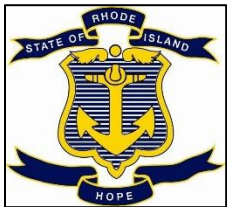


**RHODE ISLAND**  
**STRETCH CODE FOR COMMERCIAL CONSTRUCTION: A**  
**VOLUNTARY GREEN BUILDINGS PROGRAM**



February 16, 2018

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

RI Office of Energy Resources

One Capitol Hill

Providence, RI 02908

Phone: (401) 574-9100

Fax: (401) 574-9125

[www.energy.ri.gov](http://www.energy.ri.gov)

1<sup>st</sup> EDITION

2017

**Rhode Island Stretch Code for  
Commercial Construction<sup>®</sup>**

Portions of this stretch code are adapted from the 2014 Rhode Island Green Construction Code and the 2015 International Green Construction Code.

## 2015 International Green Construction Code®

First Printing: May 2015

ISBN: 978-1-60983-488-3

COPYRIGHT © 2015 by  
INTERNATIONAL CODE COUNCIL, INC.

With the cooperating sponsorships of the American Institute of Architects, ASTM International, ASHRAE, United States Green Building Council and the Illuminating Engineering Society.

ALL RIGHTS RESERVED. This 2015 *International Green Construction Code*® is a copyrighted work owned by the International Code Council, Inc. Without advance written permission from the copyright owner, no part of this book may be reproduced, distributed or transmitted in any form or by any means, including, without limitation, electronic, optical or mechanical means (by way of example, and not limitation, photocopying, or recording by or in an information storage retrieval system). For information on permission to copy material exceeding fair use, please contact: Publications, 4051 Flossmoor Road, Country Club Hills, IL 60478. Phone 1-888-ICC-SAFE (422-7233).

Trademarks: “International Code Council,” the “International Code Council” logo and the “International Green Construction Code” are trademarks of the International Code Council, Inc.

# PREFACE

## Introduction

The *Rhode Island Commercial Stretch Code* provides minimum requirements to safeguard the environment, and improve the public health, safety and general welfare of building occupants. The *Stretch Code* establishes provisions that are intended to reduce the negative impacts and increase the overall positive impacts of the built environment.

The *Commercial Stretch Code* contains clear and specific requirements with provisions that promote safe and sustainable construction for non-residential buildings in an integrated fashion with all regulations promulgated by the State Building Code Standards Committee. Consistent with State base codes, it will be updated to allow for new construction methods and technologies to be incorporated at least once every three years.

The *Commercial Stretch Code* addresses natural resource, material, water and energy conservation, as well as indoor environmental quality and comfort, building commissioning, operations and maintenance for new and existing buildings, building sites and building materials, components, equipment and systems. Innovative approaches and alternative materials, designs, and methods not specifically addressed in the code can be approved by the code official where the proposed innovative approaches or materials, designs or methods comply with the intent of the provisions of the code.

This code is founded on principles intended to establish provisions consistent with the scope of a green construction code that adequately protects public health, safety and welfare; provisions that do not unnecessarily increase construction costs; provisions that do not restrict the use of new materials, products or methods of construction; and provisions that do not give preferential treatment to particular types or classes of materials, products or methods of construction. This is achieved through comprehensive provisions which are enforceable, useable and adoptable.

The Rhode Island *Commercial Stretch Code* (hereafter “Stretch Code”) is a **voluntary code** that provides guidance and best practice requirements intended to reduce the negative impacts and increase the overall positive impacts of the built environment. It is consistent with the Rhode Island Office of Energy Resources’ mission to lead Rhode Island to a secure, cost-effective, and sustainable energy future and supports the Governor’s energy efficiency and renewable energy goals for State-owned facilities ([EO 15-17](#)).

## Application

Compliance with the 2017 Rhode Island *Stretch Code* is an option for buildings needing to comply with the Rhode Island Green Buildings Act (RI General Laws Chapter 37-24). The Green Buildings Act applies to new construction projects of more than 5,000 square feet and the renovation of spaces greater than 10,000 square feet if such projects receive funding from the state. For privately funded projects, this code is designed to be used as a voluntary green construction code to be utilized in the design and construction of high performance, green buildings.

The provisions of this code apply to all occupancies other than:

- Temporary structures approved under section 3103 of the Rhode Island Building Code;
- Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories in height with a separate means of egress, and their accessory structures.

## Code Development

The first edition of this code was the 2014 *Rhode Island Green Construction Code* which was an amended version of the 2012 *International Green Construction Code* (IGCC.) The IGCC is the culmination of an effort that started in 2010 with the drafting of Public Version 1.0 (PV 1.0) by the Sustainable Building Technology Committee (SBTC) established by the International Code Council (ICC) Board of Directors. Following that, Public Version 2.0 was created, based upon public comments submitted and approved by the IGCC Public Comment Committee. Following the issuance of PV 2.0, a full cycle of code development in accordance with ICC’s Code Development Procedures was held in 2011. This included the submission of code change proposals followed by a Code Development Hearing, the submission of public comments and a Final Action Hearing. The

2015 edition of the IGCC represents the first code developed through the new cdpACCESS™ system. This system allowed stakeholders to collaborate on potential code changes and ultimately was used to submit code changes via an online system. The 2015 IGCC was developed in collaboration with the following Cooperating Sponsors: The American Institute of Architects (AIA); ASTM International; ASHRAE; the U.S. Green Building Council (USGBC); and the Illuminating Engineering Society (IES).

In December of 2015, Rhode Island Governor Gina M. Raimondo issued Executive Order 15-17 which includes a directive for the Rhode Office of Energy Resources to coordinate with the Energy Efficiency and Resource Management Council, National Grid, and the Green Building Advisory Committee to establish a voluntary aspirational or stretch building code based on the International Green Construction Code or equivalent by 2017. This code is the result of work initiated by Executive Order 15-17. It is meant to replace the 2014 *Rhode Island Green Construction Code* and is largely based upon the *2015 International Green Construction Code*.



### Code Maintenance

A new edition of the Rhode Island Stretch Code is promulgated every three years and/or as otherwise needed to maintain consistency with best practice construction techniques and materials.

### Effective Use of the Rhode Island Stretch Code

This code is designed to be used as an overlay code. It replaces the previous version of the same code, which was originally titled the *Rhode Island Green Construction Code*, but does not replace any other codes or regulations in effect. As an overlay code, this code is designed to work with the Rhode Island Building Codes and their referenced standards.

### National Grid Efficiency Program Stretch Code Support

An important premise of National Grid’s residential and commercial new construction offerings is to prepare building design and construction practitioners for future advancement in the energy efficiency requirements of the state building code. The Rhode Island Stretch Code shares this premise. National Grid’s new construction programs have been designed to complement the energy aspects of the stretch code where possible. Incentives and assistance are available as follows but are subject to change.

**Technical assistance** - National Grid provides technical assistance to commercial building design practitioners to evaluate potential energy efficient design elements. This service is typically provided through third party energy engineering firms. National Grid will fund up to 75% of the cost of this service for commercial buildings over 100,000 square feet and up to 100% for commercial projects less than 100,000 square feet but greater than 20,000 square feet.

**Financial incentives** - Through National Grid’s Energy Efficiency program, incentives are available for eligible and cost-effective design elements that improve the energy performance of a building. National Grid will fund eligible energy efficient design improvements at \$0.35/kWh and \$1.70 per therm saved over the base design in accordance with the “State of Rhode Island Energy Conservation Code.”

To learn more about National Grid’s new construction services, download the Participants’ Guide, call 844-280-4326, or email [newconstruction@nationalgrid.com](mailto:newconstruction@nationalgrid.com).

### Acknowledgements

Special thanks to the many working group members that lent their expertise and time to support the development of this stretch code. Although the following list is not exhaustive, we would like to acknowledge the following individuals and organizations for their significant contributions:

Division of Capital Asset Management & Maintenance, Rhode Island Department of Administration: Arthur J. Jochmann II

Energy & Resource Solutions (ERS): Brian McCowan, Stretch Code Development Consultant

Green Building Advisory Committee: All members, with specific thanks to Christopher Armstrong, Joseph DaSilva, Steven Hughes, and Stephen Turner

National Grid: Kathleen Arthur, Francis Boucher, Thomas J. Coughlin Jr., and Puja Vohra

Northeast Energy Efficiency Partnerships (NEEP): Darren Port and Carolyn Sarno

Rhode Island Building Code Commission: John Leyden, Commissioner

Rhode Island Energy Efficiency and Resource Management Council (EERMC): All council members and Mike Guerard, lead on the EERMC's managing consultant team

Rhode Island Office of Energy Resources: George Sfinarolakis and Becca Trietch

---

## Adoption

The International Code Council maintains a copyright in all of its codes and standards. Maintaining copyright allows the ICC to fund its mission through sales of books, in both print and electronic formats. The *International Green Construction Code* is designed for adoption and use by jurisdictions that recognize and acknowledge the ICC's copyright in the code, and further acknowledge the substantial shared value of the public/private partnership for code development between jurisdictions and the ICC.

The ICC also recognizes the need for jurisdictions to make laws available to the public. All ICC codes and ICC standards, along with the laws of many jurisdictions, are available for free in a non-downloadable form on the ICC's website. Jurisdictions should contact the ICC at [adoptions@iccsafe.org](mailto:adoptions@iccsafe.org) to learn how to adopt and distribute laws based on the *International Green Construction Code* in a manner that provides necessary access, while maintaining the ICC's copyright.

## Maintenance

The *International Building Code* is kept up to date through the review of proposed changes submitted by code enforcing officials, industry representatives, design professionals and other interested parties. Proposed changes are carefully considered through an open code development process in which all interested and affected parties may participate.

The contents of this work are subject to change through both the code development cycles and the governmental body that enacts the code into law. For more information regarding the code development process, contact the Codes and Standards Development Department of the International Code Council.

While the development procedure of the *International Green Construction Code* ensures the highest degree of care, the ICC, its members and those participating in the development of this code do not accept any liability resulting from compliance or noncompliance with the provisions because the ICC does not have the power or authority to police or enforce compliance with the contents of this code. Only the governmental body that enacts the code into law has such authority.

Consistent with State base codes, Rhode Island will update the *Rhode Island Commercial Stretch Code* at least once every three years to allow for new construction methods and technologies to be incorporated.

## IGCC Code Development Committee Responsibilities (Letter Designations in Front of Section Numbers)

In each IGCC code development cycle, proposed changes to the IGCC are considered at the Committee Action Hearing by the International Green Construction Code Development Committee, whose action constitutes a recommendation to the voting membership for final action on the proposed change. Proposed changes to a code section that has a number beginning with a letter in brackets are considered by a different code development committee. For example, proposed changes to code sections that have [BG] in front of them (e.g., [BG] 309.1) are considered by the IBC — General Code Development Committee at the Committee Action Hearing.

The content of sections in this code that begin with a letter designation is maintained by another code development committee in accordance with the following:

- [A] = Administrative Code Development Committee;
- [BE] = IBC – Means of Egress Code Development Committee;
- [BG] = IBC – General Code Development Committee;
- [BS] = IBC – Structural Code Development Committee;
- [E] = International Energy Conservation Code Development Committee;
- [F] = International Fire Code Development Committee;
- [M] = International Mechanical Code Development Committee.;
- [P] = International Plumbing Code Development Committee.

For the development of the 2018 edition of the I-Codes, there will be three groups of code development committees and they will meet in separate years. Note that these are tentative groupings.

<b>Group A Codes (Heard in 2015, Code Change Proposals Deadline: January 12, 2015)</b>	<b>Group B Codes (Heard in 2016, Code Change Proposals Deadline: January 11, 2016)</b>	<b>Group C Codes (Heard in 2017, Code Change Proposals Deadline: January 11, 2017)</b>
<b>International Building Code</b> – Fire Safety (Chapters 7, 8, 9, 14, 26) – Means of Egress (Chapters 10, 11, Appendix E) – General (Chapters 2-6, 12, 27-33, Appendices A, B, C, D, K)	Administrative Provisions (Chapter 1 of all codes except IRC and IECC, administrative updates to currently referenced standards, and designated definitions)	International Green Construction Code
International Fuel Gas Code	<b>International Building Code</b> – Structural (Chapters 15-25, Appendices F, G, H, I, J, L, M)	
International Existing Building Code	International Energy Conservation	
International Mechanical Code	International Fire Code	
International Plumbing Code	International Residential Code – IRC - Building (Chapters 1-10, Appendices E, F, H, J, K, L, M, O, R, S, T, U)	
International Private Sewage Disposal Code	International Wildland-Urban Interface	
International Property Maintenance Code		
International Residential Code – IRC - Mechanical (Chapters 12-24) – IRC - Plumbing (Chapters 25-33, Appendices G, I, N, P)		
International Swimming Pool and Spa Code		
International Zoning Code		

**Note:** Proposed changes to the ICC Performance Code will be heard by the code development committee noted in brackets [ ] in the text of the code.

Code change proposals submitted for code sections that have a letter designation in front of them will be heard by the respective committee responsible for such code sections. Because different committees hold code development hearings in different years, proposals for this code will be heard by committees in both the 2015 (Group A) and the 2016 (Group B) code development cycles.

For example, every section of Chapter 1 of this code is designated as the responsibility of the Administrative Code Development Committee, and that committee is part of the Group

B code hearings. This committee will conduct its code development hearings in 2016 to consider all code change proposals for Chapter 1 of this code and proposals for Chapter 1 of all I-Codes except the *International Energy Conservation Code*, the *ICC Performance Code* and the *International Residential Code*. Therefore, any proposals received for Chapter 1 of this code will be deferred for consideration in 2016 by the Administrative Code Development Committee.

Another example is Section 202 of this code, definition of “Dwelling unit,” which is designated as the responsibility of the IBC—General Code Development Committee. This committee will conduct its code development hearings in 2015 to consider code change proposals in its purview, which includes any proposals to the definition of “Dwelling unit.”

It is very important that anyone submitting code change proposals understand which code development committee is responsible for the section of the code that is the subject of the code change proposal. For further information on the code development committee responsibilities, please visit the ICC website at [www.iccsafe.org/scoping](http://www.iccsafe.org/scoping).

## Marginal Markings

Double vertical lines in the margins within the body of the code indicate a technical change specific to the requirements of this Rhode Island edition. Single vertical lines in the margins indicate a technical change from the 2014 Rhode Island Green Construction Code. Sections deleted for this version of the code are clearly marked as deleted.

## Italicized Terms

Selected terms set forth in Chapter 2, Definitions, are italicized where they appear in code text. Such terms are not italicized where the definition set forth in Chapter 2 does not impart the intended meaning in the use of the term. The terms selected have definitions that the user should read carefully to facilitate better understanding of the code.

## International Green Construction Code/Rhode Island Stretch Code Synopsis

The following is a chapter-by-chapter synopsis of the scope and intent of the provisions of the International Green Construction Code upon which the Rhode Island Stretch Code for Commercial Construction is based:

**Chapter 1 Scope and Administration.** Chapter 1 establishes the limits of applicability of the code and describes the manner in which the code is to be applied and enforced. Chapter 1 is divided into two parts: Part 1 – Scope and Application (Sections 101 and 102); and Part 2 – Administration and Enforcement (Sections 103 – 109).

Section 101 identifies which buildings and structures come under its purview and Section 102 references other ICC codes as applicable. Section 103 establishes the duties and powers of the code official, requires that compliance and enforcement be part of the enforcement of other ICC codes listed in Section 102.4, and grants authority to the code official to make inspections. Section 105 provides guidance to the code official in the approval of materials, methods of construction, designs, systems and innovative approaches where they are not specifically prescribed in the IgCC. As the IgCC is an overlay code, Section 106, in conjunction with Section 101.2, requires that permits be issued under other ICC codes.

The provisions of Chapter 1 also establish the rights and privileges of the design professional, contractor and property owner.

It is important to note that by reference to Section 301.1.1, Section 101.3 allows ASHRAE 189.1, *Standard for the Design of High-Performance Green Buildings*, to be used. In addition, Exception 1 to Section 101.3 notes that the code is not applicable to low-rise residential structures unless the jurisdiction selects ICC 700 in Table 302.1 for application to various types of residential buildings and occupancies. Further, ICC 700 is noted in Section 101.3.1 as being a “deemed to comply document” for mid- and high-rise R-2 and R-4 occupancies.

**Chapter 2 Definitions.** All terms that are defined in the code are listed alphabetically in Chapter 2. Terms are defined in Chapter 2. Codes are technical documents and every word, term and punctuation mark can impact the meaning of the code text and the intended results. The code often uses terms that have a unique meaning in the code and that code meaning can differ substantially from the ordinarily understood meaning of the term as used outside of the code.



Where understanding of a term's definition is especially key to or necessary for understanding a particular code provision, the term is shown in italics wherever it appears in the code. However, this is true only for those terms that have a meaning that is unique to the code. In other words, the generally understood meaning of a term or phrase might not be sufficient or consistent with the meaning prescribed by the code; therefore, it is essential that the code-defined meaning be known.

Definitions are deemed to be of prime importance in establishing the meaning and intent of the code text that uses code-defined terms. The user of the code should be familiar with and consult this chapter because the definitions are essential to the correct interpretation of the code and because the user may not be aware that a term is defined in a manner that is not commonly understood.

**Chapter 3 Jurisdictional Requirements.** The jurisdictional requirements contained in Section 302 are formatted to afford jurisdictions the flexibility to adapt the code in a manner that is best suited to meet their unique environmental and regional goals and needs. The section numbers and optional enhanced performance features listed in Table 302.1 do not become enforceable unless they are specifically selected in the table by the jurisdiction and the appropriate "Yes" box is checked or otherwise specifically indicated in the jurisdiction's adopting ordinance. Those provisions selected by the jurisdiction in Table 302.1 become enforceable for all buildings constructed in the jurisdiction. The text of all section numbers listed in Table 302.1 also contains a reference to Table 302.1, reinforcing the fact that they are not enforceable unless they are specifically adopted. Furthermore, the sample ordinance provided in the IgCC references Table 302.1 and requires that the jurisdiction indicate those provisions from the list that it intends to enforce. Jurisdictions must take great care when making their choices in Table 302.1. While various requirements listed in Table 302.1 may be environmentally beneficial in many jurisdictions, some may be inappropriate in other jurisdictions. If these practices were appropriate for all jurisdictions, they would have been included in the baseline requirements of the IgCC, not in Table 302.1.

**Chapter 4 Site Development and Land Use.** Chapter 4 is intended to minimize the negative environmental impacts on and protect, restore and enhance the natural features and environmental quality of building sites.

Section 401.2 requires predesign site inventory and assessment. Where indicated by the jurisdiction in Table 302.1, Section 402 limits building construction near surface water, in conservation and flood hazard areas and on greenfield sites, park land or agricultural land. Section 403 requires stormwater management. Section 404 limits potable water uses related to landscape irrigation and outdoor fountains. Section 405 addresses vegetation, soil and water quality protection.

Section 406 requires that a plan be developed to ensure that least 75 percent of land-clearing debris and excavated soils is diverted from disposal.

Section 407.1 requires that at least one walkway or bicycle path connect building entrances to streets or other paths. Buildings with a total floor area of over 10,000 square feet (929 m<sup>2</sup>) must also provide changing and shower facilities. Bicycle parking and storage requirements are contained in Sections 407.3 through 407.3.2 and Table 407.3.

Where indicated by the jurisdiction in Table 302.1, and where the total building floor area is greater than 10,000 square feet (929 m<sup>2</sup>), preferred parking is required by Section 407.4 for high-occupancy and low-emission, hybrid and electric vehicles. These requirements, however, do not take precedence over the accessible parking requirements of the International Building Code.

Section 408 mitigates heat island effects through requirements related to site hardscape materials, shading and roof surfaces and coverings. Where indicated to be enforceable in the jurisdiction in Table 302.1, light pollution from building sites must be controlled in accordance with Section 409.

**Chapter 5 Material Resource Conservation and Efficiency.** Chapter 5 addresses material resource conservation and efficiency by means of provisions related to material selection, recycling, reuse, renewability, toxicity and durability, including resistance to damage caused by moisture.

Section 502 addresses material storage and handling during the construction phase. Section 503 requires that a construction material and waste management plan be prepared and allows the jurisdiction to increase the percentage of waste that must be recycled in Table 302.1. Section 504 requires areas be designed and constructed to facilitate the recycling of waste generated post-certificate of occupancy.

Section 503 requires a construction waste management plan.

Section 504 requires recycling areas for waste that is generated by the building occupants after issuance of the Certificate of Occupancy.

Section 505 requirements are related to material selection and properties.

Section 505.2 requires that at least 55 percent of constructed materials selected for each project be any combination of the following material types: used, recycled, recyclable, bio-based, or indigenous.

Section 505.3 contains provisions for whole building life cycle assessment.

Section 505.4 requires that at least 55 percent of the materials in buildings comply with provisions related to environmental product declarations or multi-attribute standards.

Section 506 regulates the mercury content of fluorescent lamps.

## **Chapter 6 Energy Conservation, Efficiency and CO<sub>2</sub>e Emission Reduction.**

Chapter 6 is intended to provide flexibility and permit the use of innovative approaches to achieve the effective use of energy.

All buildings that consume energy must comply with the requirements of Sections 603 (Energy Metering, Monitoring and Reporting).

In addition to the preceding, buildings must comply with one of three options:

- Buildings designed to the **performance-based** compliance option must also comply with Sections 602 (Performance-Based Compliance), 609 (Specific Appliances and Equipment), 610 (Onsite Renewable Energy Provisions) and specified provisions of Section 608 (Building Electrical Power and Lighting Systems). In addition, these buildings must also be in compliance with key provisions of the *Rhode Island Energy Conservation Code*.
- Buildings designed to the **prescriptive-based** compliance option must also comply with Sections 605 (Building Envelope Systems), 606 (Building Mechanical Systems), 607 (Building Service Water Heating Systems), 608 (Building Electrical Power and Lighting Systems), 609 (Specific Appliances and Equipment) and 610 (Onsite Renewable Energy Provisions). In addition, these buildings must also be in compliance with key provisions of the *Rhode Island Energy Conservation Code*.
- Buildings designed to the **outcome-based** compliance option must also comply with Sections 610 (Building Renewable Energy Provisions) and 612 (Outcome-based Pathway Requirements). In addition, these buildings must also be in full compliance with the *Rhode Island Energy Conservation Code*.

Section 602.2 requires that performance-based designs demonstrate a zEPI of not more than 46, as determined in accordance with Equation 6-1. This equation is based on a ratio of Proposed building performance to Baseline building performance. Both the Proposed and Baseline performances must be calculated in accordance with Appendix G of ASHRAE 90.1. Section 602.3 requires the CO<sub>2</sub>e emissions for both the Proposed and Baseline buildings to be determined by Equation 6-2.

Section 603 addresses energy metering, monitoring and reporting and is applicable to all buildings that consume energy. Section 603.2 requires that energy distribution systems be designed to provide separate metering of the energy use categories listed in Table 603.2. For buildings greater than 25,000 square feet in gross floor area, meters must be installed. For buildings less than 25,000 square feet in gross floor area, the system must be designed to accommodate the installation of future meters. Section 603.3 requires that building energy metering be capable of determining energy use and peak demand for the types of energy indicated in Sections 603.3.1 through 603.3.7.

Where the jurisdiction has indicated in Table 302.1 that Section 604.1 is enforceable, an automated demand-response infrastructure must be provided. This requires that building energy, HVAC and lighting systems and specific building energy-using components be provided with controls that respond to changes in energy demand by means of automated preprogrammed strategies.

Section 605 provides building envelope system requirements for buildings that are designed on a prescriptive basis. Section 605.1.1 requires that insulation and fenestration exceed the requirements of the International Energy Conservation Code by at least 5 percent. Section 605.1.2.2 requires testing of the building thermal envelope for air tightness.

Section 610 establishes minimum renewable energy source requirements for all buildings that consume energy. It requires that buildings use renewable energy sources to provide either 2 percent of total calculated annual energy use by means of solar photovoltaic or wind, or 10 percent of annual estimated hot water energy by means of solar hot water heating.

Section 612 establishes the requirements for the outcome-based pathway compliance option. For those buildings containing the occupancies specifically in Table 612.1, this option allows for compliance to be determined after the building is constructed and occupied. Buildings with occupancies or uses not listed in Table 612.1 cannot use this option.

There are also provisions outside of Chapter 6 that have significant impacts on energy: Table 302.1 allows jurisdictions to require lower zEPI values, or require more stringent levels of efficiency, by occupancy. Where adopted, the project electives of Section A106 in Appendix A contain additional energy conserving practices that recognize and encourage energy performance that exceeds the baseline minimum requirements of Chapters 3 and 6. Section 1003.2 addresses energy use where existing buildings are altered. Where indicated to be enforceable in Table 302.1, Section 1007.3 requires that owners of existing buildings report post certificate of occupancy annual net energy use, energy demand and CO<sub>2</sub>e emissions.

**Chapter 7 Water Resource Conservation, Quality and Efficiency.** Chapter 7 provides requirements that are intended to conserve water, protect water quality and provide for safe water consumption.

Section 701 regulates water metering.

Section 702 regulates water consumption through limitations of fixture and fitting flow rates and by means of requirements related to specific equipment and appliances. It also requires that municipal reclaimed water, where available and required by the jurisdiction in Table 302.1, be supplied to water-supplied toilets, urinals, trap primers and applicable industrial systems. Hot water distribution systems must be designed to reduce the volume of water between fixtures and sources of hot or tempered water in accordance with Section 702.8.

Section 703 regulates water used in HVAC systems and equipment including hydronic closed systems, humidification systems, condensate coolers, condensate drainage recovery, once through heat exchangers, humidifier discharge, cooling towers, evaporative condensers, fluid coolers, wet-hood exhaust scrubber systems and evaporative cooling systems.

Section 704 regulates water treatment devices and equipment including water softeners, reverse osmosis water treatment systems and onsite reclaimed water treatment systems.

**Chapter 8 Indoor Environmental Quality and Comfort.** Chapter 8 is intended to ensure that the building's interior environment is conducive to the health of building occupants.

Section 801.2 requires that an indoor air quality management plan be developed to ensure compliance with Sections 802 through 805. Section 802 addresses air-handling system access for cleaning and repair, as well as air-handling filter rack design. Section 803 contains requirements for the ventilation of buildings during the construction phase, limits pollutant sources in print, copy and janitorial rooms, and provides filters requirements for air-conditioning systems. Section 804 contains specific indoor air quality and pollutant control requirements for fireplaces, solid fuel-burning appliances, vented decorative gas appliances, vented gas fireplace heaters and decorative gas appliances. Where the jurisdiction has indicated in Table 302.1 that Section 804.2 is enforceable, baseline indoor air quality testing is required. Section 805 prohibits the use of urea-formaldehyde foam insulation and materials that contain asbestos.

Section 806 regulates emissions from wood products, adhesives, sealants, paints, coatings, flooring, acoustical ceiling tiles, wall systems and insulation.

Section 808 requires that fenestration be provided to ensure that interior spaces in the specified occupancies benefit from exposure to natural light.

**Chapter 9 Commissioning, Inspections, Operation and Maintenance.** Chapter 9 addresses building commissioning, inspections, operation and maintenance. It requires commissioning and inspections as specifically listed in Table 903.1. Chapter 9 also requires that construction documents contain information related to building operation and maintenance in accordance with Section 903.

Many of the provisions of Chapter 9, and in particular those in Sections 902 and 903, are essentially based on the requirements for special inspections contained in the *International Building Code*. Both Table 903.1 and Section 903 also contain ties to, and are coordinated with,

various provisions in Chapters 6 and 8 of this code. The building operation and maintenance documents required by Section 903 are intended to help and encourage building owners and facility management staff to operate and maintain buildings in a manner, and a performance level, as originally intended by the design professionals as they strove to configure the building systems in a manner that satisfied the requirements of the code.

**Chapter 10 Existing Buildings.** Conceptually, the requirements of Chapter 10 of the IgCC are based on the requirements in the *International Existing Building Code*. These provisions are not retroactive. They apply only where buildings are altered or added to.

Additions are essentially handled as new construction.

Alterations must meet the requirements of other applicable chapters of the code for those portions or elements of the building that are being altered. However, similar to the means by which the International Building Code addresses accessibility in existing buildings, Section 1003.2 requires that at least 10 percent of the cost of alterations be dedicated to improvements related to water and energy conservation and efficiency. Water and energy conservation and efficiency requirements that are intended to apply specifically to existing buildings are listed in Sections 1003.2.1 through 1003.2.7. These sections address the following: metering devices; heating, ventilation and air conditioning; service water systems; lighting; swimming pools and spas; insulation of unconditioned attics; and roof replacement insulation.

Section 1004 requires that buildings undergoing a change of occupancy comply with the basic water and energy conservation measures in Sections 1001.3.1, 1001.3.2 and 1001.3.3.

Section 1005 provides relief for historic buildings under certain conditions. Where buildings are decommissioned, Section 1006 requires that a material and waste management plan be developed to ensure that such buildings are deconstructed and demolished in such a manner that at least 50 percent of materials are diverted from landfills.

Where indicated to be enforceable in the jurisdiction in Table 302.1, Section 1007.2 allows existing buildings to be evaluated for compliance with the IgCC. Existing building owners often use this type of information to market their building to potential tenants. Section 1007.3, again where indicated by the jurisdiction in Table 302.1, requires annual net energy use, energy demand and CO<sub>2</sub>e emissions reporting.

**Chapter 11 Existing Building Site Development.** While Chapter 10 is applicable to existing buildings, Chapter 11 is applicable to additions to, and to the alteration, repair, maintenance and operation of the sites on which those buildings are located.

Conceptually, much like Chapter 10, the requirements of Chapter 11 of the IgCC are based on requirements contained in the International Existing Building Code. These provisions are not retroactive. They apply only where buildings are altered or added to.

Additions are essentially handled as new construction. Alterations must meet the requirements of other applicable chapters of the code for those portions or elements of the building that are being altered.

Section 1105 provides relief for historic buildings under certain conditions.

**Chapter 12 Referenced Standards.** The code contains numerous references to standards that are used to regulate materials and methods of construction. Chapter 12 contains a comprehensive list of all standards that are referenced in the code. The standards are part of the code to the extent of the reference to the standard (see Sections 102.4 and 102.4.1). Compliance with the referenced standard is necessary for compliance with this code. By providing specifically adopted standards, the construction and installation requirements necessary for compliance with the code can be readily determined. The basis for code compliance is, therefore, established and available on an equal basis to the code official, contractor, designer and owner.

Chapter 12 is organized in a manner that makes it easy to locate specific standards. It lists all of the referenced standards, alphabetically, by acronym of the promulgating agency of the standard. Each agency's standards are then listed in either alphabetical or numeric order based upon the standard identification. The list also contains the title of the standard; the edition (date) of the standard referenced; any addenda included as part of the ICC adoption; and the section or sections of this code that reference the standard.

**Appendices.** Appendices are provided in the IgCC to offer optional or supplemental criteria to the provisions in the main chapters of the code. Appendices provide additional information and

standards not typically administered by all building departments. Appendices have the same force and effect as the first 12 chapters of the IgCC only when they are explicitly adopted by the jurisdiction.

**Appendix A Project Electives.** *A minimum of Six project electives are required to be completed for compliance with the stretch code.* Where Appendix A provisions are adopted, it encourages the construction of buildings that are “greener” and “more sustainable” than those that meet only the baseline minimum requirements found in the body of the IgCC.

These provisions encourage, but do not require, the implementation of green and sustainable practices that are otherwise difficult or impossible to mandate. For example, it would not be realistic to require that all buildings be constructed on brownfield sites. It is, however, environmentally beneficial to encourage construction on brownfield sites. Thus, Appendix A contains a project elective related to brownfield sites.

Project electives encourage the consideration of, but do not require the implementation of, all green and sustainable practices contained in Appendix A. Compliance is required with at least six of the project electives.

Where green and sustainable practices and provisions are generally suitable as mandatory requirements, they have typically been placed in the body of the IgCC. Green and sustainable practices that are seldom or never appropriate as mandatory requirements for all projects in all regions, or that are intended to encourage and recognize, but not necessarily require, higher building performance, are typically more appropriately integrated in the code as project electives.

Sections A104 through A109 of Appendix A are arranged by major sections that correspond with the fundamental principles addressed in Chapters 4 through 8 of the IgCC: site; material resource conservation and efficiency; energy conservation, efficiency and earth atmospheric quality; water resource conservation and efficiency; and indoor environmental quality and comfort.

The specific project electives to be implemented on each project are selected by the owner and design professional from these sections. It is because the specific electives selected can vary from project to project that they are deemed “project” electives, and it is the fact that these provisions are not mandatory until they are selected by the owner and design professional that they are deemed project “electives.”

It is intended that building owners will implement multiple project electives beyond the minimum of three in an effort to show that their buildings are “greener” and gain a market advantage over their competitors, or to show the public that they are interested in the public welfare that sustainable practices promote. Jurisdictions that adopt the appendix are required to list the project electives complied with on each project in documents that accompany the Certificate of Occupancy, which can, in turn, be used by owners for their sustainable “bragging rights.”

**Appendix B Post-Occupancy Commissioning Reporting.** This appendix contains optional provisions related to commissioning that are to be complied with after the Certificate of Occupancy is issued.

# TABLE OF CONTENTS

**CHAPTER 1 SCOPE AND ADMINISTRATION. . . 1**

**PART 1—SCOPE AND APPLICATION..... 1**

Section

101 General . . . . . 1

102 Applicability . . . . . 1

**PART 2—ADMINISTRATION AND ENFORCEMENT ..... 2**

103 Duties and Powers of the Code Official . . . . . 2

104 Construction Documents . . . . . 2

105 Approval . . . . . 2

106 Permits . . . . . 3

107 Inspections . . . . . 3

108 Board of Appeals . . . . . 3

109 Certificate of Occupancy . . . . . 3

**CHAPTER 2 DEFINITIONS ..... 5**

Section

201 General . . . . . 5

202 Definitions . . . . . 5

**CHAPTER 3 JURISDICTIONAL REQUIREMENTS ..... 15**

Section

301 General . . . . . 15

302 Jurisdictional Requirements . . . . . 15

**CHAPTER 4 SITE DEVELOPMENT AND LAND USE ..... 17**

Section

401 General . . . . . 17

402 Preservation of Natural Resources . . . . . 17

403 Stormwater Management . . . . . 18

404 Landscape Irrigation and Outdoor Fountains . . . . . 19

405 Management of Vegetation, Soils and Erosion Control . . . . . 20

406 Building Site Waste Management . . . . . 23

407 Transportation Impact . . . . . 23

408 Heat Island Mitigation . . . . . 25

409 Site Lighting . . . . . 26

410 Site Completion and Commissioning. . . . . 27

**CHAPTER 5 MATERIAL RESOURCE CONSERVATION AND EFFICIENCY ..... 29**

Section

501 General . . . . . 29

502 Construction Material Management. . . . . 29

503 Construction Waste Management . . . . . 29

504 Waste Management and Recycling . . . . . 29

505 Material Selection . . . . . 29

506 Lamps. . . . . 30

507 Building Envelope Moisture Control . . . . . 31

508 Materials Completion. . . . . 31

**CHAPTER 6 ENERGY CONSERVATION, EFFICIENCY AND CO<sub>2</sub>e EMISSION REDUCTION ..... 33**

Section

601 General . . . . . 33

602 Performance-Based Compliance . . . . . 33

603 Energy Metering, Monitoring and Reporting . . . . . 35

604 Automated Demand-response (Auto-DR) Infrastructure . . . . . 37

605 Building Envelope Systems . . . . . 39

606 Building Mechanical Systems . . . . . 40

607 Building Service Water Heating Systems . . . . . 44

608 Building Electrical Power and Lighting Systems . . . . . 45

609 Specific Appliances and Equipment . . . . . 47

610 Onsite Renewable Energy Systems . . . . . 51

611 Energy Systems Completion . . . . . 51

612 Optional Outcome-based Pathway Requirements. . . . . 51

**CHAPTER 7 WATER RESOURCE CONSERVATION, QUALITY AND EFFICIENCY..... 54**

Section

701 General . . . . . 54

702 Fixtures, Fittings, Equipment and Appliances . . . . . 54

703 HVAC Systems and Equipment. . . . . 60

704 Water Treatment Devices and Equipment . . . . . 61

705 Plumbing Systems Completion. . . . . 61

**TABLE OF CONTENTS**

**CHAPTER 8 INDOOR ENVIRONMENTAL QUALITY AND COMFORT ..... 64**

Section

801 General ..... 64

802 Building Construction Features, Operations and Maintenance Facilitation ..... 64

803 HVAC Systems ..... 64

804 Specific Indoor Air Quality and Pollutant Control Measures ..... 65

805 Prohibited Materials ..... 66

806 Material Emissions and Pollutant Control ..... 66

808 Daylighting ..... 69

**CHAPTER 9 COMMISSIONING, INSPECTIONS, OPERATION AND MAINTENANCE ..... 73**

Section

901 General ..... 73

902 Commissioning Authority ..... 73

903 Commissioning ..... 73

904 Building Operations and Maintenance ..... 77

**CHAPTER 10 EXISTING BUILDINGS ..... 79**

Section

1001 General ..... 79

1002 Additions ..... 80

1003 Alterations to Existing Buildings ..... 80

1004 Change of Occupancy ..... 82

1005 Historic Buildings ..... 82

1006 Demolition ..... 83

1007 Jurisdictional Requirements ..... 83

**CHAPTER 11 EXISTING BUILDING SITE DEVELOPMENT ..... 85**

Section

1101 General ..... 85

1102 Additions ..... 85

1103 Alterations to Existing Building Sites ..... 85

1104 Change of Occupancy ..... 86

1105 Historic Building Sites ..... 86

**CHAPTER 12 REFERENCED STANDARDS .... 87**

**APPENDIX A PROJECT ELECTIVES ..... 97**

Section

A101 General ..... 97

A102 Definitions ..... 97

A103 Applicability and Conformance ..... 97

A104 Site Project Electives ..... 97

A105 Material Resource Conservation and Efficiency ..... 100

A106 Energy Conservation, Efficiency and Earth Atmospheric Quality ..... 101

A107 Water Resource Conservation and Efficiency .. 102

A108 Indoor Environmental Quality and Comfort ... 103

A109 Acoustics ..... 104

A110 Whole Building Life Cycle Assessment ..... 106

A111 Referenced Standards for Electives ..... 107

**APPENDIX B POST-OCCUPANCY COMMISSIONING REPORTING ..... 109**

Section

B101 General ..... 109

**INDEX ..... 111**





# CHAPTER 1

## SCOPE AND ADMINISTRATION

### PART 1—SCOPE AND APPLICATION

#### SECTION 101 GENERAL

[A] **101.1 Title.** These regulations shall be known as the Rhode Island Stretch Code for Commercial Construction, hereinafter referred to as “this code.”

[A] **101.2 General.** This code is an overlay document to be used in conjunction with the other codes and standards adopted by the State of Rhode Island. This code is not intended to be used as a standalone construction regulation document and permits are not to be issued under this code. This code is not intended to abridge or supersede safety, health or environmental requirements under other applicable codes or ordinances.

[A] **101.3 Scope.** Where applicable, the provisions of this code shall apply to the design, construction, addition, alteration, change of occupancy, relocation, replacement, repair, equipment, building site, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures and to the site on which the building is located. Occupancy classifications shall be determined in accordance with the *International Building Code*.

#### Exceptions:

1. The code shall not apply to items 1.1, 1.2 and 1.3 except where the jurisdiction adopts the jurisdictional requirements of Section 302.1, Item 1, for residential buildings.
  - 1.1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories in height above grade plane with a separate means of egress, their accessory structures, and the site or lot upon which these buildings are located.
  - 1.2. Group R-3 residential buildings, their accessory structures, and the site or lot upon which these buildings are located.
  - 1.3. Group R-2 and R-4 residential buildings four stories or less in height above grade plane, their accessory structures, and the site or lot upon which these buildings are located.
2. The code shall not apply to equipment or systems that are used primarily for industrial or manufacturing purposes.
3. The code shall not apply to temporary structures approved under Section 3103 of the *International Building Code*.
4. Where ASHRAE 189.1 is selected in accordance with

Section 301.1.1, ASHRAE 189.1 shall not apply to buildings identified in Exceptions 1 through 3.

[A] **101.3.1 Residential construction.** The following shall be deemed to comply with this code:

1. Group R-2 and R-4 residential buildings five stories or more in height above grade plane, their accessory structures, and the site or lot upon which these buildings are located that comply with ICC 700, with the minimum energy efficiency category requirements of the Silver performance level or equivalent.
2. Group R-2 and R-4 portions of mixed use buildings that comply with ICC 700, with the minimum energy efficiency category requirements of the Silver performance level or equivalent. The remainder of the building and the site upon which the building is located shall comply with the provisions of this code.

[A] **101.4 Appendices.** Provisions in the appendices shall not apply unless specifically adopted.

[A] **101.5 Intent.** This code is intended to safeguard the environment, public health, safety and general welfare through the establishment of requirements to reduce the negative impacts and increase the positive impacts of the built environment on the natural environment and building occupants.

#### SECTION 102 APPLICABILITY

[A] **102.1 Code conflicts.** Where there is a conflict between a general requirement and a specific requirement of this code, the specific requirement shall be applicable. Where, in any specific case, different sections of the code specify different materials, methods of construction or other requirements, the most practical requirement to meet the intent of the code shall govern.

[A] **102.2 Other laws.** The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

[A] **102.3 Application of references.** References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

[A] **102.4 Referenced codes and standards.** The following codes shall be considered part of the requirements of this code: *International Building Code*, *International Code Council Performance Code*, *International Energy Conservation Code*, *International Existing Building Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code*, *International Property Maintenance Code*, and *International Residential Code*.

## SCOPE AND ADMINISTRATION

[A] **102.4.1 Conflicting provisions.** Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code or the International Codes listed in Section 102.4, the provisions of this code or the International Codes listed in Section 102.4, as applicable, shall take precedence over the provisions in the referenced code or standard.

[A] **102.5 Partial invalidity.** In the event that any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

[A] **102.6 Existing structures.** The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the *International Building Code*, the *International Existing Building Code*, the *International Property Maintenance Code* or the *International Fire Code*, or as is deemed necessary by the *code official* for the general safety and welfare of building occupants and the public.

[A] **102.7 Mixed occupancy buildings.** In mixed occupancy buildings, each portion of a building shall comply with the specific requirements of this code applicable to each specific occupancy.

## PART 2—ADMINISTRATION AND ENFORCEMENT

### SECTION 103

#### DUTIES AND POWERS OF THE CODE OFFICIAL

Section deleted in Rhode Island.

### SECTION 104

#### CONSTRUCTION DOCUMENTS

[A] **104.1 Information on construction documents.** The content and format of construction documents shall comply with the concurrent *Rhode Island Building Code*.

### SECTION 105

#### APPROVAL

[A] **105.1 General.** This code is not intended to prevent the use of any material, method of construction, design, system, or innovative approach not specifically prescribed herein, provided that such construction, design, system or innovative approach has been *approved* by the *code official* as meeting the intent of this code and all other applicable laws, codes and ordinances.

[A] **105.2 Approved materials and equipment.** Materials, equipment, devices and innovative approaches *approved* by the *code official* shall be constructed, installed and maintained in accordance with such approval.

[A] **105.2.1 Used materials, products and equipment.** The use of used materials, products and equipment that meet the requirements of this code for new materials is permitted. Used equipment and devices shall be permitted

to be reused subject to the approval of the *code official*.

[A] **105.3 Modifications.** Where there are practical difficulties involved in carrying out the provisions of this code, the *code official* shall have the authority to grant modifications for individual cases, upon application of the owner or the owner's authorized agent, provided the *code official* shall first find that special individual reason makes the strict letter of this code impractical and that the modification is in compliance with the intent and purpose of this code and that such modification does not lessen the minimum requirements of this code. The details of granting modifications shall be recorded and entered in the files of the department.

[A] **105.4 Innovative approaches and alternative materials, design, and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design, innovative approach, or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design, innovative approach or method of construction shall be reviewed and *approved* where the *code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, design, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. The details of granting the use of alternative materials, designs, innovative approach and methods of construction shall be recorded and entered in the files of the department. Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.

[A] **105.4.1 Research reports.** Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved* sources.

[A] **105.4.2 Tests.** Where there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the *code official* shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *code official* shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be retained by the *code official* for the period required for retention of public records.

[A] **105.5 Compliance materials.** The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

[A] **105.6 Approved programs.** The *code official* or other authority having jurisdiction shall have the authority to deem a national, state or local program to meet or exceed this code.

Buildings *approved* in writing by such a program shall be considered to be in compliance with this code.

**[A] 105.6.1 Specific approval.** The *code official* or authority having jurisdiction shall have the authority to approve programs or compliance tools for a specified application, limited scope or specific locale. For example, a specific approval shall be permitted to apply to a specific section or chapter of this code.

SECTION 106  
PERMITS

Section deleted in Rhode Island.

SECTION 107  
INSPECTIONS

Section deleted in Rhode Island.

SECTION 108  
BOARD OF APPEALS

**[A] 108.1 General.** Appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code shall be made to a Board of Appeals as determined by the jurisdiction.

**[A] 108.2 Limitations on authority.** An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted there under have been incorrectly interpreted, the provisions of this code do not fully apply or an equivalent or better form of construction is proposed. The board shall have no authority to waive requirements of this code.

**[A] 108.3 Qualifications.** The members of the board of appeals related to interpretation of this code shall be qualified by experience and training in the matters covered by this code and shall not be employees of the jurisdiction.

SECTION 109  
CERTIFICATE OF OCCUPANCY

**[A] 109.1 Violations.** Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction.



## CHAPTER 2

# DEFINITIONS

### SECTION 201 GENERAL

**201.1 Scope.** Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings shown in this chapter.

**201.2 Interchangeability.** Words used in the present tense include the feminine and neuter; the singular number includes the plural and the plural, the singular.

**201.3 Terms defined in other codes.** Where terms are not defined in this code and are defined in the *International Building Code*, *International Energy Conservation Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code* or *International Residential Code*, such terms shall have the meanings ascribed to them as in those codes.

**201.4 Terms not defined.** Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

### SECTION 202 DEFINITIONS

**95th-PERCENTILE RAINFALL EVENT.** The rainfall event having a precipitation total greater than or equal to 95 percent of all rainfall events during a 24-hour period on an annual basis.

**A-WEIGHTED SOUND LEVEL.** Sound pressure level in decibels measured with a sound level meter using an A-weighted network.

**ACCIDIFICATION.** The dissolved acid from fossil fuel combustion used in electricity production, heating and transportation and deposited by rain into ecosystems.

**[A] ADDITION.** An extension or increase in floor area or height of a building or structure.

**[E] AIR CURTAIN.** A device that generates and discharges a laminar air stream installed at the building entrance intended to prevent the infiltration of external, unconditioned air into the conditioned spaces, or the loss of interior, conditioned air to the outside.

**[A] ALTERATION.** Any construction or renovation to an existing structure other than repair or addition.

**[A] APPROVED.** Acceptable to the *code official*.

**[A] APPROVED AGENCY.** An established and recognized agency regularly engaged in conducting tests or furnishing inspection services or commissioning services, where such agency has been *approved*.

