactured houses (modular)
b. *Building projects* and structures that use none of the following:
    1. Electricity
    2. Fossil fuel
    3. Water

2.3 The requirements in this standard shall not be used to circumvent any applicable safety, health, or environmental requirements.

3. DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

3.1 General. Certain terms, abbreviations, and acronyms are defined in this section for the purposes of this standard. These definitions are applicable to all sections of this standard.

Terms that are not defined herein, but that are defined in standards that are referenced herein (***Informative Note:*** e.g., ANSI/ASHRAE/IES Standard 90.1), shall have the meanings as defined in those standards.

Other terms that are not defined shall have their ordinarily accepted meanings within the context in which they are used. Ordinarily accepted meanings shall be based on American standard English language usage, as documented in an *approved* unabridged dictionary.

3.2 Definitions

agricultural land: land that is, or was, within ten years prior to the date of the building permit application for the *building project*, primarily devoted to the commercial production of horticultural, viticultural, floricultural, dairy, apiary, vegetable, or animal products or of berries, grain, hay, straw, turf, seed, finfish in upland hatcheries, or livestock, and that has long-term commercial significance for agricultural production. Land that meets this definition is *agricultural land* regardless of how the land is zoned by the local government with zoning jurisdiction over that land.

***agrifiber product*:** wheatboard or strawboard.

air, makeup: see ANSI/ASHRAE Standard 62.1.

air, outdoor: see ANSI/ASHRAE Standard 62.1.

air, transfer: see ANSI/ASHRAE Standard 62.1.

airflow, minimum outdoor: the outdoor airflow provided by a ventilation system to meet requirements for indoor air quality, excluding any additional *outdoor air* intake to reduce or eliminate the need for *mechanical cooling*.