ANSI/ASHRAE/USGBC/IES Standard 189.1-2014

(Supersedes ANSI/ASHRAE/USGBC/IES Standard 189.1-2011)

Standard for the Design of High-Performance Green Buildings

Except Low-Rise Residential Buildings

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A Compliance Option of the International Green Construction Code™

See Appendix H for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, the U.S. Green Building Council, the Illuminating Engineering Society of North America, and the American National Standards Institute.

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NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE Web site 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

ANSI/ASHRAE/USGBC/IES Standard 189.1 was originally created through a collaborative effort involving ASHRAE, the U.S. Green Building Council, and the Illuminating Engineering Society. Like its 2009 and 2011 predecessors, the 2014 version of the standard is written in code-intended language so that it may be referenced or adopted by enforcement authorities to provide the minimum acceptable level of design criteria for high-performance green buildings. States and local jurisdictions within the United States that wish to adopt Standard 189.1 into law may want to review applicable federal laws regarding preemption and related waivers that are available from the U.S. Department of Energy (www1.eere.energy.gov/buildings/appliance_standards/ state_petitions.html).

Building projects, which are defined in the standard to include both the building and the site, result in potentially significant energy and environmental impacts through their design, construction, and operation. The U.S. Green Building Council reports that buildings in the United States are responsible for 38% of U.S. carbon dioxide emissions, 41% of U.S. energy consumption, and 14% of U.S. water consumption, and contribute 5.5% to GDP per year just for construction. In addition, development frequently converts land from biologically diverse natural habitat that manages rain runoff to impervious hardscape with reduced biodiversity.

While buildings consume energy and have other environmental impacts, they also contribute significantly to national economies and provide critical amenities to building occupants who live in, work in, and otherwise use buildings. Based on a combination of research and practical experience, it is clear that buildings can provide these amenities with reduced energy use, greenhouse gas emissions, water use, heat island and light pollution effects, and impacts on the atmosphere, materials, and resources.

The far-reaching effects of buildings have led to many actions to reduce their energy and environmental impacts. To help meet its responsibility to support such actions, ASHRAE Standing Standard Project Committee (SSPC) 189.1 has used the ASHRAE continuous maintenance process to update the standard in response to input from all segments of the building community. Compliance with these updated provisions will further reduce energy and environmental impacts through high-performance building design, construction, and operation, while providing indoor environments that support the activities of building occupants.

The project committee members represent a broad cross section of the building community and include designers, owners, operators, installation contractors, equipment and product manufacturers, industry trade organizations, code officials, researchers, regulators, and sustainable development experts. This diverse group considers a variety of factors in developing the provisions of the standard, including published research, justification for proposals received from outside the committee, and the committee members' professional judgment.

Provisions within the standard are not uniformly subjected to economic assessment. Cost-benefit assessment, while an important consideration in general, is not a necessary criterion for acceptance of any given change to the standard. However, the practicality and existing application of all the standard's requirements are considered before they are included.

Standard 189.1 addresses site sustainability, water use efficiency, energy use efficiency, indoor environmental quality, and the building's impact on the atmosphere, materials, and resources. The standard devotes a section to each of these subject areas, as well as a separate section related to plans for construction and high-performance operation.

All words and phrases that are defined in the standard are displayed in italics to indicate that they are being used in a manner that may differ from their common definition.

New provisions of the 2014 standard relative to the 2011 version are summarized below, but not all changes are identified specifically. Appendix H of the standard identifies all addenda to the 2011 version that are included in the 2014 edition.

- *Since Standard 189.1 adopts by reference many requirements from other ASHRAE standards, the 2014 version updates requirements to reflect the most current version of each referenced standard. Specifically, it refers to Standards 90.1-2013 and 62.1-2013.*
- *Site Sustainability: All site requirements have been made mandatory, with the prescriptive and performance options moved to the mandatory requirements. In addition, the requirements relative to stormwater management have been enhanced, and new requirements have been added for bicycle parking; preferred parking for low-emission, hybrid, and electric vehicles; and a predesign assessment of native and invasive plants.*
- *Water: The stringency of the water use requirements are increased for toilets, clothes washers, dishwashers, and green roofs.*
- *Energy: Significant updates were made to reflect the publication of Standard 90.1-2013. These include revised building envelope provisions, which are now specified as a percent increase in stringency as compared to Standard 90.1-2013. Building envelope assemblies in compliance can be found in Informative Appendix E. Fenestration orientation requirements were also updated based on new research. Updates also include changes to the equipment efficiency tables that were originally in Appendix C in 189.1-2011 and are now in Appendix B. Energy Star references have also been updated, and clarity has been provided as to which apply to all buildings and which apply to the Alternative Renewables Approach. The continuous air-barrier requirements have been removed from the energy section, although buildings must still*

comply with Standard 90.1-2013 with no exceptions for climate zones. Either whole-building pressurization testing or an air-barrier commissioning program is now required in Section 10.