**[A] APPROVED SOURCE.** An independent person, firm

or corporation, *approved* by the *code official*, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses.

**AREA, TOTAL BUILDING FLOOR.** The total of the *total floor areas* on all stories of the building.

**AREA, TOTAL FLOOR.** The total area of a story as measured from the interior side of the exterior walls.

**ASBESTOS-CONTAINING MATERIALS.** Building materials containing one or more of the following mineral fibers in any detectable amounts greater than 1 percent that have been intentionally added or are present as a contaminant: chrysotile, amosite, crocidolite, tremolite, actinolite, anthophyllite and any fibrous amphibole.

**[F] AUTOMATIC.** Self-acting, operating by its own mechanism when actuated by some impersonal influence, such as a change in current strength, pressure, temperature or mechanical configuration (see “Manual”).

**AUTOMATIC TIME SWITCH CONTROL.** A device or system that automatically controls lighting or other loads, including switching ON or OFF, based on time schedules.

**BASIS OF DESIGN.** 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. Also see the definition of “Owner’s project requirements.”

**BICYCLE PARKING, LONG TERM.** Bicycle racks or storage lockers provided for bicycle riders including, but not limited to, employees and students, anticipated to be at a building site for four or more hours.

**BICYCLE PARKING, SHORT TERM.** Bicycle racks or storage lockers provided for bicycle riders including, but not limited to, customers, visitors, and event audiences, anticipated to be at a building site for less than four hours.

**BIO-BASED MATERIAL.** A commercial or industrial material or product, other than food or feed, that is composed of, or derived from, in whole or in significant part, biological products or renewable domestic agricultural materials, including plant, animal, and marine materials, or forestry materials.

**BRANCH CIRCUIT.** All circuit conductors between the final branch-circuit overcurrent device and the load.

**BROWNFIELD.** A site in which the expansion, redevelopment or reuse of would be required to address the presence or potential presence of a hazardous substance, pollutant or contaminant. *Brownfield* sites include:

1. EPA-recognized *brownfield* sites as defined in Public Law 107-118 (H.R. 2869) “Small Business Liability Relief and Brownfields Revitalization Act,” 40 CFR, Part 300; and

## DEFINITIONS

2. Sites determined to be contaminated according to local or state regulation.

**BTU.** Abbreviation for British thermal unit, which is the quantity of heat required to raise the temperature of 1 pound (454 g) of water 1 °F (0.56 °C) (1 Btu = 1055 J).

**BUFFER.** The number of feet of setback from a wetland or water body determined by a jurisdiction to be necessary to protect a specific wetland or water body. The width of the buffer varies based on characteristics of the wetland and surrounding areas including, but not limited to, the type and function of the wetland, soils, slopes, land uses, habitats, and needs for wildlife or water quality protection.

**[A] BUILDING.** Any structure used or intended for supporting or sheltering any use or occupancy, including the energy using systems and site subsystems powered through the building's electrical service.

**BUILDING COMMISSIONING.** See "Commissioning."

**BUILDING SITE.** A lot, or a combination of adjoining lots, that are being developed and maintained subject to the provisions of this code. A building site includes public ways, private roadways, bikeways and pedestrian ways that are developed as an element of the total development.

**BUILDING THERMAL ENVELOPE.** The basement walls, exterior walls, floor, roof, and any other building elements that enclose conditioned space. This boundary also includes the boundary between conditioned space and any exempt or unconditioned space.

**CAPTIVE KEY CONTROL.** An automatic control device or system that energizes circuits when the key that unlocks the sleeping unit is inserted into the device and that de-energizes those circuits when the key is removed.

**CARBON DIOXIDE EQUIVALENT (CO<sub>2e</sub>) EMISSIONS.** A measure used to compare the emissions from various greenhouse gases based upon their 100-year time horizon global warming potential (GWP). CO<sub>2e</sub> emissions from carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) are included. The carbon dioxide equivalent for a gas is derived by multiplying the weight of the gas by the associated GWP.

**CHANGE OF OCCUPANCY.** A change in the purpose or level of activity within a building that involves a change in application of the requirements of this code.

**CLIMATE ZONE.** A geographical region based on climate criteria as specified in the *International Energy Conservation Code*.

**CODE OFFICIAL.** The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

**COMBINATION OVEN/STEAMER.** A chamber designed for heating, roasting, or baking food by a combination of conduction, convection, radiation, electromagnetic energy or steam.

**[A] COMMISSIONING.** A process that verifies and documents that the selected building and site systems have been designed, installed, and function in accordance with the

owner's project requirements and construction documents, and minimum code requirements.

**COMPOSITE WOOD PRODUCTS.** Hardwood plywood, particleboard, and medium-density fiberboard.

Composite wood products do not include the following:

1. Hardboard and structural plywood as specified in DOC PS-1;
2. Structural panels as specified in DOC PS-2;
3. Structural composite lumber as specified in ASTM D5456;
4. Oriented strand board and glued laminated timber as specified in ANSI A190.1;
5. Prefabricated wood I-joists as specified in ASTM D5055; and
6. Finger-jointed lumber.

**CONSERVATION AREA.** Land designated by the jurisdiction or by state or federal government, as appropriate for conservation from development because of the land possessing natural values important to the community including, but not limited to, wildlife habitat, forest or other significant vegetation, steep slopes, ground water recharge area, riparian corridor or wetland.

**CONSTRUCTION-COMPACTED SUBSOIL.** Subsoils that are compacted through any of the following: clearing, grading, smearing and topsoil removal such that the infiltrative capacity of the soils or the bulk density of the soils is significantly altered in comparison to the reference soil properties.

**[A] CONSTRUCTION DOCUMENTS.** Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit.

**CONTINUOUS INSULATION (ci).** Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope

**[M] CONTROL.** A specialized automatic or manual device or system used to regulate the operation of lighting, equipment or appliances.

**CO<sub>2e</sub>.** Weight of each gas emitted when consuming a specific energy type in the building per unit of the specific energy type provided to the building at the utility meter multiplied by the global warming potential (GWP) of the specific gas, and then summed over all three gases emitted.

where:

$$\text{GWP (CO}_2\text{)} = 1$$

$$\text{GWP (CH}_4\text{)} = 25$$

$$\text{GWP (N}_2\text{O)} = 298.$$

**COURT.** An open, uncovered space, unobstructed to the sky, bounded on three or more sides by exterior building

walls or other enclosing devices.

**[E] DAYLIGHT RESPONSIVE CONTROL.** A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

**DAYLIGHT SATURATION.** The percentage of daylight hours throughout the year when not less than 28 footcandles (300 lux) of natural light is provided at a height of 30 inches (760 mm) above the floor.

**DAYLIGHT ZONE.** That portion of a building's interior floor area that is illuminated by natural light.

**DECIBELS (dB).** Term used to identify ten times the common logarithm of the ratio of two like quantities proportional to the power of energy.

**DECONSTRUCTION.** The process of systematically disassembling a building, structure, or portion thereof, so that the materials, products, components, assemblies and modules can be salvaged for repurpose, reuse or recycling.

**[E] DEMAND LIMIT.** The shedding of loads when predetermined peak demand limits are about to be exceeded.

**[E] DEMAND RESPONSE (DR).** The ability of a building system to reduce the energy consumption for a specified time period after receipt of demand response signal typically from the power company or demand response provider. Signals requesting demand response are activated at times of peak usage or when power reliability is at risk.

**[E] DEMAND RESPONSE, AUTOMATED (AUTO-DR).** Fully automated demand response initiated by a signal from a utility or other appropriate entity, providing fully automated connectivity to customer energy end-use control strategies.

**DEMAND-RESPONSE AUTOMATION INTERNET SOFTWARE.** Software that resides in a building energy management control system that can receive a demand-response signal and automatically reduce heating, ventilating, air-conditioning (HVAC) and lighting system loads.

**DEMOLITION.** The process of razing, relocation, or removal of an existing building or structure, or a portion thereof.

**DETENTION.** The short-term storage of stormwater on a site in order to regulate the runoff from a given rainfall event and to control discharge rates to reduce the impact on downstream stormwater systems.

#### **DISHWASHER.**

**Dishwasher, door type.** A machine designed to clean and sanitize plates, glasses, cups, bowls, utensils, and trays by applying sprays of detergent solution and a sanitizing final rinse, that is designed to accept a standard 20-inch by 20-inch (508 mm by 508 mm) dish rack which requires the raising of a door to place the rack into the wash/rinse chamber.

**Dishwasher, multiple tank conveyor.** A machine designed to clean and sanitize plates, glasses, cups, bowls, utensils, and trays by applying sprays of detergent solution and a sanitizing final rinse, using a conveyor or similar mechanism to carry dishes through a series of wash and rinse sprays utilizing one or more tanks within

the machine. This type of machine may include a pre-washing section before the washing section and an auxiliary rinse section between the power rinse and final rinse section.

**Dishwasher, pot pan and utensil.** A machine designed to clean and sanitize pots, pans, and kitchen utensils by applying sprays of detergent solutions and a sanitizing final rinse.

**Dishwasher, rackless conveyor.** A machine designed to clean and sanitize plates, glasses, cups, bowls, utensils, and trays by applying sprays of detergent solution and a sanitizing final rinse, using a conveyor or similar mechanism to carry dishes through a series of wash and rinse sprays within the machine. Rackless conveyor machines utilize permanently installed, vertical pegs to carry dishware through the wash and rinse cycles.

**Dishwasher, single-tank conveyor.** A machine designed to clean and sanitize plates, glasses, cups, bowls, utensils, and trays by applying sprays of detergent solution and a sanitizing final rinse, using a conveyor or similar mechanism to carry dishes through a series of wash and rinse sprays within the machine. This type of machine does not have a pumped rinse tank but may include a prewashing section ahead of the washing section.

**Dishwasher, under counter.** A machine designed to clean and sanitize plates, glasses, cups, bowls, utensils, and trays by applying sprays of detergent solution and a sanitizing final rinse, that has an overall height 38 inches (965 mm) or less, designed to be installed under food preparation workspaces.

**DIVERSE USE CATEGORIES.** Categories of occupancies and land uses which are designated as either community, retail or service facilities:

**Community facilities.** The community facilities category includes: child care; civic or community center; a building containing a place of worship; police or fire station; post office, public library, public park, school, senior care facility, homeless shelter, and similar social services facilities.

**Retail uses.** The retail use category includes: convenience store, florist, hardware store, pharmacy, grocery or supermarket and similar retail uses.

**Service uses.** The service use category includes: bank, coffee shop or restaurant; hair care; health club or fitness center; laundry or dry cleaner, medical or dental office and similar service uses.

**[BG] DWELLING UNIT.** A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

**ENERGY MANAGEMENT AND CONTROL SYSTEM, BUILDING (EMCS).** A computerized, intelligent network of electronic devices, designed to automatically monitor and control the energy using systems in a building.

## DEFINITIONS

**ENERGY STAR.** A joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) designed to identify and promote energy-efficient products and practices.

**ENERGY STAR QUALIFIED.** Appliances or equipment that have been found to comply with ENERGY STAR requirements by a third-party organization recognized by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE).

**[M] EQUIPMENT.** All piping, ducts, vents, control devices and other components of systems other than appliances which are permanently installed and integrated to provide control of environmental conditions for buildings. This definition shall also include other systems specifically regulated in this code.

**EUTROPHICATION.** The process by which a body of water acquires a high concentration of nutrients, especially phosphates and nitrates.

**[M] EVAPORATIVE COOLING SYSTEM.** A system for cooling the air in a building or space by removing heat from the outdoor air by means of the evaporation of water. The system forces air through wet porous pads, causing the latent heat of evaporation to cool the air. Water is continuously circulated over the pads to replenish the evaporated water. Where the cooled air is sent directly into the building, the system is referred to as “direct evaporative cooling.” Where the cooled air is sent through heat exchangers recirculating indoor air, the system is referred to as “indirect evaporative cooling.”

**[A] EXISTING BUILDING.** A building erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued.

**[A] EXISTING STRUCTURE.** A structure erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued.

**EXTERIOR WALL, OBSTRUCTED.** That portion of an exterior wall with limited access to natural light due to shading from buildings, structures, or geological formations,

**FACILITY OPERATIONS.** A facility is operational during the time when the primary activity that facility is designed for is taking place. For Group A and Group M occupancies, this is the time during which the facility is open to the public.

**[E] FAN EFFICIENCY GRADE (FEG).** A numerical rating identifier that specifies the fan’s aerodynamic ability to convert shaft power, or impeller power in the case of a direct driven fan, to air power. FEGs are based on fan peak (optimum) energy efficiency that indicates the quality of the fan energy usage and the potential for minimizing the fan energy usage.

### FARMLAND.

**Farmlands of statewide significance.** Land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage

and oil seed crops. Criteria for delineating this land is determined by the appropriate state agency.

**Prime farmland.** Land that has the best combination of physical and chemical characteristics for producing food, fiber, feed, forage, and oil seed crops and that is also available for these uses, including cropland, pastureland, forest land, range land and similar lands which are not water areas or urban or built-up land areas.

**Unique farmland.** Land other than prime farmland that is used for the production of specific high-value food or fiber crops. The land has the special combination of soil quality, location, growing season and moisture supply needed to economically produce sustained high-quality crops or high yields of a specific crop where the lands are treated and managed according to acceptable farming methods.

**FEEDER CONDUCTORS.** The circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.

**[E] FENESTRATION.** Products classified as either vertical fenestration or skylights.

**FIBER PROCUREMENT SYSTEM.** A system that ensures that fiber procured for the manufacture of wood and wood-based products comes from responsible or certified sources in accordance with ASTM D7612.

**[M] FIREPLACE.** An assembly consisting of a hearth and fire chamber of noncombustible material and provided with a chimney for use with solid fuels.

**Factory-built fireplace.** A listed and labeled fireplace and chimney system composed of factory-made components, and assembled in the field in accordance with the manufacturer’s instructions and the conditions of the listing.

**Masonry fireplace.** A field-constructed fireplace composed of solid masonry units, bricks, stones or concrete.

**[BS] FLOOD HAZARD AREA.** The greater of the following two areas:

1. The area within a *floodplain* subject to a 1-percent or greater chance of flooding in any given year;
2. The area designated as a *flood hazard area* on a community’s flood hazard map, or otherwise legally designated.

**[BS] FLOOD OR FLOODING.** A general and temporary condition of partial or complete inundation of normally dry land from:

1. The overflow of inland or tidal waters.
2. The unusual and rapid accumulation of runoff of surface waters from any source.

**[BS] FLOODPLAIN.** An area of land at risk of being inundated with water during high flows. *Floodplains* are associated with both water courses, such as rivers and streams, and bodies of water, such as oceans and lakes.

**[BE] FLOOR AREA, NET.** The actual occupied area not



including unoccupied accessory areas such as corridors, stairways, toilet rooms, mechanical rooms and closets.

**FREEZER.** Equipment designed to enclose a space of mechanically cooled and temperature-controlled air used to maintain prescribed frozen food holding temperatures.

**FRYER, DEEP FAT.** A unit with a width between 12 and 18 inches (305 and 457 mm) that cooks food by immersion in a tank of oil or fat more than 25 pounds (11 kg) and less than 50 pounds (23 kg).

**FRYER, LARGE VAT.** A unit with a width greater than 18 inches (457 mm) that cooks food by immersion in a tank of oil or fat more than 50 pounds (23 kg).

**GEOHERMAL.** Systems that utilize the earth as a heat source or heat sink, including systems utilizing subsurface water or subsurface steam.

**GLOBAL WARMING POTENTIAL (GWP).** The cumulative radiative forcing effects of a gas over a 100-year time horizon resulting from the emission of a unit mass of gas relative to a reference gas. The GWP-weighted emissions of direct greenhouse gases in the U.S. Inventory are presented in terms of equivalent emissions of carbon dioxide (CO<sub>2</sub>), using units of teragrams of carbon dioxide equivalents (TgCO<sub>2</sub>Eq.). conversion: Tg=10<sup>9</sup> kg = 10<sup>6</sup> metric tons = 1 million metric tons.

**[P] GRAY WATER.** Waste from bathtubs, showers, lavatories, clothes washers, and laundry trays.

**GREENFIELD.** Land that has not been previously developed or has a history of only agricultural use.

**GREENHOUSE GAS.** A gas in the atmosphere that absorbs and emits radiation within the thermal infrared range.

**GRIDDLE, DOUBLE-SIDED.** Equipment used to cook food between flat, smooth, or grooved horizontal plates heated from above and underneath.

**GRIDDLE, SINGLE-SIDED.** Equipment used to cook food directly on a flat, smooth, or grooved horizontal plate heated from underneath.

**GROUND SOURCE.** See “Geothermal.”

**HARDSCAPE.** Paved areas on a building site.

**HIGH-OCCUPANCY VEHICLE.** A vehicle which is occupied by two or more people, including carpools, vanpools, and buses.

**[A] HISTORIC BUILDINGS.** A building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places;
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed, state designated, or locally designated historic district.

**ICE MACHINE.**

**Ice machine, ice-making head.** A factory-made assembly consisting of a condensing unit and ice-making section operating as an integrated unit, with means for making and harvesting ice, that combines the ice-making mechanism and the condensing unit in a single package, but requires a separate ice storage bin.

**Ice machine, remote-condensing unit.** A factory-made assembly consisting of a condensing unit and ice-making section operating as an integrated unit, with means for making and harvesting ice, where the ice-making mechanism and condenser or condensing unit are in separate sections.

**Ice machine, self-contained unit.** A factory-made assembly consisting of a condensing unit and ice-making section operating as an integrated unit, with means for making and harvesting ice and where the ice-making mechanism and storage compartment are combined into an integral cabinet.

**IMPERVIOUS SURFACE.** Paved concrete or asphalt and other similar surfaces that readily accommodate the flow of water with relatively little absorption, as typically used at exterior horizontal areas including, but not limited to, parking lots, bikeways, walkways, plazas and fire lanes.

**INDEPENDENT SYSTEM OPERATOR (ISO).** The electric system’s operator.

**INFEASIBLE.** An alteration of a building, site feature, or system that has little likelihood of being accomplished because existing physical or site constraints prohibit modification or addition of elements, spaces or features which are in full and strict compliance with the minimum requirements for new construction.

**INFRASTRUCTURE.** Facilities within a jurisdiction that provide community services and networks for travel and communication including: transportation services such as, but not limited to roads, bikeways and pedestrian ways and transit services; utility systems such as, but not limited to, water, sanitary sewage, stormwater management, telecommunications, power distribution and waste management; and community services such as, but not limited to, public safety, parks, schools and libraries.

**INFRASTRUCTURE, ADEQUATE.** The capacity of infrastructure systems, as determined by the jurisdiction, to serve the demands imposed by a new development on building sites without negatively impacting services to existing users of the infrastructure and without negatively impacting the overall functionality of the infrastructure. Adequacy can be determined based on existing infrastructure or on the infrastructure as augmented by a development project.

**INVASIVE PLANT SPECIES.** Species that are not native to the ecosystem under consideration and that cause, or are likely to cause, economic or environmental harm or harm to human, animal or plant health, defined by using the best scientific knowledge of that region. Invasive species shall include, but shall not be limited to, those nonnative species identified on:

1. *Approved* city, county or regional lists.
2. State noxious weeds laws, state invasive plant laws, and state invasive species laws.

## DEFINITIONS

3. Federal noxious weeds laws.

[A] **JURISDICTION.** The governmental unit that has adopted this code under due legislative authority.

[A] **LABEL.** An identification applied on a product by the manufacturer that contains the name of the manufacturer, the function and performance characteristics of the product or material, and the name and identification of an approved agency and that indicates that the representative sample of the product or material has been tested and evaluated by an approved agency.

[A] **LABELED.** Equipment, materials or products to which has been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

**LIFE CYCLE ASSESSMENT (LCA).** A technique to evaluate the relevant energy and material consumed and environmental emissions associated with the entire life of a building, product, process, material, component, assembly, activity or service.

**LIGHTING BOUNDARY.** Where the lot line abuts a public walkway, bikeway, plaza, or parking lot, the *lighting boundary* shall be a line 5 feet (1524 mm) from the lot line and located on the public property. Where the lot line abuts a public roadway or public transit corridor, the *lighting boundary* shall be the centerline of the public roadway or public transit corridor. In all other circumstances, the *lighting boundary* shall be at the lot line.

[A] **LISTED.** Equipment, materials, products or services included in a list published by an organization acceptable to the *code official* and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

[A] **LOT.** A portion or parcel of land considered as a unit.

[A] **LOT LINE.** A line dividing one lot from another, or from a street or any public place.

**LOW EMISSION, HYBRID AND ELECTRIC VEHICLE.** Vehicles that achieve EPA Tier 2, California LEV-II, or a minimum of EPA LEV standards, whether by means of hybrid, alternative fuel, or electric power.

**LOW VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMER.** A NEMA 'Class 1' transformer that is air-cooled, does not use oil as a coolant, has an input voltage  $\leq$  600 volts, and is rated for operation at a frequency of 60 hertz.

[E] **MANUAL.** Capable of being operated by personal intervention (see "Automatic").

**MINIMUM EFFICIENCY REPORTING VALUE**

**(MERV).** Minimum efficiency-rated value for the effectiveness of air filters.

**METER.** A measuring device used to collect data and indicate usage.

**MODIFIED ENERGY FACTOR (MEF).** The capacity in cubic feet of the clothes container of a clothes washing machine, C, divided by the clothes washing total energy consumption in kWh per cycle. Total energy consumption per cycle is the sum of the machine electrical energy consumption per cycle, M; the hot water energy consumption per cycle, E; and the energy required for removal of the remaining moisture in the wash load per cycle, D. The equation is:

$$\text{MEF} = C / (M + E + D) \text{ (Equation 2-1)}$$

**MUNICIPAL RECLAIMED WATER.** Reclaimed water treated by a municipality.

**NATIVE PLANT SPECIES.** Species that are native to the ecosystem under consideration, defined by using the best scientific knowledge of that region. Consideration for inclusion as a native species shall include, but is not limited to, those species identified in any of the following:

1. *Approved* city, county and regional lists.
2. State laws.
3. Federal laws.

**[P] NONPOTABLE WATER.** Water not safe for drinking, personal or culinary utilization.

**[BE] OCCUPANT LOAD.** The occupant load as calculated in accordance with the requirements of Chapter 10 of the *International Building Code*.

**[E] OCCUPANT SENSOR CONTROL.** An automatic device or system that detects the presence or absence of people within an area and causes lighting, equipment, or appliances to be regulated accordingly.

**ONCE-THROUGH COOLING.** The use of water as a cooling medium where the water is passed through a heat exchanger one time and 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.

**ONSITE RENEWABLE ENERGY SYSTEM.** An energy generation system located on the building or building site that derives its energy from a renewable energy source.

**ORGANIC MATTER.** Carbon-containing material composed of both living organisms and formerly living, decomposing plant and animal matter. Soil organic matter content is either naturally occurring or is a result of supplementation with compost or other partially decomposed plant and animal material.

**OUTDOOR ORNAMENTAL FOUNTAIN.** An outdoor fixture whose dominant use is aesthetic consisting of a catch basin, reservoir or chamber from which one or more jets or streams of water is emitted.

**OVEN, CONVECTION.** A chamber designed for heating, roasting, or baking food by conduction, convection, radiation, and/or electromagnetic energy.

**OWNER'S PROJECT REQUIREMENTS.** 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.

**OZONE DEPLETION.** Destruction of the ozone gas in the upper atmospheric layer, caused by substances formed from breakdown of ozone-depleting substances.

**[A] PERMIT.** An official document or certificate issued by the code official that authorizes performance of a specified activity.

**PERVIOUS CONCRETE.** Hydraulic cement concrete with distributed, interconnected macroscopic voids that allows water to pass through the material with little resistance.

**POST-CONSUMER RECYCLED CONTENT.** The 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 that can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

**[P] POTABLE WATER.** Water free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming to the bacteriological and chemical quality requirements of the Public Health Service Drinking Water Standards or the regulations of the public health authority having jurisdiction.

**POWER CONVERSION SYSTEM.** The equipment used to convert incoming electrical power, to the force causing vertical motion of the elevator. In a traction system, this would include the electrical drive, motor, and transmission.

**PRECONSUMER (POST-INDUSTRIAL) RECYCLED CONTENT.** The proportion of recycled material in a product diverted from the waste stream during the manufacturing process. Preconsumer recycled content does not include reutilization of material such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

**PRIMARY ENERGY USE.** The total fuel-cycle energy embedded within building materials and all forms of energy required for building operation. Units of energy are reported in total Btu's for building materials and total Btu's per unit of energy (e.g., kWh, therms and gallons) consumed in the operation of building mechanical systems (HVAC and lighting). Total fuel-cycle energy includes energy required from the point of initial extraction, through processing and delivery to the final point of consumption into building materials or building operation.

**PROCESS LOADS.** Building energy loads that are not related to building space conditioning, lighting, service water heating or ventilation for human comfort.

**PROGRAM OPERATOR.** Body or bodies that conduct a Type III environmental declaration program. A program operator is a company or a group of companies, industrial sector or trade association, public authorities or agencies, or an independent scientific body or other organization.

**[E] PROJECTION FACTOR.** A ratio that describes the

## DEFINITIONS

geometry of a horizontal projection, as determined in accordance with Equation 4-2 of Section C402.3.3 of the *International Energy Conservation Code*.

**[E] PROPOSED DESIGN.** A description of the proposed building used to estimate annual energy use for determining compliance based on total building performance including improvements in design such as the use of passive solar energy design concepts and technologies, improved *building thermal envelope* strategies, increased equipment and systems efficiency, increased use of daylighting, improved control strategies and improved lighting sources that will result in a decrease in annual energy.

**[E] R-VALUE (THERMAL RESISTANCE).** The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ( $h \times ft^2 \times ^\circ F/Btu$ ) [ $(m^2 \times K)/W$ ].

**[P] RAINWATER.** Water from natural precipitation.

**REBOUND AVOIDANCE, EXTENDED AUTO-DR CONTROL.** The rebound avoidance, extended Auto-DR control strategy is essentially an extension of the rebound avoidance, slow recovery strategy. Although a slow recovery strategy is critical to maximize the benefit of an Auto-DR strategy, the building energy management and control system (EMCS) programming for just such a strategy can be very complex or might not be possible for many conventional EMCS's. A rebound avoidance, extended Auto-DR control strategy also includes logic and controls for avoiding a rebound peak when the control signal is stopped.

**REBOUND AVOIDANCE, SEQUENTIAL EQUIPMENT RECOVERY.** Sequential equipment recovery that disperses short duration equipment start up spikes gradually, thereby avoiding a larger whole building demand spike.

**REBOUND AVOIDANCE, SLOW RECOVERY.** Slow recovery strategies slowly recover the target parameter that was controlled in the demand response strategy. Where this strategy is applied, the zone setpoints are gradually restored to the normal setpoints. Where air moving systems are targeted, a limit strategy is applied to the adjustable speed drives; fan adjustable speed drive limits are gradually shifted up.

**RECEIVING WATERS.** Groundwater, creeks, streams, rivers, lakes or other water bodies that receive treated or untreated waste water or stormwater, including water from combined sewer systems and stormwater drains.

**[P] RECLAIMED WATER.** Nonpotable water that has been derived from the treatment of waste water by a facility or system licensed or permitted to produce water meeting the jurisdiction's water requirements for its intended uses. Also known as "Recycled Water."

**RECYCLABILITY.** Ability of a material or product to be captured and separated from a waste stream for conversion, reprocessing or reuse.

**REFRIGERATOR.** Equipment designed to enclose a space of mechanically cooled and temperature-controlled air used to maintain prescribed cold food holding temperatures.

**[A] REGISTERED DESIGN PROFESSIONAL.** An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

**[A] REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE.** A *registered design professional* engaged by the owner to review and coordinate certain aspects of the project, as determined by the building official, for compatibility with the design of the building or structure, including submittal documents prepared by others, deferred submittal documents and phased submittal documents.

**RELOCATABLE (RELOCATED) MODULAR BUILD-ING.** A partially or completely assembled building using a modular construction process and designed to be reused or repurposed multiple times and transported to different building sites.

**RENEWABLE ENERGY CREDIT (REC).** A REC represents the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation. A REC, and its associated attributes and benefits, is sold separately from the underlying physical electricity associated with an onsite renewable energy source.

**RENEWABLE ENERGY SOURCE.** Energy derived from solar radiation, wind, waves, tides, biogas, biomass, or geothermal energy.

**[A] REPAIR.** The reconstruction or renewal of any part of an existing building or building site for the purpose of its maintenance or to correct damage.

**RETENTION (STORMWATER).** The permanent holding of stormwater on a site, preventing the water from leaving the site as surface drainage and allowing for use of the water on site, or loss of the water through percolation, evaporation or absorption by vegetation.

**REUSE.** To divert a material, product, component, module, or a building from the waste stream in order to use it again.

**[BS] ROOF COVERING.** The covering applied to the roof deck for weather resistance, fire classification or appearance.

**[BS] ROOF RECOVER.** The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

**[BS] ROOF REPAIR.** Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

**[BS] ROOF REPLACEMENT.** The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

**SEQUENCE OF OPERATIONS.** A fully descriptive detailed account of the intended operation of energy using systems covering the operation of systems in narrative terms, accounting for all of the equipment that makes up the systems, how the systems are designed to operate, and how they are to be controlled.

**SITE DISTURBANCE.** Site preparation or construction that negatively affects the native vegetation of the site.

**[BS] SKYLIGHT.** Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal.

**[BS] SKYLIGHT, UNIT.** A factory-assembled, glazed fenestration unit, containing one panel of glazing material that allows for natural lighting through an opening in the roof assembly while preserving the weather-resistant barrier of the roof.

**[BG] SLEEPING UNIT.** A room or space in which people sleep, that can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.

**SMOG.** Emissions from industry and fossil-fueled transportation trapped at ground level reacting with sunlight producing photochemical smog.

**[E] SOLAR HEAT GAIN COEFFICIENT (SHGC).** The ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation which is then reradiated, conducted or convected into the space.

**SOLAR PHOTOVOLTAIC SYSTEM.** Devices such as photovoltaic (PV) modules and inverters that are used to transform solar radiation into energy.

**SOLAR REFLECTANCE.** A measure of the ability of a surface material to reflect sunlight. It is the fraction of incident sunlight reflected by a surface, expressed on a scale of 0 to 1. Solar reflectance is also referred to as "albedo."

**SOLAR REFLECTANCE INDEX (SRI).** A value that incorporates both solar reflectance and thermal emittance in a single measure to represent a surface's relative temperature in the sun. SRI compares a surface's temperature to those of standard black and standard white surfaces. It typically ranges from 0 for standard black to 100 for standard white, but can be less than 0 or greater than 100.

**SOLAR THERMAL EQUIPMENT.** A device that uses solar radiation to heat water, air or a heat transfer fluid to provide heat for service water heating, process heating, space heating or space cooling within a facility.

**[E] STANDARD REFERENCE DESIGN.** A building design that meets the minimum requirements of the *International Energy Conservation Code*.

**STANDBY MODE (ELEVATOR).** An operating mode during periods of inactivity in which electrical loads are reduced to conserve energy. For elevators, standby mode begins up to 5 minutes after an elevator is unoccupied and has parked and completed its last run and ends when the doors are re-opened. For escalators and moving walkways, standby mode begins after traffic has been absent for up to 5 minutes and ends when the next passenger arrives.

**STEAM COOKER.** Equipment in which potable steam is used for heating, cooking, and reconstituting food.

**[BG] STORY.** That portion of a building included between the upper surface of a floor and the upper surface of the floor

or roof next above. It is measured as the vertical distance from top to top of two successive tiers of beams or finished floor surfaces and, for the topmost story, from the top of the floor finish to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.

**[A] STRUCTURE.** That which is built or constructed.

**[BS] SUBSTANTIAL IMPROVEMENT.** Any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started. If the structure has sustained substantial damage, any repairs are considered *substantial improvement* regardless of the actual repair work performed. The term does not include either of the following:

1. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the *code official* and that are the minimum necessary to assure safe living conditions.
2. Any alteration of a historic structure provided that the alteration will not preclude the structure's continued designation as a historic structure.

**THERMAL EMITTANCE.** The ratio of radiative power emitted by a sample to that emitted by a black body radiator at the same temperature.

**TIME SWITCH CONTROL.** An automatic control device or system that controls lighting or other loads, including switching off, based on time schedules.

**TOPSOIL.** The upper, outmost layer of soil having the highest concentration of organic matter and microorganisms and where the majority of biological soil activity occurs.

**TRACTION ELEVATOR.** An elevator system in which the cars are suspended by ropes wrapped around a sheave that is driven by an electric motor.

**TRANSIT SERVICE.** A service that a public transit agency serving the area has committed to provide including, but not limited to, bus, streetcar, light or heavy rail, passenger ferry or tram service.

**TUBULAR DAYLIGHTING DEVICE (TDD).** A non-operable fenestration unit primarily designed to transmit daylight from a roof surface to an interior space via a tubular conduit. The basic unit consists of an exterior glazed weathering surface, a light-transmitting tube with a reflective interior surface, and an interior-sealing device such as a translucent panel. The unit is either factory assembled, or field assembled from a manufacturing kit.

**TYPE III ENVIRONMENTAL PRODUCT DECLARATION.** A product declaration that provides quantified environmental data using predetermined parameters and, where relevant, additional environmental information, for either brand-specific or industry-wide environmental product declaration.

**[E] U-FACTOR (THERMAL TRANSMITTANCE).** The coefficient of heat transmission (air to air) through a

## DEFINITIONS

building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films ( $\text{Btu/h} \times \text{ft}^2 \times ^\circ\text{F}$ ) [ $\text{W}/(\text{m}^2 \times \text{K})$ ].

**VEGETATIVE ROOF.** An assembly of interacting components designed to waterproof and normally insulate a building's top surface that includes, by design, vegetation and related landscaping elements.

**[M] VENTILATION.** The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

**VERTICAL FENESTRATION.** Windows (fixed or movable), opaque doors, glazed doors, glazed block, and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees (1.05 rad) from horizontal.

**VOLATILE ORGANIC COMPOUND (VOC).** A volatile chemical compound based on carbon chains or rings that typically contain hydrogen and sometimes contain oxygen, nitrogen and other elements, and that has a vapor pressure of greater than 0.1 mm of mercury at room temperature.

**VOLTAGE DROP.** A decrease in voltage caused by losses in the circuit conductors connecting the power source to the load.

**WATER FACTOR (WF).** The quantity of water, in gallons per cycle (Q), divided by a clothes washing machine clothes container capacity in cubic feet (C). The equation is:

$$\text{WF} = \text{Q}/\text{C} \quad \text{(Equation 2-2)}$$

**WATER FEATURE.** An outdoor open water installation or natural open water way within a built landscape to retain water supplied from source other than rainwater naturally flowing into the feature.

**WATERSENSE.** A program of the U.S. Environmental Protection Agency (EPA) designed to identify and promote water-efficient products and practices.

**WETLAND.** Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

**ZERO ENERGY PERFORMANCE INDEX (zEPI).** A scalar representing the ratio of the energy performance of a proposed design or an existing building compared to the mean energy performance of the building stock from the benchmark year of 2000.



## CHAPTER 3

# JURISDICTIONAL REQUIREMENTS

### SECTION 301 GENERAL

**301.1 Scope.** This chapter contains requirements that are specific to and selected by the jurisdiction.

**301.1.1 Application.** Section deleted in Rhode Island.

**301.2 Jurisdictional requirements.** This chapter requires that the jurisdiction indicate in Table 302.1 whether specific provisions are mandatory for all buildings regulated by this code and, where applicable, the level of compliance required. All other provisions of this code shall be mandatory as applicable.

### SECTION 302 JURISDICTIONAL REQUIREMENTS

**302.1 Requirements determined by the jurisdiction.**

Table 302.1 indicates the Rhode Island mandatory and optional requirements:

1. The jurisdiction shall indicate whether requirements for residential buildings, as indicated in Exception 1 to Section 101.3, are applicable by selecting “Yes” or “No” in Table 302.1. Where “Yes” is selected, the provisions of ICC 700 shall apply and the remainder of this code shall not apply.

2. For compliance with this code, a zEPI of 46 or less is required for all occupancy types and may be demonstrated using prescriptive or performance pathways.
3. Where “Yes” or “No” boxes are provided, the jurisdiction shall check the box to indicate “Yes” where that section is to be enforced as a mandatory requirement in the jurisdiction, or “No” where that section is not to be enforced as a mandatory requirement in the jurisdiction.



**TABLE 302.1  
REQUIREMENTS DETERMINED BY THE JURISDICTION**

Section	Section Title or Description and Directives	Jurisdictional Requirements	
<b>CHAPTER 1. SCOPE AND ADMINISTRATION</b>			
101.3 Exception 1.1	Detached one- and two-family dwellings and multiple single-family dwellings (town-houses) not more than three stories in height above grade plane with a separate means of egress, their accessory structures, and the site or lot upon which these buildings are located, shall comply with ICC 700.	<input type="checkbox"/> Yes	X No
101.3 Exception 1.2	Group R-3 residential buildings, their accessory structures, and the site or lot upon which these buildings are located, shall comply with ICC 700.	<input type="checkbox"/> Yes	X No
101.3 Exception 1.3	Group R-2 and R-4 residential buildings four stories or less in height above grade plane their accessory structures, and the site or lot upon which these buildings are located, shall comply with ICC 700.	<input type="checkbox"/> Yes	X No
<b>CHAPTER 4. SITE DEVELOPMENT AND LAND USE</b>			
402.2.1	Flood hazard area preservation, general	X Yes	<input type="checkbox"/> No
402.2.2	Flood hazard area preservation, specific	X Yes	<input type="checkbox"/> No
402.3	Surface water protection	X Yes	<input type="checkbox"/> No
402.5	Conservation area	<input type="checkbox"/> Yes	X No
402.6	Agricultural land	X Yes	<input type="checkbox"/> No
402.7	Greenfield sites	X Yes	<input type="checkbox"/> No
407.4.1	High-occupancy vehicle parking	X Yes	<input type="checkbox"/> No
407.4.2	Low-emission, hybrid and electric vehicle parking	X Yes	<input type="checkbox"/> No
409.1	Light pollution control	X Yes	<input type="checkbox"/> No
<b>CHAPTER 5. MATERIAL RESOURCE CONSERVATION AND EFFICIENCY</b>			
503.1	Minimum percentage of waste material diverted from landfills	<input type="checkbox"/> 50% X 65% <input type="checkbox"/> 75%	
<b>CHAPTER 6. ENERGY CONSERVATION, EFFICIENCY AND CO<sub>2e</sub> EMISSION REDUCTION</b>			
302.1, 302.1.1, 602.1	zEPI of Jurisdictional Choice – The jurisdiction shall indicate a zEPI of 46 or less in each occupancy for which it intends to require enhanced energy performance.	Occupancy: <u>All</u> zEPI: <u>46</u>	
604.1	Automated demand response infrastructure	<input type="checkbox"/> Yes	X No
<b>CHAPTER 7. WATER RESOURCE CONSERVATION, QUALITY AND EFFICIENCY</b>			
702.6	Municipal reclaimed water	<input type="checkbox"/> Yes	X No
<b>CHAPTER 8. INDOOR ENVIRONMENTAL QUALITY AND COMFORT</b>			
804.2	Post-Construction Pre-Occupancy Baseline IAQ Testing	X Yes	<input type="checkbox"/> No
807.1	Sound transmission and sound levels	<input type="checkbox"/> Yes	X No
<b>CHAPTER 10. EXISTING BUILDINGS</b>			
1007.2	Evaluation and certification of existing buildings and building sites	<input type="checkbox"/> Yes	X No
1007.3	Post-certificate of occupancy annual net energy use, energy demand, and CO <sub>2e</sub> emissions reporting	X Yes	<input type="checkbox"/> No
<b>APPENDIX A. PROJECT ELECTIVES</b>			
A 101	Project Electives	Min. Required 6	

## CHAPTER 4

# SITE DEVELOPMENT AND LAND USE

### SECTION 401 GENERAL

**401.1 Scope and intent.** This chapter provides requirements for the development and maintenance of building and building sites to minimize negative environmental impacts and to protect, restore and enhance the natural features and environmental quality of the site.

**401.2 Predesign site inventory and assessment.** An inventory and assessment of the natural resources and baseline conditions of the building site shall be submitted with the construction documents.

The inventory and assessment shall:

1. Determine the location of any protection areas identified in Section 402.1 that are located on, or adjacent to, the building site;
2. Identify *invasive plant species* on the site for removal;
3. Identify native plant species on the site; and
4. Identify site features to be preserved.

### SECTION 402 PRESERVATION OF NATURAL RESOURCES

**402.1 Protection by area.** Where *flood hazard areas*, surface water bodies or wetlands, conservation areas, parklands, agricultural lands or *greenfields* are located on, or adjacent to, a lot, the development of the lot as a building site shall comply with the provisions of Sections 402.2 through 402.7.

**402.2. Flood hazard areas.** For locations within *flood hazard areas*, unless compliance with Section 402.2.1 or Section 402.2.2 is required by Table 302.1, new buildings and structures and *substantial improvements* shall comply with Section 402.2.3.

**402.2.1 Flood hazard area preservation, general.** Where this section is indicated to be applicable in Table 302.1, new buildings and structures, site disturbance, and development of land shall be prohibited within *flood hazard areas*.

**402.2.2 Flood hazard area preservation, specific.** Where this section is indicated to be applicable in Table 302.1, new buildings and structures, site disturbance, and development of land shall be prohibited within the specific *flood hazard areas* established pursuant to local land use authority.

**402.2.3 Development in flood hazard areas.** New buildings, structures and *substantial improvements* constructed in *flood hazard areas* shall be in compliance with Section 1612 of the *International Building Code* provided the lowest floors are elevated or dry floodproofed to not less than 1 foot (25 mm) above the elevation required by Section

1612 of the *International Building Code*, or the elevation established by the jurisdiction, whichever is higher.

**402.3 Surface water protection.** Where this section is indicated to be applicable in Table 302.1, buildings and building site improvements shall not be located over, or located within a buffer as established by the jurisdiction, around or adjacent to oceans, lakes, rivers, streams and other bodies of water that support or could support fish, recreation or industrial use. The buffer shall be measured from the ordinary high-water mark of the body of water.

#### Exceptions:

1. Buildings and associated site improvements specifically related to the use of the water including, but not limited to, piers, docks, fish hatcheries, and habitat restoration facilities, shall be permitted where the impacts of the construction and location adjacent to or over the water on the habitat is mitigated.
2. Buildings and associated site improvements shall be permitted where a wetlands permit has been issued under a national wetlands permitting program or otherwise issued by the authority having jurisdiction.

**402.4 Wetland protection.** Buildings and building site improvements shall not be located within a wetland or within a buffer as established by the jurisdiction around a wetland.

**Exception:** Buildings and associated site improvements specifically related to the use of the wetland including, but not limited to, piers, docks, fish hatcheries, and habitat restoration facilities, shall be permitted where the impacts of the construction and location adjacent to or over the wetland on the habitat are mitigated.

**402.5 Conservation area.** Where this section is indicated to be applicable in Table 302.1, site disturbance or development of land in or within 50 feet (15 240 mm) of a designated conservation area shall not be permitted.

**Exception:** Buildings and associated site improvements located in or within 50 feet (15 240 mm) of a conservation area shall be permitted where the building and associated site improvements serve a purpose related to the conservation area as determined by the authority that designated the conservation area.

**402.6 Agricultural land.** Where this section is indicated to be applicable in Table 302.1, buildings and associated site improvements shall not be located on land zoned for agricultural purposes.

**Exception:** Buildings and associated site improvements shall be permitted to be located on agriculturally zoned land where the building serves an agriculturally related purpose, including, but not limited to, primary residence,

farmhouse, migrant workers housing, farm produce storage, processing and shipping.

**402.7 Greenfield sites.** Where this section is indicated to be applicable in Table 302.1, site disturbance or development shall not be permitted on *greenfield* sites.

**Exception:** The development of new buildings and associated site improvements shall be permitted on *greenfield* sites where the jurisdiction determines that adequate infrastructure exists, or will be provided, and where the sites comply with not less than one of the following:

1. The *greenfield* site is located within ¼ mile (0.4 km) of developed residential land with an average density of not less than 8 dwelling units per acre (19.8 dwelling units per hectare).
2. The *greenfield* site is located within ¼ mile (0.4 km) distance, measured over roads or designated walking surfaces, of not less than 5 diverse uses and within ½ mile (0.8 km) walking distance of not less than 7 diverse uses. The diverse uses shall include not less than one use from each of the following categories of diverse uses: retail, service, or community facility.
3. The *greenfield* site has access to transit service. The building on the building site shall be located in compliance with one of the following:
  - 3.1. Within ¼ mile (0.4 km) distance, measured over designated walking surfaces, of existing or planned bus or streetcar stops.
  - 3.2. Within ½ mile (0.8 km) distance, measured over designated walking surfaces, of existing or planned rapid transit stops, light or heavy passenger rail stations, ferry terminals, or tram terminals.
4. The *greenfield* site is located adjacent to areas of existing development that have connectivity of not less than 90 intersections per square mile (35 intersections per square kilometer). Not less than 25 percent of the perimeter of the building site shall adjoin, or be directly across a street, public bikeway or pedestrian pathway from the qualifying area of existing development.
  - 4.1. Intersections included for determination of connectivity shall include the following:
    - 4.1.1. Intersections of public streets with other public streets;
    - 4.1.2. Intersections of public streets with bikeways and pedestrian pathways that are not part of a public street for motor vehicles; and
    - 4.1.3. Intersections of bikeways and pedestrian pathways that are not part of a public street for motor

vehicles with other bikeways and pedestrian pathways that are not part of a public street for motor vehicles.

- 4.2. The following areas need not be included in the determination of connectivity:
  - 4.2.1. Water bodies, including, but not limited to lakes and wetlands.
  - 4.2.2. Parks larger than ½ acre (2023 m<sup>2</sup>), designated conservation areas and areas preserved from development by the jurisdiction or by the state or federal government.
  - 4.2.3. Large facilities including, but not limited to airports, railroad yards, college and university campuses.

**402.7.1 Site disturbance limits on greenfield sites.** For *greenfield* sites that are permitted to be developed, site disturbances shall be limited to the following areas:

1. Within 40 feet (18 288 mm) of the perimeter of the building;
2. Within 15 feet (4572 mm) of proposed surface walkways, roads, paved areas and utilities;
3. Within 25 feet (7620 mm) of constructed areas with permeable surfaces that require additional staging areas to limit compaction in the constructed areas.

## SECTION 403 STORMWATER MANAGEMENT

**403.1 Stormwater management.** Stormwater management systems, including, but not limited to, infiltration, evapotranspiration; rainwater harvest and runoff reuse; shall be provided and maintained on the building site.

**403.1.1 Increased runoff.** Stormwater management systems shall address the increase in runoff that would occur resulting from development on the building site and shall either:

1. Manage rainfall onsite and size the management system to retain not less than the volume of a single storm that is equal to the 95<sup>th</sup>-percentile rainfall event as recorded by the National Climatic Data Center or other approved precipitation records and all smaller storms and maintain the predevelopment natural runoff; or
2. Maintain or restore the predevelopment stable, natural runoff hydrology of the site throughout the development or redevelopment process. Postconstruction runoff rate, volume, and duration shall not exceed predevelopment rates. The stormwater management system design shall be based, in part, on a hydrologic analysis of the building site.

