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## SPECIAL NOTE

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). *Consensus* is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this standard as an ANS, as "substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution." Compliance with this standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

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 Manager of Standards of ASHRAE should be contacted for:

a. interpretation of the contents of this Standard,
b. participation in the next review of the Standard,
c. offering constructive criticism for improving the Standard, or
d. permission to reprint portions of the Standard.

## CONTENTS

## ANSI/ASHRAE/USGBC/IES Standard 189.1-2014, Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings



**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.

***biodiverse plantings:*** nonhomogeneous, multiple-species plantings.

***breathing zone:*** see ANSI/ASHRAE Standard 62.1.

***brownfield site:*** a *site* documented as contaminated by means of an ASTM E1903 Phase II Environmental Site Assessment or a *site* classified as a brownfield by a local, state, or federal government agency.

***building entrance:*** see ANSI/ASHRAE/IES Standard 90.1.

***building envelope:*** see ANSI/ASHRAE/IES Standard 90.1.

***building project:*** a building, or group of buildings, and *site* that utilize a single submittal for a construction permit or that are within the boundary of contiguous properties under single ownership or effective control. (See *owner.*)

***carbon dioxide equivalent ($CO_2e$):*** a measure used to compare the impact of various greenhouse gases based on their global warming potential (GWP). $CO_2e$ approximates the time-integrated warming effect of a unit mass of a given greenhouse gas, relative to that of carbon dioxide ($CO_2$). GWP is an index for estimating the relative global warming contribution of atmospheric emissions of 1 kg of a particular greenhouse gas compared to emissions of 1 kg of $CO_2$. The following GWP values are used based on a 100-year time horizon: 1 for $CO_2$, 25 for methane ($CH_4$), and 298 for nitrous oxide ($N_2O$).

***classroom:*** a *space* primarily used for scheduled instructional activities.

***climate zone:*** see Section 5.1.4 of ANSI/ASHRAE/IES Standard 90.1.

***commissioning authority (CxA):*** an entity identified by the *owner* who leads, plans, schedules, and coordinates the commissioning team to implement the building *commissioning process*. (See *commissioning* [*Cx*] *process*.)

***commissioning (Cx) plan:*** a document that outlines the organization, schedule, allocation of resources, and documentation requirements of the building *commissioning process*. (See *commissioning* [*Cx*] *process*.)

***commissioning (Cx) process:*** a quality-focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the *owner's project requirements*. (See *owner's project requirements*.)

***conditioned space:*** see ANSI/ASHRAE/IES Standard 90.1.

***construction checklist:*** a form used by the contractor to verify that appropriate components are on site, ready for installation, correctly installed, and functional.

***construction documents:*** see ANSI/ASHRAE/IES Standard 90.1.

***contaminant:*** see ANSI/ASHRAE Standard 62.1.

***continuous air barrier:*** see ANSI/ASHRAE/IES Standard 90.1.

***cycles of concentration:*** the ratio of makeup rate to the sum of the blowdown and drift rates.

***daylight area:*** area in an *enclosed space* that is in the *primary sidelighted area*, *daylight area under roof monitors*, or *daylight area under skylights*.

***daylight area under roof monitors:*** see ANSI/ASHRAE/IES Standard 90.1.

***daylight area under skylights:*** see ANSI/ASHRAE/IES Standard 90.1.

***daylight hours:*** the period from 30 minutes after sunrise to 30 minutes before sunset.

***demand control ventilation (DCV):*** see ANSI/ASHRAE/IES Standard 90.1.

***densely occupied space:*** those *spaces* with a design occupant density greater than or equal to 25 people per 1000 $ft^2$ (100 $m^2$).

***design professional:*** see ANSI/ASHRAE/IES Standard 90.1.

***designated park land:*** federal-, state-, or local-government-owned land that is formally designated and set aside as park land or a wildlife preserve.

***dwelling unit:*** see ANSI/ASHRAE/IES Standard 90.1.

***dynamic glazing:*** see ANSI/ASHRAE/IES Standard 90.1.

***electronics:*** computers and accessories; monitors; printers; and other equipment, such as scanners, fax machines, electric typewriters, cell phones, telephones, answering machines, shredders, postage machines, televisions, VHS/DVD players, portable cassette/CD players with radio devices, and stereo equipment.

***emergency ride home:*** access to transportation home in the case of a personal emergency or unscheduled overtime for employees who commute via transit, carpool, or vanpool.

***enclosed space:*** See ANSI/ASHRAE/IES Standard 90.1.

***evapotranspiration (ET):*** the sum of evaporation and plant transpiration. Evaporation accounts for the movement of water to the air from sources such as the soil, canopy interception, and water bodies. Transpiration accounts for the movement of water within a plant and the subsequent loss of water as vapor through stomata in its leaves.

> ***$ET_c$:*** *evapotranspiration* of the plant material derived by multiplying $ET_o$ by the appropriate plant coefficient.
>
> ***$ET_o$:*** maximum *evapotranspiration* as defined by the standardized Penman-Monteith equation or from the National Weather Service, where available.