- *Energy Performance, Carbon Dioxide Emissions, and Renewables: The requirements for energy performance and renewable energy have been modified. Most of the modifications clarify existing requirements and reflect changes to Standard 90.1. The carbon dioxide emission factors for different energy sources have also been updated.*
- *Indoor Environmental Quality: Lighting quality has been added to the scope of this section and requirements have been added for lighting controls in specific space types. The fact that Standard 62.1 no longer contains requirements for healthcare facilities, which are now covered by ANSI/ASHRAE/ASHE Standard 170,* Ventilation of Health Care Facilities*, is reflected by specific reference to Standard 170 for those facilities. The requirements for air sealing of filtration and air-cleaning equipment have been clarified, and new requirements for preoccupancy ventilation and building envelope moisture management have been added.*
- *Building Impacts on the Atmosphere, Materials, and Resources: The requirements for areas to store and collect recyclables, including batteries and electronics, for construction waste management and for life-cycle assessment have been updated. New requirements were also added for multiple-attribute product declaration or certification and maximum mercury content levels of certain types of electric lamps.*
- *Construction and Plans for Operation: In addition to the air-barrier testing requirements noted in bullet four above, this section has updated requirements related to the environmental impacts associated with the idling of construction vehicles and new requirements to reduce the entry of airborne contaminants associated with construction areas.*

As was the case in the 2011 edition of the standard, each section (other than 5 and 10) follows a similar format:

X.1 General. This subsection includes a statement of scope and addresses other broad issues for the section.

x.2 Compliance Paths. This subsection indicates the compliance options available within a given section.

x.3 Mandatory Provisions. This subsection contains mandatory provisions that apply to all projects (i.e., provisions that must be met and may not be ignored in favor of equal or more stringent provisions found in other subsections).

x.4 Prescriptive Option. This subsection—an alternative to the Performance Option—contains prescribed provisions that must be met in addition to all mandatory provisions. Prescribed provisions are intended to offer a simple compliance approach that involves minimal calculations.

x.5 Performance Option. This subsection—an alternative to the Prescriptive Option—contains performance-based provisions that must be met in addition to all mandatory provisions. Performance provisions are intended to offer a more complex alternate compliance approach that typically involves simulation or other calculations, which are expected to result in the same or better performance than compliance with prescribed provisions.

SSPC 189.1 considers and responds to proposed changes to this continuous maintenance standard and provides interpretations of the standard's requirements on request. Proposed changes to the standard may originate within or outside of the committee. The committee welcomes proposals for improving the standard using ANSI-approved ASHRAE continuous maintenance procedures. A continuous maintenance proposal (CMP) form can be found online at www.ashrae.org/standards-research--technology/standards--guidelines/continuous-maintenance. A hard copy of the form can be found in the back of this standard and may be completed and submitted at any time. The committee takes formal action on every proposal received, which often results in 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, and interpretations, as well as meeting notices, ASHRAE encourages interested parties to sign up for the ASHRAE Listserv for this standard (www.ashrae.org/resources--publications/periodicals/listserves).

1. PURPOSE

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

a. balance environmental responsibility, resource efficiency, occupant comfort and well being, and community sensitivity; 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.

2. SCOPE

2.1 This standard provides minimum criteria that

a. apply to the following elements of *building projects*:
   1. New buildings and their systems.
   2. New portions of buildings and their systems.
   3. New systems and equipment in existing buildings.
b. address *site* sustainability, water use efficiency, energy efficiency, indoor environmental quality (IEQ), and the building's impact on the atmosphere, materials, and resources.

2.2 The provisions of this standard do not apply to

a. single-family houses, multifamily structures of three stories or fewer above grade, manufactured houses (mobile homes), and manufactured houses (modular), and
b. buildings that use none of the following: electricity, fossil fuel, or water.

2.3 This standard shall not be used to circumvent any 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 (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 upon American standard English language usage, as documented in an unabridged dictionary accepted by the *authority having jurisdiction*.

3.2 Definitions

acceptance representative: an entity identified by the *owner* who leads, plans, schedules, and coordinates the activities needed to implement the building acceptance testing activities. The *acceptance representative* may be a qualified employee or consultant of the *owner*. The individual serving as the *acceptance representative* shall be independent of the project design and construction management, though this individual may be an employee of a firm providing those services.

adapted plants: see *plants, adapted plants.*

adequate transit service: at least two buses (including bus rapid transit), streetcars, or *light rail* trains per hour on weekdays, operating between 6:00 a.m. and 9:00 a.m., and between 3:00 p.m. and 6:00 p.m., or at least five heavy passenger rail or ferries operating between 6:00 a.m. and 9:00 a.m., and between 3:00 p.m. and 6:00 p.m.

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.

air, outdoor: 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*.

alternate on-site sources of water: see *water, alternate on-site sources of*.

alternative daily cover: cover material, other than earthen material, placed on the surface of the active face of a municipal solid-waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging.

attic and other roofs: see ANSI/ASHRAE/IES Standard 90.1.

authority having jurisdiction (AHJ): the agency or agent responsible for enforcing this standard.

automatic: see ANSI/ASHRAE/IES Standard 90.1

baseline building design: see ANSI/ASHRAE/IES Standard 90.1.

baseline building performance: see ANSI/ASHRAE/IES Standard 90.1.

Basis of Design (BoD): a document that records the concepts, calculations, decisions, and product selections used to meet the *owner's project requirements* and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process. (See *owner's project requirements*.)

bilevel lighting control: lighting control in a *space* that provides at least one intermediate level of lighting power in addition to fully on and fully off. Continuous dimming systems are covered by this definition.

biobased product: a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable agricultural materials (including plant, animal, and marine materials) or forestry materials.