**403.1.2 Adjoining lots and property.** The stormwater management system shall not redirect or concentrate off-site discharge that would cause increased erosion or other drainage related damage to adjoining lots or public property.

**403.1.3 Brownfields.** Stormwater management systems on areas of *brownfields* where contamination is left in place shall not use infiltration. Stormwater management systems shall not penetrate, damage, or otherwise compromise remediation actions at the building site.

**403.2 Coal tar sealants.** Coal tar sealants shall not be used in any application exposed to stormwater, wash waters, condensates, snowmelt, icemelt or any source of water that could convey coal tar sealants into soils, surface waters or groundwaters.

SECTION 404  
LANDSCAPE IRRIGATION AND OUTDOOR  
FOUNTAINS

**404.1 Landscape irrigation systems.** Irrigation of exterior landscaping shall comply with Sections 404.1.1 and 404.1.2.

**404.1.1 Water for outdoor landscape irrigation.** Outdoor landscape irrigation systems shall be designed and installed to reduce potable water use by 50 percent from a calculated mid-summer baseline in accordance with Section 404.1.2 or, where permitted by State regulation or local ordinances, the system shall be supplied by municipal reclaimed water or with *alternate onsite nonpotable water* complying with Chapter 7.

**Exceptions:** Potable water is permitted to be used as follows:

1. During the establishment phase of newly planted landscaping.
2. To irrigate food production.
3. To supplement nonpotable water irrigation of shade trees provided in accordance with Section 408.2.3.
4. Potable water is permitted for landscape irrigation where approved by local ordinance or regulation.

**404.1.2 Irrigation system design and installation.** Where in-ground irrigation systems are provided, the systems shall comply with all of the following:

1. The design and installation of outdoor irrigation systems shall be under the supervision of an irrigation professional accredited or certified by an appropriate local or national body.
2. Landscape irrigation systems shall not direct water onto building exterior surfaces, foundations, exterior paved surfaces or adjoining lots. Systems shall not generate runoff.
3. Where an irrigation control system is used, the system shall be one that regulates irrigation

based on weather, climatological or soil moisture status data. The controller shall have integrated or separate sensors to suspend irrigation events during rainfall.

4. Irrigation zones shall be based on plant water needs with plants of similar need grouped together. Turfgrass shall not be grouped with other plantings on the same zone.
5. Microirrigation zones shall be equipped with pressure regulators that ensure zone pressure is not greater than 40 psi (275.8 kPa), filters, and flush end assemblies.
6. Irrigation sprinklers shall:
  - 6.1. Have nozzles with matched precipitation rates.
  - 6.2. Be prohibited on landscape areas less than 4 feet (1230 mm) in any dimension.
  - 6.3. Be prohibited on slopes greater than 1 unit vertical to 4 units horizontal (25-percent slope).
 

**Exception:** Where the application rate of the irrigation sprinklers is less than or equal to 0.5 inches (12.7 mm) per hour.
  - 6.4. Be permitted for use on turfgrass and crop areas only excepting microsprays of a flow less than 45 gallons (170 liters) per hour.
  - 6.5. If of the pop-up configuration, pop-up to a height of not less than 4 inches (101 mm).
  - 6.6. Only be installed in zones composed exclusively of irrigation sprinklers and shall be designed to achieve a lower quarter distribution uniformity of not less than 0.65.

**404.2 Outdoor ornamental fountains and water features.** Where available and *approved* for use by the authority having jurisdiction, alternate nonpotable onsite water sources complying with Chapter 7 shall be used for outdoor ornamental fountains and other water features constructed or installed on a building site. Where the fountain or water feature is the primary user of the building site's nonpotable water source, a potable makeup water connection is prohibited.

**Exception:** Outdoor ornamental fountains and water features are allowed to use potable water provided water is recirculated and there is not an automatic refill valve connection to a source of potable water, and provided that either:

1. The catch basin or reservoir is no greater than 100 gallons (379 L); or
2. Less than 20 square feet (1.86 m<sup>2</sup>) of water surface area is exposed.

**404.2.1 Treatment.** The treatment required to maintain appropriate water quality shall be determined by the authority having jurisdiction.

**404.2.2 Recirculation.** Outdoor ornamental fountains and water features shall be equipped to recirculate and reuse the supplied water.

**404.2.3 Signage.** Signage in accordance with Chapter 7 shall be posted at each outdoor ornamental fountain and water feature where non-potable water is used.

**SECTION 405  
MANAGEMENT OF VEGETATION, SOILS AND  
EROSION CONTROL**

**405.1 Soil and water quality protection.** Soil and water quality shall be protected in accordance with Sections 405.1.1 through 405.1.6.

**405.1.1 Soil and water quality protection plan.** A soil and water quality protection plan shall be submitted by the owner or the owner’s authorized agent and *approved* prior to construction. The protection plan shall address the following:

1. A soils map, site plan, or grading plan that indicates designated soil management areas for all site soils, including, but not limited to:
  - 1.1. Soils that will be retained in place and designated as vegetation and soil protection areas (VSPAs).
  - 1.2. Topsoils that will be stockpiled for future reuse and the locations for the stockpiles.
  - 1.3. Soils that will be disturbed during construction and plans to restore disturbed soils and underlying subsoils to soil reference conditions.
  - 1.4. Soils that will be restored and re-vegetated.
  - 1.5. Locations for all laydown and storage areas, parking areas, haul roads and construction vehicle access, temporary utilities and construction trailer locations.
  - 1.6. Treatment details for each zone of soil that will be restored, including the type, source and expected volume of materials, including compost amendments, mulch and topsoil.
  - 1.7. A narrative of the measures to be taken to ensure that areas not to be disturbed and areas of restored soils are protected from compaction by vehicle traffic or storage, erosion, and contamination until project completion.
2. A written erosion, sedimentation and pollutant control program for construction activities associated with the project. The program shall describe the best

management practices (BMPs) to be employed including how the BMPs accomplish the following objectives:

- 2.1. Prevent loss of soil during construction due to stormwater runoff or wind erosion, including the protection of topsoil by stockpiling for reuse.
  - 2.2. Prevent sedimentation of stormwater conveyances or *receiving waters* or other public infrastructure.
  - 2.3. Prevent polluting the air with dust and particulate matter.
  - 2.4. Prevent runoff and infiltration of other pollutants from construction site, including, but not limited to thermal pollution, concrete wash, fuels, solvents, hazardous chemical runoff, pH and pavement sealants. Ensure proper disposal of pollutants.
  - 2.5. Protect from construction activities the designated vegetation and soil protection areas, *flood hazard areas* and other areas of vegetation that will remain on site.
3. A written periodic maintenance protocol for landscaping and stormwater management systems, including, but not limited to:
    - 3.1. A schedule for periodic watering of new planting that reflects different water needs during the establishment phase of new plantings as well as after establishment. Where development of the building site changed the amount of water reaching the preserved natural resource areas, include appropriate measures for maintaining the natural areas.
    - 3.2. A schedule for the use of fertilizers appropriate to the plants species, local climate and the pre-establishment and post-establishment needs of the installed landscaping. Nonorganic fertilizers shall be discontinued following plant establishment.
    - 3.3. A requirement for a visual inspection of the site after major precipitation events to evaluate systems performance and site impacts.
    - 3.4. A schedule of maintenance activities of the stormwater management system including, but not limited to, cleaning of gutters, downspouts, inlets and outlets, removal of sediments from pretreatment sedimentation pits and wet detention ponds, vacuum sweeping followed by high-pressure hosing at porous pavement and removal of litter and debris.

- 3.5. A schedule of maintenance activities for landscaped areas including, but not limited to, the removal of dead or unhealthy vegetation; reseeding of turf areas; mowing of grass to a height that optimizes lawn health and retention of precipitation.

**405.1.2 Topsoil protection.** Topsoil that could potentially be damaged by construction activities or equipment shall be removed from areas to be disturbed and stockpiled on the building site for future reuse on the building site or other *approved* location. Topsoil stockpiles shall be secured and protected throughout the project with temporary or permanent soil stabilization measures to prevent erosion or compaction.

**405.1.3 Imported soils.** Topsoils or soil blends imported to a building site to serve as topsoil shall not be mined from the following locations:

1. Sites that are prime farmland, unique farmland, or farmland of statewide importance.
2. *Greenfield* sites where development is prohibited by Section 402.7.

**Exception:** Soils shall be permitted to be imported from the locations in Items 1 and 2 where those soils are a byproduct of a building and building site development process provided that imported soils are reused for functions comparable to their original function.

**405.1.4 Soil reuse and restoration.** Soils that are being placed on a building site shall be prepared and placed in a manner that establishes the ability of the soil to support the vegetation that has been retained and that will be planted. Soil reuse and restoration shall be in accordance with Sections 405.1.4.1 and 405.1.4.2.

**405.1.4.1 Preparation.** Before placing stockpiled or imported topsoil, compliance with all of the following shall occur:

1. Areas shall be cleared of debris including, but not limited to, building materials, plaster, paints, road base type materials, petroleum based chemicals, and other harmful materials;
2. Areas of construction-compacted subsoil shall be scarified; and
3. The first lift of replaced soil shall be mixed into this scarification zone to improve the transition between the subsoil and overlying soil horizons.

**Exception:** Scarification is prohibited in the following locations:

1. Where scarification would damage existing tree roots.
2. On inaccessible slopes.
3. On or adjacent to trenching and drainage installations.
4. On areas intended by the design to be compacted such as abutments, footings, inslopes.

5. *Brownfields*.

6. Other locations where scarification would damage existing structures, utilities and vegetation being preserved.

**405.1.4.2 Restoration.** Soils disturbed during construction shall be restored in areas that will not be covered by buildings, structures or hardscapes. Soil restoration shall comply with the following:

1. Organic matter. To provide appropriate organic matter for plant growth and for water storage and infiltration, soils shall be amended with a mature, stable compost material so that not less than the top 12 inches (305 mm) of soil contains not less than 3 percent organic matter. Sphagnum peat or organic amendments that contain sphagnum peat shall not be used. Soil organic matter shall be determined in accordance with ASTM D2974. Organic materials selected for onsite amendment or for blending of imported soils shall be renewable within a 50-year cycle.

**Exception:** Where the reference soil for a building site has an organic level depth other than 12 inches (305 mm), soils shall be amended to organic matter levels and organic matter depth that are comparable to the site's reference soil.

2. Additional soil restoration criteria. In addition to compliance with Item 1, soil restoration shall comply with not less than three of the following criteria:

- 2.1. Compaction. Bulk densities within the root zone shall not exceed the densities specified in Table 405.1.2 and shall be measured using a soil cone penetrometer in accordance with ASABE S313.3. The root zone shall be not less than 12 inches (305 mm) nor less than the site's reference soil, whichever results in the greater depth of measurement. Data derived from a soil cone penetrometer shall be reported in accordance with ASABE EP542.

- 2.2. Infiltration rates. Infiltration rates or saturated hydraulic conductivity of the restored soils shall be comparable to the site's reference soil. Infiltration rates shall be determined in accordance with ASTM D3385 or ASTM D5093. For sloped areas where the methods provided in the referenced standards cannot be used successfully, alternate methods *approved* by the *code official* shall be permitted provided that the same method is used to test both reference soil and onsite soil.

- 2.3. Soil biological function. Where remediated soils are used, the biological function of the soils' mineralizable nitrogen shall be permitted as a proxy assessment of biological activity.
- 2.4. Soil chemical characteristics. Soil chemical characteristics appropriate for plant growth shall be restored. The pH, cation exchange capacity and nutrient profiles of the original undisturbed soil or the site's reference soil shall be matched in restored soils. Salinity suitable for regionally appropriate vegetation shall be established. Soil amendments and fertilizers shall be selected from those that minimize nutrient loading to waterways or groundwater.

**TABLE 405.1.2  
MAXIMUM CONE PENETROMETER READINGS**

SURFACE RESISTANCE (PSI)		SUBSURFACE RESISTANCE (PSI)	
All Textures Sand	Sand (includes loamy sand, sandy loam, sandy clay loam, and sandy clay)	Silt (includes loam, silt loam, silty clay loam, and silty clay)	Clay (includes clay loam)
110	260	260	225

**405.1.5 Engineered growing media.** Where engineered growing media are used onsite, including, but not limited to vegetative roofs, trees located within hardscape areas, and special soils specified for wetlands and environmental restoration sites, such media shall comply with the best available science and practice standards for that engineered growing media and use.

**405.1.6 Documentation.** The following shall be provided to document compliance with Sections 405.1.3 through 405.1.5:

- 1. Documentation, such as receipts from a soil, compost and amendments supplier, to demonstrate that techniques to restore soil occurred; and
- 2. Soil test results to demonstrate that the selected techniques achieved the criteria of Section 405.1.4.2. Not less than two soil tests shall be conducted on the building site. For building sites where more than 8,000 square feet (744 m<sup>2</sup>) of soil is to be disturbed during construction, there shall be not less than one report for every 4,000 square feet (372 m<sup>2</sup>) disturbed or report frequency as determined by the *registered design professional*.

**405.2 Vegetation and soil protection.** Vegetation and soils shall be protected in accordance with Sections 405.2.1 and 405.2.2.

**405.2.1 Vegetation and soil protection plan.** Where existing soils and vegetation are to be protected, a vegetation and soil protection plan establishing designated vegetation and soil protection areas (VSPAs) shall be submitted with the construction documents and other submittal documents. The protection plan shall address the following:

- 1. Identification of existing vegetation located on a building site that is to be preserved and protected.
  - 2. Identification of portions of the building site to be designated as vegetation and soil protection areas (VSPAs) that are to be protected during the construction process from being affected by construction activities.
  - 3. Specification of methods to be used such as temporary fencing or other physical barriers to maintain the protection of the designated vegetation and soil protection areas (VSPAs).
  - 4. Specification of protected perimeters around trees and shrubs that are to be included in the designated vegetation and soil protection areas (VSPAs). Perimeters around trees shall be identified as a circle with a radius of not less than 1 foot (305 mm) for every inch (25 mm) of tree diameter with a radius of not less than 5 feet (1524 mm). The perimeters around shrubs shall be not less than twice the radius of the shrub.
- Exception:** *Approved* alternative perimeters appropriate to the location and the species of the trees and shrubs shall be permitted.
- 5. Specification of methods to protect the viability of the designated vegetation and soil protection areas (VSPAs) to support the remaining vegetation at the conclusion of the construction process including minimizing impacts on the existing stormwater drainage patterns associated with the VSPAs.
  - 6. Identification of plans, methods and practices used to designate essential areas of soil and sub-soil disturbance.

**405.2.1.1 Tree protection zones (TPZ).** Where tree protection zones are specified, the specifications and documentation shall be in accordance with Part 5 of TCIA/ANSI A300.

**405.2.2 Invasive plant species.** *Invasive plant species* shall not be planted on a building site. A management plan for the containment, removal and replacement of any *invasive plant species* currently on the site shall be generated based on either published recommendation for the referenced invasive plant or guidance prepared by a qualified professional. Existing vegetation that is to be retained on a building site shall be protected as required by Section 405.2.

**405.3 Native plant landscaping.** Where new landscaping is installed as part of a site plan or within the building site, not less than 75 percent of the newly landscaped area shall be planted with native plant species.

SECTION 406  
BUILDING SITE WASTE MANAGEMENT

**406.1 Building site waste management plan.** A building site waste management plan shall be developed and implemented to divert not less than 75 percent of the land-clearing debris and excavated soils from disposal. Land-clearing debris includes rock, trees, stumps and associated vegetation. The plan shall include provisions that address all of the following:

1. Materials to be diverted from disposal by efficient usage, recycling or reuse on the building site shall be specified.
2. Diverted materials shall not be sent to sites that are agricultural land, *flood hazard areas* or *greenfield* sites where development is prohibited by Section 402.1 except where *approved* by the *code official*.
3. The effective destruction and disposal of *invasive plant species*.
4. Where contaminated soils are removed, the methods of removal and location where the soils are to be treated and disposed.
5. The amount of materials to be diverted shall be specified and shall be calculated by weight or volume, but not both.
6. Where the site is located in a federal or state designated quarantine zone for invasive insect species, building site vegetation management shall comply with the quarantine rules.
7. Receipts or other documentation related to diversion shall be maintained through the course of construction. When requested by the *code official*, evidence of diversion shall be provided.

**406.2 Construction waste.** Construction materials and waste and hardscape materials removed during site preparation shall be managed in accordance with Section 503.

SECTION 407  
TRANSPORTATION IMPACT

**407.1 Walkways and bicycle paths.** Not less than one independent, paved walkway or bicycle path suitable for bicycles, strollers, pedestrians, and other forms of nonmotorized locomotion connecting a street or other path to a building entrance shall be provided. Walkways and bicycle paths shall connect to existing paths or sidewalks, and shall be designed to connect to any planned future paths. Paved walkways and bicycle paths shall be designed to minimize stormwater runoff. Pervious and permeable pavement shall be designed in accordance with Section 408.2.4.

**407.2 Changing and shower facilities.** Buildings with a *total building floor area* greater than 10,000 square feet (929 m<sup>2</sup>) and that are required to be provided with long-term bicycle parking and storage in accordance with Section 407.3 shall be provided with onsite changing room and shower facilities. Not less than one shower shall be provided for each 20 long-term bicycle parking spaces, or fraction thereof.

Where more than one changing room and shower facility is required, separate facilities shall be provided for each sex.

**407.3 Bicycle parking and storage.** Long-term and short-term bicycle parking shall be provided as specified in Table 407.3. The required number of spaces shall be determined based on the net floor area of each primary use or occupancy of a building except where Table 407.3 specifies otherwise. Accessory occupancy areas shall be included in the calculation of primary occupancy area.

**Exceptions:**

1. Long-term bicycle parking shall not be required where the *total building floor area* is less than 2,500 square feet (232 m<sup>2</sup>).
2. Subject to the approval of the *code official*, the number of bicycle parking spaces shall be permitted to be reduced because of building site characteristics including, but not limited to, isolation from other development.

**407.3.1 Short-term bicycle parking.** Short-term bicycle parking shall comply with all of the following:

1. It shall be provided with illumination of not less than 1 footcandle (11 lux) at the parking surface;
2. It shall be located at the same grade as the sidewalk or at a location reachable by ramp or accessible route;
3. Horizontal parking spaces shall have a floor area of not less than 18 inches (457 mm) by 72 inches (1829 mm) for each bicycle;
4. Vertical parking spaces shall have a floor area of not less than 18 inches (457 mm) by 44 inches (1118 mm) for each bicycle with not less than 24 inches (610 mm) of clearance above the highest point of the bicycle rack;
5. It shall be provided with a rack or other facility for locking or securing each bicycle; and
6. It shall be located within 100 feet (30 480 mm) of, and visible from, the main entrance.

**Exception:** Where directional signage is provided at the main building entrances, short-term bicycle parking shall be permitted to be provided at locations not visible from the main entrance.

**407.3.2 Long-term bicycle parking.** Long-term bicycle parking shall comply with all of the following:

1. It shall be located on the same *building* site or within the building;
2. It shall be provided with illumination of not less than 1 footcandle (11 lux) at the parking surface;
3. Horizontal parking spaces shall have a floor area of not less than 18 inches (457 mm) by 72 inches (1829 mm) for each bicycle;



4. Vertical parking spaces shall have a floor area of not less than 18 inches (457 mm) by 44 inches (1118 mm) for each bicycle with not less than 24 inches (610 mm) of clearance above the highest point of the bicycle rack; and
5. It shall be provided with a rack or other facility for locking or securing each bicycle.

Not less than 50 percent of long-term bicycle parking shall be within a building or provided with a permanent

cover including, but not limited to, roof overhangs, awnings, or bicycle storage lockers or within covered parking structures.

Vehicle parking spaces, other than those required by Section 407.4, local zoning requirements and accessible parking required by the International Building Code, shall be permitted to be used for the installation of long term bicycle parking spaces.

**TABLE 407.3  
BICYCLE PARKING\***

OCCUPANCY	SPECIFIC USE	SHORT-TERM SPACES	LONG-TERM SPACES <sup>b</sup>
A-1	Movie theaters	1 per 50 seats; not less than 4 spaces	2 spaces
	Concert halls, theaters other than for movies	1 per 500 seats	
A-2	Restaurants	1 per 50 seats; not less than 2 spaces	
A-3	Places of worship	1 per 500 seats	1 per 50,000 square feet; not less than 2 spaces
A-3	Assembly spaces other than places of worship	1 per 25,000 square feet; not less than 2 spaces	
A-4 – A-5	All	1 per 500 seats	2 spaces
B	All	1 per 50,000 square feet; not less than 2 spaces	1 per 25,000 square feet; not less than 2 spaces
E	Schools	None	1 per 250 square feet of classroom area
E, I-4	Day care	None	2 spaces
F, H	All	None	1 per 25,000 square feet; not less than 2 spaces
I-1	All	None	2 spaces
I-2	All	1 per 25,000 square feet; not less than 2 spaces	1 per 50,000 square feet; not less than 2 spaces
M	All	1 per 25,000 square feet; not less than 2 spaces	1 per 50,000 square feet; not less than 2 spaces
R-1	Hotels, motels, boarding houses	None	1 per 25,000 square feet; not less than 2 spaces
R-2, R-3, R-4	All	None	None
S	Transit park and ride lots	None	1 per 20 vehicle parking spaces
	Commercial parking facilities	1 per 20 vehicle parking spaces	None
	All other	None	2 spaces
Other	Outdoor recreation, parks	1 per 20 vehicle parking spaces; not less than 2 spaces	None

For SI: 1 square foot = 0.0929 m<sup>2</sup>.

- a. Requirements based on square feet shall be the net floor area of the occupancy or use.
- b. When a calculation results in a fraction of space, the requirements shall be rounded to the next higher whole number.

**407.4 Preferred vehicle parking.** Where either Section 407.4.1 or 407.4.2 is indicated to be applicable in Table 302.1, parking provided at a building site shall comply with this section. Preferred parking spaces required by this section shall be those in the parking facility that are located on the shortest route of travel from the parking facility to a building entrance, but shall not take precedence over parking spaces that are required to be accessible in

accordance with the *International Building Code*. Where buildings have multiple entrances with adjacent parking, parking spaces required by this section shall be dispersed and located near the entrances. Such parking spaces shall be provided with *approved* signage that specifies the permitted usage.

**407.4.1 High-occupancy vehicle parking.** Where employee parking is provided for a building that has a *total*

building floor area greater than 10,000 square feet (929 m<sup>2</sup>), a building occupant load greater than 100 and not less than 20 employees, at least 5 percent, but not less than two, of the employee parking spaces provided shall be designated as preferred parking for *high-occupancy vehicles*.

**407.4.2 Low-emission, hybrid, and electric vehicle parking.** Where parking is provided for a building that has a total building floor area greater than 10,000 square feet (929 m<sup>2</sup>) and that has a building occupant load greater than 100, at least 5 percent, but not less than two, of the parking spaces provided shall be designated as preferred parking for low emission, hybrid, and electric vehicles. Parking designated for electric vehicles must include charging stations.

**407.4.3. Rhode Island Charge Up! Program.** The Rhode Island Charge Up! Public Sector Vehicle Electrification Incentive Program – administered by the Rhode Island Office of Energy Resources (OER) – offers incentives to state agencies and municipalities interested in installing electric vehicle supply equipment (EVSE, or charging stations) at publicly accessible facilities and the program also supports the purchase or lease of electric vehicles (EVs) for integration into public sector fleets.

SECTION 408  
HEAT ISLAND MITIGATION

**408.1 General.** The heat island effect of building and building site development shall be mitigated in accordance with Sections 408.2 and 408.3

**408.2 Site hardscape.** In climate zones 1 through 6, as established in the *International Energy Conservation Code*, not less than 50 percent of the site hardscape shall be provided with one or any combination of options described in Sections 408.2.1 through 408.2.4. For the purposes of this section, site hardscape shall not include areas of the site covered by solar photovoltaic arrays or solar thermal collectors.

**408.2.1 Site hardscape materials.** Hardscape materials shall have an initial solar reflectance value of not less than 0.30 in accordance with ASTM E1918 or ASTM C1549.

**Exception:** The following materials shall be deemed to comply with this section and need not be tested:

1. Pervious and permeable concrete pavements.
2. Concrete paving without added color or stain.

**408.2.2 Shading by structures.** Where shading is provided by a building or structure or a building element or component, such building, structure, component or element shall comply with all of the following:

1. Where open trellis-type, free-standing structures such as, but not limited to, covered walkways, and trellises or pergolas, are covered with native plantings, the plantings shall be designed to achieve mature coverage within five years;
2. Where roofed structures are used to shade parking,

those roofs shall comply with Section 408.3 in climate zones 1 through 6; and

3. Shade provided onto the hardscape by an adjacent building or structure located on the same lot shall be calculated and credited toward compliance with this section based on the projected peak sun angle on the summer solstice.

**408.2.3 Shading by trees.** Where shading is provided by trees, such trees shall be selected and placed in accordance with all of the following:

1. Trees selected shall be those that are native or adaptive to, the region and climate zone in which the project site is located. *Invasive plant species* shall not be selected. Plantings shall be selected and sited to produce a hardy and drought resistant vegetated area;
2. Construction documents shall be submitted that show the planting location and anticipated ten year canopy growth of trees and that show the contributions of existing tree canopies; and
3. Shading calculations shall be shown on the construction documents demonstrating compliance with this section and shall include only those hardscape areas directly beneath the trees based on a ten year growth canopy. Duplicate shading credit shall not be granted for those areas where multiple trees shade the same hardscape.

**408.2.4 Pervious pavement and permeable unit pavement.** Pervious pavement and permeable unit pavement including open grid paving systems and open-graded aggregate systems shall have an infiltration rate not less than 2 gallons per minute per square foot (100 L/min × m<sup>2</sup>). The infiltration rate for pervious pavement shall be determined by testing in accordance with ASTM C1701/C1701M. The infiltration rate for permeable unit pavement shall be determined by testing in accordance with ASTM C1781/C1781M. Pervious pavement and permeable unit pavement shall be permitted where the use of these types of hardscapes does not interfere with fire and emergency apparatus or vehicle or personnel access and egress, utilities, or telecommunications lines. Aggregate used shall be open-graded to allow the pavement to comply with the infiltration rate.

**408.3 Roof surfaces.** Not less than 75 percent of the roof surfaces of structures providing shade to parking in accordance with Section 408.2.2 shall be a roof complying with Section 408.3.1; shall be covered with a vegetative roof complying with Section 408.3.2; or a combination of these requirements.

**Exception:** Portions of roof surfaces occupied by the following shall be permitted to be deducted from the roof surface area required to comply with this section:

1. Solar thermal collectors.
2. Solar photovoltaic systems.
3. Roof penetrations and associated equipment.

4. Portions of the roof used to capture heat for building energy technologies.
5. Rooftop decks and rooftop walkways.
6. Portions of roofs that are ballasted with a stone ballast of not less than 17 pounds per square foot (74 kg/m<sup>2</sup>) or 23 pounds per square foot (117 kg/m<sup>2</sup>) for pavers.

**408.3.1 Roof coverings—solar reflectance and thermal emittance.** Where roof coverings are used for compliance with Section 408.3, roof coverings shall comply with Section 408.3.1.1 or 408.3.1.2. The values for solar reflectance and thermal emittance shall be determined by an independent laboratory accredited by a nationally recognized accreditation program. Roof products shall be listed and labeled and certified by the manufacturer demonstrating compliance.

**408.3.1.1 Roof products testing.** Roof products shall be tested for not less than three-year aged solar reflectance in accordance with ASTM E1918, ASTM C1549 or the CRRC-1 Standard and thermal emittance in accordance with ASTM C1371, ASTM E408 or the CRRC-1 Standard, and shall comply with the minimum values in Table 408.3.1.

**408.3.1.2 Solar reflectance index.** Roof products shall be permitted to use a solar reflectance index (SRI) where the calculated value is in compliance with Table 408.3.1 values for minimum aged SRI. The SRI value shall be determined using ASTM E1980 with a convection coefficient of 2.1 Btu/h-ft<sup>2</sup> (12 W/m<sup>2</sup> × k) based on three-year aged roof samples tested in accordance with the test methods in Section 408.3.1.1.

**TABLE 408.3.1  
REFLECTANCE AND EMITTANCE**

ROOF SLOPE	MINIMUM AGED SOLAR REFLECTANCE	MINIMUM AGED THERMAL EMITTANCE	MINIMUM AGED SRI
2:12 or less	0.575	0.75	64
Greater than 2:12	0.30	0.75	25

**408.3.2 Vegetative roofs.** Vegetative roofs, where provided in accordance with Section 408.3, shall comply with the following:

1. All plantings shall be selected based on their hardiness zone classifications in accordance with USDA MP1475 and shall be capable of withstanding the climate conditions of the jurisdiction and the micro climate conditions of the building site including, but not limited to, wind, precipitation and temperature. (Rhode Island USDA plant hardiness zones include 6a, 6b, and 7a. These zones are distinct from the IECC climate zones.) Planting density shall provide foliage coverage, in the warm months, of not less than 80 percent within two years of the date of installation unless a different time period is established in the *approved* design. Plants shall be distributed to meet the coverage requirements. *Invasive plant species* shall not be planted.

2. The soil medium shall be designed for the physical conditions and local climate to support the plants and shall consist of nonsynthetic materials. The planting design shall include measures to protect the engineered soil medium until the plants are established. Protection measures include, but are not limited to, installation of pregrown vegetated mats or modules, tackifying agents, fiber blankets and reinforcing mesh. The maximum wet weight and water holding capacity of a soil medium shall be determined in accordance with ASTM E2399.
3. Where access to the building facades is provided from locations on the perimeter of the roof, nonvegetated buffers adequate to support associated equipment and to protect the roof shall be provided.
4. Nonvegetated clearances as required for fire classification of vegetative roof systems shall be provided in accordance with the *International Fire Code*.
5. Plantings shall be capable of being managed to maintain the function of the vegetative roof as provided in the documents required by Section 903.1.
6. Installation of plantings shall be in accordance with the roof covering manufacturer’s installation instructions and shall not diminish the weather protective properties of the roof covering.

**SECTION 409  
SITE LIGHTING**

**409.1 Light pollution control.** Where this section is indicated to be applicable in Table 302.1, upright, light trespass, and glare shall be limited for all exterior lighting equipment as described in Sections 409.2 and 409.3.

**Exception:** Lighting used for the following exterior applications is exempt where equipped with a control device independent of the control of the nonexempt lighting:

1. Specialized signal, directional, and marker lighting associated with transportation.
2. Advertising signage or directional signage.
3. Lighting integral to equipment or instrumentation and installed by its manufacturer.
4. Theatrical purposes, including performance, stage, film production, and video production.
5. Athletic playing areas where lighting is equipped with hoods or louvers for glare control.
6. Temporary lighting.
7. Lighting for industrial production, material handling, transportation sites, and associated storage areas where lighting is equipped with hoods or louvers for glare control.
8. Theme elements in theme and amusement parks.
9. Roadway lighting required by governmental authorities.

**SITE DEVELOPMENT AND LAND USE**

- 10. Lighting used to highlight features of public monuments and registered landmark structures.
- 11. Lighting classified for and used in hazardous areas.
- 12. Lighting for swimming pools, spas and water features.
- 13. Lighting for flags and flagpoles in light pollution zones B, C and D.

**409.1.1 Lighting pollution zones.** The light pollution zone for the building site shall be determined from Table 409.1.1 unless otherwise specified by the jurisdiction.

**[E] TABLE 409.1.1  
LIGHT POLLUTION ZONES**

LIGHT POLLUTION ZONE	DESCRIPTION
A	Rural and low-density residential areas such as, but not limited to: agricultural districts, one- and two-family residential communities, business parks, rural town centers, commercial or industrial areas with limited nighttime activity and the developed areas within parks and open space preserves.
B	Light commercial business districts and high-density or mixed-use residential districts such as, but not limited to: neighborhood business districts, light industrial areas with moderate nighttime activity, multifamily residential uses, institutional residential uses, hospitals, hotels, motels, churches, schools and neighborhood recreation facilities.
C	High-density commercial business districts, and heavy industrial or manufacturing areas such as, but not limited to: business districts in large cities, commercial corridors, high-density suburban commercial areas, town center mixed-use areas, industrial uses and shipping and rail yards with high nighttime activity, high-use recreation facilities, regional shopping malls, car dealerships, gas stations, and other exterior retail areas with high nighttime activity.
D	Areas such as, but not limited to: high-density entertainment districts and heavy industrial areas, where approved by the code official.

**409.2 Uplight.** Exterior lighting shall comply with the requirements of Table 409.2 for the light pollution zones (LZ) appropriate to the building site.

**Exception:** Lighting used for the following exterior applications shall be exempt from the requirements of Table 409.2.

- 1. Lighting for building facades, landscape features, and public monuments in light pollution zones C and D.
- 2. Lighting for building facades in light pollution zone B.

**TABLE 409.2  
UPLIGHT RATINGS <sup>a b</sup>**

	LIGHT POLLUTION ZONE (LPZ)			
	A	B	C	D
Maximum luminaire uplight rating	U1	U2	U3	U4

- a. Uplight ratings (U) are defined by IES TM-15-07 Addendum A.
- b. The rating shall be determined by the actual photometric geometry in the specified mounting orientation.

**409.3 Light trespass and glare.**  
Section deleted in Rhode Island.

**SECTION 410  
SITE COMPLETION AND COMMISSIONING**

**410.1 Site completion.** Within 60 days of final inspection, the *registered design professional* shall provide evidence of completion of the installation site components and systems to the *code official*, in accordance with the requirements of this chapter and Table 410.1.

**410.2 Site commissioning.** Commissioning of site components and systems shall be in accordance with Section 903.

**410.3 Site operations and maintenance documents.** Operations and maintenance documents for equipment, products and systems shall be provided in accordance with Section 904.

**TABLE 410.1  
SITE SYSTEMS COMPLETION**

Construction or System Requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
<b>Chapter 4: Site development and land use</b>					
Natural resources and base line conditions of <i>building site</i>	Report	With <i>Permit</i> Submittal	None	<b>Designer of Record</b>	401.2
Landscape irrigation systems (also a Cx requirement in chapter 9)	Field Observation	Installation	None	<b>Designer of Record</b>	404.1, 405.1.1 and Ch 9
	Verification	Prior to Occupancy	None	<b>CxA</b>	
<i>Topsoil</i> and Vegetation Protection Measures; Setbacks from protected areas	Field Observation & Report	Installation of measures, prior to other site disturbance	None	<b>Designer of Record</b>	405.1.1
Imported Soils	Field Observation & Report	With <i>Permit</i> Submittal; After all fill operations complete.	None	<b>Designer of Record</b>	405.1.3
Soil Restoration and Reuse	Field Observation & Report	Preparation and replacement of soils	None	<b>Designer of Record</b>	405.1.4
Erosion and sediment control	Field Observation	During construction activities	None	<b>Designer of Record</b>	405.1.1
	Maintenance Plan	None	Periodic for 24 months	<b>Owner</b>	
Hardscape and shading provided by structures and vegetation	Field Observation	During construction and installation		<b>Designer of Record</b>	408.2
	Maintenance Plan	None	24 Months	<b>Owner</b>	
Vegetative Roofs (also a Cx requirement in chapter 9)	Field Observation	Installation	None	<b>Designer of Record</b>	408.3.2 and Ch 9
	Verification	Prior to Occupancy	None	<b>CxA</b>	
	Maintenance Plan	None	24 months	<b>Owner</b>	
Site Lighting (also a Cx requirement in chapter 9)	Field Observation	Installation	None	<b>Designer of Record</b>	409 and Ch 9
	Verification	Prior to Occupancy	None	<b>CxA</b>	

## CHAPTER 5

# MATERIAL RESOURCE CONSERVATION AND EFFICIENCY

### SECTION 501 GENERAL

**501.1 Scope.** The provisions of this chapter shall govern matters related to building material conservation, resource efficiency and environmental performance.

### SECTION 502 CONSTRUCTION MATERIAL MANAGEMENT

**502.1 Construction material management.** Construction material management shall comply with Sections 502.1.1 and 502.1.2.

**502.1.1 Storage and handling of materials.** The on-site storage and handling of materials during construction phases shall comply with the applicable manufacturer's printed or electronic media instructions. Where manufacturer's instructions are not available, *approved* printed or electronic media standards or guidelines shall be followed.

**502.1.2 Construction phase moisture control.** Porous or fibrous materials and other materials subject to moisture damage shall be protected from moisture during the construction phase. Material damaged by moisture or that are visibly colonized by fungi either prior to delivery or during the construction phase shall be cleaned and dried or, where damage cannot be corrected by such means, shall be removed and replaced.

### SECTION 503 CONSTRUCTION WASTE MANAGEMENT

**503.1 Construction material and waste management plan.** Not less than 50 percent of nonhazardous construction waste shall be diverted from disposal, except where other percentages are indicated in Table 302.1. A Construction Material and Waste Management Plan shall be developed and implemented to recycle or salvage construction materials and waste where such salvage and recycling facilities are available within 75 miles of the building site. The Construction Material and Waste Management Plan shall comply with all of the following:

1. The location for collection, separation and storage of recyclable construction waste shall be indicated.
2. Materials to be diverted from disposal by efficient usage, recycling, reuse, manufacturer's reclamation, or salvage for future use, donation or sale shall be specified.
3. The percentage of materials to be diverted shall be specified and shall be calculated by weight or volume, but not both.

4. Receipts or other documentation related to diversion shall be maintained through the course of construction. Where requested by the *code official*, evidence of diversion shall be provided.

The percentage of materials diverted shall be calculated by weight or volume, but not both. For the purposes of this section, construction materials and waste shall include, but are not limited to (1) all materials delivered to the site and intended for installation prior to the issuance of the certificate of occupancy, including related packaging; and (2) includes construction materials and waste removal during demolition or razing. For the purposes of this section, construction and waste materials shall not include land-clearing debris, excavated soils and fill and base materials such as, but not limited to, topsoil, sand and gravel. Land-clearing debris shall include trees, stumps, rocks, and vegetation. Excavated soil, fill material and land-clearing debris shall be managed in accordance with Section 406.1.

### SECTION 504 WASTE MANAGEMENT AND RECYCLING

**504.1 Recycling areas for waste generated post certificate of occupancy.** Waste recycling areas for use by building occupants shall be provided in accordance with one of the following:

1. Waste recycling areas shall be designed and constructed in accordance with the jurisdiction's laws or regulations;
2. Where laws or regulations do not exist or where limited recycling services are available, waste recycling areas shall be designed and constructed to accommodate recyclable materials based on the availability of recycling services; or
3. Where recycling services are not available, waste recycling areas shall be designed and constructed to accommodate the future recycling of materials in accordance with an *approved* design. The *approved* design shall meet one of the following:
  - 3.1. The *approved* waste recycling area design shall be based on analysis of other regional recycling services, laws or regulations.
  - 3.2. The *approved* waste recycling area shall be designed to meet the needs of the occupancy, facilitate efficient pick-up, and shall be available to occupants and haulers.

### SECTION 505 MATERIAL SELECTION

**505.1 Material selection and properties.** Building materials shall conform to Section 505.2, 505.3 or 505.4.

**Exception:** Electrical, mechanical, plumbing, security and fire detection, and alarm equipment and controls, automatic fire sprinkler systems, elevators and conveying systems shall not be required to comply with Section 505.2.

**505.2 Material selection.** Not less than 55 percent of the total building materials used in the project, based on mass, volume or cost, shall comply with Section 505.2.1, 505.2.2, 505.2.3, 505.2.4 or 505.2.5. Where a material complies with more than one section, the material value shall be multiplied by the number of sections that it complies with. The value of total building material mass, volume or cost shall remain constant regardless of whether materials are tabulated in more than one section.

**505.2.1 Used materials and components.** Used materials and components shall comply with the provisions for such materials in accordance with the applicable code referenced in Section 102.4 and the applicable requirements of this code.

**505.2.2 Recycled content building materials.** Recycled content building materials shall comply with one of the following:

1. Contain not less than 25 percent combined post-consumer and preconsumer recovered material, and shall comply with Section 505.2.3.
2. Contain not less than 50 percent combined post-consumer and preconsumer recovered material.

**505.2.3 Recyclable building materials and building components.** Recyclable building materials and building components shall comply with one of the following:

1. Building materials or components that can be recycled into the same material or another material with a minimum recovery rate of not less than 30 percent through recycling and reprocessing or reuse; or
2. Building materials that are recyclable through an established closed loop manufacturer’s take-back program.

**505.2.4 Bio-based materials.** Bio-based materials shall be those materials that comply with one or more of the following:

1. The bio-based content is not less than 75 percent as determined by testing in accordance with ASTM D6866.
2. Wood and wood products used to comply with this section, other than salvaged or reused wood products, shall be labeled in accordance with the SFI Standard, FSC STD-40-004 V2-1 EN, PEFC Council Technical Document or equivalent *fiber procurement system*. As an alternative to an on-product label, a Certificate of Compliance indicating compliance with the *fiber procurement system* shall be permitted. Manufacturer’s *fiber procurement systems* shall be audited by an accredited third-party.
3. The requirements of USDA 7 CFR Part 2902, and listed for use on the USDA BioPreferred website: <https://www.biopreferred.gov/BioPreferred/>.

**505.2.5 Indigenous materials.** Indigenous materials or components shall be composed of resources that are recovered, harvested, extracted and manufactured within a 500 mile (800 km) radius of the building site. Where only a portion of a material or product is recovered, harvested, extracted and manufactured within 500 miles (800 km), only that portion shall be included. Where resources are transported by water or rail, the distance to the building site shall be determined by multiplying the distance that the resources are transported by water or rail by 0.25, and adding that number to the distance transported by means other than water or rail.

**505.3 Whole building life cycle assessment.** Elective in Rhode Island – see Appendix A.

**505.4 Multi-attribute material declaration and certification.** Not less than 55 percent of the total building materials used in the project, based on mass, volume or cost, shall comply with Section 505.4.1 or 505.4.2. Where a material complies with both Sections 505.4.1 and 505.4.2, the material value shall be multiplied by two.

**505.4.1 Environmental product declaration.** A building material with a Type III environmental product declaration that is verified by a program operator. The environmental product declaration shall comply with the provisions of ISO 14025 and ISO 21930 and be externally verified.

**505.4.2 Multi-attribute standard.** A material specific assessment that is verified by an approved agency shall be submitted for each product in accordance with the following items, as applicable. The assessment shall be verified as meeting the minimum performance level specified in each standard, which focuses on the life-cycle stages from development to end of life. These stages shall include material selection, energy and water use during development, performance, human and environmental impact, and end of life.

1. NSF/ANSI 140 for carpet.
2. NSF/ANSI 332 for resilient floor coverings.
3. NSF/ANSI 336 for commercial furnishings fabric.
4. NSF/ANSI 342 for wall coverings.
5. NSF/ANSI 347 for single-ply roofing membranes.
6. NSC 373 for natural dimension stone.
7. TCNA ANSI/A138.1 for ceramic tiles, glass tiles, and tile installation materials.
8. UL 100 for gypsum boards and panels.
9. UL 102 for door leafs.

## SECTION 506 LAMPS

**506.1 Mercury content in fluorescent lamps.** The mercury content in straight fluorescent lamps shall comply with Section 506.1.1 and the mercury content in compact fluorescent lamps shall comply with Section 506.1.2, as applicable.

**Exception:** Mercury content is not limited for lighting

integral to equipment or instrumentation and installed by the manufacturer, or for lamps with a high color rendering index that is greater than or equal to 87.

**506.1.1 Straight fluorescent lamps.** Non-preheat straight, double-ended fluorescent lamps less than 70 inches (1800 mm) and greater than 21 inches (550 mm) in length and containing a medium bi-pin base or miniature bi-pin base shall comply with the following:

1. T-5 lamps with a rated lifetime of less than 25,000 hours at 3 hours per start shall contain not more than an average of 3 milligrams of mercury per lamp.
2. T-8 lamps with a rated lifetime less than 25,000 hours at 3 hours per start on an instant start ballast shall contain not more than an average of 4 milligrams of mercury per lamp.
3. All other T5 or T8 lamps shall contain not more than an average of 5 milligrams of mercury per lamp.

**506.1.2 Compact fluorescent lamps.** Single-ended pin-base and screw-base compact fluorescent lamps shall contain not more than an average of 5 milligrams of mercury per lamp, and shall be listed and labeled in accordance with UL 1993.

## SECTION 507

### BUILDING ENVELOPE MOISTURE CONTROL

**507.1 Moisture control preventive measures.** Moisture preventive measures shall be implemented for the categories listed in items 1 through 7. Inspections shall be executed in a method and at a frequency as listed in Table 508.1.

1. Foundation sub-soil drainage system.
2. Foundation waterproofing.
3. Foundation dampproofing.
4. Under slab water vapor protection.

## SECTION 508

### MATERIALS COMPLETION

**508.1 Materials completion.** Within 60 days of conducting the final inspection, the registered design professional shall provide evidence of completion of the materials installation to the code official, in accordance with the requirements of this chapter.



**TABLE 508.1  
MATERIALS COMPLETION PLAN**

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
<b>Chapter 5: Material Resource Conservation and Efficiency</b>					
1. Foundation sub-soil drainage system.	Field Observation	Periodic observation for entire sub-soil drainage-system.	None	<b>Designer of Record</b>	507.1 and IBC Ch 18
2. Foundation waterproofing	Field Observation	Periodic observation for the entire foundation.	None	<b>Designer of Record</b>	507.1 and IBC Ch 18
3. Foundation damp proofing	Field Observation	Periodic observation for the entire foundation.	None	<b>Designer of Record</b>	507.1 and IBC Ch 18
4. Under slab water vapor protection (also a Cx requirement in chapter 9)	Field Observation	Periodic observation for the entire slab footprint.	None	<b>Designer of Record</b>	507.1 and IBC Ch 19
	Verification	Installation	None	<b>CxA</b>	Ch 9 and ASTM E 1643
5. Flashing at: Windows, exterior doors, skylights, wall flashing and drainage systems (also a Cx requirement in chapter 9)	Field Observation	Periodic observation for not less than 25% of all flashing locations.	None	<b>Designer of Record</b>	507.1 and IBC Ch 14
	Testing	Installation	None	<b>CxA</b>	Ch 9 and ASTM E 2813 (Fundamental)
6. Exterior wall coverings.	Field Observation	Periodic observation for not less than 25% of exterior wall cladding systems.	None	<b>Designer of Record</b>	507.1 and IBC Ch 14
7. Roof coverings, roof drainage, and flashings (also a Cx requirement in chapter 9)	Field Observation	Periodic observation for not less than 25% of all roof covering, roof drainage and flashings.	None	<b>Designer of Record</b>	507.1 and IBC Ch 15
	Testing	Installation	None	<b>CxA</b>	Ch 9 and ASTM E 2813 (Fundamental)

## CHAPTER 6

# ENERGY CONSERVATION, EFFICIENCY AND CO<sub>2</sub>e EMISSION REDUCTION

### SECTION 601 GENERAL

**601.1 Scope.** The provisions of this chapter regulate the design, construction, and operation of buildings and their associated building sites for the effective use of energy.