***expressway:*** a divided highway with a minimum of four lanes, which has controlled access for a minimum of ten miles (16 kilometers) and a posted minimum speed of at least 45 mph (70 km/h).

***fenestration:*** see ANSI/ASHRAE/IES Standard 90.1.

***fenestration area:*** see ANSI/ASHRAE/IES Standard 90.1.

***fish and wildlife habitat conservation area:*** areas with which state or federally designated endangered, threatened, or sensitive species have a primary association.

***forest land:*** all designated state forests, national forests, and all land that is, or was within ten years prior to the date of the

building permit for the *building project*, primarily devoted to growing trees for long-term commercial timber production.

***generally accepted engineering standard:*** see ANSI/ASHRAE/IES Standard 90.1.

***geothermal energy:*** heat extracted from the Earth's interior and used to produce electricity or mechanical power or provide thermal energy for heating buildings or processes. *Geothermal energy* does not include systems such as heat pumps that use energy independent of the geothermal source to raise the temperature of the extracted heat.

***greenfield site:*** a *site* of which 20% or less has been previously developed with impervious surfaces.

***greyfield site:*** a *site* of which more than 20% is currently or has been previously developed with impervious surfaces.

***gross roof area:*** see ANSI/ASHRAE/IES Standard 90.1.

***gross wall area:*** see ANSI/ASHRAE/IES Standard 90.1.

***hardscape:*** *site* paved areas, including roads, driveways, parking lots, walkways, courtyards, and plazas.

***heat island effect:*** the tendency of urban areas to be at a warmer temperature than surrounding rural areas.

***high-performance green building:*** a building designed, constructed, and capable of being operated in a manner that increases environmental performance and economic value over time, seeks to establish an indoor environment that supports the health of occupants, and enhances satisfaction and productivity of occupants through integration of environmentally preferable building materials and water-efficient and energy-efficient systems.

***high-speed door:*** a nonswinging door used primarily to facilitate vehicular access or material transportation, and having an *automatic* closing device with an opening rate of not less than 32 in./s (810 mm/s) and a closing rate of not less than 24 in./s (610 mm/s).

***hydrozoning:*** to divide the landscape irrigation system into sections in order to regulate each zone's water needs based on plant materials, soil, and other factors.

***improved landscape:*** any disturbed area of the *site* where new plant and/or grass materials are to be used, including green *roofs*, plantings for stormwater controls, planting boxes, and similar vegetative use. *Improved landscape* shall not include *hardscape* areas such as sidewalks, driveways, other paved areas, and swimming pools or decking.

***integrated design process:*** a design process utilizing early collaboration among representatives of each stakeholder and participating consultant on the project. Unlike the conventional or linear design process, integrated design requires broad stakeholder/consultant participation.

***integrated project delivery*:** see *integrated design process*.

***interior projection factor:*** see *projection factor, interior.*

***irrigation adequacy:*** a representation of how well irrigation meets the needs of the plant material. This reflects the percentage of required water for turf or plant material supplied by rainfall and controller-scheduled irrigations.

***irrigation excess:*** a representation of the amount of irrigation water applied beyond the needs of the plant material. This reflects the percentage of water applied in excess of 100% of required water.

***isolation devices:*** see ANSI/ASHRAE/IES Standard 90.1.

***landscape establishment period:*** a time period, beginning on the date of completion of permanent plantings and not exceeding 18 months, intended to allow the permanent landscape to become sufficiently established to remain viable.

***life-cycle assessment (LCA):*** a compilation and evaluation of the inputs, outputs, and the potential environmental impacts of a building system throughout its life cycle. *LCA* addresses the environmental aspects and potential environmental impacts (e.g., use of resources and environmental consequences of releases) throughout a building's life cycle, from raw material acquisition through manufacturing, construction, use, operation, end-of-life treatment, recycling, and final disposal (end of life). The purpose is to identify opportunities to improve the environmental performance of buildings throughout their life cycles.

***light rail:*** a streetcar-type vehicle that has step entry or level boarding entry and is operated on city streets, semiexclusive rights-of-way, or exclusive rights-of-way.

***lighting power allowance:*** see ANSI/ASHRAE/IES Standard 90.1.

***lighting quality:*** the degree to which the luminous environment in a *space* supports the requirements of the occupants.

***lighting zone (LZ):*** an area defining limitations for outdoor lighting.

> ***LZ0:*** undeveloped areas within national parks, state parks, *forest land*, rural areas, and other undeveloped areas as defined by the *AHJ*.
>
> ***LZ1:*** developed areas of national parks, state parks, *forest land*, and rural areas.
>
> ***LZ2:*** areas predominantly consisting of *residential* zoning, neighborhood business districts, light industrial with limited night time use, and *residential* mixed-use areas.
>
> ***LZ3:*** all areas not included in *LZ0*, *LZ1*, *LZ2*, or *LZ4*.
>
> ***LZ4:*** high-activity commercial districts in major metropolitan areas as designated by the local jurisdiction.