**601.2 Intent.** This chapter is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve the effective use of energy.

**601.2.1 National Grid through its electric and natural gas efficiency programs offers technical assistance and financial incentives for many of the requirements included in this chapter. Please refer to the introduction for this code and contact National Grid to learn more about participating in their programs.**

**601.3 Application.** Buildings and their associated building sites shall comply with Section 601.3.1, 601.3.2 or 601.3.3.

**601.3.1 Performance-based compliance.** Buildings designed on a performance basis shall comply with Sections C402.5, C403.2, C404, C405.2, C405.3, C405.5 and C405.6 of the *International Energy Conservation Code* and with Sections 601.4, 602, 608.6, 608.7, 608.8, 608.9,

**601.3.2 Prescriptive-based compliance.** Buildings designed on a prescriptive basis shall comply with Sections C402, C403, C404 and C405 of the *International Energy Conservation Code*, and with the requirements of Sections 601.4, 605, 606, 607, 608, 609 and 610 of this code.

**601.3.3 Outcome-based compliance.** Buildings designed on an outcome basis shall comply with Sections 601.4, 610 and 612, and with the *International Energy Conservation Code*.

**601.4 Minimum requirements.** Buildings shall be provided with metering complying with Section 603, and commissioning complying with Chapter 9 of this code.

**601.5 Multiple buildings on a site and mixed-use buildings.** Where there is more than one building on a site and where a building has more than one use in the building, each building or each portion of a building associated with a particular use shall comply with Section 601.5.1 or 601.5.2, or a combination of both.

**601.5.1 Multiple buildings on a site.** For building sites with multiple buildings, the energy use associated with the building site shall be assigned on a proportional basis to each building based on total net floor area of each building in relation to the total net floor area of all buildings on the building site.

Where energy is derived from either renewable or waste energy, or both sources located on the building site,

on or in individual buildings and delivered to multiple buildings, the energy so derived shall be assigned on a proportional basis to the buildings served based on building net floor area.

**Exception:** Where it can be shown that energy to be used at the building site is associated with a specific building, that energy use shall be assigned to that specific building.

**601.5.2 Mixed use buildings.** Where buildings have more than one use, the energy use requirements shall be based on each individual occupancy.

### SECTION 602 PERFORMANCE-BASED COMPLIANCE

**602.1 Performance-based compliance.** Compliance for buildings and their sites to be designed on a performance basis shall be determined by predictive modeling of both energy performance and CO<sub>2</sub>e emissions. Predictive energy modeling shall use source energy kBtu unit measure based on compliance with Section 602.2. Predictive CO<sub>2</sub>e emissions modeling shall be in accordance with Section 602.3.

**602.1.2 Registered design professional.** For the purposes of this section, and where it is required that documents be prepared by a *registered design professional*, the *code official* is authorized to require the owner to engage and designate on the building permit application a *registered design professional* who shall act as the *registered design professional* in responsible charge of the building simulation modeling.

**602.2 Energy performance modeling.** Performance-based designs shall demonstrate a zEPI score of not more than 46 (10% improvement compared with ASHRAE 90.1 2013/IECC 2015) as determined in accordance with Equation 6-1.

$$zEPI = 52 \times (\text{Proposed building performance} / \text{Baseline building performance})$$
 **(Equation 6-1)**

where:

Proposed Building Performance = The proposed building performance in source kBtu for the proposed design of the building and its site calculated in accordance with Section 602.2.1.

Baseline Building Performance = The baseline building performance in source kBtu for a baseline building and its site calculated in accordance with Section 602.2.1.

52 = a fixed value representing the performance of a baseline building designed to comply with ASHRAE Standard 90.1-2013/IECC 2015.

**602.2.1 Modeling methodology.** The proposed building performance and the baseline building performance of the building and building site shall be calculated in accordance with Appendix G, ASHRAE 90.1 2013, as modified by Sections 602.2.1.1, 602.2.1.2, and 602.2.1.3. The energy use modeling shall include all energy used for building and site functions and anticipated occupancy.

**Alternative modeling methodology.** If applying for whole building performance efficiency incentives through National Grid, the modeling procedure accepted for performance incentive approval may be utilized. The outcome of the procedure must demonstrate modeled energy usage at least 10% lower than a baseline building, as determined by program guidelines. In addition to the National Grid program required energy usage calculations, the conversion factors specified in sections 602.2.1.1, 602.2.1.2, and 602.2.1.3 must be completed and a zEPI score must be calculated for compliance with this code.

**602.2.1.1 Energy units.** The building performance calculations shall be based on energy use instead of energy cost. Energy use shall be converted to consistent units by multiplying the nonrenewable energy fossil fuel use at the utility meter or measured point of delivery to Btus and multiplying by the “Energy Conversion Factor” for the New England region in Table 602.2.1.1.

**602.2.1.2 Site to source electric power conversion.** In calculating the proposed building performance and the baseline building performance, electric energy used shall be calculated in source energy by multiplying the electric power use at the utility meter in Btus by the “Source Energy Conversion Factor” for the New England region in Table 602.2.1.2.

**602.3 Annual direct and indirect CO<sub>2</sub>e emissions.** The CO<sub>2</sub>e emissions for the proposed and baseline building and building site shall be based on the proposed and baseline building performance calculated in accordance with Section 602.2.1 and as modified by Sections 602.3.1 and 602.3.2. The emissions associated with the proposed design shall be less than the CO<sub>2</sub>e emissions associated with the standard reference design in accordance with Equation 6-2.

$$CO_2e \text{ pdp} \leq (zEPI \times CO_2e \text{ bbp})/52 \text{ (Equation 6-2)}$$

where:

zEPI = score determined in accordance with Section 602.2.

CO<sub>2</sub>e pdp = emissions associated with the proposed building performance.

CO<sub>2</sub>e bbp=emissions associated with the baseline building performance in accordance with Section 602.2.

52 = A fixed value representing CO<sub>2</sub>e emissions of a baseline building designed to comply with the 2012 edition of the *International Energy Conservation Code*.

**602.3.1 CO<sub>2</sub>e emissions from electricity.** Emissions associated with use of electric power shall be calculated by converting the electric power used by the building at the electric utility meter or measured point of delivery, to kWh, and multiplying by the CO<sub>2</sub>e conversion factor in Table 602.3.2.2

**602.3.2 Onsite nonrenewable energy.** Emissions associated with the use of nonrenewable energy sources other than electrical power shall be calculated by multiplying the fossil fuel energy used by the building and its site at the utility meter or measured point of delivery by the national emission factors in Table 602.3.2.1.

**TABLE 602.3.2.1  
ENERGY CONVERSION AND EMISSION FACTORS  
FOR NON-ELECTRIC FUELS**

FUEL TYPE	ENERGY CONVERSION FACTOR	EMISSION FACTOR
Natural Gas	1.09	141
Fuel Oil	1.19	198
LPG	1.15	172
Purchased District Heating—Hot Water	1.35	191
Purchased District Heating—Steam	1.45	205
District Cooling	0.99	147
Other	1.1	217

**TABLE 602.3.2.2  
ELECTRICITY SITE TO SOURCE  
CONVERSION AND  
EMISSION RATE FACTORS**

eGRID 2010 SUBREGION ACRONYM	SUB-REGION NAME	SOURCE ENERGY CONVERSION FACTOR	CO <sub>2</sub> e RATE (kg/kWh)
NEWE	NPCC New England	3.03	0.428

SECTION 603  
ENERGY METERING, MONITORING AND REPORTING

**603.1 Purpose.** Buildings that consume energy shall comply with Section 603. The purpose of this section is to provide requirements that will ensure that buildings are constructed or altered in a way that will provide the capability for their energy use, production and reclamation to be measured, monitored and reported. This includes the design of energy distribution systems so as to isolate load types, the installation of or ability to install in the future meters, devices and a data acquisition system, and the installation of, or the ability to provide, public displays and other appropriate reporting mechanisms in the future.

All forms of energy delivered to the building and building site, produced on the building site or in the building and reclaimed at the building site or in the building shall be metered and all energy load types measured in accordance with this section.

**603.1.1 Buildings with tenants.** In buildings with tenants, the metering required by Section 603.3 shall be collected for the entire building and for each tenant individually. Tenants shall have access to all data collected for their space.

**603.2 Energy distribution design requirements and load type isolation in buildings.** Energy distribution systems within, on or adjacent to and serving a building shall be designed such that each primary circuit, panel, feeder, piping system or supply mechanism supplies only one energy use category as specified in Table 603.2. The energy use category served by each distribution system shall be clearly designated on the energy distribution system with the use category served, and adequate space shall be provided for installation of metering equipment or other data collection devices, temporary or permanent, to measure their energy use. The energy distribution system shall be designed to facilitate the collection of data for each of the building energy types in Section 603.3 and for each of the energy use categories specified in Table 603.2. Where there are multiple buildings on a building site, each building shall comply separately with the provisions of Section 603.

**Exceptions:**

1. Buildings designed and constructed such that the total usage of each of the load types specified in Table 603.2 shall be permitted to be measured through the use of installed sub-meters as specified in section 603.4 or other equivalent methods as *approved*.
2. Within Group I-2 occupancies, loads connected to critical, life safety and equipment branches shall be permitted to be monitored in the aggregate.

TABLE 603.2  
ENERGY USE CATEGORIES

LOAD CATEGORY	DESCRIPTION OF ENERGY USE
Total HVAC system	Heating, cooling and ventilation including, but not limited to fans, pumps, boilers, chillers and water heating.
Total lighting system	Interior and exterior lighting used in occupant spaces and common areas.
Plug loads	Devices, appliances and equipment connected to convenience receptacle outlets.
Process loads	Any single load of an activity within the building that exceeds 5 percent of the peak connected load of the whole building including, but not limited to, data centers, manufacturing equipment and commercial kitchens.
Building operations and other miscellaneous loads	Loads not included elsewhere in this table including, but not limited to, vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas, snow-melt systems and exterior lighting that is mounted on the building or used to illuminate building facades.

**603.3 Energy-type metering.** Buildings shall be provided with the capability to determine energy use and peak demand as provided in this section for each of the energy types specified in Sections 603.3.1 through 603.3.7. Utility energy meters or supplemental sub-meters are permitted to be used to collect whole building data, and shall be equipped with a local data port connected to a data acquisition system in accordance with Section 603.5. Billing and delivery data is permitted to be used for non-regulated fuels as specified in sections 603.3.1 through 603.3.7. Data must be recorded and maintained in a database or log.

**603.3.1 Gaseous fuels.** Gaseous fuels including, but not limited to, natural gas, LP gas, coal gas, hydrogen, landfill gas, digester gas and biogas, shall be capable of being metered at the building site to determine the gross consumption and peak demand of each different gaseous fuel by each building on a building site. The installation of gas meters and related piping shall be in accordance with the *International Fuel Gas Code*.

**Exception:** Gaseous fuels used for clinical purposes are not required to be metered.

**Exception:** Unregulated gaseous fuel consumption may be recorded and logged as specified in section 603.3.

**603.3.2 Liquid fuels.** Liquid fuels including, but not limited to, fuel oil, petroleum-based diesel, kerosene, gasoline, bio diesel, methanol, ethanol and butane, shall be capable of being metered at the building site to allow a determination of the gross consumption and peak demand of each liquid fuel use by each building on a building site. The installation of meters and related piping shall be in accordance with the *International Mechanical Code*.

**Exception:** Stationary reciprocating internal combustion engines (RICE) provided only for emergency and standby power are not required to be metered.

**Exception:** Unregulated gaseous fuel consumption may be recorded and logged as specified in Section 603.3.

**603.3.3 Solid fuels.** Solid fuels including, but not limited to, coal, charcoal, peat, wood products, grains, and municipal waste shall be capable of having their use determined at the building site to allow a determination of the gross consumption and peak demand of each solid fuel use by each building on a building site, and such usage must be recorded and maintained in a database or log.

**603.3.4 Electric power.** Electric power shall be capable of being metered at the building site to allow a determination of the gross consumption and peak demand by each building on a building site. The installation of electric meters and related wiring shall be in accordance with NFPA 70.

**603.3.5 District heating and cooling.** Hot water, steam, chilled water, and brine shall be capable of being metered at the building site, or where produced on the building site, to allow a determination of the gross consumption of heating and cooling energy by each building on a building site. Energy use associated with the production of hot water, steam, chilled water or brine shall be determined based on the fuel used.

**603.3.6 Combined heat and power.** Equipment and systems with a connected load greater than 125,000 Btu/hr (36.63 kW) providing combined heat and power (CHP) shall be capable of being metered to allow a determination of the gross consumption of each form of delivered energy to the equipment. The output of CHP shall be metered in accordance with the applicable portions of Section 603 based on the forms of output from the CHP.

**603.3.7 Renewable and waste energy.** Equipment and systems providing energy from renewable or waste energy sources which is included in the determination of the building zEPI, shall be capable of being metered to allow a determination of the output of equipment and systems in accordance with Sections 603.3.7.1 through 603.3.7.5.

**603.3.7.1 Solar electric.** Equipment and systems providing electric power through conversion of solar energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.

**Exception:** Systems with a rated output of less than 3 kW shall not be required to have the capacity to be metered.

**603.3.7.2 Solar thermal.** Equipment and systems providing heat to fluids or gases through the capture of solar energy shall be capable of being metered so that the peak thermal energy (Btu/h) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of heat captured (Btu) for delivery to the building and its systems can be determined intervals of 1 hour or less.

**Exception:** Systems with a rated output of less than 25 kBtu/hr shall not be required to have the capacity to be metered. The rated output shall be determined using listed and labeled solar collectors that have been tested in accordance with SRCC 100.

**603.3.7.3 Waste heat.** Equipment and systems providing energy through the capture of waste heat shall be capable of being metered so that the amount of heat captured and delivered to the building and its systems can be determined at intervals of 1 hour or less.

**Exception:** Systems with a rated output of less than 25 kBtu/h shall not be required to have the capacity to be metered.

**603.3.7.4 Wind power systems.** Equipment and systems providing electric power through conversion of wind energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.

**Exception:** Systems with a rated output of less than 3 kW shall not be required to have the capacity to be metered.

**603.3.7.5 Other renewable energy electric production systems.** Equipment and systems providing electric power through conversion of other forms of renewable energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.

**Exception:** Systems with a rated output of less than 3 kW shall not be required to have the capacity to be metered.

**603.4 Energy load type sub-metering.** For buildings that are not less than 25,000 square feet (2323 m<sup>2</sup>) in *total building floor area*, the energy use of the categories specified in Section 603.2 shall be metered through the use of sub-meters or other *approved*, equivalent methods meeting the capability requirements of Section 603.3.

**603.4.1 Buildings less than 25,000 square feet.** For buildings that are less than 25,000 square feet (2323 m<sup>2</sup>) in *total building floor area*, the energy distribution system

shall be designed and constructed to accommodate the future installation of sub-meters and other *approved* devices in accordance with Section 603.4. This includes, but is not limited to, providing access to distribution lines and ensuring adequate space for the installation of submeters and other *approved* devices.

### 603.5 Minimum energy measurement and verification.

Meters, sub-meters, and other *approved* devices installed in compliance with Sections 603.3 and 603.4 shall be connected to a data acquisition and management system capable of storing not less than 36-months worth of data collected by all meters and other *approved* devices and transferring the data in real time to a display as required in Section 603.6.

**Exception:** Stationary reciprocating internal combustion engines (RICE) provided only for emergency and standby power are not required to be connected to a data acquisition and management system.

**603.5.1 Annual emissions.** The data acquisition and management system shall be capable of providing the data necessary to calculate the annual CO<sub>2</sub>e emissions associated with the operation of the building and its systems using the results of annual energy use measured in accordance with Section 603.5. The calculation shall be based on energy measured for each form of energy delivered to the site on an annual basis. Where reporting of emissions is required, the determination of emissions shall be in accordance with Sections 602.3.1 and 602.3.2.

**603.6 Energy display.** A permanent, readily accessible and visible display shall be provided adjacent to the main building entrance or on a publicly available Internet web site. The display shall be capable of providing all of the following:

1. The current energy demand for the whole building level measurements, updated for each fuel type at the intervals specified in Section 603.3.
2. The average and peak demands for the previous day and the same day the previous year.
3. The total energy usage for the previous 18 months.

## SECTION 604

### AUTOMATED DEMAND-RESPONSE (AUTO-DR) INFRASTRUCTURE

**Note:** *Rhode Island's Electric Utility does not currently offer a demand-response (DR) incentive program. Until such time that a DR program is introduced, section 604 is not required.*

**604.1 Establishing an open and interoperable automated demand-response (Auto-DR) infrastructure.** Where this section is indicated to be applicable in Table 302.1, buildings that contain heating, ventilating, air-conditioning (HVAC) or lighting systems shall be provided with Auto-DR infrastructure in accordance with Sections 604.1 through 604.4.

**Exception:** Auto-DR infrastructure is not required for the following buildings and systems:

1. Buildings located where the electric utility or regional independent system operator (ISO) or regional transmission operator (RTO) does not offer a demand-response program to buildings regulated by this code.
2. Buildings with onsite renewable energy systems that have a minimum rated capacity no less than 20 percent of the building's peak energy demand during the period of the day when the building reaches its peak demand.
3. Group I-2, Condition 2 occupancies.
4. Critical emergency response facilities.
5. Spaces used for hazardous materials storage.
6. Building smoke exhaust removal and smoke control systems.
7. Means of egress illumination required by Chapter 10 of the *International Building Code*.
8. Manufacturing process systems.
9. Buildings with passive or active features that show peak electric energy use reduction of 15 percent or more during demand-response periods identified by the code official. Modeled peak energy use shall be determined in accordance with Section 602 and shall demonstrate that the building reduces modeled peak daily electric energy use by not less than 15 percent from the baseline building for the demand-response period identified by the code official.
10. Systems serving process loads where constant temperatures are necessary to prevent degradation of plants, animals, or other temperature-sensitive materials.

**604.2 Heating, ventilating and air-conditioning (HVAC) systems equipped with direct digital control (DDC).** HVAC systems with direct digital control (DDC) to the zone level shall be programmed to allow centralized demand shed for noncritical zones in accordance with the following:

1. The controls shall have a capability to remotely set up the operating cooling temperature setpoints by 4°F (2.2°C) or more in all noncritical zones on signal from a centralized contact or software point within an energy management control system (EMCS).
2. The controls shall have a capability to remotely set down the operating heating temperature setpoints by 4°F (2.2°C) or more in all noncritical zones on signal from a centralized contact or software point within an EMCS.
3. The controls shall have capabilities to remotely reset the temperatures in all noncritical zones to original operating levels on signal from a centralized contact or software point within an EMCS.
4. The controls shall be programmed to provide an adjustable rate of change for the temperature setup and reset.

5. The controls shall have the following features:
  - 5.1. Be accessible to authorized facility operators.
  - 5.2. Be equipped with a manual control to allow adjustment of heating and cooling setpoints globally from a single point.
  - 5.3. Shall direct the space-conditioning systems to conduct a centralized demand shed, as specified for noncritical zones during the demand-response period, upon receipt of a demand-response signal.

**604.3 Heating, ventilating and air-conditioning (HVAC) systems not equipped with DDC.** Unitary heating or cooling systems, including heat pumps, not controlled by a central energy management control system (EMCS) shall have an occupant-controlled smart thermostat in accordance with Section 604.3.1.

**Exception:** Gravity gas wall heaters, gravity floor heaters, gravity room heaters, noncentral electric heaters, fireplaces or decorative gas appliances, wood stoves, room air conditioners, and room air-conditioner heat pumps.

**604.3.1 Occupant-controlled smart thermostat (OCST).** Occupant-controlled smart thermostats (OCST) shall be capable of the following:

1. OCSTs shall include communication capabilities through either:
  - 1.1. Not less than one expansion port that allows for the installation of a removable module containing a radio or physical connection port to enable communication; or
  - 1.2. Onboard communication devices.
2. OCSTs shall be capable of both receiving and responding to demand-response signals.
3. Event modes shall be capable of being overridden by the occupant.
4. OCSTs, with communications enabled, shall be capable of receiving and automatically responding to demand-response signals by adjusting the thermostat setpoint by either the default number of degrees or the number of degrees established by the occupant.
5. In response to demand-response signals, the OCST shall default to an event response that initiates setpoint offsets of +4°F for cooling and -4°F for heating relative to the current setpoint.
6. OCSTs shall be capable of manual adjustments to event responses, thermostat settings and setpoints at any time, including during demand-response periods.
7. OCSTs shall have the capability to display information to the occupant including, but not limited to, communications system connection status, an indication that a demand-response period is in progress, the currently sensed temperature and the current setpoint.

**604.3.2 Rebound avoidance.** The Auto-DR strategy shall include logic to prevent a rebound peak. When the signal for Auto-DR is ended, a gradual return to normal heating, ventilating and air-conditioning (HVAC) equipment operations shall be part of the Auto-DR strategy, through any combination of the strategies and systemic adjustments, including, but not limited, to the following:

1. Where close to the unoccupied period, the Auto-DR period shall be extended using a rebound avoidance, extended Auto-DR control strategy until the initiation of the unoccupied period.
2. Rebound avoidance, slow recovery control strategies, gradually increasing or decreasing space temperature setpoints or a variance in the timing by cooling or heating zone.
3. Rebound avoidance, slow recovery control strategies, gradually increasing or decreasing zone supply air temperatures.
4. Rebound avoidance, slow recovery control strategies, gradually increasing or decreasing chilled water temperatures or decreasing hot water temperatures.
5. Rebound avoidance, sequential equipment recovery strategies, gradually restoring demand limited equipment capacity.
6. Rebound avoidance, sequential equipment recovery strategies, gradually restoring equipment that was turned off during the Auto-DR period.
7. Rebound avoidance, slow recovery control strategies, gradually increasing capacity for air moving and pumping systems.
8. Rebound avoidance, sequential equipment recovery or rebound avoidance, slow recovery control where chilled water or hot water and other capacity control valves are sequentially or gradually allowed to return to normal operation, respectively.

**604.4 Lighting.** Where buildings in Group B office occupancies, Group E occupancies and Group M occupancies have a floor area greater than 10,000 square feet (929 m<sup>2</sup>), the Auto-DR system shall be capable of reducing the total connected lighting power by not less than 15 percent. The lighting power shall be determined in accordance with Section C405.5 of the *International Energy Conservation Code*.

**Exception:** The following buildings and lighting systems need not be addressed by the Auto-DR system:

1. Luminaires or signage on emergency circuits.
2. Luminaires located within a daylight zone that are dimmable and connected to daylight responsive controls in accordance with the *International Energy Conservation Code*.

3. Luminaires or signage for which a lighting power reduction would endanger patient care, occupant safety or occupant security.

**604.5 Energy storage.** Where energy storage is used as a means to comply with the requirements of this section, Sections 606 or 607, the following information shall be submitted for review to the code official:

1. A narrative describing the operation of the energy storage system that identifies, among other things, the building end use loads being supplied by the energy storage system and the storage medium used.
2. A list of energy storage system components.
3. A calculation that shows the maximum charge level (KWh), maximum electric charge rate (KW) and electric or thermal discharge rate (KW) of the system.
4. The name of the utility, ISO, or RTO that will control the energy storage system.
5. Whether the energy storage system is to be dispatched by the serving grid operator, or micro-grid operator for frequency regulation, renewable integration, or grid stabilization purposes.
6. Other information requested by the code official.

## SECTION 605 BUILDING ENVELOPE SYSTEMS

**605.1 Prescriptive compliance.** Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2, *building thermal envelope* systems shall comply with the provisions of Section C402 of the *International Energy Conservation Code* and the provisions of this section.

**605.1.1 Insulation and fenestration criteria.** The building thermal envelope shall exceed the requirements of Tables C402.1.4 and C402.4 of the *International Energy Conservation Code* by not less than 10 percent. Specifically, for purposes of compliance with this code, each U-factor, C-factor, F-factor and SHGC in the specified tables shall be reduced by 10 percent to determine the prescriptive criteria for this code. The 10 percent reduction criteria can be met for each individual envelope component/assembly, or may be calculated as a 10 percent weighted average reduction by utilizing the COMcheck software tool envelope trade-off methodology. Non-envelope measures may not be used for the trade-off reduction calculation. Where Table C402.1.3 of the *International Energy Conservation Code* provides for no requirement (NR) for the R-value of an assembly, the U-factor, C-factor and F-factor are not required to be reduced. In Sky Type “C” locations specified in Section 808.4, the skylights shall not exceed 5 percent of the building roof area.

**605.1.1.1 Shading devices for fenestration.** Vertical fenestration within 135 degrees (3316 rad) of the nearest south cardinal ordinate in buildings located in the northern hemisphere or the nearest north cardinal ordinate in buildings located in the southern hemisphere,

shall be shaded by one or a combination of the following methods:

1. Permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.
2. Automatically controlled shading devices capable of modulating in multiple steps the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity, that comply with all of the following:
  - 2.1. Exterior shading devices in the closed position shall cover not less than 90 percent of the fenestration.
  - 2.2. Interior shading devices in the closed position shall cover not less than 90 percent of the fenestration and have a minimum solar reflectance of 0.50 for the surface facing the fenestration.
  - 2.3. A manual override, where provided, shall override operation of automatic controls for not longer than 4 hours.
  - 2.4. Commissioning shall be conducted as required by Chapter 9 of this code to verify that the automatic controls for shading devices respond to changes in illumination or radiation intensity.

**Exception:** Shading devices are not required for the following buildings and fenestrations:

1. Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the *International Building Code* based on the exposure category and basic wind speed at the building site.
2. Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line.
3. Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.
4. Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing



shall be automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity. Functional testing of the controls of the dynamic glazing shall be conducted in accordance with Section 611.10.

**605.1.2 Air leakage.** The *building thermal envelope* shall be durably sealed to limit air leakage in accordance with Section C402.4 of the *International Energy Conservation Code* and the provisions of this section.

**605.1.2.1 Air barriers.** A continuous air barrier shall be provided for buildings in *climate zones* 1 through 8 in accordance with Section C402.5.1 of the *International Energy Conservation Code*. The exception in Section C402.5.1 of the *International Energy Conservation Code* shall not apply.

**605.1.2.2 Testing requirement.** The *building thermal envelope* air tightness shall be tested and the air leakage rate of the total area of the *building thermal envelope* shall not exceed 0.25 cfm/ft<sup>2</sup> under a pressure differential of 0.3-inch water column (1.57 lb/ft<sup>2</sup>) (1.25 L/s.m<sup>2</sup> under a pressure differential of 75 Pa). Testing shall occur after rough-in and after installation of penetrations of the building envelope, including penetrations for utilities, heating, ventilating and air-conditioning (HVAC) systems, plumbing, and electrical equipment and appliances. Testing shall be done in accordance with ASTM E779. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner. Where the tested rate exceeds 0.25 cfm/ft<sup>2</sup>, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal leaks shall be submitted to the code official and the building owner, and shall be deemed to satisfy the requirements of this section.

**605.1.2.3 Deleted in Rhode Island**

**605.2 Roof replacement.** Above-deck insulation for roof replacement on an existing building with insulation completely above the deck and where the roof slope is less than two units in 12 units (17 percent roof slope) shall be in accordance with Section 1003.2.7.

**605.3 Continuous insulation.** The requirements for continuous insulation as specified in the Rhode Island Building Code SBC-1 and the Energy Conservation Code SBC-8 must be met. And, all parts of the opaque thermal envelope shall be provided with not less than R-5 continuous insulation to prevent thermal bridging.

## SECTION 606 BUILDING MECHANICAL SYSTEMS

**606.1 Prescriptive compliance.** Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2, building mechanical systems shall comply with the provisions of the *International Energy Conservation Code* and the provisions of this section.

**606.2 HVAC equipment performance requirements.** Heating, ventilating and air-conditioning (HVAC) equipment shall comply with Section 606.2.2

**606.2.1 Section deleted in Rhode Island.**

**606.2.2 Space cooling and heating equipment.** Equipment shall comply with the minimum efficiency requirements of this section. Mechanical equipment not specifically addressed by this code shall comply with the provisions of the *Rhode Island Energy Conservation Code*.

**606.2.2.1 Ground source heat pumps.** The efficiency of ground source heat pumps shall comply with the provisions of Table 606.2.2.1 based on the applicable referenced test procedure.

**606.2.2.2 Multistage ground source heat pumps.** The efficiency of multistage ground source heat pumps shall comply with the provisions of Table 606.2.2.1 based on the applicable referenced test procedure.

**606.2.2.3 Unitary and split air conditioning systems.** The efficiency of unitary and split air conditioning systems shall comply with the provisions of Table 606.2.2.3. Split systems must have both a new condenser and a new coil that meets AHRI specifications and the matched system (condenser and coil) performance must meet or exceed the minimum performance requirements in the table.

**606.2.2.4 Unitary and split heat pump systems.** The efficiency of unitary and split heat pump systems shall comply with the provisions of Table 606.2.2.4.

**606.2.2.5 Chiller systems.** Chiller systems for space conditioning shall comply with the provisions of Table 606.2.2.5. All water cooled chillers must be equipped with condenser water reset strategy.

**606.2.2.6 Natural gas heating systems.** Natural gas fired heating systems shall comply with the provisions of Table 606.2.2.6.

**606.2.2.7 Minimum fan efficiency.** Stand-alone supply, return and exhaust fans designed for operating with motors over 750 watts (1 hp) shall have an energy efficiency classification of not less than FEG71 as defined in AMCA 205. The total efficiency of the fan at the design point of operation shall be within 10 percentage points of either the maximum total efficiency of the fan or the static efficiency of the fan.

**TABLE 606.2.2.1  
ENERGY-EFFICIENCY CRITERIA  
FOR GROUND SOURCE HEAT PUMPS**

PRODUCT TYPE	COOLING	HEATING	TEST PROCEDURE
	MINIMUM EER	MINIMUM COP	
Water-to-Air Closed loop	15	3.2	ISO 13256-1
Water-to-Air Open loop	18	4.0	ISO 13256-1
Water-to-Water Closed loop	15	3.2	ISO 13256-2
Water-to-Water Open loop	18	4.0	ISO 13256-2
Direct Expansion	15	3.5	AHRI 870
Direct GeoExchange	15	3.5	AHRI 870

EER = Energy efficiency ratio, COP = Coefficient of performance

**TABLE 606.2.2.3  
ENERGY-EFFICIENCY CRITERIA FOR UNITARY AND SPLIT AIR CONDITIONING SYSTEMS**

Unitary and Split Air Conditioning Systems			
Unit Size (Btu/hr)	Cooling Mode Minimum Efficiency		
	SEER	EER	IEER
< 65,000 (split system)	15.0	12.5	NA
< 65,000 (packaged)	15.0	12.0	NA
≥ 65,000 to < 135,000	NA	12.0	13.8
≥ 135,000 to < 240,000	NA	12.0	13.0
≥ 240,000 to < 760,000	NA	10.6	12.1
≥ 760,000	NA	10.2	11.4

Unitary Evaporatively Cooled Air Conditioning Systems			
Unit Size (Btu/hr)	Cooling Mode Minimum Efficiency		
	SEER	EER	IEER
≥ 240,000	NA	13.3	14.1

Unitary Water Cooled Air Conditioning Systems			
Unit Size (Btu/hr)	Cooling Mode Minimum Efficiency		
	SEER	EER	IEER
≥ 240,000	NA	13.8	14.6

**TABLE 606.2.2.4  
ENERGY-EFFICIENCY CRITERIA FOR UNITARY AND SPLIT HEAT PUMP SYSTEMS**

Unitary and Split Air Cooled Heat Pump Systems				
Unit Size (Btu/hr)	Cooling Mode Minimum Efficiency		Heating Mode Minimum Efficiency	
	SEER	EER	HSPF	COP
< 65,000 (split system)	15.0	12.5	9.0	NA
< 65,000 (packaged)	15.0	12.0	8.5	NA
≥ 65,000 to < 135,000	NA	12.0	NA	3.4
≥ 135,000 to < 240,000	NA	12.0	NA	3.2
≥ 240,000	NA	10.8	NA	3.2

Unitary Water Source Heat Pump Systems				
Unit Size (Btu/hr)	Cooling Mode Minimum Efficiency		Heating Mode Minimum Efficiency	
	SEER	EER	HSPF	COP
< 135,000 Btu/hr	NA	14.0	NA	4.6

**TABLE 606.2.2.5  
ENERGY-EFFICIENCY CRITERIA FOR CHILLER SYSTEMS**

Chiller Systems		
Type	Unit size - AHRI Net Tons	Minimum Efficiency*
Air cooled with condenser	< 150	FL: 10.52 EER IPLV: 13.75 EER
	≥ 150	FL: 10.52 EER IPLV: 14.03 EER
Water cooled rotary screw or scroll	< 75	FL: 0.702 kW/Ton IPLV: 0.540 kW/Ton
	≥ 75 and < 150	FL: 0.698 kW/Ton IPLV: 0.527 kW/Ton
	≥ 150 and < 300	FL: 0.612 kW/Ton IPLV: 0.486 kW/Ton
	≥ 300	FL: 0.588 kW/Ton IPLV: 0.441 kW/Ton
Water cooled centrifugal**	< 300	FL: 0.571 kW/Ton IPLV: 0.405 kW/Ton
	≥ 300 and < 1000	FL: 0.698 kW/Ton IPLV: 0.540 kW/Ton

\* Compliance with either full load (FL) efficiency or integrated part load value (IPLV) efficiency is required

\*\* Includes water cooled oil free compressor chillers

**TABLE 606.2.2.6  
ENERGY-EFFICIENCY CRITERIA FOR NATURAL GAS HEATING EQUIPMENT**

Natural Gas Heating Equipment	Size	Minimum Efficiency Rating
Furnace with electronic commutated motor (ECM)	≤ 150 MBH	97% AFUE
Condensing unit heater	≤ 300 MBH	90% thermal efficiency
Infrared heater	All	Low intensity rated
Condensing boiler	≤ 300 MBH	95% AFUE
	> 300 MBH	90% AFUE
Condensing boiler with integral water heater	All	.90 EF or 90% AFUE

**606.3 Duct and plenum insulation, sealing and testing.**

Supply and return air ducts and plenums, air handlers and filter boxes shall be insulated and sealed in accordance with Section C403.2.9 of the *International Energy Conservation Code*. The exception in Section C403.2.9.1.1 shall not apply.

**606.3.1 Duct air leakage testing.** Ductwork that is designed to operate at static pressures greater than 3 inches water column (747 Pa) and all ductwork located outdoors shall be leak-tested in accordance with the *SMACNA HVAC Air Duct Leakage Test Manual*. Representative sections totaling not less than 25 percent of the total installed duct area for the designated pressure class shall be tested. Positive pressure testing is acceptable for negative pres-

sure ductwork. Duct systems with pressure ratings in excess of 3 inches water column (747 Pa) shall be identified on the construction documents. Duct leakage shall not exceed the rate determined in accordance with Equation 6-3.

$$F = CLP^{0.65} \tag{Equation 6-3}$$

where:

F = maximum leakage in cfm/100 ft<sup>2</sup> (L/s × 9.3 m<sup>2</sup>) duct surface area.

CL = 4, duct leakage class, cfm/100 ft<sup>2</sup> (L/s × 9.3 m<sup>2</sup>) at 1-inch water column.

P = test pressure, which shall be equal to the design duct pressure class rating (inches of water column).

**606.4 Heating, ventilating and air-conditioning (HVAC) piping insulation.** Piping with a nominal diameter greater than 1/4 inch (6.4 mm), including associated valves, fittings and piping system components, in heating, ventilating and air-conditioning (HVAC) systems shall be thermally insulated in accordance with Table 606.4. For insulation outside of the conductivity ranges specified in Table 606.4, the minimum thickness of the insulation shall be determined in accordance with Equation 6-4.

$$T = r [(1 + t/r)^{Kk} - 1] \tag{Equation 6-4}$$

where:

T = minimum insulation thickness (inches) (mm).

r = actual outside radius of pipe (inches) (mm).

T = insulation thickness specified in Table 606.4 for applicable fluid temperature and pipe size.

K = Conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu × in/h × ft<sup>2</sup> × °F).

k = the upper value of the conductivity range specified in Table 606.4 for the applicable fluid temperature.

Building cavities and interstitial framing spaces shall be large enough to accommodate the combined diameter of the pipe plus the insulation, plus the full thickness of the insulation plus any other objects in the cavity that the piping must cross.

**Exception:** Piping insulation is not required for the following:

1. Factory-installed piping within HVAC equipment tested and rated in accordance with Section 606.2.
2. Piping conveying fluids having a design operating temperature range between 60°F (15.6°C) and 105°F (40.6°C).
3. Piping conveying fluids not heated or cooled such as roof and condensate drains, cold water supply, and natural gas piping.
4. Where heat gain or heat loss will not increase energy usage, such as liquid refrigerant piping.
5. Piping having an outside diameter of 1 inch (25 mm) or less, associated with strainers, control valves, and balancing valves.

**TABLE 606.4  
MINIMUM PIPE INSULATION THICKNESS**

FLUID	CONDUCTIVITY Btu-in/(h × ft <sup>2</sup> × F)	RATIO OF WALL THICKNESS OF PIPE INSULATION TO NOMINAL PIPE DIAMETER <sup>a, b</sup>
Steam	0.27 – 0.34	≥ 2:1
Hot Water	0.22 – 0.29	≥ 1:1
Chilled Water	0.22 – 0.28	≥ 1:1

For SI: 1 inch = 25.4 mm, 1 Btu-in = W/m × K.

a. The proportions apply to all nominal pipe diameters greater than 1/4 inch and less than or equal to 2 inches. For nominal pipe diameters larger than 2 inches, outside diameter, the minimum wall thickness of the insulation shall be equal to the wall thickness required for 2-inch pipe.

b. These thicknesses are based on energy-efficiency considerations only.

**606.5 Economizers.** Economizers shall comply with the requirements of the *Rhode Island Energy Conservation Code*, except as noted herein.

**606.5.1 Economizer systems.** Each cooling system that has a fan shall include either an air economizer complying with Section 606.5.1.1 or a water economizer complying with Section 606.5.1.2.

**Exception:** Economizers are not required where individual cooling units have a capacity of less than 33,000 Btu/h. The total supply capacity of all fan-cooling units not provided with economizers shall not exceed 20 percent of the total supply.

1. Deleted in Rhode Island.
2. In *climate zones* other than 1A or 1B, capacity of all fan-cooling units in the building nor 480,000 Btu/h, whichever is greater.
3. Systems that serve Group I-2, Condition 2 occupancies and ambulatory care facilities, where more than 75 percent of the air designed to be supplied by the system is to spaces that are required to be humidified above a 35°F (1.7°C) dew-point temperature to comply with applicable codes or accreditation standards. Systems that serve other occupancies, where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above a 35°F (1.7°C) dew-point temperature to satisfy process needs.
4. Systems that include a condenser heat recovery system that is designed to utilize 60 percent of the peak heat rejection load at design conditions and there is a documented need for that rejected heat for either service hot water or space heating during peak heat rejection design conditions.
5. Systems that serve spaces estimated as having a sensible cooling load at design conditions, excluding transmission and infiltration loads, of less than or equal to transmission and infiltration losses at the temperature and relative humidity design conditions in accordance with Section 6.1 of ASHRAE 55.
6. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
7. Deleted in Rhode Island.

**606.5.1.1 Air economizers.** Where air economizers are required by this code, they shall be designed with dual enthalpy control sensors (1 outdoors and 1 indoors) in addition to complying with the provisions of the *Rhode Island Energy Conservation Code*.

**606.5.1.2 Water economizer systems for HVAC equipment.** Water economizer systems for heating, ventilating and air-conditioning (HVAC) equipment shall be designed in accordance with the *Rhode Island Energy Conservation Code*.

**606.6 Variable air volume (VAV) fan control.** Individual fans with motors equal to or greater than 1.0 horsepower (0.746 kW) shall be one of the following:

1. Driven by a mechanical or electrical variable speed drive.
2. Driven by a vane-axial fan with variable-pitch blades.
3. Provided with controls or devices that will result in fan motor demand of not more than 30 percent of its design wattage at 50 percent of design airflow when static pressure setpoint equals one-third of the total design static pressure, based on manufacturer's certified fan data.

Static pressure sensors used to control VAV fans shall be placed in a position so that the controller setpoint is not greater than one-third of the total design fan static pressure, except for systems with direct digital control. Where this results in the sensor being located downstream of major duct branching, multiple sensors shall be installed in each major branch to ensure that the static pressure can be maintained in each branch.

For systems with direct digital control of individual zone boxes reporting to the central control panel, the static pressure setpoint shall be reset based on the zone requiring the most pressure. The setpoint shall be reset lower until one zone damper is wide open.

**Exception:** Systems without zone dampers are exempt from the static pressure reset requirements.

**606.7 Laboratory exhaust systems.** Buildings with laboratory exhaust systems shall comply with the provisions of Section C403.2.8 of the *International Energy Conservation Code* except as specified in Section 606.7.1.

**606.7.1 Laboratory exhaust systems.** Buildings with laboratory exhaust systems having a total exhaust rate greater than 5,000 cfm (2360 L/s) shall be provided with one or more of the following:

1. A variable air volume (VAV) laboratory exhaust and room supply system capable of reducing exhaust and makeup air flow rates to the minimum required in the *International Mechanical Code*.
2. A heat recovery system to precondition makeup air from laboratory exhaust so that the percentage that the exhaust and makeup air flow rates can be reduced from design conditions plus the sensible recovery effectiveness percentage totals not less than 50 percent.
3. Direct makeup auxiliary air supply equal to not less than 75 percent of the exhaust air flow rate capable of being heated and cooled to the design temperatures specified in Section C302.1 of the *International Energy Conservation Code*.

**606.8 Control of HVAC in Group R-1 sleeping rooms.** In Group R-1 occupancies, each sleeping room shall be provided with a dedicated system to control automatically the heating, ventilating and air-conditioning (HVAC) systems to control the energy consumption during unoccupied periods. The controls shall be designed to raise cooling and lower

heating temperature setpoints by at least 4°F (-15.6°C) during periods when the sleeping room is unoccupied.

**Exception:** Automatic controls are not required in Group R-1 occupancies with fewer than 20 sleeping rooms.

## SECTION 607

### BUILDING SERVICE WATER HEATING SYSTEMS

**607.1 Prescriptive compliance.** Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2, service water heating systems shall comply with the provisions of the *International Energy Conservation Code* and the provisions of this section.

**607.2 Service water heating (SWH) equipment performance requirements.** Service water heating equipment shall comply with Sections 607.2.1 and 607.2.2.

**607.2.1 Equipment covered by federal standards.** Equipment covered by federal minimum efficiency standards shall comply with the minimum efficiency requirements of the *International Energy Conservation Code*.

**607.2.2 Water heater controls for dwelling units.** Water heaters installed in dwelling units in buildings shall be equipped with external water temperature thermostat controls.

**607.3 Pools, hot tubs and spas.** Pools, hot tubs and spas shall comply with the efficiency requirements of the *International Energy Conservation Code*.

**607.3.1 Pools in conditioned space.** For pools that are located within a conditioned space, not less than 25 percent of the annual energy consumption of pool operation and not less than 50 percent of the peak design space heating, ventilating, and cooling requirements for the space in which the pool is located shall be by one or both of the following:

1. An onsite renewable energy system.
2. A heat recovery system.

**607.4 Snow melt systems.** Snow melt systems shall not be installed unless 100 percent of the design snow melt peak load demand is supplied by one or both of the following:

1. An onsite renewable energy system.
2. A heat recovery system.

**Exception:** Emergency service ingress and egress are exempt from the requirements of Section 607.4.

**607.5 Drain water heat recovery.** One or more drain water heat recovery units shall be installed in the drain piping system for the indicated plumbing fixtures and appliances in the following building occupancies:

1. Laundry washing machines for laundry services in Group F occupancies.
2. Laundry washing machines that are connected to hot and cold water supplies, for boarding houses, hotels and motels in Group R-1 occupancies.

3. Shared shower facilities and laundry washing machines in Group R-2 occupancies.
4. Laundry washing machines that are connected to hot and cold water supplies, and showers for health clubs and spas in Group A-3 occupancies.

**Exception:** Drain water heat recovery units shall not be required for:

1. Laundry washing machines that are used by guests.
2. Laundry washing machines that are supplied with cold water only provided that space and access are available for adding a drain water heat recovery unit to the drain system in the future.
3. Fixtures and appliances that are located on a concrete slab on grade.
4. Applications where a drain water heat recovery unit cannot increase the incoming water temperature by 36 percent of the temperature difference between the incoming cold water and the drain water.
5. Applications where any portion of a drain water heat recovery unit would be required to be located in a sump below grade.
6. Applications where a drain water heat recovery unit would convey grease-laden waste that requires the installation of a grease or oil separator in accordance with Section 1003 of the *International Plumbing Code*.

Drain water heat recovery units shall comply with CSA B55.2. Potable water-side pressure loss shall be less than 10 psi at maximum design flow. For Group R occupancies, the efficiency of drain water heat recovery units shall be in accordance with CSA B55.1.

**607.6 Buried service hot water piping.** Service hot water piping installed within a slab or below grade shall be insulated in accordance with Section C404.4 of the *International Energy Conservation Code* and shall be placed within a physically protective, waterproof channel or sleeve having internal dimensions large enough so that the piping and insulation can be removed and replaced, and maintain its dimensional integrity during and after construction.

**Exception:** A waterproof conduit shall not be required where the insulation manufacturer provides documentation that stipulates that the pipe insulation will maintain its insulating value indefinitely in underground applications in damp soil and the insulation is installed in accordance with the manufacturer's instructions.

## SECTION 608 BUILDING ELECTRICAL POWER AND LIGHTING SYSTEMS

**608.1 General.** Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2, building electrical power and lighting systems shall comply with the provisions of the *Rhode Island Energy Conservation Code* and the provisions of Section 608. *Occupant sensor controls, time switch controls, and daylight responsive controls* required by this section shall comply with Section C405.2 of the *Rhode Island Energy Conservation Code*. Daylight zones shall be determined in accordance with Section C405.2 of the *Rhode Island Energy Conservation Code*.

**608.1.1 Total percentage of interior lighting with automatic controls** – In addition to meeting the individual lighting control provisions of the code, a minimum of 80% of the interior lighting connected load must be controlled by occupancy and/or daylight controls.

**Exception:** Means of egress and other emergency lighting is not to be included in this calculation.

**608.1.2 Total connected interior lighting power.** The total connected interior lighting power shall be determined in accordance with the methodology utilized in the *Rhode Island Energy Conservation Code*, and must achieve at least a 12% lighting power reduction compared with the lighting power allowances (LPAs) published in that code. *Table 608.1 provides LPAs for many common building area types that are 12% lower than those published in the base code and meet the requirements of this code. For other building areas not included in the table, the design LPA are to be calculated. The lighting power must be calculated with COMcheck or an equivalent tool and included with the code compliance documentation.*

**Exception:** The connected power associated with the following lighting equipment is not included in calculating total connected lighting power:

1. Professional sports arena playing field lighting.
2. Lighting in sleeping units.
3. Emergency lighting automatically off during normal building operation.
4. Lighting in spaces specifically designed for use by occupants with special lighting needs, including those with visual impairment and other medical and age-related issues.
5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
6. Other special purpose lighting as exempted in the *Rhode Island Energy Conservation Code*.

TABLE 608.1  
LIGHTING POWER ALLOWANCE

Building Area Type	LPA (w/ft <sup>2</sup> )	Building Area Type	LPA (w/ft <sup>2</sup> )
Automotive facility	0.70	Multifamily	0.44
Convention center	0.88	Museum	0.89
Courthouse	0.88	Office	0.71
Dining: bar lounge/leisure	0.88	Parking garage	0.18
Dining: cafeteria/fast food	0.78	Penitentiary	0.70
Dining: family	0.83	Performing arts theater	1.21
Dormitory	0.50	Police station	0.76
Exercise center	0.73	Post office	0.76
Fire station	0.58	Religious building	0.87
Gymnasium	0.82	Retail	1.10
Health care clinic	0.78	School/university	0.76
Hospital	0.91	Sports arena	0.79
Hotel/Motel	0.76	Town hall	0.77
Library	1.04	Transportation	0.61
Manufacturing facility	1.02	Warehouse	0.57
Motion picture theater	0.66	Workshop	1.04

**608.2 Sleeping unit controls.** Sleeping units in Group R-1 and R-2 occupancies shall have a master control device that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants have left the room.

**Exception:** Luminaires and switched receptacles controlled by captive key controls.

**608.2.1 Sleeping unit bathroom controls.** Permanently wired luminaires located in bathrooms within sleeping units in Group R-1 and R-2 occupancies shall be equipped with *occupant sensor controls* that require manual intervention to energize circuits (manual on/automatic off.)

**Exception:** Five watts or less of lighting capacity in each bathroom shall not be required to be controlled by the *occupant sensor control* where such lighting is connected to the master control device for the sleeping unit.

**608.3 Interior light reduction controls.** *Occupant sensor controls* shall be provided to reduce connected lighting power automatically by not less than 45 percent during periods when occupants are not present in the following locations:

1. Corridors and enclosed stairwells.
2. Parking garages.

**Exception:** Automatic power reduction is not required for the following:

1. Where *occupant sensor controls* are overridden by *time switch controls* that keep lights on continuously during peak occupancy periods.
2. Means of egress lighting required by the *Building Code* or the *Fire Code*.

**608.4 Exterior lighting controls.** Exterior lighting shall comply with the requirements of Sections 608.4.1 and 608.4.2.

**608.4.1 Exterior light reduction.** Exterior lighting shall be controlled by a time switch and configured so that the total exterior lighting power is automatically reduced by not less than 30 percent within 2 hours after facility operations conclude.

**Exception:** Exterior lighting need not be controlled for the following occupancies and conditions:

1. Group H occupancies.
2. Group I-3 occupancies
3. Lighting that is connected to *occupant sensor controls*.
4. Means of egress lighting required by the *Building Code* or the *Fire Code*.
5. Solar powered luminaires that are not connected to a centralized power source.

**608.4.2 Exterior lighting and signage shutoff.** The lighting of building facades, signage, and landscape features shall be controlled by a *time switch control* configured so that the lighting automatically shuts off from within 1 hour after facility operations conclude until within 1 hour before facility operations begin or as established by the jurisdiction. Where facility operations are continuous, decorative lighting of building facades and landscape features shall automatically shut off from midnight until 6:00 a.m.

**608.5 Daylight responsive controls.** *Daylight responsive controls* shall be provided to control the electric lights within daylight zones in the following spaces:

1. Spaces having a total of more than 90 watts of general lighting within sidelight daylight zones. General lighting does not include lighting that is required to have specific application control in accordance with Section C405.2 of the *International Energy Conservation Code*.
2. Spaces having a total of more than 90 watts of general lighting within toplight daylight zones.

**Exception:** *Daylight responsive controls* are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with Section C405.2 of the *International Energy Conservation Code*.
4. Sidelight daylight zones on the first floor above grade in Group A-2 and Group M occupancies.

**608.6 Plug load controls.** Receptacles and electrical outlets in the following spaces shall be controlled by an occupant sensor or time switch as follows:

1. In office spaces without furniture systems incorporating wired receptacles, not less than one controlled receptacle shall be provided for each 50 square feet (4.65 m<sup>2</sup>).
2. In office spaces with furniture systems incorporating wired receptacles, not less than one controlled circuit shall be provided at each electrical outlet used for powering furniture systems.
3. In classrooms in Group B and Group E occupancies, not less than four controlled receptacles shall be provided in each classroom.
4. In copy rooms, print shops, and computer labs, not less than one controlled receptacle shall be provided for each data jack.
5. In spaces with an overhead cabinet above a counter or work surface, not less than one controlled receptacle shall be provided for each work surface.

**608.6.1 Distribution and marking.** Controlled receptacles and electrical outlets shall be distributed in a reasonably uniform pattern throughout each space. Controlled receptacles shall be marked to differentiate them from uncontrolled receptacles.

**608.6.2 Furniture systems.** Furniture systems incorporating wired receptacles shall include not less than two receptacles at each workstation that are connected to a controlled circuit.

**608.6.3 Computer office equipment.** Computer monitors, plug in space heaters, air purifiers, radios, computer speakers, coffee makers, fans, and task lights located in spaces with controlled receptacles shall be plugged into controlled receptacles.

**608.6.4 Audio and visual systems.** Displays, projectors, and audio amplifiers in Group B and Group E classrooms, conference and meeting rooms, and multipurpose rooms shall be controlled by an occupant sensor.

**608.6.5 Water dispensers.** Water dispensers that utilize energy to cool or heat drinking water shall be controlled by time switch controls.

**608.6.6 Refrigerator and freezer cases.** Lighting integral to vending machines and refrigerator and freezer cases shall be controlled by an occupant sensor or a time switch.

**608.7 Section deleted in Rhode Island.**

**608.8 Section deleted in Rhode Island.**

**608.9 Exterior lighting.** Exterior lighting on building sites shall comply with the lighting power and control requirements of Section C405.6 of the *Rhode Island Energy Conservation Code* regardless of how the power for that lighting is supplied.

**Exception:** Lighting for the following purposes is exempt:

1. Where *approved* because of historical, safety, signage, or emergency lighting considerations.
2. Roadway lighting required by governmental authorities.

**608.10 Main electrical panel rating.** The main electrical service entrance panel for the building shall be listed and labeled as a suitable connection to an onsite renewable energy source.

## SECTION 609

### SPECIFIC APPLIANCES AND EQUIPMENT

**609.1 General.** This section provides requirements for appliances and equipment installed in the building or on the building site. Permanent appliances and equipment shall comply with the provisions of Section 609.2.

**Exception:** Section 609 does not apply to appliances and equipment in compliance with Sections 605 through 608 and those specified in Table 609.1.



**TABLE 609.1  
EXEMPT APPLIANCES AND EQUIPMENT**

RESIDENTIAL PRODUCTS	COMMERCIAL PRODUCTS
Battery chargers	Commercial air conditioners and heat pumps
Boilers	Commercial clothes washers
Ceiling fans and ceiling fanlight kits	Commercial packaged boilers
Central air conditioners and heat pumps	Commercial refrigerators, refrigerators-freezers, and freezers
Clothes dryers	Commercial unit heaters
Clothes washers	Commercial warm air furnaces
Compact fluorescent lamps	Commercial water heaters
Dehumidifiers	Distribution transformers
Direct heating equipment	Electric motors
Dishwashers	HD lamps
External power supplies	Illuminated exit signs
General service fluorescent and incandescent lamps	Metal halide lamp fixtures
Fluorescent lamp ballasts	Refrigerated beverage vending machines
Furnace fans	Small electric motors
Furnaces	Traffic signal and pedestrian modules
Micro-wave ovens	Walk-in coolers and walk-in freezers
Pool heaters	
Ranges and ovens	
Refrigerators, refrigerator-freezers, and freezers	
Room air conditioners	
Torchieres	
Water heaters	

**609.2 Permanent appliances and equipment.** Appliances and equipment that are permanently connected to the building energy supply systems shall comply with the provisions of Sections 609.2.1 through 609.2.4 as applicable. Such appliances and equipment shall be listed and labeled and installed in accordance with the manufacturer’s installation instructions and the provisions and terms of their listing, the *International Building Code*, *International Energy Conservation Code*, *International Fuel Gas Code*, *International Mechanical Code* and *International Plumbing Code*, and shall be provided with controls and energy monitoring systems as required by this code.

**609.2.1 Elevators.** Elevator systems intended for normal occupant use in office buildings and in hotels and multi-story multi-family buildings shall comply with sections 609.2.1.1 through 609.2.1.2.3.

**609.2.1.1 Lighting.** The total lighting in each elevator cab shall be not less than 35 lumens per watt, based on the total lumens from lamps divided by the total wattage of the luminaires in the cab, but not including luminaires of signals and displays.

**609.2.1.2 Power conversion system.** Power conversion systems for traction elevators shall comply with Sections 609.2.1.2.1 through 609.2.1.2.3.

**609.2.1.2.1 Motor.** Induction motors with a Class IE2 efficiency rating, as defined by IEC EN 60034-30, or alternative technologies, such as permanent magnet synchronous motors that have equal or better efficiency, shall be used. Induction electric motors that are covered by U.S. statutory efficiency stand-

ards shall comply with IEC IE2 or IE3 levels of efficiency, depending on the type of induction electric motor.

**609.2.1.2.2 Transmission.** Transmissions shall not reduce the efficiency of the combined motor/transmission below that shown for the Class IE2 motor. Gearless machines shall be assumed to have a 100-percent transmission efficiency.

**609.2.1.2.3 Drive.** Potential energy released during motion shall be recovered.

**609.2.1.3 Ventilation.** Cab ventilation fans shall have an efficacy greater than or equal to 3.0 cfm per watt (0.085 m<sup>3</sup>/min./watt).

**609.2.1.4 Standby mode.** For elevators in all buildings designed to this code, when the elevator is stopped, not occupied, and with doors closed, lighting, ventilation, and cab displays shall be capable of being de-energized within 5 minutes of stopping, and re-energized prior to opening the doors. Power shall cease to be applied to the door motor after the elevator is stopped, lighting is de-energized, and no one is in the cab, and re-energized upon the next passenger arrival. In buildings with multiple elevators serving the same floors, not less than half of the elevators shall be capable of switching to sleep, low-power mode, during periods of low traffic.

**609.2.1.5 Guides.** Elevator car guides shall be of the roller type, in order to reduce frictional energy losses. Counterweights with sliding guides shall be balanced in order to minimize frictional losses associated with the counterweight guides.

**609.2.2 Escalators and moving walkways.** Escalators and moving walkways shall comply with Sections 609.2.2.1 through 609.2.2.4.

**609.2.2.1 Lighting.** Light sources, including, but not limited to, balustrade lighting, comb-plate lighting and step demarcation lighting, shall have an efficacy of not less than 35 lm/W, based on the total lumens from lamps divided by the total wattage of the luminaires provided on the escalator or moving walk.

**609.2.2.2 Drive system.** Induction motors with a class IE3 efficiency rating, as defined by IEC EN 60034-30, or permanent magnet synchronous motors shall be used.

**609.2.2.3 Handrails.** Handrails shall use friction-reducing measures, such as, but not limited to, rollers in newels.

**609.2.2.4 Standby mode.** Escalators and moving walkways shall be capable of being automatically turned off when the building is unoccupied or outside of facility operations. In locations where multiple escalators serve the same passenger load, not less than 50 percent of the escalators shall have the capability of being turned off in response to reduced occupant traffic.

**609.2.3 Commercial food service equipment.** Not less than 50 percent of the commercial food service equipment installed shall comply with energy efficiency and water use as identified in Table 609.2.3, based on aggregate energy input rating.

**609.2.4 Conveyors.** Motors associated with conveyors shall be sized to meet the expected load and designed to run within 90 percent of capacity at all times the conveyor

is expected to operate. Conveyor motors shall be provided with sleep mode controls. Two-speed motors and adjustable-speed drives shall be provided where load weights are expected to vary. Readily accessible controls shall be provided to allow for manual shut off of the conveyor when the conveyor is not needed. Conveyor systems shall be designed to use gravity feed where conditions allow and arranged so that long straight runs are provided with as few drives as possible.

**TABLE 609.2.3  
COMMERCIAL FOOD SERVICE EQUIPMENT—ENERGY-EFFICIENCY AND WATER USE REQUIREMENTS**

APPLIANCE TYPE	ENERGY-EFFICIENCY REQUIREMENTS	MAXIMUM WATER USE
<b>Combination Oven/Steamer</b>		
Electric <sup>a</sup>	N/A	3.5 gal/hr/pan
Gas <sup>a</sup>	N/A	3.5 gal/hr/pan
<b>Dishwashers</b>		
Door type, high temp <sup>b</sup>	idle rate ≤ 0.7 kW	0.95 gal/rack
Door type, low temp <sup>b</sup>	idle rate ≤ 0.6 kW	1.18 gal/rack
Multiple tank conveyor, high temp <sup>c</sup>	idle rate ≤ 2.0 kW	0.54 gal/rack
Multiple tank conveyor, low temp <sup>c</sup>	idle rate ≤ 2.0 kW	0.54 gal/rack
Pot pan and utensil <sup>d</sup>	N/A	2.2 gal/rack
Rackless conveyor <sup>d</sup>	N/A	2.2 gallons/minute
Single tank conveyor, high temp <sup>c</sup>	idle rate ≤ 1.5 kW	0.7 gal/rack
Single tank conveyor, low temp <sup>c</sup>	idle rate ≤ 1.5 kW	0.79 gal/rack
Under counter, high temp <sup>b</sup>	idle rate ≤ 0.5 kW	1.0 gal/rack
Under counter, low temp <sup>b</sup>	idle rate ≤ 0.5 kW	1.7 gal/rack
<b>Freezers</b>		
Chest <sup>e</sup>	daily energy ≤ 0.270V + 0.130 kWh/day	N/A
Reach-in, solid door, 0 ≤ V < 15 ft <sup>3</sup> <sup>e</sup>	daily energy ≤ 0.250V + 1.250 kWh/day	N/A
Reach-in, solid door, 15 ≤ V < 30 ft <sup>3</sup> <sup>e</sup>	daily energy ≤ 0.4V – 1.000 kWh/day	N/A
Reach-in, solid door, 30 ≤ V < 50 ft <sup>3</sup> <sup>e</sup>	daily energy ≤ 0.163V + 6.125 kWh/day	N/A
Reach-in, solid door, 50 ≤ V ft <sup>3</sup> <sup>e</sup>	daily energy ≤ 0.158V + 6.333 kWh/day	N/A
Reach-in, transparent door, 0 ≤ V < 15 ft <sup>3</sup> <sup>e</sup>	daily energy ≤ 0.607V + 0.893 kWh/day	N/A
Reach-in, transparent door, 15 ≤ V < 30 ft <sup>3</sup> <sup>e</sup>	daily energy ≤ 0.733V – 1.000 kWh/day	N/A
Reach-in, transparent door, 30 ≤ V < 50 ft <sup>3</sup> <sup>e</sup>	daily energy ≤ 0.250V + 13.50 kWh/day	N/A
Reach-in, transparent door, 50 ≤ V ft <sup>3</sup> <sup>e</sup>	daily energy ≤ 0.450V + 3.50 kWh/day	N/A
<b>Fryers</b>		
Deep fat, electric <sup>f</sup>	efficiency ≥ 50% and idle rate ≤ 9000 Btu/h	N/A
Deep fat, gas <sup>f</sup>	efficiency ≥ 80% and idle rate ≤ 1.0 kW	N/A
Large vat, electric <sup>g</sup>	efficiency ≥ 80% and idle rate ≤ 1.1 kW	N/A
Large vat, gas <sup>g</sup>	efficiency ≥ 50% and idle rate ≤ 12000 Btu/h	N/A
<b>Griddles</b>		
Double-sided, electric <sup>h</sup>	efficiency ≥ 70% and idle rate ≤ 355 W/sq. ft.	N/A
Double-sided, gas <sup>h</sup>	efficiency ≥ 38% and idle rate ≤ 2650 Btu/h/sq. ft.	N/A
Single-sided, electric <sup>i</sup>	efficiency ≥ 70% and idle rate ≤ 355 W/sq. ft.	N/A
Single-sided, gas <sup>i</sup>	efficiency ≥ 38% and idle rate ≤ 2650 Btu/h/sq. ft.	N/A
<b>Hot Food Holding Cabinets</b>		
13 ≤ V ≤ 28 ft <sup>3</sup> <sup>j</sup>	idle rate ≤ 2V + 254 Watts	N/A
V < 13 ft <sup>3</sup> <sup>j</sup>	idle rate ≤ 21.5V Watts	N/A
V > 28 ft <sup>3</sup> <sup>j</sup>	idle rate ≤ 3.8V + 203.5 Watts	N/A

**TABLE 609.2.3—CONTINUED  
COMMERCIAL FOOD SERVICE EQUIPMENT—ENERGY-EFFICIENCY AND WATER USE REQUIREMENTS**

APPLIANCE TYPE	ENERGY-EFFICIENCY REQUIREMENTS	MAXIMUM WATER USE
<b>Ice Machines</b>		
Ice making head, H > 450 lb/day <sup>k</sup>	energy ≤ 6.20 – 0.0010H kWh/100 lb ice	25 gal/100 lb ice
Ice making head, H < 450 lb/day <sup>k</sup>	energy ≤ 9.23 – 0.0077H kWh/100 lb ice	25 gal/100 lb ice
Remote condensing unit w/o remote compressor, H < 1000 lb/day <sup>k</sup>	energy ≤ 8.05 – 0.0035H kWh/100 lb ice	25 gal/100 lb ice
Remote condensing unit w/o remote compressor, H > 1000 lb/day <sup>k</sup>	energy ≤ 4.64 kWh/100 lb ice	25 gal/100 lb ice
Remote condensing unit with remote compressor, H < 934 lb/day <sup>k</sup>	energy ≤ 8.05 – 0.0035H kWh/100 lb ice	25 gal/100 lb ice
Remote condensing unit with remote compressor, H > 934 lb/day <sup>k</sup>	energy ≤ 4.82 kWh/100 lb ice	25 gal/100 lb ice
Self-contained unit, H < 175 lb/day <sup>k</sup>	energy ≤ 16.7 – 0.0436H kWh/100 lb ice	35 gal/100 lb ice
Self-contained unit, H > 175 lb/day <sup>k</sup>	energy ≤ 9.11 kWh/100 lb ice	35 gal/100 lb ice
<b>Convection Ovens</b>		
Full-size electric <sup>l</sup>	efficiency ≥ 70% and idle rate ≤ 1.6 kW	0.25 gals/hr
Full-size gas <sup>l</sup>	efficiency ≥ 44% and idle rate ≤ 13000 Btu/h	0.25 gals/hr
Half-size electric <sup>l</sup>	efficiency ≥ 70% and idle rate ≤ 1.0 kW	0.25 gals/hr
<b>Refrigerators</b>		
Chest <sup>e</sup>	daily energy ≤ 0.125V + 0.475 kWh/day	N/A
Reach-in, solid door, 0 ≤ V < 15 ft <sup>3 e</sup>	daily energy ≤ 0.089V + 1.411 kWh/day	N/A
Reach-in, solid door, 15 ≤ V < 30 ft <sup>3 e</sup>	daily energy ≤ 0.037V + 2.200 kWh/day	N/A
Reach-in, solid door, 30 ≤ V < 50 ft <sup>3 e</sup>	daily energy ≤ 0.056V + 1.635 kWh/day	N/A
Reach-in, solid door, 50 ≤ V ft <sup>3 e</sup>	daily energy ≤ 0.06V + 1.416 kWh/day	N/A
Reach-in, transparent door, 0 ≤ V < 15 ft <sup>3 e</sup>	daily energy ≤ 0.118V + 1.382 kWh/day	N/A
Reach-in, transparent door, 15 ≤ V < 30 ft <sup>3 e</sup>	daily energy ≤ 0.140V + 1.050 kWh/day	N/A
Reach-in, transparent door, 30 ≤ V < 50 ft <sup>3 e</sup>	daily energy ≤ 0.088V + 2.625 kWh/day	N/A
Reach-in, transparent door, 50 ≤ V ft <sup>3 e</sup>	daily energy ≤ 0.110V + 1.500 kWh/day	N/A
<b>Steam Cookers</b>		
With drain connection, electric <sup>m</sup>	N/A	5 gal/hour/pan
With drain connection, gas <sup>m</sup>	N/A	5 gal/hour/pan
No drain connection, electric <sup>m</sup>	efficiency ≥ 50% and idle rate ≤ 135W/pan	2 gal/hour/pan
No drain connection, gas <sup>m</sup>	efficiency ≥ 38% and idle rate ≤ 2100 Btu/h/pan	2 gal/hour/pan
Water-cooled refrigeration equipment	Not allowed unless on a closed-loop system or cooling tower	—

For SI: °C = [°F - 32]/1.8, 1 Btu/h = 0.29 W.

- a. Maximum water use as determined by ASTM F2861.
- b. Idle rate as determined by ASTM F1696 and water use as determined by ANSI/NSF 3.
- c. Idle rate as determined by ASTM F1920 and water use as determined by ANSI/NSF 3.
- d. Water use as determined by ANSI/NSF 3.
- e. Daily energy use as determined by ANSI/ASHRAE Standard 72 with temperature setpoints at 38°F for medium-temp refrigerators, 0°F for low-temp freezers, and -15°F for ice cream freezers.
- f. Heavy-load cooking-energy efficiency and idle rate as determined by ASTM F1361.
- g. Heavy-load (French fry) cooking-energy efficiency and idle rate as determined by ASTM F2144. h. Heavy-load cooking-energy efficiency and idle rate as determined by ASTM F1605.
- i. Heavy-load cooking-energy efficiency and idle rate as determined by ASTM F1275. j. Idle rate as determined by ASTM F2140.
- k. Energy and water use as determined by AHRI 810.
- l. Heavy-load (potato) cooking-energy efficiency and idle rate as determined by ASTM F1496.
- m. Heavy-load (potato) cooking-energy efficiency and idle rate as determined by ASTM F1484.

## SECTION 610 ONSITE RENEWABLE ENERGY SYSTEMS

**610.1 Onsite renewable energy systems.** Each building or its associated building site shall be equipped with any combination of onsite renewable energy systems in accordance with one of the following:

1. Provide not less than 0.50 watts per square foot (5.4 W/m<sup>2</sup>) of conditioned floor area of the building.
2. Provide not less than 3 percent of the energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4[CE] of the *International Energy Conservation Code*.

Installation, inspection, maintenance, repair and replacement of onsite renewable energy systems shall comply with manufacturer's instructions, the *International Building Code*, the *International Fire Code* and NFPA 70. Onsite renewable energy systems shall be tested after installation to verify that the installed performance meets design specifications. A report of the tested performance shall be provided to the building owner and the building official. Onsite renewable energy systems shall be individually metered in accordance with Section 603.3.7

### Exceptions:

1. For buildings where the registered design professional certifies that the incident solar radiation available to the building or its associated building site is not sufficient to meet the requirements of Section 610.1 and where the owner shall contract for no less than 87 kWh Renewable Energy Credits per square foot of conditioned floor area. The Renewable Energy Credits shall comply with Section 610.2.
2. Building occupancies listed below, where at least 10 percent of the building's total annual estimated hot water consumption is met with any combination of onsite renewable energy systems designed, constructed and installed in accordance with the manufacturer's instructions.
  - 2.1. Group A-2, restaurants and banquet halls.
  - 2.2. Group F, laundries.
  - 2.3. Group R-1, boarding houses, hotels, motels.
  - 2.4. Group R-2 occupancies.
  - 2.5. Group A-3, health clubs and spas.
  - 2.6. Group I-2, hospitals, psychiatric hospitals and nursing homes.
3. Buildings where at least 10 percent of the building's total annual estimated space heating or space cooling is met by any combination of onsite renewable energy systems designed, constructed and installed in accordance with the manufacturer's instructions.

**610.2 Renewable energy credit (REC).** A renewable energy credit (REC) shall comply with all of the following:

1. Be from a renewable electricity generation facility that began operation or was repowered not earlier than 15 years prior to the date of the purchase, and represent the renewable and environmental attributes of electricity generated at that facility,
2. Not be derived from a renewable electricity generation facility that has been mandated by a local, state or federal government agency or was required under any legal requirement.
3. Not be simultaneously used to meet a local, state or federal energy mandate or other legal requirement
4. Not represent renewable energy, renewable attributes or environmental attributes that can be legitimately claimed by another party.

## SECTION 611 ENERGY SYSTEMS COMPLETION

**611.1 Systems completion requirements.** Prior to passing the final inspection, the registered design professional or approved agency shall provide to the code official evidence to the code official that installation and commissioning of systems have been completed, and that commissioned building systems have been installed in accordance with the provisions of **Chapter 9; COMMISSIONING, INSPECTIONS, OPERATION AND MAINTENANCE.**

**611.2 Commissioning plan.** A commissioning plan shall be developed for the systems specified in the construction documents to be commissioned by a registered design professional or approved agency and shall be assembled in accordance with Section 903.3.

**611.3 Functional and performance testing.** Functional and performance testing shall be performed in accordance with the requirements of Sections 611.3.1, 611.3.2 and 611.3.3.

**611.3.1 Equipment.** Equipment functional and performance testing shall demonstrate that the installation and operation of components, systems, and system-to-system interfacing relationships is in accordance with approved plans and specifications so that operation, function, performance and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all

specified modes of control and sequence of operation, including under full-load, part-load and all of the following emergency conditions:

1. Each mode as described in the sequence of operation.
2. Redundant or automatic backup mode.
3. Performance of alarms.
4. Mode of operation upon a loss of power and restoration of power.

**611.3.2 Controls.** Control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operated in accordance with the *approved* plans and specifications.

**611.3.3 Sequence of operation.** The sequence of operation shall be verified to document that the sequence operates in accordance with the *approved* plans and specifications. This verified sequence of operation shall be the final record of system operation, and shall be included on the control “record documents,” and as part of the education and Systems Manual operation and maintenance document that is provided to the owner.

**611.3.4 Mechanical systems adjusting and balancing.** HVAC systems shall be tested, adjusted and balanced in accordance with generally accepted standards, as approved. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the construction documents. Test and balance activities shall include the provisions of Section C408.2.2 of the International Energy Conservation Code except that the exceptions to Section C408.2.2 shall not apply. A written report describing the test and balance activities and measurements completed shall be provided with the final Systems Manual.

*Note: All energy system completion and commissioning tables are located in Chapter 9.*

pathway, compliance with the Rhode Island Energy Conservation Code must be demonstrated using one of the approved prescriptive or performance methodologies.

**612.1 Outcome-based requirements.** Compliance for buildings and their sites to be designed on an outcome basis shall be determined by actual measurement of all energy being used once the building and the energy using elements associated with the building site are in full operation in accordance with Equation 6-6. Where a building has multiple occupancy types, the maximum allowable energy use shall be based on total gross floor area of each occupancy type in relation to the total gross floor area of all occupancy types within the building. Buildings and building sites complying with this section shall also comply with the *Rhode Island Energy Conservation Code*. Compliance with this stretch code shall be based on a determination of actual energy use in accordance with this section.

**Exception:** Buildings having one or more uses or occupancies not listed in Table 612.1 or where a mixed use building in accordance with the *Rhode Island Building Code* includes any occupancies not shown in Table 612.1, shall not be eligible to demonstrate compliance with this code in accordance with Section 612.

**612.1.1 zEPI.** All outcome-based designs shall demonstrate a zEPI of not more than 46 as determined in accordance with Equation 6-6.

$$zEPI = 100 (EUI_a / EUI_r) \tag{Equation 6-6}$$

where:

EUI<sub>a</sub> = the Actual Annual Energy Use Index for the building and building site expressed in accordance with Section 612.1.2 and Equation 6-7.

EUI<sub>r</sub> = the Reference Annual Energy Use Index for the building use and occupancy in Table 612.1 as adjusted by Section 612.1.3 where applicable.

**SECTION 612  
OPTIONAL OUTCOME-BASED PATHWAY  
REQUIREMENTS**

The outcome-based pathway is an optional pathway for demonstrating compliance with this code. When using this

**TABLE 612.1  
REFERENCE ANNUAL ENERGY USE INDEX (EUI<sub>R</sub>)**

CLIMATE ZONE	1A	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	6A	6B	7	8
Use and Occupancy <sup>a</sup>	Reference EUI <sub>r</sub> : skBtu/sf/yr														
<b>Business (B)</b>															
Office	154	159	154	151	140	137	167	144	152	179	155	190	176	208	282
Bank	154	159	154	151	140	137	167	144	152	179	155	190	176	208	282
Medical office (non-diagnostic)	115	118	115	113	104	102	125	108	114	134	116	148	131	156	210
<b>Storage (S-2)</b>															
Distribution/Shipping Center	105	67	69	66	64	55	75	70	66	87	81	104	95	119	186
<b>Mercantile (M)</b>															
Grocery/Food Store	448	476	452	484	450	473	522	479	514	554	511	592	561	633	758
<b>Assembly (A)</b>															

Library (A-3)	234	232	224	230	217	209	254	228	235	275	246	304	277	327	434
Educational (E)															
Elementary/Middle School	140	139	134	134	128	124	149	132	132	160	141	182	161	193	274
Institutional (I-2)															
Hospital/Inpatient Health	417	422	397	408	388	407	425	366	398	425	374	439	394	446	532

a. Use and occupancy as determined by Chapter 3 of the *International Building Code*.

**612.1.2 Actual energy use intensity (EUI<sub>a</sub>).** The actual energy use intensity (EUI<sub>a</sub>) of the *building* and *building site* shall be expressed in accordance with this section. Onsite renewable energy generation in excess of the generation requirements of Section 610 shall be included in the calculation of the EUI<sub>a</sub>.

The EUI<sub>a</sub> shall be determined in accordance with Equation 6-7 and Sections 612.1.2.1.

$$EUI_a = (AEU_{consumption} - AEU_{renewable}) / TCFA$$

**(Equation 6-7)**

where: EUI<sub>a</sub> = the energy use intensity of the *building* and *building site*.

AEU<sub>consumption</sub> = the annual energy consumed by the building and building site from all forms of energy specified in Sections 603.3.1 through 603.3.6 and converted to source Btus in accordance with Section 602.2.1.2.

AEU<sub>renewable</sub> = the annual energy produced by *onsite renewable energy systems* in excess of the production required by Section 610 and converted to source Btus by multiplying onsite Btu production by a factor of 1.

TCFA = the total *conditioned floor area* of the building.

**612.1.2.1 Measurement of AEU.** The AEU shall be determined from metering, utility billing or other form of measurement in accordance with Section 603.

**612.1.3 Reference energy use intensity (EUI<sub>r</sub>).** The reference energy use intensity shall be determined utilizing Table 612.1. The EUI<sub>r</sub> value from Table 612.1 shall be adjusted based on the monthly weighted average percentage of occupied floor area during the 12-month compliance period as documented in accordance with Section 612.3.2. For buildings with multiple use or occupancy designations in Table 612.1, the EUI<sub>r</sub> shall be adjusted based on the weighted area average of the use or occupancy.

**612.2 Annual direct and indirect CO<sub>2</sub>e emissions.** The emissions associated with the EUI<sub>a</sub> shall be less than or equal to the CO<sub>2</sub>e emissions associated with the CO<sub>2</sub>e emissions in accordance with the EUI<sub>r</sub> determined in Section 612.1.3. The CO<sub>2</sub>e emissions calculations for the building and building site shall be determined in accordance with Sections 612.2.1 and 612.2.2 and Equation 6-8.

**(Equation 6-8)**

$$CO_2e_a \leq (CO_2e_r \times zEPI) / 100$$

where:

zEPI = the minimum score as prescribed by Section 612.1.1.  
CO<sub>2</sub>e<sub>a</sub> = emissions associated with the EUI<sub>a</sub> of the building as determined in accordance with Section 612.1.2.

CO<sub>2</sub>e<sub>r</sub> = emissions associated with the EUI<sub>r</sub> as determined in accordance with Section 612.1.3 where the EUI<sub>r</sub> is apportioned with the same distribution of fuel types as measured in the EUI<sub>a</sub>.

**612.2.1 Onsite electricity.** For the purpose of determining compliance with the provisions of Section 612.2, the CO<sub>2</sub>e emissions associated with onsite electricity use shall be calculated in accordance with Section 602.3.1.

**612.2.2 Onsite nonrenewable energy.** For the purpose of determining compliance with the provisions of Section 612.2, the CO<sub>2</sub>e emissions associated with onsite nonrenewable energy use shall be calculated in accordance with Section 602.3.2.

**612.3 Compliance.** Compliance with Section 612 shall be determined in accordance with Sections 612.3.1 through 612.3.3.

**612.3.1 Section deleted in Rhode Island.**

**612.3.2 Reporting of energy use and CO<sub>2</sub>e emissions.** Within 36 months of full building occupancy, the building owner shall provide the *code official* with documentation, in a form acceptable to the code official and certified by a *registered design professional*, of a continuous 12-month period where the building complies with Sections 612.1 and 612.2. The occupancy or use type for the occupied period utilized in Section 612.1.3 shall be indicated in the documentation and include the time periods and square footage of the building occupied by all building tenants.

**612.3.3 Section deleted in Rhode Island.**

## CHAPTER 7

# WATER RESOURCE CONSERVATION, QUALITY AND EFFICIENCY

### SECTION 701 GENERAL

**701.1 Scope.** The provisions of this chapter shall establish the means of conserving water, protecting water quality and providing for safe water consumption.

**\*\* 701.2 Water usage metering required.** Water consumed from any source associated with the building or building site shall be metered. Each potable and reclaimed source of water, and each onsite non-potable water source, shall be metered separately. Meters shall be installed in accordance with the requirements of the *International Plumbing Code*. For the purposes of Section 701.2.1, each meter identified in Table 701.2.1 shall be capable of communicating water consumption data remotely and at a minimum, be capable of providing daily data with electronic data storage and reporting capability that can produce reports that show daily, monthly, and annual water consumption.

**\*\* Exception:** Fire sprinkler systems installed in accordance with Section 903.3 of the *International Fire Code* shall not be required to be metered.

**\*\* 701.2.1 Individual metering required.** A minimum of two of the systems listed in Table 701.2.1. shall be individually metered for water usage in accordance with the requirements listed in table.701.2.1. Similar appliances and

equipment shall be permitted to be grouped and supplied from piping connected to a single meter.

**Exception:** In Group I-2 occupancies and ambulatory care facilities, water used for patient treatment or to support patient care shall not be required to be individually metered.

### SECTION 702 FIXTURES, FITTINGS, EQUIPMENT AND APPLIANCES

**702.1 Fitting and fixture consumption.** Fixtures shall comply with Table 702.1 and the following:

1. For dwelling unit and guestroom shower compartments with a floor area of not greater than 2600 in<sup>2</sup> (1.7 m<sup>2</sup>), the combined flow rate from shower water outlets that are capable of operating simultaneously including rain systems, waterfalls, body sprays and jets shall not exceed 2.0 gallons per minute (gpm) (7.6 L/min). Where the floor area of such shower compartments is greater than 2600 in<sup>2</sup> (1.7 m<sup>2</sup>), the combined flow rate from simultaneously operating shower water outlets shall not exceed 2.0 gpm (7.6 L/min) for each additional 2600 in<sup>2</sup> (1.7 m<sup>2</sup>) of floor area or portion thereof.

**TABLE 701.2.1  
METERING REQUIREMENTS**

\*\*

<b>Irrigation.</b>	Meter water systems serving at least 80% of the irrigated landscaped area. Calculate the percentage of irrigated landscape area served as the total metered irrigated landscape area divided by the total irrigated landscape area. Landscape areas fully covered with xeriscaping or native vegetation that requires no routine irrigation may be excluded from the calculation.
<b>Indoor plumbing fixtures and fittings.</b>	Meter water systems serving at least 80% of the indoor fixtures and fitting described in WE Prerequisite Indoor Water Use Reduction, either directly or by deducting all other measured water use from the measured total water consumption of the building and grounds.
<b>Domestic hot water.</b>	Meter water use of at least 80% of the installed domestic hot water heating capacity (including both tanks and on-demand heaters).
<b>Boiler</b>	Boiler with aggregate projected annual water use of 100,000 gallons (378 500 liters) or more, or boiler of more than 500,000 BtuH (150 kW). A single makeup meter may record flows for multiple boilers.
<b>Reclaimed water</b>	Meter reclaimed water, regardless of rate. A reclaimed water system with a makeup water connection must also be metered so that the true reclaimed water component can be determined.
<b>Other process water</b>	Meter at least 80% of expected daily water consumption for process end uses, such as humidification systems, dishwashers, clothes washers, pools, and other subsystems using process water.

2. In gang shower rooms, the combined flow rate from shower water outlets that are capable of operating simultaneously, including rain systems, waterfalls, body sprays and jets, shall not exceed 2.0 gpm (7.6 L/min) for every 1600 in<sup>2</sup> (1.01 m<sup>2</sup>) or portion thereof of room floor area.
3. In shower compartments required to comply with the requirements of Chapter 11 of the *International Building Code*, the combined flow rate from shower water outlets that are capable of operating simultaneously, including rain systems, waterfalls, body sprays and jets, shall not exceed 4.0 gpm (15.1 L/min) for every 2600 in<sup>2</sup> (1.7 m<sup>2</sup>) or portion thereof of room floor area.

**TABLE 702.1  
MAXIMUM FIXTURE AND FITTING FLOW RATES FOR  
REDUCED WATER CONSUMPTION<sup>f,g</sup>**

FIXTURE OR FIXTURE FITTING TYPE	MAXIMUM FLOW RATE
Showerhead <sup>a</sup>	2.0 gpm at 80 psi and WaterSense labeled
Lavatory faucet and bar sink—private	1.5 gpm at 60 psi
Lavatory faucet—public (metered)	0.25 gpc <sup>b</sup>
Lavatory faucet—public (nonmetered)	0.5 gpm at 60 psi
Kitchen faucet—private	1.8 gpm at 60 psi
Kitchen and bar sink faucets in other than dwelling units and guestrooms	2.2 gpm at 60 psi
Urinal	0.5 gpf and WaterSense labeled or nonwater urinal
Water closet—public and remote <sup>c</sup>	1.6 gpf
Water closet—public and nonremote	1.28 gpf average <sup>d,e</sup>
Water closet—tank type, private	1.28 gpf and WaterSense labeled <sup>d</sup>
Water closet—flushometer type, pri-	1.28 gpc <sup>e</sup>
Prerinse spray valves	1.3 gpm and WaterSense labeled
Drinking fountains (manual)	0.7 gpm
Drinking fountains (metered)	0.25 gpc <sup>b</sup>

For SI: 1 foot = 304.8 mm, 1 gallon per cycle (gpc) = 3.8 Lpc, 1 gallon per flush (gpf) = 3.8 Lpf, 1 gallon per minute (gpm) = 3.8 Lpm, 1 pound per square inch = 6.895 kPa.

- a. Includes hand showers, body sprays, rainfall panels and jets. Showerheads shall be supplied by automatic compensating valves that comply with ASSE 1016/ASME A112.1016/CSA B125.16 and that are specifically designed to function at the flow rate of the showerheads being used.
- b. Gallons per cycle of water volume discharged from each activation of a metered faucet.
- c. A remote water closet is a water closet located not less than 30 feet upstream of other drain line connections or fixtures and is located where less than 1.5 drainage fixture units are upstream of the drain line connection.
- d. The effective flush volume for a dual-flush water closet is defined as the composite, average flush volume of two reduced flushes and one full flush.
- e. In public settings, the maximum water use of a dual flush water closet is based solely on its full flush operation; not an average of full and reduced volume flushes.
- f. Water dispensers associated with drinking fountains shall not have limitations for flow rate.
- g. Where a faucet has a pot filler mode, the flow shall not exceed 22 gpm

at 60 psi. Such faucets shall automatically return to the flow rate indicated in the table when the pot filler mode activation mechanism is released or when the faucet flow is turned off.

**702.2 Combination tub and shower valves.** Tub spout leakage from combination tub and shower valves that occurs when the outlet flow is diverted to the shower shall not exceed 0.1 gpm, measured in accordance with the requirements of ASME A112.18.1/CSA B125.1.

**702.3 Food establishment prerinse spray valves.** Food establishment prerinse spray valves shall have a maximum flow rate in accordance with Table 702.1 and shall shut off automatically when released.

**702.4 Drinking fountain controls.** Drinking fountains equipped with manually controlled valves shall shut off automatically upon release of the valve. Metered drinking fountains shall comply with the flow volume specified in Table 702.1.

**702.5 Appliances.** Sections 702.5.1 through 702.5.4 shall regulate appliances that are not related to space conditioning.

**Exception.** Appliances meeting the energy efficiency requirements in Chapter 6 of this code are deemed to meet these requirements by default.

**702.5.1 Clothes washers.** Clothes washers of the type in the ENERGY STAR program as defined in “ENERGY STAR® Program Requirements, Product Specification for Clothes Washers, Eligibility Criteria,” shall have a water factor (WF) not exceeding 6.0 and a *modified energy factor* (MEF) of not less than 2.0.

**702.5.2 Ice makers.** Ice makers shall not be water cooled. Ice makers producing cubed-type ice shall be ENERGY STAR qualified as commercial ice machines. Ice makers of a type not currently ENERGY STAR qualified, such as flake, nugget or continuous-type ice makers, shall not exceed the total water use of 25 gallons per 100 pounds (94 L per 45 kg) of ice produced.

**702.5.3 Steam cookers.** Steam cookers shall consume not more than the amounts indicated in Table 609.2.3.

**702.5.4 Dishwashers.** Dishwashers shall be ENERGY STAR qualified where an ENERGY STAR category exists for the specific dishwasher type. Where an ENERGY STAR category does not exist, the dishwasher shall be in accordance with Table 702.5.4.

**TABLE 702.5.4  
MAXIMUM WATER CONSUMPTION FOR COMMERCIAL  
DISHWASHERS**

DISHWASHER TYPE	MAXIMUM WATER CONSUMPTION
Rackless conveyor	2.2 gallons per minute
Utensil washer	2.2 gallons per rack

For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 Lpm.

**702.6 Section deleted in Rhode Island.**

**702.7 Hot and tempered water distribution.** Water supply piping shall be in accordance with Section 702.7.1 or Section 702.7.2. The flow rate through ¼-inch (6.4 mm) tubing shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16-inch



(7.9 mm) tubing shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8-inch (9.5 mm) tubing shall not exceed 1.5 gpm (5.7 Lpm).

**702.7.1 Maximum allowable pipe length method.** The maximum allowable pipe length from the source of hot or tempered water to the termination of the fixture supply pipe shall be in accordance with the maximum pipe length columns in Tables 702.7.2(2) through 702.7.2(10), as appropriate for the type of pipe to be installed. Where the type of pipe to be installed is unknown or the type of pipe is not covered by Tables 702.7.2(2) through 702.7.2(10), Table 702.7.2(1) shall be used for design purposes. Where the length contains more than one size of pipe, the largest size shall be used for determining the maximum allowable length of the pipe in the tables.

**702.7.2 Maximum allowable pipe volume method.** The water volume in the piping shall be calculated in accordance with Section 702.7.2.1. The maximum volume of hot or tempered water in the piping to public lavatory faucets, metering or nonmetering, shall be 2 ounces (0.06 L). For fixtures other than public lavatory faucets, the maximum volume shall be 64 ounces (1.89 L) for hot or tempered water from a water heater or boiler; and 24 ounces (0.7 L) for hot or tempered water from a circulation loop pipe or an electrically heat-traced pipe. The water volume in the piping shall be calculated in accordance with Section 702.7.2.1.

**702.7.2.1 Water volume determination.** The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the source of hot water and the termination of the fixture supply pipe. The volume shall be determined from the liquid ounces per foot column of Tables 702.7.2(2) through 702.7.2(10) as appropriate for the type of pipe. Where the type of pipe is unknown or the type of pipe is not covered by Tables 702.7.2(2) through 702.7.2(10), Table 702.7.2(1) shall be used to determine the volume. The volume contained

within fixture shutoff valves, flexible water supply connectors to a fixture fitting, or within a fixture fitting shall not be included in the water volume determination. Where hot or tempered water is supplied by a circulation loop pipe or an electrically heat-traced pipe, the volume shall include the portion of the fitting on the source pipe that supplies water to the fixture.

**702.8 Trap priming water.** Potable water shall not be used for trap priming purposes where an alternate nonpotable on-site water distribution system, a reclaimed water distribution system or a gray water distribution system is available.

**702.8.1 Continuous operation prohibited.** Trap primers that allow continuous water flow shall be prohibited.

**702.8.2 Volume limitation.** Trap primers shall be of the type that use not more than 30 gallons (114 L) per year per trap.

**702.8.3 Water criteria.** Where nonpotable water is available and is already being used to supply plumbing fixtures, such water shall be used to supply trap primers.

**702.9 Water-powered pumps.** Water-powered pumps shall not be used as the primary means of removing ground water from sumps. Where used as an emergency backup pump for the primary pump, the primary pump shall be an electrically powered pump and the water-powered pump shall be equipped with an auditory alarm that indicates when the water-powered pump is operating. The alarm shall have a minimum sound pressure level rating of 85 dB measured at a distance of 10 feet (3048 mm). Where water-powered pumps are used, they shall have a water-efficiency factor of pumping not less than 2 gallons (7.6 L) of water to a height of 8 feet (2438 mm) for every 1 gallon (3.8 L) of water used to operate the pump, measured at a water pressure of 60 psi (413.7 kPa). Pumps shall be clearly marked as the gallons (liters) of water pumped per gallon (liters) of potable water consumed.

**TABLE 702.7.2(1)  
VOLUME AND MAXIMUM LENGTH OF PIPE OR TUBE OF A TYPE UNKNOWN OR NOT COVERED<sup>b</sup>**

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM PIPE OR TUBE LENGTH		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
1/4 <sup>a</sup>	0.33	50	16	6
5/16 <sup>a</sup>	0.5	50	16	4
3/8 <sup>a</sup>	0.75	50	16	3
1/2	1.5	43	16	2
5/8	2	32	12	1
3/4	3	21	8	0.5
7/8	4	16	6	0.5
1	5	13	5	0.5
1¼	8	8	3	0.5
1½	11	6	2	0.5
2 or larger	18	4	1	0.5

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. The flow rate for 1/4-inch size pipe or tube is limited to 0.5 gpm; for 5/16-inch size, it is limited to 1 gpm; for 3/8-inch size, it is limited to 1.5 gpm.

b. Not covered means pipe or tube types not covered by Tables 702.7.2(2) through 702.7.2(10).

**TABLE 702.7.2(2)  
VOLUME AND MAXIMUM LENGTH OF TYPE K COPPER TUBING**

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM TUBE LENGTH		
		System without a circulation loop or heat-traced line (feet)	System with a heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
3/8 <sup>a</sup>	0.84	44.6	14.3	2.7
1/2	1.45	44.5	16.6	2.1
3/4	2.90	21.7	8.3	0.5
1	5.17	12.6	4.8	0.5
1¼	8.09	7.9	3.0	0.5
1½	11.45	5.8	1.9	0.5
2 or larger	20.04	3.6	0.9	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. The flow rate for 3/8-inch size is limited to 1.5 gallons per minute.