***liner system (Ls):*** an insulation system for a metal building *roof* that includes the following components. A continuous membrane is installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins. For multilayer installations, the last rated R-value of insulation is for unfaced insulation draped over purlins and then compressed when the metal *roof* panels are attached. A minimum R-3 (R-0.5) thermal spacer block between the purlins and the metal *roof* panels is required unless compliance is shown by the overall assembly U-factor or otherwise noted.

***low-impact trail:*** erosion-stabilized pathway or track that utilizes natural groundcover or installed system greater than 50% pervious. The pathway or track is designed and used

only for pedestrian and nonmotorized vehicles (excluding power-assisted conveyances for individuals with disabilities).

***low-voltage dry-type distribution transformers:*** transformers that are not oil- or fluid-cooled, with an input voltage less than or equal to 600 V, that range in size from 15 to 333 kVA for single-phase and 15 to 1000 kVA for three-phase equipment and are used for general-purpose applications as described in 42 USC§ 6291.

***maintenance plan:*** see *maintenance program* in ANSI/ASHRAE/ACCA Standard 180.

***makeup air:*** see ANSI/ASHRAE Standard 62.1.

***mechanical cooling:*** see ANSI/ASHRAE/IES Standard 90.1

***minimum outdoor airflow rate:*** see *airflow, minimum outdoor.*

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

***native plants:*** see *plants, native plants*.

***networked guest-room control system:*** an energy management control system, accessible from the hotel/motel front desk or other central location, that is capable of identifying reserved rooms according to a timed schedule and is capable of controlling each hotel/motel guest room separately.

***nonpotable water:*** see *water, nonpotable*.

***nonresidential:*** see ANSI/ASHRAE/IES Standard 90.1.

***north-oriented:*** facing within 45 degrees of true north within the northern hemisphere (however, facing within 45 degrees of true south in the southern hemisphere).

***occupant load:*** the number of persons for which the means of egress of a building or portion thereof is designed.

***occupiable space:*** see ANSI/ASHRAE Standard 62.1.

***office furniture system:*** either a panel-based workstation comprising modular interconnecting panels, hang-on components, and drawer/filing components, or a freestanding grouping of furniture items and their components that have been designed to work in concert.

***on-site renewable energy system:*** photovoltaic, solar thermal, *geothermal energy*, and wind systems used to generate energy and located on the *building project*.

***once-through cooling:*** the use of water as a cooling medium where the water is passed through a heat exchanger one time and is then discharged to the drainage system. This also includes the use of water to reduce the temperature of condensate or process water before discharging it to the drainage system.

***open-graded (uniform-sized) aggregate:*** materials such as crushed stone or decomposed granite that provide 30% to 40% void *spaces*.

***outdoor air:*** see *air, outdoor.*

***outdoor air fault condition:*** a situation in which the measured *minimum outdoor airflow* of a ventilation system is 10% or more below the setpoint value that corresponds to the occupancy and operation conditions at the time of the measurement.

***owner:*** the party in responsible control of development, construction, or operation of a project at any given time.

***owner's project requirements (OPR):*** a written document that details the functional requirements of a project and the expectations of how it will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

***permanently installed:*** see ANSI/ASHRAE/IES Standard 90.1.

***permeable pavement:*** pervious concrete or porous asphalt that allows the movement of water and air through the paving material, and which is primarily used as paving for roads, parking lots, and walkways. Permeable paving materials have an open-graded coarse aggregate with interconnected voids.

***permeable pavers:*** units that present a solid surface but allow natural drainage and migration of water into the base below by permitting water to drain through the *spaces* between the pavers.

***plants:***

a. ***adapted plants:*** *plants* that reliably grow well in a given habitat with minimal attention from humans in the form of winter protection, pest protection, water irrigation, or fertilization once root systems are established in the soil. *Adapted plants* are considered to be low maintenance but not invasive.
b. ***invasive plants:*** species of *plants* that are not native to the *building project site* and that cause or are likely to cause environmental harm. At a minimum, the list of invasive species for a *building project site* includes *plants* included in city, county, and regional lists and state and federal noxious weeds laws.
c. ***native plants:*** *plants* that adapted to a given area during a defined time period and are not invasive. In America, the term often refers to *plants* growing in a region prior to the time of settlement by people of European descent.

***porous pavers (open-grid pavers):*** units where at least 40% of the surface area consists of holes or openings that are filled with sand, gravel, other porous material, or vegetation.

***postconsumer recycled content:*** proportion of *recycled material* in a product generated by households or by commercial, industrial, and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain. (See *recycled material*.)

***potable water:*** see *water, potable*.

***preconsumer recycled content:*** proportion of *recycled material* in a product diverted from the waste stream during the manufacturing process. Content that shall not be considered preconsumer recycled includes the reutilization of materials such as rework, regrind, or scrap generated in a process and