**TABLE 702.7.2(3)  
VOLUME AND MAXIMUM LENGTH OF TYPE L COPPER TUBING**

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM TUBE LENGTH		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
3/8 <sup>a</sup>	0.97	38.7	12.4	2.3
1/2	1.55	41.6	15.5	1.9
3/4	3.22	19.6	7.5	0.5
1	5.49	11.8	4.6	0.5
1¼	8.38	7.6	2.9	0.5
1½	11.83	5.6	1.9	0.5
2 or larger	20.58	3.5	0.9	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. The flow rate for 3/8-inch size is limited to 1.5 gallons per minute.

**TABLE 702.7.2(4)  
VOLUME AND MAXIMUM LENGTH OF TYPE M COPPER TUBING**

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM TUBE LENGTH		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
3/8 <sup>a</sup>	1.06	35.4	11.3	2.1
1/2	1.69	38.2	14.2	1.8
3/4	3.43	18.4	7.0	0.4
1	5.81	11.2	4.3	0.4
1¼	8.70	7.4	2.8	0.5
1½	12.18	5.4	1.8	0.5
2 or larger	21.08	3.4	0.9	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. The flow rate for 3/8-inch size is limited to 1.5 gallons per minute.

**TABLE 702.7.2(5)  
VOLUME AND MAXIMUM LENGTH OF CPVC TUBING, CTS<sup>a</sup>**

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM TUBE LENGTH		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
1/2	1.25	51.6	19.2	2.4
3/4	2.67	23.6	9.0	0.6
1	4.43	14.7	5.6	0.6
1¼	6.61	9.7	3.6	0.6
1½	9.22	7.2	2.4	0.6
2 or larger	15.79	4.6	1.1	0.6

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. Copper tube size outside diameter dimension and SDR 11.

**TABLE 702.7.2(6)  
VOLUME AND MAXIMUM LENGTH OF CPVC PIPE, SCHEDULE 40**

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM TUBE LENGTH		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
3/8 <sup>a</sup>	1.17	32.1	10.3	1.9
1/2	1.89	34.1	12.7	1.6
3/4	3.58	17.6	6.7	0.4
1	5.53	11.8	4.5	0.5
1¼	9.66	6.6	2.5	0.4
1½	13.20	5.0	1.7	0.4
2 or larger	21.88	3.3	0.8	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. The flow rate for 3/8-inch size is limited to 1.5 gallons per minute.

**TABLE 702.7.2(7)  
VOLUME AND MAXIMUM LENGTH OF CPVC PIPE, SCHEDULE 80**

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM TUBE LENGTH		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
3/8 <sup>a</sup>	0.86	43.6	14.0	2.6
1/2	1.46	44.2	16.4	2.1
3/4	2.74	23.0	8.8	0.5
1	4.56	14.3	5.5	0.5
1¼	8.24	7.8	2.9	0.5
1½	11.38	5.8	1.9	0.5
2 or larger	19.11	3.8	0.9	0.5

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. The flow rate for 3/8-inch size is limited to 1.5 gallons per minute.

**TABLE 702.7.2(8)  
VOLUME AND MAXIMUM LENGTH OF PE-AL-PE TUBING**

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM TUBE LENGTH		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
3/8 <sup>a</sup>	0.63	59.5	19.0	3.6
1/2	1.31	49.2	18.3	2.3
3/4	3.39	18.6	7.1	0.4
1	5.56	11.7	4.5	0.4
1¼	8.49	7.5	2.8	0.5
1½	13.88	4.8	1.6	0.4
2 or larger	21.48	3.4	0.8	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. The flow rate for 3/8-inch size is limited to 1.5 gallons per minute.

**TABLE 702.7.2(9)  
VOLUME AND MAXIMUM LENGTH OF PEX AND PE-RT TUBING, CTS<sup>b</sup>**

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM TUBE LENGTH		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
3/8 <sup>a</sup>	0.6	58.6	18.8	3.5
1/2	1.18	54.7	20.3	2.5
3/4	2.35	26.8	10.2	0.6
1	3.91	16.6	6.4	0.6
1¼	5.81	11.0	4.1	0.7
1½	8.09	8.2	2.7	0.7
2 or larger	13.86	5.2	1.3	0.6

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. The flow rate for 3/8-inch size is limited to 1.5 gallons per minute.

b. Copper tube size outside diameter dimension and SDR 9, for both PEX and PE-RT types of tubing.

**TABLE 702.7.2(10)  
VOLUME AND MAXIMUM LENGTH OF PEX-AL-PEX TUBING**

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM TUBE LENGTH		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
3/8 <sup>a</sup>	0.63	59.5	19.0	3.6
1/2	1.31	49.2	18.3	2.3
3/4	3.39	18.6	7.1	0.4
1	5.56	11.7	4.5	0.4
1¼	8.49	7.5	2.8	0.5
1½	13.88	4.8	1.6	0.4
2 or larger	21.48	3.4	0.8	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. The flow rate for 3/8-inch size is limited to 1.5 gpm.

## SECTION 703 HVAC SYSTEMS AND EQUIPMENT

**702.10 Food service handwashing faucets.** Faucets for handwashing sinks in food service preparation and serving areas shall be of the self-closing type.

**702.11 Dipper wells.** The water supply to a dipper well shall have a shutoff valve and flow control valve. Water flow into a dipper well shall not exceed 1 gpm (3.78 Lpm) at a supply pressure of 60 psi (413.7 kPa).

**702.12 Automated vehicle wash facilities.** Not less than 50 percent of the water used for the rinsing phase of the wash cycle at automated vehicle wash facilities shall be collected to be reused for the washing phase. Towel and chamois washing machines shall have high-level water cutoffs. Except for water recirculated within the facility, potable and nonpotable water use for automobile washing shall not exceed 40 gallons (151 L) per vehicle for in-bay automatic washing and 35 gallons (132.5 L) per vehicle for conveyor and express-type car washing.

**Exception:** Bus and large commercial vehicle washing facilities.

**702.13 Self-service vehicle wash facilities.** Spray wand nozzles used at self-service vehicle wash facilities shall discharge not more than 3 gpm (11.4 Lpm). Faucets for chamois wringer sinks shall be of the self-closing type.

**702.14 Vehicle washing facilities.** Waste water from reverse osmosis water treatment systems installed in vehicle washing facilities shall discharge to the washing phase water holding tank.

**702.15 Food waste disposers.** The water flow into a commercial food waste disposer in a food establishment shall be controlled by a load-sensing device such that the water flow does not exceed 1 gpm (3.78 Lpm) under no-load operating conditions and 8 gpm (30.2 Lpm) under full-load operating conditions.

**702.16 Combination ovens.** Combination ovens shall consume not more than 3.5 gallons (13.25 L) per hour per steamer pan in any operational mode. Water consumption shall be tested in accordance with the requirements of ASTM F1639.

**702.17 Autoclaves and sterilizers.** Autoclaves and sterilizers requiring condensate tempering systems shall be of the type that does not require potable water to be blended with the discharge water to reduce the temperature of discharge.

**Exception:** Autoclaves and sterilizers in Group I-2, Condition 2 facilities and ambulatory care facilities are not required to comply with this section.

**702.18 Liquid ring vacuum pumps.** Except where the discharge is contaminated with hazardous materials or pathogens, the discharge water from liquid ring vacuum pumps shall be recovered for reuse within the pump or for other onsite applications.

**702.19 Film processors.** The cooling water discharge from water-cooled film processors shall be recovered and reused within the processor or for other onsite applications.

**703.1 Hydronic closed systems.** Closed loop hydronic heating and cooling systems, and ground-source heat pump systems shall not be connected to a potable makeup water supply.

**703.2 Humidification systems.** Except where greater humidity is required for medical, agricultural, archival or scientific research purposes, humidification systems shall be disabled and locked-out when the relative humidity in the space served is greater than 55 percent.

**703.3 Condensate coolers and tempering.** Potable water shall not be used as tempering water for sanitary discharge where the tempering water volume requirement for the application exceeds 200 gallons per day (757 liters per day). Where the tempering water volume required for the application is 200 gallons per day (757 liters per day) or less and potable water is used for tempering, water flow control devices shall be installed. Such control devices shall limit the flow rate of tempering water to that which is necessary to limit the temperature of the waste discharge to a maximum of 140°F (60°C). Such devices shall have a maximum flow rate of 200 gallons per day (757 liters per day).

**703.4 Condensate drainage recovery.** Condensate shall be collected and reused onsite for applications such as, but not limited to, water features, fountains, gray water collection systems and rainwater collection systems. Where onsite applications for condensate reuse are not available and the community sanitary sewer authority provides return credit for sanitary sewage or recycles sewage into a nonpotable water supply, condensate shall be discharged to the sanitary sewer system except where prohibited by the authority having jurisdiction.

**703.5 Heat exchangers.** Once-through cooling shall be prohibited. Heat exchangers shall be connected to a recirculating water system such as a chilled water loop, cooling tower loop or similar recirculating system.

**703.6 Humidifier discharge.** Water discharge from flow-through-type humidifiers and from the draining and flushing operations of other types of humidifiers shall be collected for reuse where a collection and reuse system exists.

**703.7 Cooling towers, evaporative condensers and fluid coolers.** Cooling towers, evaporative condensers, and fluid coolers shall be installed in accordance with the requirements of Section 908 of the *International Mechanical Code*.

**703.7.1 Location.** Cooling towers, evaporative condensers and fluid coolers shall be located on the property as required for buildings in accordance with the *International Building Code* and shall be located so as to prevent the discharge vapor plumes from entering occupied spaces. Plume discharges shall be not less than 5 feet (1524 mm) above and 20 feet (6096 mm) away from any ventilation inlet to a building.

**703.7.2 Once-through cooling.** The use of potable water for once-through or single-pass cooling operations is prohibited.

**703.7.3 Controllers and alarms.** Cooling towers, evaporative condensers, and fluid coolers shall be equipped with conductivity controllers and overflow alarms.

**703.7.4 Drift.** Cooling towers, evaporative condensers and fluid coolers shall produce drift losses of not greater than 0.002 percent of the recirculated water volume for counter-flow systems, and not greater than 0.005 percent of the recirculated water for cross-flow systems.

**703.7.5 Water quality.** Where nonpotable water is used within cooling towers, evaporative condensers and fluid coolers, it shall conform to the water quality and treatment requirements of the jurisdiction having authority and the water chemistry guidelines recommended by the equipment manufacturers.

**703.7.6 Discharge.** The discharge water from cooling towers used for air-conditioning systems shall be in compliance with Table 703.7.6. Where the discharge water is not captured for reuse, it shall be discharged and treated in accordance with jurisdictional requirements, if applicable.

**Exception:** Discharge water with total dissolved solids in excess of 1,500 ppm (1,500 mg/L), or silica in excess of 120 ppm (120 mg/L) measured as silicon dioxide, shall not be required to meet the minimum parameters specified in Table 703.7.6.

**TABLE 703.7.6  
MINIMUM CYCLES OF CONCENTRATION  
FOR DISCHARGE WATER**

MAKEUP WATER TOTAL HARDNESS (mg/L) <sup>a</sup>	MINIMUM CYCLES OF CONCENTRATION
< 200	5
≥ 200	3.5

a. Total hardness concentration expressed as calcium carbonate.

**703.8 Wet-hood exhaust scrubber systems.** Where wet-hood exhaust scrubber systems are used, they shall incorporate a water recirculation system.

**703.8.1 Washdown systems.** Hoods incorporating wash-down or rinsing systems for perchloric acid and similar chemicals shall utilize self-closing valves. Such systems shall be designed to drain automatically after each wash-down process has been completed.

**703.8.2 Water sources.** Where suitable alternate onsite nonpotable water or municipal reclaimed water is available, makeup water supplies to the recirculation system of wet-hood exhaust scrubbers shall utilize alternate onsite nonpotable water or municipal reclaimed water of a water quality appropriate for the application.

**703.9 Section deleted in Rhode Island.**

**SECTION 704**

**WATER TREATMENT DEVICES AND EQUIPMENT**

**704.1 Water softeners.** Water softeners shall comply with Sections 704.1.1 through 704.1.4.

**704.1.1 Demand-initiated regeneration.** Water softeners shall be equipped with demand-initiated regeneration control systems. Such control systems shall automatically initiate the regeneration cycle after determining the depletion, or impending depletion of softening capacity.

**704.1.2 Water consumption.** Water softeners shall have a maximum water consumption during regeneration of 4 gallons (15.1 L) per 1,000 grains (17.1 g/L) of hardness removed as measured in accordance with NSF 44.

**704.1.3 Waste connections.** Waste water from water softener regeneration shall not discharge to reclaimed water collection systems and shall discharge in accordance with the *International Plumbing Code*.

**704.1.4 Efficiency and listing.** Water softeners that regenerate in place, that are connected to the water system they serve by piping not exceeding 1¼ inches (31.8 mm) in diameter, or that have a volume of 3 cubic feet (0.085 m<sup>3</sup>) or more of cation exchange media shall have a rated salt efficiency of not less than 4,000 grains of total hardness exchange per pound of salt (571 g of total hardness exchange per kg of salt), based on sodium chloride equivalency and shall be listed and labeled in accordance with NSF 44. All other water softeners shall have a rated salt efficiency of not less than 3,500 grains of total hardness exchange per pound of salt (500 g of total hardness exchange per kg of salt), based on sodium chloride equivalency.

**704.2 Reverse osmosis water treatment systems.** Point-of-use reverse osmosis treatment systems shall be listed and labeled in accordance with NSF 58. The discharge pipe from a reverse osmosis drinking water treatment unit shall connect to the building drainage system in accordance with Section 611.2 of the *International Plumbing Code*. Point-of-use reverse osmosis systems shall be equipped with an automatic shutoff valve that prevents the production of reject water when there is no demand for treated water.

**704.3 Onsite reclaimed water treatment systems.** Onsite reclaimed water treatment systems, including gray water reuse treatment systems and waste water treatment systems, used to produce nonpotable water for use in water closet and urinal flushing, surface irrigation and similar applications shall be listed and labeled to NSF 350.

**SECTION 705**

**PLUMBING SYSTEMS COMPLETION**

**705.1 Plumbing systems completion.** Within 60 days from conducting the final inspection, the *registered design professional* shall provide evidence of completion of the plumbing system installation to the *code official*, in accordance with the requirements of this chapter and Table 705.1.

**TABLE 705.1  
PLUMBING SYSTEMS COMPLETION PLAN**

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
<b>Chapter 7: Water</b>					
Appliances	Field Observation	Final Inspection	None	<b>Designer of Record</b>	702.6
Hot water distribution (also a Cx requirement in chapter 9)	Field observation	During installation	None	<b>Designer of Record</b>	702.8 and CH 9
	Verification	During commissioning	None	<b>CxA</b>	
Cooling tower performance (also a Cx requirement in chapter 9)	Testing & verification	During commissioning	None	<b>CxA</b>	703.7.7 and CH 9
Rainwater system water quality (also a Cx requirement in chapter 9)	Testing & verification	During commissioning	None	<b>CxA</b>	707.15.1 and CH 9
	Maintenance Plan	None	Annually	<b>Owner</b>	
Gray water system water quality (also a Cx requirement in chapter 9)	Testing & verification	During commissioning	None	<b>CxA</b>	708.13.8 and CH 9
	Maintenance Plan	None	Annually	<b>Owner</b>	
Soil percolation test	Field inspection and report	Prior to installation of gray water irrigation system	None	<b>Designer of Record</b>	708.14.2





## CHAPTER 8

# INDOOR ENVIRONMENTAL QUALITY AND COMFORT

### SECTION 801 GENERAL

**801.1 Scope and intent.** The provisions of this chapter are intended to provide an interior environment that is conducive to the health of building occupants.

**801.2 Indoor air quality management plan required.** An indoor air quality management plan shall be developed. Such plan shall address the methods and procedures to be used during design and construction to obtain compliance with Sections 802 through 805.

### SECTION 802 BUILDING CONSTRUCTION FEATURES, OPERATIONS AND MAINTENANCE FACILITATION

**802.1 Scope.** To facilitate the operation and maintenance of the completed building, the building and its systems shall comply with the requirements of Sections 802.2 and 802.3.

**802.2 Air-handling system access.** The arrangement and location of air-handling system components including, but not limited to, ducts, air handler units, fans, coils and condensate pans, shall allow access for cleaning and repair of the air-handling surfaces of such components. Access ports shall be installed in the air-handling system to permit such cleaning and repairs. Piping, conduits, and other building components shall not be located so as to obstruct the required access ports.

**802.3 Air-handling filtration and bypass pathways.** Air-handling equipment and HVAC equipment shall be designed and installed to limit the amount of airflow that bypasses the air filters and shall comply with the following:

1. Channels, racks and other filter-retaining constructions that do not seal tightly to the filter frame by means of a friction fit shall be provided with a means to seal the filter frame to the filter-holding construction.
2. Where standard size filters are installed in banks of multiple filters, gaskets shall seal the gap between the frames of adjacent filters.
3. As an alternative to gaskets, the frames of adjacent filters shall be compressed tightly together by means of spring elements that are built into the filter-retaining construction.
4. Channels, racks and other filter-retaining constructions shall be sealed to the duct or housing of the HVAC equipment served by the filters.
5. Filter access doors in ducts and HVAC equipment shall be designed to limit the amount of airflow that bypasses the filters.

6. Field or shop-fabricated spacers shall not be installed for the purpose of replacing the intended size filter with a smaller size filter.
7. Gaskets and seals shall be accessible for repair, maintenance and replacement.

### SECTION 803 HVAC SYSTEMS

**803.1 Construction phase requirements.** The ventilation of buildings during the construction phase shall be in accordance with Sections 803.1.1 through 803.1.3.

**803.1.1 Duct openings.** Duct and other related air distribution component openings shall be covered with tape, plastic or sheet metal, or shall be closed by an *approved* method to reduce the amount of dust and debris that collects in the system from the time of rough-in installation and until startup of the heating and cooling equipment. Dust and debris shall be cleaned from duct openings prior to system flush out and building occupancy.

**803.1.2 Indoor air quality during construction.** Temporary ventilation during construction shall be provided in accordance with Sections 803.1.2.1 through 803.1.2.3.

**803.1.2.1 Ventilation.** Ventilation during construction shall be achieved through openings in the building envelope using one or more of the following methods:

1. Natural ventilation in accordance with the provisions of the *International Building Code* or the *International Mechanical Code*.
2. Fans that produce a minimum of three air changes per hour.
3. Exhaust in the work area at a rate of not less than 0.05 cfm/ft<sup>2</sup> (0.24 L/s/in<sup>2</sup>) and not less than 10 percent greater than the supply air rate so as to maintain negative pressurization of the space.

**803.1.2.2 Protection of HVAC system openings.** HVAC supply and return duct and equipment openings shall be protected during dust-producing operations.

**803.1.2.3 Return air filters.** Where a forced air HVAC system is used during construction, new return air filters shall be installed prior to system flush out and building occupancy.

**803.1.3 Construction phase ductless system or filter.** Where spaces are conditioned during the construction phase, space-conditioning systems shall be of the ductless variety, or filters for ducted systems shall be rated at MERV 8 or higher in accordance with ASHRAE 52.2, and system equipment shall be designed to be compatible. Duct system design shall account for pressure drop across the filter.

**803.2 Thermal environmental conditions for human occupancy.** Buildings shall be designed in compliance with ASHRAE 55, Sections 6.1, “Design,” and 6.2, “Documentation.”

**Exception:** Spaces with special requirements for processes, activities, or contents that require a thermal environment outside of that which humans find thermally acceptable, such as food storage, natatoriums, shower rooms, saunas and drying rooms.

**803.3 Isolation of pollutant sources.** The isolation of pollutant sources related to print, copy and janitorial rooms shall be in accordance with Section 803.3.1.

**803.3.1 Printer, copier and janitorial rooms.** Enclosed rooms or spaces that are over 100 square feet (9.3 m<sup>2</sup>) in area and that are used primarily as a print or copy facility containing five or more printers, copy machines, scanners, facsimile machines or similar machines in any combination, and rooms used primarily as janitorial rooms or closets where the use or storage of chemicals occurs, shall comply with all of the following:

1. The enclosing walls shall extend from the floor surface to the underside of the floor, roof deck or solid ceiling above and shall be constructed to resist the passage of airborne chemical pollutants and shall be constructed and sealed as required for 1-hour fire resistance-rated construction assemblies. Alternatively, for janitorial rooms and closets, all chemicals shall be stored in *approved* chemical safety storage cabinets.
2. Doors in the enclosing walls shall be automatic or self-closing.
3. An HVAC system shall be provided that: provides separate exhaust airflow to the outdoors at a rate of not less than 0.50 cfm per square foot (2.4 L/s/m<sup>2</sup>); that maintains a negative pressure of not less than 7 Pa within the room; and that prohibits the recirculation of air from the room to other portions of the building.

**803.4 Filters.** Filters for air-conditioning systems that serve occupied spaces shall be rated at MERV 11 or higher, in accordance with ASHRAE Standard 52.2, and system equipment shall be designed to be compatible. The air-handling system design shall account for pressure drop across the filter. The pressure drop across clean MERV 11 filters shall be not greater than 0.45 in. w.c. at 500 fpm (412 Pa at 2.54 m/s) filter face velocity. Filter performance shall be shown on the filter manufacturer’s data sheet.

## SECTION 804 SPECIFIC INDOOR AIR QUALITY AND POLLUTANT CONTROL MEASURES

**804.1 Fireplaces and appliances.** Where located within buildings, fireplaces, solid fuel-burning appliances, vented decorative gas appliances, vented gas fireplace heaters and decorative gas appliances for installation in fireplaces shall comply with Sections 804.1.1 through 804.1.3. Unvented

room heaters and unvented decorative appliances, including alcohol burning, shall be prohibited.

**804.1.1 Venting and combustion air.** Fireplaces and fuel-burning appliances shall be vented to the outdoors and shall be provided with combustion air provided from the outdoors in accordance with the *International Mechanical Code* and the *International Fuel Gas Code*. Solid fuel-burning fireplaces shall be provided with a means to tightly close off the chimney flue and combustion air openings when the fireplace is not in use.

**804.1.2 Wood-fired appliances.** Wood stoves and wood-burning fireplace inserts shall be listed and, additionally, shall be labeled in accordance with the requirements of the EPA Standards of Performance for New Residential Wood Heaters, 40 CFR Part 60, subpart AAA.

**804.1.3 Biomass appliances.** Biomass fireplaces, stoves and inserts shall be listed and labeled in accordance with ASTM E1509 or UL 1482. Biomass furnaces shall be listed and labeled in accordance with CSA B366.1 or UL 391. Biomass boilers shall be listed and labeled in accordance with CSA B366.1 or UL 2523.

**804.2 Post-construction, pre-occupancy baseline IAQ testing.** Where this section is indicated to be applicable in Table 302.1, and after all interior finishes are installed, the building shall be tested for indoor air quality and the testing results shall indicate that the levels of VOCs meet the levels detailed in Table 804.2 using testing protocols in accordance with ASTM D5197, ASTM D5466, ASTM D6196, ASTM D6345, and ISO 7708. Test samples shall be taken in not less than one location in each 25,000 square feet (1860 m<sup>2</sup>) of floor area or in each contiguous floor area.

**Exceptions:**

1. Group F, H, I-2, S and U occupancies shall not be required to comply with this section.
2. A building shall not be required to be tested where a similarly designed and constructed building as determined by the code official, for the same owner or tenant, has been tested for indoor air quality and the testing results indicate that the level of VOCs meet the levels detailed in Table 804.2.
3. Where the building indoor environment does not meet the concentration limits in Table 804.2 and the tenant does not address the air quality issue by mitigation and retesting, the building shall be flushed out by supplying continuous ventilation with all air-handling units at their maximum outdoor air rate for at least 14 days while maintaining an internal temperature of at least 60°F (15.6°C), and relative humidity not higher than 60 percent. Occupancy shall be permitted to start 7 days after start of the flush out, provided that the flush out continues for the full 14 days.

**TABLE 804.2  
MAXIMUM CONCENTRATION OF AIR POLLUTANTS**

MAXIMUM CONCENTRATION OF AIR POLLUTANTS RELEVANT TO IAQ	MAXIMUM CONCENTRATION, $\mu\text{g}/\text{m}^3$ (unless otherwise noted)
1-Methyl-2-pyrrolidinone <sup>a</sup>	160
1,1,1-Trichloroethane	1000
1,3-Butadiene	20
1,4-Dichlorobenzene	800
1,4-Dioxane	3000
2-Ethylhexanoic acid <sup>a</sup>	25
2-Propanol	7000
4-Phenylcyclohexene (4-PCH) <sup>a</sup>	2.5
Acetaldehyde	140
Acrylonitrile	5
Benzene	60
t-Butyl methyl ether	8000
Caprolactam <sup>a</sup>	100
Carbon disulfide	800
Carbon monoxide	9 ppm and no greater than 2 ppm above outdoor levels
Carbon tetrachloride	40
Chlorobenzene	1000
Chloroform	300
Dichloromethane	400
Ethylbenzene	2000
Ethylene glycol	400
Formaldehyde	27
n-Hexane	7000
Naphthalene	9
Nonanal <sup>a</sup>	13
Octanal <sup>a</sup>	7.2
Particulates (PM 2.5)	35 (24-hr)
Particulates (PM 10)	150 (24-hr)
Phenol	200
Styrene	900
Tetrachloroethene	35
Toluene	300
Total volatile organic compounds (TVOC)	500
Trichloroethene	600
Xylene isomers	700

a. This chemical has a limit only where carpets and fabrics with styrene butadiene rubber (SBR) latex backing material are installed as part of the base building systems.

**SECTION 805  
PROHIBITED MATERIALS**

**805.1 Scope.** Use of the following materials shall be prohibited:

1. Asbestos-containing materials.
2. Urea-formaldehyde foam insulation.

**SECTION 806  
MATERIAL EMISSIONS AND POLLUTANT CONTROL**

**806.1 Emissions from composite wood products.** Composite wood products used interior to the *approved* weather covering of the building shall comply with the emission limits cited in Table 806.1. Compliance with emission limits shall be demonstrated following the requirements of Section 93120 of Title 17, *California Code of Regulations*.

**Exceptions:**

1. Composite wood products that are made using adhesives that do not contain urea-formaldehyde (UF) resins.
2. Composite wood products that are sealed with an impermeable material on all sides and edges.
3. Composite wood products that are used to make elements considered to be furniture, fixtures and equipment (FF&E) that are not permanently installed.

**TABLE 806.1  
COMPOSITE PRODUCTS EMISSIONS**

PRODUCT	FORMALDEHYDE LIMIT <sup>b</sup> (ppm)
Hardwood plywood	0.05
Particle board	0.09
Medium-density fiberboard	0.11
Thin medium-density fiberboard <sup>a</sup>	0.13

For SI: 1 inch = 25.4 mm.

- a. Maximum thickness of 5/16 inch.
- b. Phase 2 Formaldehyde Emissions Standards, Table 1, Section 93120, Title 17, California Code of Regulations; compliance shall be demonstrated in accordance with ASTM D6007 or ASTM E1333.

**806.2 Adhesives and sealants.** A minimum of 85 percent by weight or volume, of specific categories of site-applied adhesives and sealants used on the interior side of the building envelope, shall comply with the VOC content limits in Table 806.2(1) or alternative VOC emission limits in Table 806.2(2). The VOC content shall be determined in accordance with the appropriate standard being either U.S. EPA Method 24 or SCAQMD Method 304, 316A or 316B. The exempt compound content shall be determined by either SCAQMD Methods 302 and 303 or ASTM D3960. Table 806.2(1) adhesives and sealants regulatory category and VOC content compliance determination shall conform to the SCAQMD Rule 1168. The provisions of this section shall not apply to adhesives and sealants subject to state or federal consumer product VOC regulations. HVAC duct sealants shall be classified as “Other” category within the SCAQMD Rule 1168 sealants table.

**Exception:** HVAC air duct sealants are not required to meet the emissions or the VOC content requirements when the air temperature in which they are applied is less than 40°F (4.5°C).

Table 806.2(2) adhesive alternative emissions standards compliance shall be determined utilizing test methodology incorporated by reference in the CDPH/EHLB/Standard

**INDOOR ENVIRONMENTAL QUALITY AND COMFORT**

Method V.1.1. The alternative emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 Accreditation.

**TABLE 806.2(1)  
SITE-APPLIED ADHESIVE AND SEALANT VOC LIMITS**

ADHESIVE	VOC LIMIT <sup>a, b</sup>
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesive	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Dry wall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250
Architectural sealants	250
Architectural sealant primer	
Nonporous	250
Porous	775
Modified bituminous sealant primer	500
Other sealant primers	750
CPVC solvent cement	490
PVC solvent cement	510
ABS solvent cement	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special purpose contact adhesive	250
Structural wood member adhesive	140

- a. VOC limit less water and less exempt compounds in grams/liter.
- b. For low-solid adhesives and sealants, the VOC limit is expressed in grams/liter of material as specified in Rule 1168. For all other adhesives and sealants, the VOC limits are expressed as grams of VOC per liter of adhesive or sealant less water and less exempt compounds as specified in Rule 1168.

**TABLE 806.2(2)  
VOC EMISSION LIMITS**

VOC	LIMIT
Individual VOCs	≤ 1/3 CA chronic REL
Formaldehyde	≤ 16.5 µg/m <sup>3</sup> or ≤ 13.5 ppb <sup>b, c</sup>

- a. CDPH/EHLB/Standard Method V.1.1 Chronic Reference Exposure Level (CREL).
- b. Effective January 1, 2012, limit became less than or equal to the CDPH/EHLB/Standard Method V.1.1 CREL (≤ 9 µg/m<sup>3</sup> or ≤ 7 ppb).
- c. Formaldehyde emission levels need not be reported for materials where formaldehyde is not added by the manufacturer of the material.

**806.3 Architectural paints and coatings.** A minimum of 85 percent by weight or volume, of site-applied interior architectural coatings shall comply with VOC content limits in

Table 806.3(1) or the alternate emissions limits in Table 806.3(2). The exempt compound content shall be determined by ASTM D3960.

Table 806.3(2) architectural coating alternate emissions standards compliance shall be determined utilizing test methodology incorporated by reference in the CDPH/EHLB/Standard Method V.1.1. The alternative emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 Accreditation.

**806.4 Flooring.** A minimum of 85 percent of the total area of flooring installed within the interior of the building shall comply with the requirements of Table 806.4(2). Where flooring with more than one distinct product layer is installed, the emissions from each layer shall comply with these requirements. The test methodology used to determine compliance shall be from CDPH/EHLB/Standard Method V.1.1. The emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 Accreditation.

Where post-manufacture coatings or surface applications have not been applied, the flooring listed in Table 806.4(1) shall be deemed to comply with the requirements of Table 806.4(2).

**806.5 Acoustical ceiling tiles and wall systems.** A minimum of 85 percent of acoustical ceiling tiles and wall systems, by area, shall comply with the requirements of Table 806.5(2). Where ceiling and wall systems with more than one distinct product layer are installed, the emissions from each layer shall comply with these requirements. The test methodology used to determine compliance shall be from CDPH/EHLB/Standard Method V.1.1. The emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 Accreditation.

Where post-manufacture coatings or surface applications have not been applied, the ceiling or wall systems listed in Table 806.5(1) shall be deemed to comply with the requirements of Table 806.5(2).

**806.6 Insulation.** A minimum of 85 percent of insulation shall comply with the requirements of Table 806.6(1) or Table 808.6(2). The test methodology used to determine compliance shall be from CDPH/EHLB/Standard Method V.1.1. The emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 Accreditation.

**TABLE 806.3(2)  
ARCHITECTURAL COATINGS VOC EMISSION LIMITS**

VOC	LIMIT
Individual	≤ 1/3 CA chronic REL <sup>a</sup>
Formaldehyde	≤ 16.5 µg/m <sup>3</sup> or ≤ 13.5 ppb <sup>b</sup>

- a. CA Chronic Reference Exposure Level (CREL).
- b. Formaldehyde emission levels need not be reported for materials where formaldehyde is not added by the manufacturer of the material.

**TABLE 806.3(1)  
VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS<sup>C, D, E</sup>**

CATEGORY	Effective: January 1, 2010	Effective: January 1, 2012
	LIMIT <sup>a</sup> g/l	LIMIT <sup>a</sup> g/l
Flat coatings	50	—
Nonflat coatings	100	—
Nonflat – High-gloss coatings	150	—
Specialty coatings:		
Aluminum roof coatings	400	—
Basement specialty coatings	400	—
Bituminous roof coatings	50	—
Bituminous roof primers	350	—
Bond breakers	350	—
Concrete curing compounds	350	—
Concrete/masonry sealers	100	—
Driveway sealers	50	—
Dry fog coatings	150	—
Faux finishing coatings	350	—
Fire-resistive coatings	350	—
Floor coatings	100	—
Form-release compounds	250	—
Graphic arts coatings (Sign paints)	500	—
High-temperature coatings	420	—
Industrial maintenance coatings	250	—
Low solids coatings	120 <sup>b</sup>	—
Magnesite cement coatings	450	—
Mastic texture coatings	100	—
Metallic pigmented coatings	500	—
Multi-color coatings	250	—
Pretreatment wash primers	420	—
Primers, sealers, and undercoaters	100	—
Reactive penetrating sealers	350	—
Recycled coatings	250	—
Roof coatings	50	—
Rust-preventative coatings	400	250
Shellacs, clear	730	—
Shellacs, opaque	550	—
Specialty primers, sealers, and undercoaters	350	100
Stains	250	—
Stone consolidants	450	—
Swimming pool coatings	340	—
Traffic marking coatings	100	—
Tub and tile refinish coatings	420	—
Waterproofing membranes	250	—
Wood coatings	275	—
Wood preservatives	350	—
Zinc-rich primers	340	—

- a. Limits are expressed as VOC Regulatory (except as noted), thinned to the manufacturer’s maximum thinning recommendation, excluding any colorant added to tint bases.
- b. Limit is expressed as VOC actual.
- c. The specified limits remain in effect unless revised limits

- are listed in subsequent columns in the table.
- d. Values in this table are derived from those specified by the California Air Resources Board *Suggested Control Measure for Architectural Coatings*, dated February 1, 2008.
- e. Table 806.3(1) architectural coating regulatory category and VOC content compliance determination shall conform to the California Air Resources Board *Suggested Control Measure for Architectural Coatings*.

**TABLE 806.4(1)  
FLOORING DEEMED TO COMPLY WITH VOC EMISSION LIMITS**

Ceramic and concrete tile
Organic-free, mineral-based
Clay pavers
Concrete pavers
Concrete
Metal

**TABLE 806.4(2) FLOORING VOC EMISSION LIMITS**

VOC	LIMIT
Individual	≤ 1/ CA chronic REL <sup>a</sup>
Formaldehyde	≤ 16.5 µg/m <sup>3</sup> or ≤ 13.5 ppb

- a. CA Chronic Reference Exposure Level (CREL).

**TABLE 806.5(1)  
CEILING AND WALL SYSTEMS DEEMED TO COMPLY WITH VOC EMISSION LIMITS**

Ceramic and concrete tile
Organic-free, mineral-based
Gypsum plaster
Clay masonry
Concrete masonry
Concrete
Metal

**TABLE 806.5(2) ACOUSTICAL CEILING TILES AND WALL SYSTEMS VOC EMISSION LIMITS**

VOC	LIMIT
Individual	≤ 1/ CA chronic REL <sup>a</sup>
Formaldehyde	≤ 16.5 µg/m <sup>3</sup> or ≤ 13.5 ppb

- a. CA Chronic Reference Exposure Level (CREL).

**TABLE 806.6(1) INSULATION VOC EMISSION LIMITS**

VOC	LIMIT
Individual	≤ 1/ CA chronic REL <sup>a</sup>
Formaldehyde	≤ 16.5 µg/m <sup>3</sup> or ≤ 13.5 ppb

- a. Limits are expressed as VOC Regulatory (except as noted), thinned to the manufacturer’s maximum thinning recommendation, excluding any colorant added to tint bases.

**806.6(2)  
INSULATION MANUFACTURED WITHOUT FORMALDEHYDE VOC EMISSION LIMITS**

VOC	LIMIT
Individual	≤ 1/2 CA chronic REL <sup>a</sup>

- a. CA Chronic Reference Exposure Level (CREL).

SECTION 807  
ACOUSTICS

**Elective requirement in Rhode Island.** See Appendix A-108

SECTION 808  
DAYLIGHTING

**808.1 General.** Fenestration shall be provided in building roofs and walls in accordance with Sections 808.2 and 808.3. Interior spaces shall be planned to benefit from exposure to the natural light offered by the fenestration in accordance with this section.

**808.1.1 Fenestration obstructions.** Advertisements or displays affixed or applied to a fenestration, or supported by the building, shall not reduce daylighting below the levels prescribed herein.

**Exception:** The ground floor and the story immediately above the ground floor.

**808.2 Applicability.** Daylighting of building spaces in accordance with Section 808.3 shall be required for the following occupancies:

1. A Group A-3 occupancy where the specific use of the room or space is for reading areas in libraries, waiting areas in transportation terminals, exhibition halls, convention centers, gymnasiums, and indoor athletic areas.
2. A Group B occupancy where the specific use of the room or space is for laboratories for testing and research, post offices, print shops, offices, educational facilities for students above the 12<sup>th</sup> grade and training and skill development not within a school or academic program.
3. Group E, F and S occupancies.
4. Those portions of Group M occupancies located directly underneath a roof, where the net floor area of the entire occupancy is 2,500 square feet (232 m<sup>2</sup>) or greater.

**Exception:** Daylighting in Groups A-3, B, E, F, M and S occupancies is not required for the following:

1. Building spaces where darkness is required for the primary use of the space, including, but not limited to, light-sensitive material handling and darkrooms.
2. Building spaces that are required to be cooled below 50°F (10°C).
3. Unconditioned buildings that are equipped with exterior doors that, when opened, provide equivalent daylighting.
4. Existing buildings undergoing an alteration, repair, movement, or change of occupancy.

**808.3 Daylit area of building spaces.** In buildings not greater than two stories above grade, not less than 50 percent of the net floor area shall be located within a daylit area. In buildings three or more stories above grade, not less than 25 percent of the net floor area shall be located within a daylit area. Buildings required to have more than 25,000 square feet (2323 m<sup>2</sup>) of daylit area shall comply with Section

808.3.2. All other buildings shall comply with either Section 808.3.1 or Section 808.3.2.

**Exception:** For buildings not less than three stories above grade with obstructed exterior walls or shaded roofs, the required daylit area shall be modified in accordance with Equation 8-1.

$$\text{Required daylit area} \geq 25\% \times \text{TDP} \quad \text{(Equation 8-1)}$$

The total daylight potential (TDP) is a weighted average of the individual daylight potentials for each floor:

$$\text{TDP} = \sum (\text{DP}_1 \div \text{FA}_1/\text{TF}) + (\text{DP}_2 \div \text{FA}_2/\text{TF}) + \dots$$

For floors with roof area immediately above:

$$\text{DP}_{1,2,\dots} = 1 - [(OW_1/\text{TW}_1) \cdot (OR_1/\text{TR}_1)]$$

For floors without roof area immediately above:

$$\text{DP}_{1,2,\dots} = 1 - (OW_1/\text{TW}_1)$$

where:

$OW_{1,2,\dots}$  = The length of obstructed exterior wall for each floor. A wall shall be considered to be obstructed where the distance from the wall to any building or geological formation that would block access to daylight is less than the height from the top of the finished floor to the top of the building or geologic formation. For the purposes of this determination, the maximum allowed heights of buildings or structures on adjacent property under existing zoning regulations is permitted to be considered.

$\text{TW}_{1,2,\dots}$  = The total length of exterior wall for each floor.

$OR_{1,2,\dots}$  = The roof area immediately above each floor that is shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.

$\text{TR}_{1,2,\dots}$  = The total roof area immediately above each floor.

$\text{FA}_{1,2,\dots}$  = The *total floor area* of each floor.

TF = The *total building floor area*.

**808.3.1 Daylight prescriptive requirements.** Daylit areas shall comply with the following:

1. Each daylit area shall be located within a toplight or sidelight daylight zone, determined in accordance with Section C405 of the *International Energy Conservation Code*.
2. The effective aperture of fenestration for the daylight zone, determined in accordance with Equation 8-2, shall comply with Table 808.3.1.
3. Overlapping daylight zones shall be counted only once.

$$EA = (AF \times VT)/DA \quad \text{(Equation 8-2)}$$

where:

EA = Effective aperture.

AF = Area of fenestration.

VT = Visible transmittance of the fenestration.

DA = Daylit area.

**808.3.2 Daylight performance path.** Each daylit area shall comply with the requirements of either Section 808.3.2.1 or 808.3.2.2. Daylight analysis shall be conducted in accordance with Section 808.3.2.3.

**808.3.2.1 Morning illumination.** Not less than 28 footcandles (300 lux) and not more than 418 footcandles (4500 lux) of natural light shall be available at a height of 30 inches (750 mm) above the floor 3 hours before the peak solar angle on the spring equinox.

**808.3.2.2 Afternoon illumination.** Not less than 28 footcandles (300 lux) and not more than 418 footcandles (4500 lux) of natural light shall be available at a height of 30 inches (750 mm) above the floor 3 hours after the peak solar angle on the spring equinox.

**808.3.2.3 Daylight analysis.** A daylight analysis shall be performed that complies with the following:

1. Sky conditions shall be assumed to be clear.
2. Address the effects of exterior shading devices, buildings, structures, and geological formations on the fenestration of the proposed building and on the ground and other light-reflecting surfaces. Include the effects of movable exterior fenestration shading devices. The configuration of fenestration with automatically controlled variable transmittance shall be adjusted to accurately represent the control system operation.
3. Exclude the effects of interior furniture systems, shelving, and stacks.
4. Use the actual reflectance characteristics of all materials.
5. Where blinds, shades and other movable interior fenestration shading devices are included in the

analysis and the exact properties of such devices cannot be accurately modeled, such devices shall be assumed to be completely diffusing, with a visible transmittance of 5 percent for fabric shades, and 20 percent for horizontal or vertical blinds.

6. Calculation points shall be spaced not more than 39.4 inches (1 m) by 39.4 inches (1 m). The calculation grid shall start within 20 inches (508 mm) of each wall or partition.

7. Where details about the window framing, mullions, wall thickness and well depth cannot be included in the model, the visible transmittance of all fenestration shall be reduced by 20 percent.

**808.4 Sky types.** Sky types as described in Section 808.4.1 or 808.4.2 shall be used in determining the applicable effective aperture in Table 808.3.1.

**808.4.1 United States sky types.** All states, counties, and territories shall be sky type B, except as named herein. The states and counties in sky type A shall be: all of Arizona; in Nevada the counties of Churchill, Lincoln, Nye, Washoe, and counties south; in New Mexico the counties of Lincoln, Otero, Sandoval, San Juan, Santa Fe, Torrance and counties south; in Texas the counties of Hudspeth, El Paso, and Jeff Davis; in Utah the counties of Iron, Kane, and Washington; and in California all counties except Del Norte, Siskiyou, Modoc, Humboldt, Trinity, and Mendocino. Alaska shall be sky type C.

**808.4.2 International sky types.** All international locations shall be sky type B, except as follows: locations with an annual average of more than 75 percent sunshine during daytime hours shall be sky type A, and locations with an annual average of less than 45 percent sunshine during daytime hours shall be sky type C.

**TABLE 808.3.1  
MINIMUM EFFECTIVE APERTURE**

SKY TYPE <sup>a</sup>	MINIMUM EFFECTIVE APERTURE (percentage)		
	Sidelighting from fenestration in a wall	Sidelighting from rooftop monitor	Toplighting
A <sup>a</sup>	12.5	5.0	1.0
B <sup>b</sup>	15.0	6.0	1.2
C <sup>c</sup>	20.0	8.0	2.2

- a. Sky Type A – more than 75 percent mean sunshine, in accordance with the NOAA Annual Mean Sunshine Percentage Table.
- b. Sky Type B – 45 percent to 75 percent mean sunshine, in accordance with the NOAA Annual Mean Sunshine Percentage Table.
- c. Sky Type C – less than 45 percent mean sunshine, in accordance with the NOAA Annual Mean Sunshine Percentage Table.

**SECTION 809  
INDOOR ENVIRONMENT QUALITY COMPLETION  
AND COMMISSIONING**

**809.1 IEQ systems completion.** Within 60 days from approval conducting the final inspection, the *registered design professional* shall provide evidence of completion of the indoor environment systems installation to the *code official*, in accordance with the requirements of this chapter and Table 809.1.

**809.2 Indoor Environmental Systems Commissioning.** Commissioning of indoor environmental systems shall be in accordance with Section 903.

**809.3 Indoor Environmental Systems Operations and Maintenance Documents.** Operations and maintenance documents for equipment, products and systems shall be provided in accordance with Section 904.

**TABLE 809.1  
INDOOR ENVIRONMENTAL QUALITY SYSTEMS COMPLETION PLAN**

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
<b>Chapter 8: IEQ</b>					
Building construction, features, operations and maintenance facilitation					
Air handling system access (also a Cx requirement in chapter 9)	Field observation	During installation	None	<b>Designer of Record</b>	802.2 and Ch 9
	Verification	During commissioning	None	<b>CxA</b>	
Air handling system filters (also a Cx requirement in chapter 9)	Field observation	During installation	None	<b>Designer of Record</b>	802.3 and Ch 9
	Verification	During commissioning	None	<b>CxA</b>	
HVAC Systems					
Temperature and humidity in occupied spaces (also a Cx requirement in chapter 9)	Verification	None	Monthly for 12 months	<b>CxA</b>	803.2 and Ch 9
Specific indoor air quality & pollutant control measures					
Listing, installation and venting of fireplaces and combustion appliances	Field observation and verification	During installation and prior to occupancy	None	<b>Designer of Record</b>	804.1





## CHAPTER 9

# COMMISSIONING, INSPECTIONS, OPERATION AND MAINTENANCE

### SECTION 901 GENERAL

**901.1 Scope.** The provisions of this chapter are intended to facilitate the pre- and post-occupancy commissioning, operation and maintenance of buildings constructed in accordance with this code in a manner that is consistent with the intent of other provisions of this code, and to further that goal through the education of building owners and maintenance personnel with regard to related best operating and management practices.

### SECTION 902 COMMISSIONING AUTHORITY

#### 902.1 Third Party Commissioning Authority

**902.1.1 Independence.** The Commissioning Authority shall be a competent and objective, third party employed directly by the owner, independent from the architect and engineer of record, as well as the contractor responsible for the work being inspected. The Commissioning Authority shall disclose possible conflicts of interest so that objectivity can be confirmed.

**902.1.2 Equipment.** The Commissioning Authority shall have adequate equipment to perform the required commissioning. The equipment shall be periodically calibrated.

**902.1.3 Personnel.** The Commissioning Authority shall employ experienced personnel educated in conducting, supervising and evaluating tests and commissioning.

### SECTION 903 COMMISSIONING

**903.1 General.** Where application is made for construction as described in this section, the Commissioning Authority shall perform commissioning during construction and after occupancy as required by this Section and Table 903.1. The Commissioning Authority shall be qualified and shall demonstrate competence, to the satisfaction of the *code official*, for the commissioning of the particular type of construction or operation. The registered design professional in responsible charge and engineers of record involved in the design of the project are not permitted to act as the Commissioning Authority. The Commissioning Authority shall provide written documentation to the *code official upon request* demonstrating competence and relevant experience or training. Experience or training shall be considered relevant where the documented experience or training is related

in complexity to the same type of commissioning activities for projects of similar complexity and material qualities.

**903.1.1 Preoccupancy report requirement.** The Commissioning Authority shall keep records of the commissioning required by this Section. The Commissioning Authority shall furnish commissioning reports to the Owner and the registered design professional in responsible charge and, upon request, to the *code official*. Reports shall indicate that work was or was not completed in conformance to the *Owner's Project Requirements (OPR)*. Discrepancies shall be brought to the immediate attention of the Owner for correction. Where discrepancies are not corrected, they shall be brought to the attention of the owner, *code official* and to the registered design professional in responsible charge prior to the completion of that phase of the work. Prior to the issuance of a Certificate of Occupancy, a preliminary commissioning report shall be provided to the Owner and the registered design professional in responsible charge and, upon request, to the *code official*.

**903.1.2 Post-occupancy report requirement.** Post-occupancy commissioning shall occur as specified in the applicable sections of this code. A post-occupancy commissioning report shall be provided to the owner within 12 months after the Certificate of Occupancy is issued for the project and shall be made available to the code official and registered design professional in responsible charge upon request.

**903.2 Commissioning.** For buildings that exceed 5000 ft<sup>2</sup> (500 m<sup>2</sup>) of gross floor area, commissioning shall be performed in accordance with this section using generally accepted engineering standards and handbooks acceptable to the code official. Buildings undergoing the commissioning process will be deemed to comply with the requirements of Section 10.3.1.1, "Building Acceptance Testing." A commissioning process shall be incorporated into the predesign, design, construction, and first year occupancy of the building project that verifies that the delivered building and its components, assemblies, and systems comply with the documented OPR. Procedures, documentation, tools, and training shall be provided to the building operating staff to sustain features of the building assemblies and systems for the service life of the building. This material shall be assembled and organized into a systems manual that provides necessary information to the building operating staff to operate and maintain all commissioned systems identified within the building project.

**TABLE 903.1  
COMMISSIONING PLAN**

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
<b>Chapter 4: Site development and land use</b>					
Landscape irrigation systems	Field Observation	Installation	None	<b>Designer of Record</b>	404.1, 405.1.1
	Verification	Prior to Occupancy	None	<b>CxA</b>	
Vegetative Roofs	Field Observation	Installation	None	<b>Designer of Record</b>	408.3.2
	Verification	Prior to Occupancy	None	<b>CxA</b>	
	Maintenance Plan	None	24 months	<b>Owner</b>	
Site Lighting	Field Observation	Installation	None	<b>Designer of Record</b>	409
	Verification	Prior to Occupancy	None	<b>CxA</b>	
<b>Chapter 5: Material Resource Conservation and Efficiency</b>					
4. Under slab water vapor protection	Field Observation	Periodic observation for the entire slab footprint.	None	<b>Designer of Record</b>	507.1 and IBC Ch 19
	Verification	Installation	None	<b>CxA</b>	ASTM E 1643
5. Flashing at: Windows, exterior doors, skylights, wall flashing and drainage systems.	Field Observation	Periodic observation for not less than 25% of all flashing locations.	None	<b>Designer of Record</b>	507.1 and IBC Ch 14
	Testing	Installation	None	<b>CxA</b>	ASTM E 2813
<b>Chapter 6 - Energy</b>					
Energy consumption, monitoring, targeting and reporting					
a. Energy Metering, Monitoring system	Field Observation	During installation	None	<b>Designer of Record</b>	603
	Testing & Verification	During commissioning	None	<b>CxA</b>	
b. Calibration	Testing & Verification	During commissioning	None	<b>CxA</b>	603
	Maintenance Plan	None	Annually	<b>Owner</b>	
Mechanical systems – buildings over 5,000 square feet total building floor area					
a. Commissioning required and noted in plans and specifications	Verification of construction documents	Plan review	None	<b>CxA</b>	611
b. Documentation of required commissioning outcomes	Final Cx Report	Subsequent to completion of all commissioning activities	None	<b>CxA</b>	611

COMMISSIONING, INSPECTIONS, OPERATION AND MAINTENANCE

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
c. Preparation and availability of a commissioning plan	Report	Between plan review and commissioning initiation	None	CxA	611
d. Balance HVAC systems (both air and hydronic)	Field Observation	During installation	None	Designer of Record	611
	Verification	During Commissioning	None	CxA	
e. Functional performance testing of HVAC equipment	Testing and report	After installation of HVAC systems and prior to occupancy	TBD	CxA	611
f. Functional performance testing of HVAC controls and control systems	Testing and report	After installation of HVAC systems and prior to occupancy	TBD	CxA	611
g. Preparation of preliminary commissioning report	Report	None	Subsequent to commissioning	CxA	611
i. Verify final HVAC system completion documentation including as-built drawings, O&M manuals and balancing reports	Submittal Review	None	Within 90 days of certificate of occupancy	Designer of Record	611
	Verification	None	Within 90 days of certificate of occupancy	CxA	
<b>Chapter 6 - Lighting</b>					
Plug load controls	Field Observation	During installation	None	Designer of Record	608.6
	Verification	During Commissioning	None	CxA	
Connection of appliances to switched receptacles	Verification	Final Inspection	None	CxA	608.6
	Verification	None	Annually	Owner	
Specified transformer nameplate efficiency rating	Field Observation	Final Inspection	None	Designer of Record	608.8.1.1
	Verification	During commissioning	None	CxA	
Verification of lamp	Field Observation	During installation	None	Designer of Record	608.10
	Verification	During Commissioning	None	CxA	
Verification of ballast	Field Observation	During installation	None	Designer of Record	608.10
	Verification	During Commissioning	None	CxA	
<b>Lighting Controls</b>					
a. Installation	Field Observation	During installation	None	Designer of Record	608.11
	Testing & Verification	During Commissioning	None	CxA	

Construction or System requiring Verification	Method	Occurrence		Responsible Party	Section Reference Standard
		Preoccupancy	Post-occupancy		
b. Calibration	Testing & Verification	During Commissioning	None	<b>CxA</b>	611.3.3
	Maintenance Plan	None	Annually	<b>Owner</b>	
<b>Chapter 7: Water</b>					
Hot water distribution	Field observation	During installation	None	<b>Designer of Record</b>	702.8
	Verification	During commissioning	None	<b>CxA</b>	
Cooling tower performance	Testing & verification	During commissioning	None	<b>CxA</b>	703.7.7
Rainwater system water quality	Testing & verification	During commissioning	None	<b>CxA</b>	707.15.1
	Maintenance Plan	None	Annually	<b>Owner</b>	
Gray water system water quality	Testing & verification	During commissioning	None	<b>CxA</b>	708.13.8
	Maintenance Plan	None	Annually	<b>Owner</b>	
<b>Chapter 8: IEQ</b>					
Building construction, features, operations and maintenance facilitation					
Air handling system access	Field observation	During installation	None	<b>Designer of Record</b>	802.2
	Verification	During commissioning	None	<b>CxA</b>	
Air handling system filters	Field observation	During installation	None	<b>Designer of Record</b>	802.3
	Verification	During commissioning	None	<b>CxA</b>	
<b>HVAC Systems</b>					
Temperature and humidity in occupied spaces	Field inspection and verification	None	Monthly for 12 months	<b>CxA</b>	803.2

**903.2.1 Activities prior to building permitting.** The following activities shall be completed:

- a) Designate a project *commissioning authority* (CxA) to lead, review, and oversee completion of the *commissioning process* activities prior to completion of schematic design.
- b) The *owner*, in conjunction with the Commissioning Authority and design team as necessary, shall develop the OPR during predesign and updated during the design phase by the design team as necessary, in conjunction with the *owner* and the commissioning team. The OPR will be distributed to all parties participating in project programming, design, construction, and operations, and the commissioning team members.
- c) The design team shall develop the design engineer's basis of design (BOD.) The BOD document shall include all the information required in Section 6.2, "Documentation," of ANSI/ASHRAE Standard 55-2010.
- d) The CxA shall review both the OPR and BOD to ensure that no conflicting requirements or goals exist and that the OPR and BOD, based on the professional judgment and experience of the CxA, are sufficiently detailed for the project being undertaken.
- e) Construction phase commissioning requirements shall be incorporated into project specifications and other construction documents developed by the design team.

- f) The CxA shall conduct two focused commissioning reviews of the construction documents: the first at near 50% design completion and the second of the final construction documents prior to delivery to the contractor preconstruction 128 certification. The purpose of these reviews is to verify that the documents achieve the construction phase OPR and the BOD, with sufficient details.
- g) Develop and implement a *commissioning plan* containing all required forms and procedures for the complete testing of all equipment, systems, and controls included in Section 10.3.1.2.4.

**903.2.2 Activities prior to building occupancy.** The following activities shall be completed:

- a) Verify the installation and performance of the systems to be commissioned, including completion of the *construction checklists* and start-up *verification checks*.
 

**Exception to 903.3.1.2.2(a):** Systems that, because their operation is seasonally dependent, cannot be fully commissioned in accordance with the *commissioning plan* at time of occupancy. These systems shall be commissioned at the earliest time after occupancy when operation of systems is allowed to be fully demonstrated as determined by CxA.
- b) It shall be verified that the owner requirements for the training of operating personnel and building occupants is completed. Where systems cannot be fully commissioned at the time of occupancy because of seasonal dependence, the training of personnel and building occupants shall be completed when the systems' operation can be fully demonstrated by the CxA.
- c) Complete preliminary commissioning report.
- d) Verify a system manual has been prepared that includes O&M documentation, full warranty information, and provides operating staff the information needed to understand and operate the commissioned systems as designed.

**903.2.3 Post-occupancy activities.** Complete the following:

- a) Complete any commissioning activities called out in the *commissioning plan* for systems whose commissioning can only be completed subsequent to building occupancy, including trend logging and off-season testing.
- b) Verify the *owner* requirements for training operating personnel and building occupants are completed for those systems whose seasonal operational dependence mean they were unable to be fully commissioned prior to building occupancy.
- c) Complete a final commissioning report.

**903.2.4 Systems.** Systems listed in Table 903.1, if including in the *building project*, shall be commissioned.

**903.2.5 Documentation.** *Owner* shall retain the System Manual and Final Commissioning Report.

## SECTION 904 BUILDING OPERATIONS AND MAINTENANCE

**904.1 General.** Building operations and maintenance documents in accordance with Section 904.3 shall be submitted to the owner prior to the issuance of the Certificate of Occupancy. Record documents shall be in accordance with Section 904.2. The building owner shall file a letter with the *code official* certifying the receipt of record documents and building operations and maintenance documents. At least one copy of these materials shall be in the possession of the owner and at least one additional copy shall remain with the building throughout the life of the structure.

**904.2 Record documents.** The cover sheet of the record documents for the project shall clearly indicate that at least one copy of the materials shall be in the possession of the owner. Record documents shall include all of the following:

1. Copies of the *approved* construction documents, including plans and specifications.
2. As-built plans and specifications indicating the actual locations of piping, ductwork, valves, controls, equipment, access panels, lighting and other similar components where they are concealed or are installed construction documents.
3. Final air and water side systems test, adjust and balance report describing activities and measurements completed in accordance with Section 611.3.
4. Final systems sequences of operation as documented upon the completion of functional performance testing.
5. For sites that have previously been a *brownfield*, or required environmental corrective action, remediation or restoration at the federal, state or local level, copies of engineering and institutional control information shall be provided.
6. A copy of the Certificate of Occupancy.

**904.3 Building operations and maintenance documents.** The building operations and maintenance documents shall consist of manufacturer's specifications and recommendations, programming procedures and data points, narratives, and other means of illustrating to the owner how the building, site and systems are intended to be maintained and operated. The following information shall be included in the materials, as applicable to the specific project:

1. Directions to the owner or occupant on the manual cover sheet indicating that at least one copy of the materials shall be in the possession of the owner or occupant.
2. Operations and maintenance manuals for equipment, products and systems installed under or related to the provisions of Chapter 4 including, but not limited to, the following, as applicable:

- 2.1. Vegetative shading, vegetative roofs and natural resource protections and setbacks.
- 2.2. Water-conserving landscape and irrigation systems.
- 2.3. Stormwater management systems.
- 2.4. Permanent erosion control measures.
- 2.5. Landscape or tree management plans.
- 3. Operations and maintenance documents for materials, products, assemblies and systems installed under or related to the provisions of this code for material resource conservation in accordance with Chapter 5 including, but not limited to, the following, as applicable:
  - 3.1. Care and maintenance instructions and recommended replacement schedule for flooring, including, but not limited to, carpeting, walk-off mats and tile.
  - 3.2. Care and maintenance instructions for natural materials including, but not limited to, wood, bio-based materials and stone.
  - 3.3. Available manufacturer's instructions on maintenance for:
    - 3.3.1. Roof coverings.
    - 3.3.2. Exterior doors, windows, and skylights.
  - 3.4. Information on and recommended schedule for required routine maintenance measures, including, but not limited to, painting and refinishing.
- 4. Operations and maintenance documents for equipment, products and systems installed under or related to the provisions of this code for energy conservation in accordance with Chapter 6 including, but not limited to, the following:
  - 4.1. Heating, ventilating and air-conditioning systems including:
    - 4.1.1. Recommended equipment maintenance schedule.
    - 4.1.2. Air filters and fluid filters, including recommended replacement schedule and materials.
    - 4.1.3. Time clocks, including settings determined during commissioning.
    - 4.1.4. Programmable controls and thermostats, including settings determined during commissioning.
  - 4.2. Domestic hot water systems including performance criteria and controls.
  - 4.3. Building thermal envelope systems including:
    - 4.3.1. Glazing systems inspection schedule.
    - 4.3.2. Performance criteria for replacements and repairs.
    - 4.3.3. Information and recommended schedule on required routine maintenance measures, including but not limited to, sealants, mortar joints and screens.
  - 4.4. Electrical and lighting systems including:
    - 4.4.1. Technical specifications and operating instructions for installed lighting equipment.
    - 4.4.2. Luminaire maintenance and cleaning plan.
    - 4.4.3. Lamp schedule, recommended relamping plan, and lamp disposal information.

# CHAPTER 10

## EXISTING BUILDINGS

### SECTION 1001 GENERAL

**1001.1 Scope.** The provisions of this chapter shall control the alteration, repair, addition, maintenance and operation and change of occupancy of existing buildings and structures. Relocated existing buildings shall comply with Chapters 4 and 10. Existing building sites shall comply with Chapter 11.

**1001.2 Building operation and maintenance.** Previously commissioned buildings and parts thereof, shall be operated and maintained in conformance to the code edition applicable at the time of construction. The owner shall be responsible for the operation and maintenance of existing buildings. The requirements of this chapter shall not provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures.

**1001.2.1 Public Schools and Buildings O&M.** Public schools and buildings are to be operated and maintained in accordance with the *REGIONAL OPERATIONS & MAINTENANCE GUIDE FOR HIGH PERFORMANCE SCHOOLS & PUBLIC BUILDINGS IN THE NORTHEAST & MID-ATLANTIC* published and maintained by the Northeast Energy Efficiency Partnerships, and available for download on their website.

**1001.3 Compliance.** Alterations, repairs, additions and changes of occupancy to existing structures shall comply with the provisions of this chapter. Where such permitted work other than a change of occupancy is undertaken, compliance with Sections 1001.3.1, 1001.3.2 and 1001.3.3 shall be required.

#### Exceptions:

1. Where the application of the requirements of Sections 1001.3.1, 1001.3.2 and 1001.3.3 to the unaltered spaces are determined by the code official to be infeasible based upon the existing configuration of spaces.
2. Materials, assemblies and components regulated by Sections 1001.3.1, 1001.3.2 and 1001.3.3 that are dependent upon properties of other concealed materials, assemblies or system components to function properly and where the properties of the concealed materials, assemblies or components are unknown or insufficient and will not be revealed during construction.
3. Where a tenant in a multi-tenant building does not have control within that tenant space of a complete system or item, compliance for that complete system or item shall not be required.

**1001.3.1 Heating, ventilating and air conditioning.** Heating, ventilating and air-conditioning systems and equipment shall be in accordance with the following:

1. Nonfunctioning thermostats shall be repaired or replaced.
2. Leaking accessible supply air and return ducts shall be sealed in accordance with Section 606.3 with approved sealants. Although the presence of existing duct tape shall not be deemed to indicate noncompliance where a duct is not leaking, duct tape shall not be acceptable for repair of such a leak.
3. Outside air dampers, damper controls and linkages controlled by HVAC units shall be in good repair and adjustment.
4. Hot water and steam leaks, defective steam traps and radiator control, relief, and vent valves in accessible piping shall not be permitted in any accessible piping.
5. Leaking accessible chilled water lines and equipment shall be repaired or replaced.
6. The programming of the building management systems (BMS) shall be tested and verified to confirm that schedules, alarms, lockouts and other performance algorithms operate as intended for the building.
7. Furnace combustion units shall have been cleaned and tuned within one year prior to the alteration. Filters shall be replaced in accordance with the furnace manufacturer's recommendations.
8. Chiller systems shall have been cleaned and tuned within one year prior to the alteration.
9. For motor-driven systems and equipment, filters shall be cleaned or replaced, and belts and other coupling systems shall be repaired.

**1001.3.2 Service water systems.** Defective hot and cold water piping and equipment within service water systems shall be repaired or replaced as follows:

1. The water supply shall meet the minimum flow and temperature requirements of the *International Plumbing Code* or the code in force at the time the building was constructed.
2. Leaking pipes, valves and equipment shall be repaired or replaced.

**1001.3.3 Motor-driven equipment.** Leaking equipment in compressed air or pumped water systems shall be repaired or replaced.

**1001.4 Existing materials, assemblies, configurations and systems.** Materials, assemblies, configurations and



systems already in use that conform to requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the *code official* to be dangerous to the environment, life, health or safety. Where such conditions are determined to be dangerous to the environment, life, health or safety, they shall be mitigated or made safe.

**SECTION 1002  
ADDITIONS**

**1002.1 General.** Additions to any site-built building or structure shall comply with the requirements of this code for new construction. Any addition to a modular building that is relocated within or into a jurisdiction that is in compliance with requirements or approvals in effect at the time of its construction shall comply with Section 1002 of this code.

**SECTION 1003  
ALTERATIONS TO EXISTING BUILDINGS**

**1003.1 General.** Alterations to existing buildings and building systems shall be in accordance with the provisions of this code for those assemblies, systems and components being altered. Unaltered portions, components and systems of the building, including relocated modular buildings, shall be in accordance with the provisions of the code in force at the time of their construction. Alterations shall not be made to an existing building or structure that will cause the existing building or structure to be in violation of any provisions of this code.

**1003.2 Requirements for Alterations.** Alterations of portions or components of buildings shall comply with Sections 1001.3 and 1003.2.1 through 1003.2.7.

**Exceptions:**

1. The total cost of improvements required by Sections 1003.2.1 through 1003.2.7 shall not be required to exceed 10 percent of the costs of the alterations exclusive of land and building site improvements. The costs of alterations shall include costs related to Section 1001.3, but shall not limit its application.
2. This section shall not require compliance that exceeds that required for systems regulated by Chapters 6 through 8 of this code.
3. Materials, assemblies and components are not required to comply with Sections 1003.2.1 through 1003.2.7 where they are dependent upon properties of other concealed materials, assemblies or system components to function properly and where the materials, assemblies or components will not be revealed during construction.
4. Alterations are not required to comply with the requirements of Sections 1003.2.1 through 1003.2.7 where the *code official* determines the alterations to be *infeasible* based upon the existing configuration of spaces, unless those spaces or portions thereof will be reconfigured as part of the alteration project.

5. Where a tenant in a multi-tenant building does not have control within that tenant space of a complete system or item, compliance for that complete system or item shall not be required.
6. Where the total cost of the alteration to the existing building is less than the percent of the value of the building as indicated in Table 1003.2, compliance with Sections 1003.2.1 through 1003.2.7 shall not be required. The percent value of the building shall be determined by the original construction cost plus completed improvement costs of the building.

**TABLE 1003.2  
MINIMUM VALUES FOR ADDITIONAL  
REQUIREMENTS TO ALTERATIONS**

BUILDING SIZE (square feet)	PERCENT OF BUILDING VALUE
Less than 5,000	20
5,000 – 50,000	10
50,001 – 500,000	1
Over 500,000	0

For SI: 1 square foot = 0.0929 m<sup>2</sup>.

**1003.2.1 Metering devices.** Dedicated individual utility or private metering devices that measure and verify energy or water use within the building or space shall be provided for at least one of the following for each type of energy used in the building:

1. Electrical energy consumption for individual tenant spaces.
2. Water consumption for individual tenant spaces.
3. Natural gas, propane or fuel oil consumption for individual tenant spaces.
4. Lighting.
5. Motors and drives.
6. Chiller load efficiency.
7. Cooling system.
8. Economizer and heat recovery systems.
9. Boiler/furnace efficiency.
10. Building process systems and equipment.
11. Water consumption for landscape irrigation.
12. Heating system.
13. Water consumption for heating and cooling equipment.
14. Water consumption for building process systems and equipment.

**Exception:** Metering devices are not required for buildings that are less than 25,000 square feet (2323 m<sup>2</sup>) in *total building floor area*.

**1003.2.2 Heating, ventilating and air-conditioning.** Heating, ventilating and air-conditioning systems and equipment shall be in accordance with the following:

1. Furnace systems shall be cleaned and tuned as part of the alteration work. Filters shall be replaced in

## EXISTING BUILDINGS

accordance with the furnace manufacturer's recommendations.

**Exception:** Furnace combustion units that have been cleaned and tuned within one year prior to alteration.

2. Each heating and cooling system shall be provided with thermostatic controls. Time clock and time switch controls that can turn systems off and on according to building occupancy requirements shall be provided and connected to the following HVAC equipment: chillers and other space-cooling equipment, chilled water pumps, boilers and other space-heating devices, hot water pumps, heat exchanger circulation pumps, supply fans, return fans, and exhaust fans. Where occupant override is provided, it shall be designed with a timer to automatically revert to time clock and time switch controls in not longer than 12 hours.

**Exception:** A time clock or time switch controls shall not be required for spaces where any of the following conditions exist:

1. A time clock is not required by Section C403.2.4.2 of the *International Energy Conservation Code*.
  2. There are 24-hour occupancy materials with special atmospheric requirements dependent on 24-hour space conditioning.
  3. A majority of the areas of the building served by the system are under setback thermostat control.
  4. Manufacturer's specifications stipulate that the system must not be shut off.
  5. Group I-2 occupancies.
3. Functional outside air economizers shall be provided on all cooling systems of more than 4 ½ tons (54,000 Btu/h) total cooling capability, or more than 1800 cfm (9.144 m<sup>3</sup>/s) air flow, provided manufacturer's guidelines are available for adding the economizer to the existing system.

**Exception:** An outside air economizer shall not be required for buildings or special uses where 100 percent outside air for ventilation is required or where any of the following conditions exist:

1. Section C403.3 of the *International Energy Conservation Code* would not require an economizer.
2. The existing system has a water-based economizer.
3. The existing system does not have an outside air intake.
4. Special economizer operations such as, but not limited to, carefully controlled humidity would require more energy use than is conserved.

5. There is insufficient space to install necessary equipment.

6. Installation of an economizer would require major modifications to the building's life safety system.

7. The existing system is a multi-zone system where the same intake air is used at the same time for either heating or cooling in different parts of the building.

4. HVAC piping and ducts, including those located above suspended ceilings, shall comply with Sections 606.3 and 606.4.

**Exception:** Additional insulation shall not be required for piping where any of the following conditions exist:

1. Additional insulation shall not be required for piping where any of the following conditions exist:

- 1.1. It is located within HVAC equipment;

- 1.2. It is located within conditioned space that conveys fluids between 60°F (15.6°C) and 105°F (40.6°C); and

- 1.3. Piping that is already insulated and the insulation is in good condition; or

2. Where HVAC ducts and piping are installed in a building cavity or interstitial framing space of insufficient width to accommodate the duct or pipe and the insulation required by Section 606.3 and Table 606.4, the insulation thickness shall be permitted to have the maximum thickness that the wall can accommodate, but shall not be less than 1/4-inch (12.7 mm) thick.

5. Where central heat is intended to be replaced with individual electric space heaters, the application for the electrical permit shall include documentation demonstrating that the new electric heaters will not consume more energy than the existing nonelectric heaters.

6. Boiler systems shall have been cleaned and tuned within one year prior to the alteration. Boilers shall be equipped with an outdoor air lockout thermostat or a temperature reset control.

7. Chiller systems shall be cleaned and tuned as part of the alteration work. Chillers shall be equipped with an outdoor air lockout thermostat and chilled water reset control.

**Exception:** Chiller systems that have been cleaned and tuned within one year prior to the alteration shall not be required to be cleaned and tuned.

8. A maximum 5-year phase out plan shall be provided for buildings with existing systems that use CFC-based refrigerants.
9. Where mechanical and electrical systems and equipment are joined with microprocessors that communicate with each other or to a computer, a properly integrated building automation system shall be installed to optimize energy, operations, and indoor comfort. The building automation system shall:
  - 9.1. Allow the owner to set up schedules of operation for the equipment and provide equipment optimal start with adaptive learning;
  - 9.2. Provide trim and respond capabilities based on zone demand;
  - 9.3. Offer the ability to monitor energy usage, including the ability to meter electric, gas, water, steam, hot water, chilled water, and fuel oil services;
  - 9.4. Offer economizing based on enthalpy calculation and/or CO<sub>2</sub> set point control;
  - 9.5. Offer load shedding when power companies are at peak demand and need; and
  - 9.6. Offer the ability to send alarms to alert the building owner, manager, or operator when problems occur because of system failures.

**1003.2.3 Service water systems.** Service water systems and equipment shall be in accordance with the following:

1. Water heater and hot water storage tanks shall have a combined minimum total of external and internal insulation value of R-16.
2. Showerhead, toilet, urinal and faucet flow rates shall be in accordance with this code.

**1003.2.4 Lighting.** Lighting systems and equipment shall be in accordance with Sections C405.2.2 and C405.2.4 of the *International Energy Conservation Code*.

**1003.2.5 Swimming pools and spas.** Swimming pools and spas and their equipment shall be in accordance with the following:

1. Outdoor heated pools and outdoor permanent spas shall be provided with a vapor retardant cover or other approved vapor retardant means in accordance with Section 105.1.
 

**Exception:** Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.
2. Backwash systems shall be based on pressure drop and shall not be based on a timer.
3. Pool and spa recirculation pumps shall be under timeclock control.

**Exception:** Filtration pumps where the public health standard requires 24-hour pump operation.

4. Heaters shall have been cleaned and tuned for efficiency within one year prior to the alteration. Where this has not been done, the heaters shall be cleaned and tuned as part of the alteration work.

**1003.2.6 Insulation of unconditioned attics.** In buildings with three or fewer stories above grade plane, ceiling insulation with a minimum R-value as required by this code shall be installed in accessible attic spaces that are directly above conditioned spaces. For the purposes of this section, accessible attic space is the space between ceiling joists and roof rafters where the vertical clear height from the top of a ceiling joist or the bottom chord of a truss, to the underside of the roof sheathing at the roof ridge, is greater than 24 inches (610 mm). Where the required R-value insulation cannot fit in the attic space, the maximum amount of insulation compatible with available space and existing uses shall be installed.

**1003.2.7 Roof replacement insulation.** For roof replacement on an existing building with insulation entirely above the deck and where the roof slope is less than two units vertical in 12 units horizontal (16-percent slope), the insulation shall conform to the energy conservation requirements for insulation entirely above deck in the *International Energy Conservation Code*.

**Exception:** Where the required R-value cannot be provided because of thickness limitations presented by existing rooftop conditions, including heating, ventilating and air-conditioning equipment, low door or glazing heights, parapet heights, or proper roof flashing heights, the maximum thickness of insulation compatible with the available space and existing uses shall be installed.

**1003.2.8 Air barriers for roof repair, roof recover and roof replacement.** For buildings where the energy use is not increased, air barriers shall not be required for roof repair, roof recover, and roof replacement where the alterations, renovations or repairs to the building do not also include alteration, renovations or repairs to the remainder of the building envelope.

## SECTION 1004 CHANGE OF OCCUPANCY

**1004.1 Change of occupancy.** Where a change in occupancy of a building or tenant space places it in a different group of the same occupancy classification or in a different occupancy classification, as determined in accordance with the provisions of the *International Building Code*, compliance with Sections 1001.3.1, 1001.3.2 and 1001.3.3 shall be required.

**Exception:** Historic buildings in accordance with Section 1005 shall not be required to comply with Section 1004.

## SECTION 1005 HISTORIC BUILDINGS

**1005.1 Historic buildings.** Provisions of this code relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy, shall not be mandatory for historic buildings provided that a report has been submitted to the code official and signed by a registered design professional, or a representative of the State Historic Preservation Office or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric or function of the building.

## SECTION 1006 DEMOLITION

**1006.1 Deconstruction and demolition material and waste management plan.** Where buildings, structures or portions thereof are deconstructed or demolished, a minimum of 50 percent of materials shall be diverted from landfills. A construction material and waste management plan shall be developed that is in accordance with Section 503.1, that includes procedures for deconstruction, and that documents the total materials in buildings, structures and portions thereof to be deconstructed or demolished and the materials to be diverted.

### Exceptions:

1. Where the scope of work is not adequate to feasibly separate materials.
2. Where recycling facilities do not exist within 75 miles (120 km) of a facility.

## SECTION 1007 JURISDICTIONAL REQUIREMENTS

**1007.1 General.** Sections 1007.2 and 1007.3 shall be mandatory and enforced only where specifically indicated by the jurisdiction in Table 302.1.

**1007.2 Evaluation and certification of existing buildings and building sites.** Where this section is indicated to be applicable in Table 302.1, building owners shall be allowed to submit a permit application for the evaluation of an existing building and building site. The building official shall determine whether the building and building site comply with the requirements of this code as applicable to a new project. The evaluation shall be in accordance with the requirements of this section.

**1007.2.1 Certificate of compliance.** Where the code official determines that the building and building site comply with the requirements of this code as applicable to a new building, the code official shall issue a certificate indicating compliance to this code, subject to Sections 1007.2.2 through 1007.2.3.2.

**1007.2.2 Specific exclusions.** Existing buildings evaluated under Section 1007.2 are not subject to the following requirements:

1. Section 806.

2. Provisions of this code related to the project's construction phase, including Sections 401.2, description of changing uses and major upgrades over the building's lifetime for which a certificate of occupancy was previously issued shall be deemed an acceptable indication of materials, assemblies and equipment in concealed spaces, except where field inspection reveals sufficient evidence suggesting non-compliance, subject to the evaluation of the *code official*.

### **1007.2.3 Previously approved documents not available.**

Where previously *approved* construction documents for the initial construction of an existing project are not available, materials, assemblies and equipment in spaces in existing buildings and existing portions thereof that are concealed, including, but not limited to, materials in spaces within walls and floor/ceiling assemblies, shall be exposed and spot checked in limited areas as determined by the *code official*.

### **1007.3 Post-certificate of occupancy annual net energy use, energy demand, and CO<sub>2</sub>e emissions reporting.**

Where the jurisdiction indicates in Table 302.1 that ongoing post-certificate of occupancy annual net energy use, energy demand and CO<sub>2</sub>e emissions reporting is required, and where the jurisdiction has indicated in Table 302.1 that enhanced energy performance in accordance with Section 302.1 is required, annual net energy use, energy demand, and CO<sub>2</sub>e emissions reporting shall be provided in accordance with this section.

**1007.3.1 Purpose.** The purpose of this section is to provide for the uniform reporting and display of the total annual net energy use, peak demand for each energy form and emissions associated with building operations and building sites.

**1007.3.2 Intent.** The intent of these requirements is to provide for the ongoing reporting and display of the total annual net energy use, peak energy demand and emissions associated with operation of the building and its systems to document ongoing compliance with the provisions of Sections 601 and 602.

**1007.3.3 Reporting.** The construction documents shall include procedures for the building owner to enter the building annual net energy consumption data from Section 603 into an *approved* tracking program to track building performance. For building parameters including, but not limited to, number of occupants, hours of operation and number of computers, use actual average values.

The tracking program output, including annual energy use and CO<sub>2</sub>e emissions, shall be reported by the building owner or the building owner's authorized agent to the code official.

Where there are multiple buildings on a building site, each building shall have its energy and CO<sub>2</sub>e emissions reported separately. Where there are energy uses associated with the building's site other than the buildings on the site, the site energy and CO<sub>2</sub>e emission reports shall be reported separately. The report shall be based upon the energy use of the previous year and shall be reported on, or before, March 1<sup>st</sup> of the following year.



# CHAPTER 11

## EXISTING BUILDING SITE DEVELOPMENT

### SECTION 1101 GENERAL

**1101.1 Scope.** The provisions of this chapter shall control the alteration, repair, maintenance and operation of existing building sites and the alteration to building site improvements. Chapter 11 applies where building site improvements are being made, or where additions are made to, or changes of occupancy occur within, the existing buildings on the site.

**1101.2 Operation and maintenance.** Building sites shall be operated and maintained in conformance to the code edition under which the site improvements were installed. The owner or the owner's authorized agent shall be responsible for the operation and maintenance of building sites. To determine compliance with this section, the *code official* shall have the authority to require a building site to be reinspected. The requirements of this chapter shall not provide the basis for removal or abrogation of protections or systems from existing building sites.

**1101.3 Compliance.** Alterations and repairs to building sites shall comply with the provisions of this code unless provided otherwise in this chapter. Where differences occur between the provisions of this code and the provisions of other locally adopted land use, zoning or site development regulations, the provisions of the most restrictive code or regulation shall apply.

**1101.4 Building site materials, systems and landscaping.** Building materials used for building site development shall comply with the requirements of this section.

**1101.4.1 Existing materials, assemblies, configurations and systems.** Materials and systems already in use on a building site in compliance with the requirements or approvals in effect at the time of their installation shall be permitted to remain in use unless determined by the *code official* to be unsafe or dangerous. Where such conditions are determined to be unsafe, they shall be mitigated or made safe.

Existing buildings and site improvements located within or located closer to protected areas than permitted by Section 402.1 but that are in compliance with the requirements or approvals in effect at the time of their installation shall be permitted to remain in use unless determined by the *code official* to be unsafe or dangerous. Where such conditions are determined to be unsafe or dangerous, they shall be mitigated or made safe.

**1101.4.2 New and replacement materials, assemblies, configurations and systems.** Except as otherwise required or permitted by this code, materials, assemblies, configurations and systems permitted by the applicable code for new construction shall be used. Like materials

shall be permitted for repairs and alterations provided a hazard to life, health or property is not created. Hazardous materials shall not be used where the code for new construction would not permit their use at building sites of similar occupancy, purpose and location.

### SECTION 1102 ADDITIONS

**1102.1 General.** Additions to any building site improvements shall comply with the requirements of this code for new construction. Unaltered portions of a building site shall be in accordance with the provisions of the code in force at the time of their construction.

Where additions to a building, or additions to building site improvements result in the alteration of existing portions or improvements of the building site, those alterations shall comply with this section and Section 1103.

Additions to an existing building site shall be made to ensure the following:

1. Existing building site improvements together with the additional or expanded improvements are not less conforming to the provisions of this code than the existing building site was prior to the addition; and
2. Where additions to any building reduces, or requires alteration to, building site improvements, the alterations to the building site together with unaltered site improvements shall not be less conforming to the provisions of this code prior to the addition to the building or structure.

### SECTION 1103 ALTERATIONS TO EXISTING BUILDING SITES

**1103.1 General.** Alterations to existing portions or site improvements on building sites shall be in accordance with the provisions of this code for those portions or building site improvements being altered. Unaltered portions and site improvements of the building site shall be in accordance with the provisions of the code in force at the time of their construction. Alterations shall be such that the existing building site is no less conforming to the provisions of this code than the existing building site was prior to the alteration.

Unaltered portions and site improvements of a building site shall be in accordance with the provisions of the code in force at the time of their construction or preservation.

**Exception:** Where, in the opinion of the *code official*, there is no significant compromise of the intent of this code, the *code official* shall have the authority to approve materials and assemblies that perform in a manner that is at least the equivalent of those being replaced.

**1103.2 Changes to hardscapes and surface vehicle parking.** Where existing hardscapes are altered, the alterations shall comply with the provisions of this code.

**Exceptions:**

1. Existing hardscapes and vegetation are permitted to be replaced with materials shown in previously *approved* construction documents.
2. Where existing vehicle surface parking lots are altered without changing parking space configuration or increasing the number of parking spaces, the altered parking lot shall not be required to comply with Section 407.4.
3. Alterations to accessible parking spaces shall not be required to comply with Section 407.4.

SECTION 1104  
CHANGE OF OCCUPANCY

**1104.1 Conformance.** Where a change in the use or occupancy of a building or tenant space places it in a different group of the same occupancy classification or in a different occupancy classification, as determined in accordance with the provisions of the *International Building Code*, compliance with Section 1104.2 shall be required. Altered portions of, and additions to, existing buildings and existing building sites that are not a result of change of occupancy requirements, shall comply with Chapter 10 and this chapter.

**1104.2 Building site improvements.** Where a change in occupancy results in an increase in the occupant load of the building, bicycle parking shall comply with the following:

1. Short-term bicycle parking spaces shall be provided in accordance with Section 407.3 equivalent to a new building of the new occupancy.
2. Where the existing building and building site have parking for motorized vehicles, long-term bicycle parking shall be provided in accordance with Section 407.3, equivalent to a new building of the new occupancy. Where the existing building does not contain covered parking spaces for vehicles, only 25 percent of the long-term bicycle parking needs to be covered.

SECTION 1105  
HISTORIC BUILDING SITES

**1105.1 Historic building sites.** Provisions of this code relating to the construction, repair, alteration, addition and restoration of building sites and site improvements shall not be mandatory for historic building sites, provided a report has been submitted to the code official and signed by a registered design professional, or a representative of the State Historic Preservation Office or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic nature of the building site. This section shall not apply where the authority having jurisdiction for environmental safety determines the building site constitutes a distinct environmental hazard.

## CHAPTER 12

# REFERENCED STANDARDS

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section 102.4.

<b>AHRI</b>	Air-Conditioning, Heating and Refrigeration Institute 2111 Wilson Boulevard, Suite 500 Arlington, VA 22201	Referenced in code section number
Standard reference number	Title	
810—2007	Standard for Performance Rating of Automatic Commercial Ice-Makers . . . . .	Table 609.2.3
870—2009	Performance Rating of Direct Geexchange Heat Pumps . . . . .	Table 606.2.2.1

<b>AMCA</b>	Air Movement and Control Association International 30 West University Drive Arlington Heights, IL 60004	Referenced in code section number
Standard reference number	Title	
205—12	Energy Efficiency Classification for Fans . . . . .	606.2.2.3
220—08 (2012)	Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating . . . . .	605.1.2.3

<b>APA</b>	APA—The Engineered Wood Association 7011 South 19th Street Tacoma, WA 98466-5333	Referenced in code section number
Standard reference number	Title	
ANSI/AITC 190.1—2012	Structural Glued Laminated Timber . . . . .	.202

<b>ARB</b>	California Air Resource Board 1001 "I" Street, P. O. Box 2815 Sacramento, CA 95812	Referenced in code section number
Standard reference number	Title	
February 1, 2008	California Air Resources Board, Architectural Coatings Suggested Control Measures February 1, 2008 . . . . .	Table 806.3(1)



# ASA

Acoustical Society of America  
1305 Walt Whitman Road, Suite 300  
Melville, NY 11747-4300

Standard reference number	Title	Referenced in code section number
ANSI/ASA S12.60-2010/ Pt. 1	Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 1: Permanent Schools . . . . .	Table 807.3.2
ANSI/ASA S12.60-2009/ Pt. 2	Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 2: Relocatable Classroom Factors . . . . .	Table 807.3.2

# ASABE

American Society of Agricultural and Biological Engineers  
2950 Niles Road  
St. Joseph, MI 49085

Standard reference number	Title	Referenced in code section number
S313.3-FEB 1999 (R2009)	Soil Cone Penetrometer . . . . .	405.1.4.2
EP542-FEB 1999 (R2009)	Procedures for Using and Reporting Data Obtained with the Soil Cone Penetrometer . . . . .	405.1.4.2

# ASHE

The American Society for Healthcare Engineering of the American Hospital Association  
155 N. Wacker Drive, Suite 400  
Chicago, IL 60606

Standard reference number	Title	Referenced in code section number
2010 FGI-ASHE	Guidelines for Design Construction of Healthcare Facilities . . . . .	807.1, Table 807.3.2, 807.5

# ASME

American Society of Mechanical Engineers  
Three Park Avenue  
New York, NY 10016-5990

Standard reference number	Title	Referenced in code section number
A112.18.1—2012/ CSA B125.1—2012	Plumbing Supply Fittings . . . . .	Table 702.1, 702.2

# ASHRAE

ASHRAE  
1791 Tullie Circle  
Atlanta, GA 30329-2305

Standard reference number	Title	Referenced in code section number
52.2—2012	Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size . . . . .	803.1.3, 803.5
55—2010	Thermal Environmental Conditions on Human Occupancy . . . . .	606.5.1, 803.2
72—05	Method of Testing Commercial Refrigerators and Freezers . . . . .	Table 609.2.3
90.1—2013	Energy Standard for Buildings Except Low-rise Residential Buildings . . . . .	602.2, 602.2.1.1
189.1—2014	Standard for the Design of High-performance Green Buildings, Except Low-rise Residential Buildings . . . . .	101.3, 301.1.1

**REFERENCED STANDARDS**

**ASSE**

American Society of Sanitary Engineering  
18927 Hickory Creek Drive, Suite 220  
Mokena, IL 60448

Standard reference number	Title	Referenced in code section number
1016/ASME A112.1016/ CSA B125.16—2011	Performance Requirements for Automatic Compensating, Valves for Individual Showers and Tub/Shower Combinations . . . . .	Table 702.1

**ASTM**

ASTM International  
100 Barr Harbor  
West Conshohocken, PA 19428-2959

Standard reference number	Title	Referenced in code section number
C1371—04a (2010)E1	Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers . . . . .	408.3.1.1
C1549—09	Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer . . . . .	408.2.1, 408.3.1.1
C1701/C1701M—09	Standard Test Method for Infiltration Rate of In-Place Pervious Concrete. . . . .	408.2.4
C1781/C1781M—13	Standard Test Method for Infiltration Rate of In-Place Pervious Unit Pavement Systems . . . . .	408.2.4
D2974—13	Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and other Organic Soils. . . . .	405.1.4.2
D3385—09	Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer . . . . .	405.1.4.2
D3960—05	Standard Practice of Determining Volatile Organic Compound (VOC) Content of Paints & Related Coatings . . . . .	806.2, 806.3
D5055—13	Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists. . . . .	202
D5093—02 (2008)	Standard Test Method for Field Measurement of Infiltration Rate Using Double-Ring Infiltrometer With Sealed-Inner Ring . . . . .	405.1.4.2
D5197—09E1	Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology). . . . .	804.2
D5456—13	Standard Specification for Evaluation of Structural Composite Lumber Products . . . . .	202
D5466—01 (2007)	Test Method for Determination of Volatile Organic Chemicals in Atmospheres (Canister Sampling Methodology). . . . .	804.2
D6007—02 (2008)	Standard Test Method for Determining Formaldehyde Concentrations in Air from Wood Products Using a Small-Scale Chamber . . . . .	Table 806.1
D6196—03 (2009)	Standard Practice for Selection of Sorbents, Sampling, and Thermal Desorption Analysis Procedures for Volatile Organic Compounds in Air. . . . .	804.2
D6345—10	Standard Guide for Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air . . . . .	804.2
D6866—12	Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis . . . . .	505.2.4
D7612—10	Standard Practice for Categorizing Wood and Wood-Based Products According to Their Fiber Sources . . . . .	202
E90—09	Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements . . . . .	807.2
E336—2010	Standard Test Method for Measurement of Airborne Sound Attenuation Between Rooms in Buildings. . . . .	807.2
E413—10	Classification for Rating Sound Insulation . . . . .	807.2
E492—09	Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine . . . . .	807.4
E779—10	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization . . . . .	605.1.2.2
E1333—10	Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber . . . . .	Table 806.1
E1509—12	Standard Specification for Room Heaters, Pellet Fuel-Burning Type. . . . .	804.1.3
E1918—06	Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field. . . . .	408.2.1, 408.3.1.1
E1980—11	Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces . . . . .	408.3.1.2

E2399—11	Standard Test Method for Maximum Media Density for Dead Load Analysis of Vegetative (Green) Roof Systems . . . . .	408.3.2
E2635—08	Standard Practice for Water Conservation in Buildings Through In-Situ Water Reclamation . . . . .	709.9
E2921—13	Standard Practice for Minimum Criteria for Comparing Whole Building Life Cycle Assessments for Use with Building Codes and Rating Systems . . . . .	505.3
F1275—03 (2008)	Standard Test Method for Performance of Griddles . . . . .	Table 609.2.3
F1361—07	Standard Test Method for Performance of Open Deep Fat Fryers . . . . .	Table 609.2.3
F1496—13	Standard Test Method for Performance of Convection Ovens . . . . .	Table 609.2.3
F1484—12	Standard Test Methods for Performance of Steam Cookers. . . . .	Table 609.2.3
F1605—95 (2007)	Standard Test Method for Performance of Double-Sided Griddles . . . . .	Table 609.2.3
F1639—05	Standard Test Method for Performance of Combination Ovens. . . . .	702.16
F1696—07	Standard Test Method for Energy Performance of Single-Rack, Door-Type Commercial Dishwashing Machines . . . . .	Table 609.2.3
F1920—11	Standard Test Method for Performance of Rack Conveyor, Commercial Dishwashing Machines . . . . .	Table 609.2.3
F2140—11	Standard Test Method for Performance of Hot Food Holding Cabinets . . . . .	Table 609.2.3
F2144—09	Standard Test Method for Performance of Large Open Vat Fryers . . . . .	Table 609.2.3
F2861—10	Standard Test Method for Enhanced Performance of Combination Oven in Various Modes . . . . .	Table 609.2.3

## CCR

California Code of Regulations Department of Industrial Relations Office of the Director  
455 Golden Gate Avenue  
San Francisco, CA 94102

Standard reference number	Title	Referenced in code section number
Section 93120—Title 17	California Code of Regulations, Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products . . . . .	806.1

## CDPH

California Department of Public Health  
1615 Capitol Avenue  
Sacramento, CA 95814

Standard reference number	Title	Referenced in code section number
EHLB Standard Method V1.1—2010	Standard Method for Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers Version 1.1(2010) . . . . .	806.2, Table 806.2(2) 806.3, 806.5, 806.6

## CRRC

Cool Roof Rating Council  
449 15<sup>th</sup> Street, Suite 200  
Oakland, CA 94612

Standard reference number	Title	Referenced in code section number
CRRC—1 2012	Cool Roof Rating Council, CRRC-1 Standard . . . . .	408.3.1.1

## CSA

CSA Group  
8501 East Pleasant Valley  
Cleveland, OH 44131-5516

Standard reference number	Title	Referenced in code section number
CAN/CSA B366.1—2011	Solid-Fuel-Fired Central Heating Appliances. . . . .	804.1.3
B55.1—2012	Test Method for Measuring Efficiency and Pressure Loss of Drain Water Heat Recovery Units . . . . .	607.5
B55.2—2012	Drain Water Heat Recovery Units . . . . .	607.5

**REFERENCED STANDARDS**

**DOC**

U.S. Department of Commerce  
National Institute of Standards and Technology  
1401 Constitution Avenue NW  
Washington, DC 20230

Standard reference number	Title	Referenced in code section number
PS 1—09	Structural Plywood. . . . .	202
PS 2—10	Performance Standard for Wood-Based Structural-Use Panels. . . . .	202

**EPA**

Environmental Protection Agency  
William Jefferson Clinton Federal Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

Standard reference number	Title	Referenced in code section number
40 CFR, Part 60 Subpart AAA	EPA Standards of Performance for New Residential Wood Heaters . . . . .	804.1.2
40 CFR 300	Small Business Liability Relief and Brownfield Revitalization Act—Public Law 107-118. . . . .	202
EPA eGRID 2010	Version 1.1; 2005 data; EPA eGrid Data . . . . .	Table 602.2.1.1, 602.3.1, Table 602.3.1, 602.3.2
ENERGY STAR	Energy Star. . . . .	202, 702.5.1, 702.5.2, 702.5.4
US EPA Method 24	Determination of Volatile Matter Content, Water Content, Density, Volume Solids and Weight Solids of Surface Coatings . . . . .	806.2
Water Sense— February 2007	High Efficiency Toilet Specification . . . . .	Table 702.1
Water Sense— October 2009	Flushing Urinal Specification . . . . .	Table 702.1
Water Sense— March 2010	Showerhead Specification . . . . .	Table 702.1

**FSC**

Forest Stewardship Council  
212 Third Avenue, North, Suite 445  
Minneapolis, MN 55401

Standard reference number	Title	Referenced in code section number
STD-40-004 V2-1 EN—2011	Standard for Chain of Custody Certification . . . . .	505.2.4

**ICC**

International Code Council, Inc.  
500 New Jersey Avenue, NW  
6th Floor  
Washington, DC 20001

Standard reference number	Title	Referenced in code section number
IBC—15	International Building Code®. . . . .	101.3, 102.4, 102.6, 103.1, 104.1, 201.3, 202, 402.2.3, 407.3.2, 407.4, 505.3, 604.1, 605.1.1.1, 608.3, 608.4.1, 608.5, 609.2, 610.1, 612.1, 612.3.1, 702.1, 703.7.1, 803.1.2.1, 1004.1, 1104.1
ICCPC—15	International Code Council Performance Code®. . . . .	102.4
IEBC—15	International Existing Building Code®. . . . .	102.4, 102.6
IECC—12	International Energy Conservation Code®. . . . .	602.3

IECC—15	International Energy Conservation Code® . . . 102.4, 201.3, 202, 601.3.1, 601.3.2, 601.3.3, 604.4, 605.1, 605.1.1, 605.1.2, 605.1.2.1, 605.1.2.3, 606.1, 606.2.1, 606.3, 606.5, 606.5.1, 606.5.1.2, 606.7, 606.7.1, 607.1, 607.2.1, 607.3, 607.4, 607.6, 608.1, 608.5, 608.7, 608.9, 609.2, 610.1, 611.1, 611.4.3, 611.7, 611.7.1, 611.9, 611.9.2.1, 611.9.2.3, 611.10, 612.1, 808.3.1, Table 902.1, 1003.2.2, 1003.2.4, 1003.2.7
IFC—15	International Fire Code®. . . . . 102.4, 102.6, 201.3, 408.3.2, 608.3, 608.4.1, 609.2, 610.1, 701.2
IFGC—15	International Fuel Gas Code®. . . . . 102.4, 201.3, 603.3.1, 609.2, 804.1.1
IMC—15	International Mechanical Code®. . . . . 102.4, 201.3, 603.3.2, 604.3, 606.7.1, 609.1, 609.2, 703.7, 803.1.2.1, 804.1.
IPC—15	International Plumbing Code®. . . . . 102.4, 201.3, 607.5, 609.2, 701.2, 704.1.3, 704.2
IPMC—15	International Property Maintenance Code®. . . . . 102.4, 102.6
IRC—15	International Residential Code®. . . . . 201.3
ICC-700—2012	National Green Building Standard . . . . . 101.3.1, 302.1, Table 302.1

# IEC

The International Electrotechnical Commission  
 Central Office  
 3, rue de Varembe  
 P.O. Box 131  
 Ch-1211 Geneva 20, Switzerland

Standard reference number	Title	Referenced in code section number
EN 60034-30—2009	Standard on Efficiency Classes for Low Voltage AC Motors . . . . .	609.2.1.2.1, 609.2.2.2

# IES

Illuminating Engineering Society  
 120 Wall Street, 17th Floor  
 New York, NY 10005-4001

Standard reference number	Title	Referenced in code section number
TM-15—11	Luminaire Classification System for Outdoor Luminaires. . . . .	Table 409.2, Table 409.3(1), Table 409.3(2)

# ISO

International Organization for Standardization  
 ISO Central Secretariat  
 Chemin de Blandonnet 8  
 CP 401  
 1214 Vernier, Geneva, Switzerland

Standard reference number	Title	Referenced in code section number
7708—1995	Air quality – Particle Size Fraction Definitions for Health-related Sampling . . . . .	804.2
13256-1—2011	Water-to-Air and Brine-to-Air Heat Pumps—Testing and Rating Performance . . . . .	Table 606.2.2.1
13256-2—2011	Water-to-Water and Brine-to-Water Heat Pumps—Testing and Rating Performance. . . . .	Table 606.2.2.1
14025—2006	Environmental Labels and Declarations—Type III Environmental Declarations— Principles and Procedures . . . . .	505.4.1
ISO/IEC 17025—2005 2004—11	General Requirements for the Competence of Testing and Calibration Laboratories . . . . .	806.2, 806.3, 806.4, 806.5, 806.
21930—2007	Sustainability in Building Construction—Environmental Declaration of Building Products . . . . .	505.4.1

**REFERENCED STANDARDS**

**NEMA**

National Electrical Manufacturers Association  
1300 North 17th Street, Suite 1752  
Rosslyn, VA 22209

Standard reference number	Title	Referenced in code section number
LSD 23—2010	Recommended Practice –Lamp Seasoning for Fluorescent Dimming Systems . . . . .	.611.9.2.2, 611.2.9.2.4

**NFPA**

National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02269

Standard reference number	Title	Referenced in code section number
NFPA 70—2014	National Electrical Code . . . . .	.603.3.4, 610.1

**NSC**

Natural Stone Council  
P.O. Box 539  
Hollis, NH 03049

Standard reference number	Title	Referenced in code section number
NSC 373—2013	Sustainability Assessment for Natural Dimension Stone. . . . .	505.4.2

**NSF**

NSF International  
789 Dixboro Road  
Ann Arbor, MI 48105

Standard reference number	Title	Referenced in code section number
NSF/ANSI 3—10	Commercial Warewashing Equipment . . . . .	Table 609.2.3
NSF/ANSI 44—12	Residential Cation Exchange Water. . . . .	704.1.2, 704.1.4
NSF/ANSI 58—12	Reverse Osmosis Drinking Water Treatment Systems . . . . .	704.2
NSF/ANSI 140—13	Sustainability Assessment for Carpet. . . . .	505.4.2
NSF/ANSI 332—12	Sustainability Assessment for Resilient Floor Coverings . . . . .	505.4.2
NSF/ANSI 336—11	Sustainability Assessment for Commercial Furnishings Fabric . . . . .	505.4.2
NSF/ANSI 342—12	Sustainability Assessment for Wall Coverings . . . . .	505.4.2
NSF/ANSI 347—12	Sustainability Assessment for Single-Ply Roofing Membranes . . . . .	505.4.2
NSF 350—2011	Onsite Residential and Commercial Water Reuse Treatment Systems . . . . .	704.3

# SCAQMD

South Coast Air Quality Management District  
21865 Capley Drive  
Diamond Bar, CA 91765

Standard reference number	Title	Referenced in code section number
SCAQMD Method 302—91 (Revised 1993)	Distillation of Solvents from Paints, Coatings and Inks, South Coast Air Quality Management District . . .	806.2
SCAQMD Method 303—91 (Revised 1993)	Determination of Exempt Compounds, South Coast Air Quality Management District . . . . .	806.2
SCAQMD Method 304—91 (Revised February 1996)	Determination of Volatile Organic Compounds (VOC) in Various Materials, South Coast Air Quality Management District . . . . .	806.2
SCAQMD Method 316A—92	Determination of Volatile Organic Compounds (VOC) in Materials Used for Pipes and Fittings . . . . .	806.2
SCAQMD Method 316B—92	Determination of Volatile Organic Compounds (VOC) in Adhesives Containing Cyanoacrylates . . . . .	806.2
SCAQMD Rule 1168	Adhesives and Sealant Applications . . . . .	806.2

# SFI

Sustainable Forest Initiative, Inc.  
900 17th Street, NW, Suite 700  
Washington, DC 20006

Standard reference number	Title	Referenced in code section number
SFI—2010-2014	Sustainable Forest Initiative 2010-2014. . . . .	505.2.4

# SMACNA

Sheet Metal & Air-Conditioning Contractors National Assoc., Inc.  
4021 Lafayette Center Road  
Chantilly, VA 22021

Standard reference number	Title	Referenced in code section number
2010	SMACNA HVAC Air Duct Leakage Test Manual (1st Edition) . . . . .	606.3.1

# SRCC

Solar Rating and Certification Corporation  
400 High Point Drive, Suite 400  
Cocoa, FL 32926

Standard reference number	Title	Referenced in code section number
SRCC 100—2013—11	Minimum Standard for Solar Thermal Collectors . . . . .	603.3.7.2

# TCIA

Tree Care Industry Association  
136 Harvey Road, Suite 101  
Londonderry, NH 03053

Standard reference number	Title	Referenced in code section number
ANSI A300 Part 5—2005	Tree, Shrub and Other Woody Plant Maintenance—Management of Trees and Shrubs during Site Planning, Site Development, and Construction Operations. . . . .	405.2.1.1

**REFERENCED STANDARDS**

**TCNA**

Tile Council of North America  
100 Clemson Research Boulevard  
Anderson, SC 29625

Standard reference number	Title	Referenced in code section number
A138/A138.1—2012	Standard Specification for Sustainable Ceramic Tiles, Glass Tiles, and Tile . . . . .	.505.4.2

**TMS**

The Masonry Society  
105 South Sunset, Suite Q  
Longmont, CO 80501

Standard reference number	Title	Referenced in code section number
0302—2012	Standard Method for Determining the Sound Transmission Class Rating for Masonry Walls . . . . .	807.2

**UL**

UL LLC  
333 Pfingsten Road  
Northbrook, IL 60062-2096

Standard reference number	Title	Referenced in code section number
UL 100—2012	Sustainability for Gypsum Boards and Panels . . . . .	.505.4.2
UL 102—2012	Sustainability for Door Leafs . . . . .	.505.4.2
UL 1482—2011	Room Heaters, Solid Fuel Type . . . . .	.804.1.3
UL 1993—2009	Standard for Safety of Self-Ballasted Lamps and Lamp Adapters . . . . .	506.1.2
UL 2523—2009	Solid Fuel-Fired Hydronic Heating Appliances, Water Heaters and Boilers with Revisions through February 2013 . . . . .	.804.1.3

**USDA**

United States Department of Agriculture  
Office of Energy Policy and New Uses  
Room 361, Reporters Bldg.  
300 Seventh Street, SW  
Washington, DC 20024

Standard reference number	Title	Referenced in code section number
7 CFR Part 2902 Rev. 1/1/06	Guidelines for Designating Bio-based Products for Federal Procurement . . . . .	505.2.4
MP 1475—90	USDA Plant Hardiness Zone Map, Miscellaneous Publication 1475 . . . . .	408.3.2





# APPENDIX A

## PROJECT ELECTIVES

*Six project electives must be completed for compliance with this stretch code.*

### SECTION A101 GENERAL

**A101.1 Scope.** The provisions of this appendix are designed to encourage and recognize the implementation of environmentally beneficial practices that achieve greater benefit than the minimum requirements of the International Green Construction Code® (IgCC®).

**A101.2 Intent.** This appendix shall provide a basis by which a jurisdiction can implement measures to increase natural resource conservation, material resource conservation, energy conservation, water conservation and environmental comfort and mitigate impacts of building site development.

\*\*

### SECTION A102 DEFINITIONS

**A102.1 Definitions.** The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

**DESIGN LIFE.** The intended service life or the period of time targeted for a building or its component parts to meet or exceed the performance requirements.

**GEOHERMAL ENERGY.** Renewable energy generated from the interior of the Earth and used to produce energy for heating buildings or serving building commercial or industrial processes.

**GRID-INTERACTIVE ELECTRIC THERMAL STORAGE (GETS).** An electric-powered heat storage system for space heating units and service water heating units that is controlled by electric system grid operators such as utilities, independent system operators (ISOs) and regional transmission organizations (RTOs).

**INFILL SITE.** Infill sites are one of the following:

1. A vacant lot, or collection of adjoining lots, located in an established, developed area that is already served by existing infrastructure;
2. A previously developed lot or a collection of previously developed adjoining lots, that is being redeveloped or is designated for redevelopment.

**INTEGRATED DESIGN PROCESS.** A design process utilizing early, multidisciplinary collaboration among the representatives of each stakeholder and participating consultant on the project. The focus of the process is on the building as an interdependent system as opposed to an accumulation of its separate components.

**PROJECT ELECTIVE.** A provision that becomes mandatory and enforceable only where selected by the owner or the owner's authorized agent by indication in Table A103.2.

**REFERENCE SERVICE LIFE.** The period of time after installation during which a building or its component parts are expected to meet or exceed the performance requirements.

**SERVICE LIFE.** The period of time after installation during which a building or its component parts meets or exceeds the performance requirements.

**VOCs, TOTAL (TVOCs).** Sum of the concentrations of all identified and unidentified *volatile organic compounds* between and including n-hexane through n-hexadecane (i.e., C<sub>6</sub> through C<sub>16</sub>) as measured by gas chromatography/mass spectrometry total ion-current chromatogram method and are quantified by converting the total area of the chromatogram in that analytical window to toluene equivalents.

### SECTION A103 APPLICABILITY AND CONFORMANCE

\*\*

**A103.1 General.** Project electives shall be applicable to building, structures and building sites constructed under the provisions of this code.

**A103.2 Required number of and selection of project electives.** A total of not less than six project electives shall be selected by the owner or the owner's authorized agent from Table A103.2. Selected project electives shall be applied as mandatory requirements for the project. Selected project electives shall be communicated to the code official by means of checking the appropriate boxes in the table and providing a copy of the table, or by inclusion of a list of selected project electives, with the construction documents.

### SECTION A104 SITE PROJECT ELECTIVES

**A104.1 Flood hazard area project elective.** Where Section 402.2.1 is not listed in Table 302.1 as a mandatory requirement, and in specific *flood hazard areas* if Section 402.2.2 is not a mandatory requirement, projects seeking *flood hazard area* project electives shall comply with one of the project electives identified in Sections A104.1.1 through A104.1.3.

**A104.1.1 Flood hazard area preservation.** Where less than 25 percent of a building site is located within a *flood hazard area*, buildings and building site improvements shall be located on portions of the building site that are located outside of the *flood hazard area*. The building site shall not be filled or regraded to raise the elevation of the site to remove areas from the *flood hazard area*.

**TABLE A103.2  
PROJECT ELECTIVES - A MINIMUM OF SIX MUST BE COMPLETED FOR STRETCH CODE COMPLIANCE**

SECTION	DESCRIPTION	OWNER SELECTIONS	
A104.1.1	Flood hazard area preservation	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.1.2	Flood hazard area minimization	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.1.3	Flood hazard area, existing building	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.2	Wildlife corridor	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.3	Infill site	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.4	Brownfield site	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.5	Site restoration	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.6	Mixed-use development	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.7	Changing and shower facilities	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.8	Long-term bicycle parking and storage	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.9.1	Site hardscape project elective 1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.9.2	Site hardscape project elective 2	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.9.3	Site hardscape project elective 3	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A104.9.4	Roof covering project elective	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A105.1	Waste management	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A105.2	Construction waste landfill maximum	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A105.3(1)	Reused, recycled content, recyclable, bio-based and indigenous materials (70%)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A105.3(2)	Reused, recycled content, recyclable, bio-based and indigenous materials (85%)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A105.4	Service life plan	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A105.5	Design for deconstruction and building reuse	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A105.6	Existing building reuse	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A105.7	Historic building reuse	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A105.8	Integrated design	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A105.9	Deconstruction	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A106.1	Project zEPI is at least 5 points lower than required by Table 302.1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Project zEPI is at least 10 points lower than required by Table 302.1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Project zEPI is at least 15 points lower than required by Table 302.1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Project zEPI is at least 20 points lower than required by Table 302.1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Project zEPI is at least 25 points lower than required by Table 302.1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Project zEPI is at least 30 points lower than required by Table 302.1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Project zEPI is at least 35 points lower than required by Table 302.1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Project zEPI is at least 40 points lower than required by Table 302.1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Project zEPI is at least 45 points lower than required by Table 302.1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Project zEPI is at least 50 points lower than required by Table 302.1	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A106.2	Mechanical systems project elective	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A106.3	Service water heating	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A106.4	Lighting systems	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A106.5	Passive design	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A106.6	Renewable energy systems—5 percent	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A106.6	Renewable energy systems—10 percent	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A106.6	Renewable energy systems—20 percent	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A107.2	Onsite wastewater treatment	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A107.3	Alternate onsite nonpotable water for outdoor hose connections	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A107.4	Alternate onsite nonpotable water for plumbing fixture flushing	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A107.5	Automatic fire sprinkler system	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A107.6	Alternate onsite nonpotable water to fire pumps	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A107.7	Alternate onsite nonpotable water for industrial process makeup water	<input type="checkbox"/> Yes	<input type="checkbox"/> No

SECTION	DESCRIPTION	OWNER SELECTIONS
A107.8	Alternate onsite nonpotable water for cooling tower makeup water	<input type="checkbox"/> Yes <input type="checkbox"/> No
A107.9	Gray water collection	<input type="checkbox"/> Yes <input type="checkbox"/> No
A108.2	VOC emissions—flooring	<input type="checkbox"/> Yes <input type="checkbox"/> No
A108.3	VOC emissions—ceiling systems	<input type="checkbox"/> Yes <input type="checkbox"/> No
A108.4	VOC emissions—wall systems	<input type="checkbox"/> Yes <input type="checkbox"/> No
A108.5	Architectural paints and coatings	<input type="checkbox"/> Yes <input type="checkbox"/> No
A108.6	Total VOC limit	<input type="checkbox"/> Yes <input type="checkbox"/> No
A108.7	Views to building exterior	<input type="checkbox"/> Yes <input type="checkbox"/> No

**A104.1.2 Flood hazard area minimization.** Where 25 percent or more of a building site is located within a *flood hazard area*, the lowest floors of buildings that are located within the *flood hazard area* shall be not less than 1 foot (305 mm) above the design flood elevation as established by the *International Building Code*, or not less than the height, as established by the jurisdiction, above the design flood elevation, whichever is higher. The placement of fill on a building site shall not be used to achieve the required height above the design flood elevation.

**A104.1.3 Flood hazard area, existing building.** Where additions, alterations, or repairs are made to an existing building located in a *flood hazard area*, and the cost of the work equals or exceeds 40 percent of the market value of the structure before the improvement or repair is started, the entire building shall be brought into compliance with the flood-resistant construction requirements in the *International Building Code* for new buildings and structures.

**A104.2 Wildlife corridor project elective.** Site development that restores a wildlife corridor, connecting wildlife corridors on adjacent lots, shall be recognized as a project elective.

**A104.3 Infill site project elective.** The development of a building site that is an infill site with a new building and associated site improvements shall be recognized as a project elective.

**A104.4 Brownfield site project elective.** The development of a building site that is a *brownfield* site with a new building with associated site improvements shall be recognized as a project elective. The development shall be in accordance with the following:

1. Phase I and II Environmental Assessment and, as necessary, the documentation of the site remediation plan and completion of the plan, as *approved* by the jurisdictional agency in charge of environmental regulations.
2. Where contamination levels are above risk-based standards for intended reuse and remediation is required, building and site development shall provide effective remediation *approved* by the local, state or federal government agency which classified the site as a *brownfield*, by one of the following:
  - 2.1. The effective remediation is completed in the manner described in the remediation plan *approved* by the agency which classified the site as a *brownfield*.

- 2.2. A remediation commensurate with the initial *approved* plan which the agency approves upon completion by issuing a letter stating that no further remediation action is required.

3. The *brownfield* site project elective fully accomplishes the applicable state and local *brownfields* program cleanup goals, with all supporting documentation as required by the state, tribal or other responsible authority.

**A104.5 Site restoration project elective.** Previously developed sites that restore 25 percent or more of the non-building footprint building site area with native or adaptive vegetation shall be recognized as a project elective.

**A104.6 Mixed-use development project elective.** Development of a mixed-use building shall be recognized as a project elective. The building shall be in accordance with all of the following:

1. It shall have not less than two stories.
2. Eight or more dwelling units of Group R-1 or R-2 occupancy shall be located above the first story.
3. The first story shall contain one or more of the following occupancies: A-1, A-2, A-3, B, M, Group E daycare, or Group R-2 live/work units.

**A104.7 Changing and shower facilities project elective.** Where a new building is less than 10,000 square feet (929 m<sup>2</sup>) in *total building floor area*, providing changing and shower facilities in accordance with Section 407.2 shall be recognized as a project elective.

**A104.8 Long-term bicycle parking and storage project elective.** The development of a new building and associated site improvements where additional long-term bicycle parking is provided in accordance with all of the following shall be recognized as a single project elective:

1. Provide long-term bicycle parking that is twice the number of parking spaces required by Table 407.3;
2. Provide spaces in accordance with Section 407.3.2; and
3. Locate not less than 90 percent of long-term bicycle parking within a building or provide the parking with a permanent cover including, but not limited to, roof overhangs, awnings, or bicycle storage lockers.

**A104.9 Heat island.** Project electives related to heat island impact shall comply with Sections A104.9.1 through A104.9.4. Compliance with multiple electives shall be recognized.

**A104.9.1 Site hardscape project elective 1.** In climate zones 1 through 6, as established in the *International Energy Conservation Code*, the development of a new building and associated site improvements where a minimum of 75 percent of the site hardscape is in accordance with one or any combination of options in Sections 408.2.1 through 408.2.4, shall be recognized as a project elective.

**A104.9.2 Site hardscape project elective 2.** In climate zones 1 through 6, as established in the *International Energy Conservation Code*, the development of a new building and associated site improvements where a minimum of 100 percent of the site hardscape is in accordance with one or any combination of options in Sections 408.2.1 through 408.2.4, shall be recognized as a project elective.

**A104.9.3 Site hardscape project elective 3.** In climate zones 7 and 8, as established in the *International Energy Conservation Code*, the development of a new building and associated site improvements where a minimum of 50 percent of the site hardscape is in accordance with one or any combination of options in Sections 408.2.1 through 408.2.4, shall be recognized as a project elective.

**A104.9.4 Roof covering project elective.** In climate zones 4 through 8, as established in the *International Energy Conservation Code*, the development of a new building with roof coverings in accordance with Section 408.3, shall be recognized as a project elective.

SECTION A105  
MATERIAL RESOURCE  
CONSERVATION AND EFFICIENCY

**A105.1 Waste management project elective.** Projects seeking a waste management project elective shall comply with Section 503.1, except that the nonhazardous construction waste materials required to be diverted from landfills shall be increased by 20 percent. Where another percentage is indicated by the jurisdiction in Table 302.1, projects seeking this credit shall increase diversion by 20 percent above the percentage indicated in Table 302.1.

**A105.2 Construction waste landfill maximum project elective.** Projects seeking a construction waste landfill maximum project elective shall comply with Section 503.1 except that not more than 4 pounds (1.814 kg) of construction waste, excluding hardscape, per square foot (0.0929 m<sup>2</sup>) of building area shall be disposed of in a landfill. Building construction waste and hardscape waste shall be measured separately.

**A105.3 Material selection project electives.** Each of the following shall be considered a separate material selection project elective. The project electives are cumulative and compliance with each item shall be recognized individually.

1. Compliance with this project elective shall require compliance with Section 505.2, except that buildings and structures shall contain used, recycled content, recyclable, bio-based and indigenous materials that

comply with Sections 505.1 through 505.2.5 such that the aggregate total materials compliant with those sections constitute at least 70 percent of the total building products and materials used, based on mass, volume or cost, used singularly or in combination.

2. Compliance with Item 1 except that such materials shall be used for at least 85 percent of the total mass, volume or cost of materials in the project.

**A105.4 Building service life plan project electives.** Projects seeking a building service life plan project elective shall comply with this section. The building service life plan (BSLP) in accordance with Section A105.4.1 shall be included in the construction documents.

**A105.4.1 Plan and components.** The building service life plan (BSLP) shall indicate the intended length in years of the design life for the building as determined by the building owner or *registered design professional*, and shall include a maintenance, repair, and replacement schedule for each of the following components. The maintenance, repair and replacement schedule shall be based on manufacturer’s reference service life data or other *approved* sources for the building components. The manufacturer’s reference service life data or data from other *approved* sources shall be included in the documentation.

1. Structural elements and concealed materials and assemblies.
2. Materials and assemblies where replacement is cost prohibitive or impractical.
3. Major materials and assemblies that are replaceable.
4. Roof coverings.
5. Mechanical, electrical and plumbing equipment and systems.
6. Site hardscape.

**A105.5 Design for deconstruction and building reuse project elective.** Projects seeking a design for deconstruction and building reuse project elective shall be designed for deconstruction of not less than 90 percent of the total components, assemblies, or modules to allow essentially the entire building to be reused. Design for deconstruction shall be documented on the building’s plans and construction documents.

**A105.6 Existing building reuse project elective.** The development of a building site on which an existing building is already located and in which not less than 75 percent of the existing core and shell of the structure will be reused shall be recognized as a project elective.

**A105.7 Historic building reuse project elective.** The development of a building site on which an existing building is already located and in which not less than 75 percent of the existing core and shell of a locally or nationally designated historic structure will be reused shall be recognized as a project elective.

**A105.8 Integrated design project elective.** The use of an integrated design process by the design team shall be considered a project elective.

**A105.9 Deconstruction project elective.** Projects seeking a deconstruction project elective shall comply with Section 503.1 and this section. Buildings, structures or portions thereof that are to be demolished shall be systematically disassembled by means of deconstruction.

## SECTION A106 ENERGY CONSERVATION, EFFICIENCY AND EARTH ATMOSPHERIC QUALITY

**A106.1 zEPI reduction project electives.** Project electives for buildings pursuing performance-based compliance in accordance with Section 601.3.1 shall be in accordance with the portions of Table A103.2 that reference Section A106.1, Equation 6-1 and the calculation procedures specified in Section 602.2.1.1.

**A106.2 Mechanical systems project elective.** Buildings seeking a mechanical systems project elective shall comply with Sections A106.2.1 through A106.2.5.

**A106.2.1 Prescriptive path.** The building shall be designed prescriptively in accordance with Section 601.3.2.

**A106.2.2 Mechanical equipment.** Mechanical equipment shall comply with Sections A106.2.2.1 and A106.2.2.2 to achieve the mechanical systems project elective.

**A106.2.2.1 Heating equipment.** For heating equipment, the part-load, full load, annual, or season efficiency of the equipment shall be not less than 10 percent greater than the part-load, full load, annual, or season efficiencies shown in the applicable tables of the *International Energy Conservation Code* or ASHRAE 90.1, or the equipment shall be ENERGY STAR qualified, as applicable. Grid-interactive electric thermal storage heating systems shall be deemed to meet the requisites of this section where they are directly regulated by the grid operator to store energy during off-peak hours, to utilize available renewable energy or to provide balancing services for management of the electric grid.

**A106.2.2.2 Cooling equipment.** For cooling equipment, the part-load, full load, annual, or season efficiency of the equipment shall be not less than 10 percent greater than the part-load, full load, annual, or season efficiencies shown in the applicable tables of the *International Energy Conservation Code* or ASHRAE 90.1, or the equipment shall be ENERGY STAR qualified.

**A106.2.3 Duct insulation.** Ducts shall be insulated to R-8 or greater where located in unconditioned spaces and R-11 minimum where located outside of the building structure. Where located within a building envelope assembly, the

duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by R-8 insulation or greater.

**A106.2.4 Duct system testing.** Duct systems shall be leak tested in accordance with the *SMACNA HVAC Air Duct Leakage Test Manual* and shall have a rate of air leakage (CL) less than or equal to 4 as determined in accordance with Equation 4-8 of the *International Energy Conservation Code*.

**A106.2.4.1 Documentation.** Documentation shall be furnished by the designer demonstrating that representative sections totaling not less than 50 percent of the duct area have been tested and that all tested sections meet the requirements of Section A106.2.4.

**A106.2.5 Service water heating equipment.** The efficiency of the service water heating equipment shall be not less than 10 percent greater than the efficiencies shown in the *International Energy Conservation Code* and ASHRAE 90.1, or the service water heating equipment shall be ENERGY STAR qualified. Grid-interactive electric thermal storage heating systems shall be deemed to meet the requisites of this section where they are directly regulated by the grid operator to store energy during off-peak hours, to utilize available renewable energy or to provide balancing services for management of the electric grid.

**A106.3 Service water heating project elective.** Buildings seeking a service water heating project elective in accordance with Sections A103.2 and A106.3 shall comply with Sections A106.3.1 through A106.3.3.

**A106.3.1 Prescriptive path.** The building shall be designed prescriptively in accordance with Section 601.3.2.

**A106.3.2 Occupancy.** The building shall be designed to serve one of the following occupancies:

1. Group A-2, restaurants and banquet halls;
2. Group F, laundries;
3. Group R-1, boarding houses (transient), hotels (transient), motels (transient);
4. Group R-2 buildings;
5. Group A-3, health clubs and spas; and
6. Group I-2, hospitals, mental hospitals and nursing homes.

**A106.3.3 Service water heating efficiency.** The efficiency of the service water heating equipment shall be at least 10 percent greater than the efficiencies shown in the *International Energy Conservation Code* and ASHRAE 90.1, or the service water heating equipment shall be ENERGY STAR qualified. Grid-interactive electric thermal storage heating systems shall be deemed to meet the requisites of this section where they are directly regulated by the grid operator to store energy during off-peak hours, to utilize available renewable energy or to provide balancing services for management of the electric grid.

**A106.4 Lighting system efficiency project elective.** Buildings seeking a lighting system efficiency project elective in accordance with Sections A103.2 and A106.4 shall comply with Sections A106.4.1 through A106.4.3.

**A106.4.1 Prescriptive path.** The building shall be designed prescriptively in accordance with Section 601.3.2.

**A106.4.2 Interior lighting system efficiency.** The interior connected lighting power shall be 10 percent less than the allowance determined in accordance with Section C405.4 of the *International Energy Conservation Code*.

**A106.4.3 Exterior lighting system efficiency.** The exterior connected lighting power shall be 10 percent less than the allowance determined in accordance with Section C405.5 of the *International Energy Conservation Code*.

**A106.5 Passive design project elective.** Buildings seeking a passive design project elective in accordance with Sections A103.2 and A106.5 shall comply with Sections A106.5.1 and A106.5.2.

**A106.5.1 Performance path.** The building shall be designed using the performance path in accordance with Section 601.3.1.

**A106.5.2 Passive design provisions.** The simulation of energy use performed pursuant to Section 602 shall document that not less than 40 percent of the annual energy use reduction realized by the proposed design has been achieved through passive heating, cooling, and ventilation design, as compared to the standard reference design. Passive heating and cooling shall use strategies including, but not limited to, building orientation, fenestration provisions, material selection, insulation choices, overhangs, shading means, microclimate vegetation and water use, passive cooling towers, natural heat storage, natural ventilation, and thermal mass.

**A106.6 Renewable energy system project electives.** Buildings seeking a renewable energy system project elective or electives shall be equipped with one or more renewable energy systems in accordance with Section 610.1 that have the capacity to provide the percent of annual energy used within the building as selected in Table A103.2. Capacity shall be demonstrated in accordance with Section 610.1.

## SECTION A107 WATER RESOURCE CONSERVATION AND EFFICIENCY

**A107.1 Indoor water use.** This section contains project electives related to indoor water use.

**A107.2 Onsite wastewater treatment project elective.** Where projects are intended to qualify for an onsite wastewater treatment project elective in accordance with Section A107.2, all wastewater from the building shall be treated to meet the quality requirements appropriate for its intended use and as required by law.

**A107.3 Alternate onsite nonpotable water for outdoor hose connections project elective.** Where projects are intended to qualify for an alternate onsite nonpotable water for outdoor hose connections project elective in accordance with Section A107.3, sillcocks, hose bibs, wall hydrants, yard hydrants, and other outdoor outlets shall be supplied by non-potable water. Such outlets shall be located in a locked vault or shall be operable only by means of a removable key.

**A107.3.1 Signage.** Each outlet shall be provided with signage in accordance with Section 1301.3 of the *International Plumbing Code*.

**A107.4 Alternate onsite nonpotable water for plumbing fixture flushing water project elective.** Where projects are intended to qualify for an *alternate onsite nonpotable water* for plumbing fixture flushing project elective in accordance with Section A107.4, nonpotable water shall be used for flushing water closets and urinals.

**A107.4.1 Water quality.** Nonpotable water for water closet and urinal flushing shall meet minimum water quality requirements as established for indoor flushing applications by local codes and regulations. Where chlorine is used for disinfection, the nonpotable water shall contain not more than 4 mg/L of chloramines or free chlorine. Where ozone is used for disinfection, the nonpotable water shall not contain gas bubbles having elevated levels of ozone at the point of use.

**A107.4.2 Filtration required.** Nonpotable water utilized for water closet and urinal flushing applications shall be filtered by a 100 micron or finer filter.

**A107.4.3 Signage.** The entries to rooms having water closets or urinals that are supplied with nonpotable water shall be provided with signage in accordance with Section 1301.3 of the *International Plumbing Code*.

**A107.5 Automatic fire sprinkler system project elective.** Where projects are intended to qualify for an automatic fire sprinkler system project elective in accordance with Section A107.5, automatic fire sprinkler systems shall be supplied with nonpotable water from an onsite rainwater collection system. Such rainwater collection system shall comply with the *International Plumbing Code*. The requirements of Sections A107.5.1 and A107.5.3 shall apply to the fire sprinkler system and the onsite rainwater collection system.

**A107.5.1 Emergency power.** An emergency power system complying with Chapter 27 of the *International Building Code* shall be provided for powering the pump and controls for the onsite rainwater collection system.

**A107.5.2 Source volume indication.** The fire command center for the building shall be equipped with a device that indicates the volume of nonpotable water contained in the collection reservoir. The indicator shall be *approved* and shall be in compliance with NFPA 72.

**A107.5.3 Quality of water used for automatic fire sprinkler system.** The required quality and treatment of the nonpotable water stored and used for an automatic

fire sprinkler system shall be determined in accordance with the *International Fire Code*.

**A107.6 Alternate onsite nonpotable water to fire pumps project elective.** Where projects are intended to qualify for an *alternate onsite nonpotable water* to fire pumps project elective in accordance with Section A107.6, one or more fire pumps shall be located within 200 feet (60 960 mm) of a non-potable water collection system of sufficient quality, pressure, and capacity for fire pump applications and the fire pumps shall be connected to such source of nonpotable water. The connections shall be in accordance with Section 913 of the *International Fire Code*.

**A107.6.1 Quality of water.** The required quality and treatment of the nonpotable water stored and used by fire pumps for fire suppression and automatic fire sprinkler systems shall be determined in accordance with the *International Fire Code*.

**A107.6.2 Signage.** Fire pumps connected to a nonpotable water supply shall have signage in accordance with Section 1301.3 of the *International Plumbing Code* at the building's fire command center and at each fire pump.

**A107.7 Alternate onsite nonpotable water for industrial process makeup water project elective.** Where projects are intended to qualify for an *alternate onsite nonpotable water* for industrial process makeup water project elective in accordance with Section A107.7, industrial processes requiring makeup water shall utilize nonpotable water except where the process requires potable water for proper functioning.

**A107.7.1 Signage.** Rooms containing process equipment supplied with nonpotable water shall be provided with signage in accordance with Section 1301.3 of the *International Plumbing Code*.

**A107.8 Alternate onsite nonpotable water for cooling tower makeup water project elective.** Where projects are intended to qualify for an *alternate onsite nonpotable water* for cooling tower makeup water project elective in accordance with Section A107.8, nonpotable water shall be utilized for cooling tower makeup water. Such water shall meet the minimum water quality requirements as established for the application by the laws, rules and ordinances applicable in the jurisdiction.

**A107.9 Gray water collection project elective.** Where projects are intended to qualify for a gray water collection project elective in accordance with Section A107.9, wastewater from lavatories, showers, bathtubs, clothes washers, and laundry trays shall be collected for reuse onsite in accordance with the gray water requirements of Section 708 of the *International Plumbing Code*.

## SECTION A108 INDOOR ENVIRONMENTAL QUALITY AND COMFORT

**A108.1 VOC emissions project electives.** Sections A108.2 through A108.6 shall be considered to be separate project electives. The electives shall be cumulative and compliance with each project elective shall be recognized individually.

**A108.2 Flooring material project elective.** Where projects are intended to qualify for a "flooring material" project elective, all flooring installed within the interior of the building shall comply with Section 806.4 or shall be one or more of the following flooring materials that are deemed to comply with VOC emission limits:

1. Ceramic and concrete tile.
2. Clay pavers.
3. Concrete.
4. Concrete pavers.
5. Metal.
6. Organic-free, mineral-based.

**A108.3 Ceiling materials project elective.** Where projects are intended to qualify for a "ceiling materials" project elective, all ceiling systems shall comply with Section 806.5 or shall be one or more of the following ceiling systems that are deemed to comply with VOC emission limits:

1. Ceramic tile.
2. Clay masonry.
3. Concrete.
4. Concrete masonry.
5. Metal.
6. Organic-free, mineral-based.

**A108.4 Wall materials project elective.** Where projects are intended to qualify for a "wall materials" project elective, all wall systems shall comply with Section 806.5 or shall be one or more of the following wall systems that are deemed to comply with VOC emission limits:

1. Ceramic tile.
2. Clay masonry.
3. Concrete.
4. Concrete masonry.
5. Metal.
6. Organic-free, mineral-based.

**A108.5 Architectural paints and coatings project elective.** Where projects are intended to qualify for an architectural paints and coatings project elective, a minimum of 85 percent by weight or volume, of site-applied interior architectural coatings applied to walls, floors, and ceilings shall comply with the alternate emissions limits in Table 806.3(2). Compliance with Table 806.3(2) for architectural coating alternate emissions shall be determined utilizing test methodology incorporated by reference in CDPH/EHLB/Standard



Method V.1.1. The alternative emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 accreditation.

**A108.6 Total VOC limit project elective.** Where projects are intended to qualify for a “total VOC limit” project elective in accordance with a minimum of 50 percent of all adhesives and sealants, architectural paints and coatings, flooring, acoustical ceiling tiles and wall systems and insulation shall have a Total Volatile Organic Compounds (TVOCs) emission limit of  $\leq 500 \text{ ug/m}^3$ . The test methodology used to determine compliance shall be from CDPH/EHLB/Standard Method V.1.1. The emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 Accreditation.

**A108.7 Views to building exterior project elective.** Where projects are intended to qualify for a “views to building exterior” project elective in accordance with Section A108.6, not less than 50 percent of the net floor area shall have a direct line of sight to the exterior through clear vision glazing. A total of not less than 45 square feet ( $4.18 \text{ m}^2$ ) of clear vision glazing in the exterior wall or roof shall be visible. The direct line of sight shall originate at a height of 42 inches (1067 mm) above the finished floor of the space, shall terminate at the clear vision glazing in the exterior wall or roof, and shall be less than 40 feet (12 192 mm) in length.

**Exception:** Where the direct line of sight is less than 25 feet (7620 mm) in length, a total of not less than 18 square feet ( $1.67 \text{ m}^2$ ) of clear vision glazing in the exterior wall or roof shall be visible.

## SECTION A109 ACOUSTICS

**A109.1 Sound transmission and sound levels.** Where required by Table 302.1, buildings and tenant spaces shall comply with the minimum sound transmission class and maximum sound level requirements of Sections 807.2 through A109.5.2.

**Exception:** The following buildings and spaces need not comply with this section:

1. Building or structures that have the interior environment open to the exterior environment.
2. Parking structures.
3. Concession stands and toilet facilities in Group A-4 and A-5 occupancies.
4. Group I-2 occupancies that comply with the 2010 FGI-ASHE *Guidelines for Design and Construction of Healthcare Facilities*.

**A109.2 Sound transmission.** Sound transmission classes established by laboratory measurements shall be determined in accordance with ASTM E413 based on measurements in accordance with ASTM E90. Sound transmission classes for concrete masonry and clay masonry assemblies

shall be calculated in accordance with TMS 0302 or determined in accordance with ASTM E413 based on measurements in accordance with ASTM E90. Field measurements of completed construction, if conducted, shall be in accordance with ASTM E336 where conditions regarding room size and absorption required in ASTM E336 are met.

**A109.2.1 Interior sound transmission.** Wall and floor-ceiling assemblies that separate Group A and F occupancies from one another or from Group B, I, M or R occupancies shall have a sound transmission class (STC) of not less than 60 or an apparent sound transmission class (ASTC) of not less than 55 if the completed construction is field tested. Wall and floor-ceiling assemblies that separate Group B, I, M or R occupancies from one another shall have a sound transmission class (STC) of not less than 50 or an apparent sound transmission class (ASTC) of not less than 45 if the completed construction is field tested. Wall and floor-ceiling assemblies that separate Group R condominium occupancies from one another or from other Group B, I, M or R occupancies shall have a sound transmission class (STC) of not less than 55 or an apparent sound transmission class (ASTC) of not less than 50 if the completed construction is field tested. New laboratory tests for STC of an assembly are not required where the STC has been established by prior tests.

**Exception:** This section shall not apply to wall and floor-ceiling assemblies enclosing:

1. Public entrances to tenants of covered and open mall buildings.
2. Concession stands and lavatories in Group A-4 and A-5 occupancies.
3. Spaces and occupancies that are accessory to the main occupancy.

**A109.2.2 Mechanical and emergency generator equipment and systems.** Wall and floor-ceiling assemblies that separate a mechanical equipment room or space from the remainder of the building shall have a sound transmission class (STC) of not less than 50 or an apparent sound transmission class (ASTC) of not less than 45 if the completed construction is field tested. Wall and floor-ceiling assemblies that separate a generator equipment room or space from the remainder of the building shall have a sound transmission class (STC) of not less than 60 or an apparent sound transmission class (ASTC) of not less than 55 if the completed construction is field tested.

**A109.3 Sound levels.** The design and construction of mechanical and electrical generator systems and of walls and floor-ceilings separating such equipment from the outdoors or other building space shall achieve sound levels not greater than specified in Sections A109.3.1 and A109.3.2 during the normal operation of mechanical equipment and generators. Electrical generators used only for emergencies are exempt from the limits on sound levels within the building and need only meet daytime limits for sound-reaching boundaries. Where necessary, wall and floor-ceiling assemblies with sound transmission class (STC) ratings greater

than specified in Section A109.2.2 shall be used to meet this requirement.

**A109.3.1 Sound of mechanical and electrical generator equipment outside of buildings.** Where mechanical equipment or electrical generators are located outside of the building envelope or their sound is exposed to the exterior environment, the sound reaching adjacent properties shall comply with all applicable ordinances and zoning performance standards. In the absence of an ordinance or zoning performance standard specifying sound limits at the boundary, or a law specifying different limits if limits are imposed, an adjacent property at the boundary shall not be subjected to a sound level greater than indicated in Table A109.3.1 because of the sound of the equipment. Where a generator is used only for providing emergency power and all periodic operational testing is done during the daytime period of Table A109.3.1, the sound of a generator during the night-time hours shall meet the daytime limits.

**A109.3.2 Sound of HVAC and mechanical systems within buildings.** Sound levels within rooms generated by HVAC and mechanical systems within the building, including electrical generators used regularly but excluding emergency generators, for all modes of operation shall not exceed the limits shown in Table A109.3.2.

**A109.4 Structure-borne sounds.** Floor and ceiling assemblies separating sleeping units or dwelling units from public or service areas within the structure in occupancies classified as Group A1, A2, A3, B, E, I, M or R, or sleeping units or dwelling units from adjacent sleeping units or dwelling units in Group R occupancies, shall have an impact insulation classification (IIC) rating of not less than 50 where laboratory tested, and 45 where field tested, when tested in accordance with ASTM E492. New laboratory tests for impact insulation class (IIC) of an assembly are not required where the IIC has been established by prior tests.

**A109.5 Commissioning for sound levels.** An approved agency, employed by the owner or the owner's authorized agent, shall furnish report(s) of test findings indicating that the sound level results are in compliance with this section and the construction documents. Discrepancies shall be brought

to the attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the design professional and *code official* prior to the completion of that work. A final testing report documenting required testing and corrections of any discrepancies noted in prior tests shall be submitted at a point in time agreed upon by the owner, or owner's authorized agent, design professional, and the *code official* for purposes of demonstrating compliance.

**Exception:** Group I-2 occupancies that comply with the 2010 FGI-ASHE *Guidelines for Design and Construction of Healthcare Facilities* are not required to comply with this section where furnishing a report of test findings of the sound transmission results.

**A109.5.1 Testing for mechanical and electrical generator equipment outside of buildings.** Commissioning shall be conducted in accordance with Section 902.1 to demonstrate compliance with the requirements of Section A109.3.1. Testing shall be conducted following the complete installation of the equipment or generators, the installation of sound reduction barriers, and balancing and operation of the equipment or generators. Testing shall be at locations representing the four cardinal directions from the face of the project building. Such testing shall demonstrate that the equipment is capable of compliance with the night-time limits under normal night-time operating conditions, and if higher sound levels are possible during the daytime, compliance with the daytime limits shall also be demonstrated.

**A109.5.2 Testing for building system background noise.** Commissioning shall be conducted in accordance with Section 902.1 to demonstrate compliance with the requirements of Section A109.3.2. Testing shall be executed within not less than 50 percent of the total number of rooms contained in a building or structure of the types listed in Table A109.3.2 for the given occupancy in accordance with Table 902.1. Testing shall occur following the complete installation of the equipment and systems, the installation of any sound reduction barriers, and balancing and operation of the equipment and systems.

**TABLE A109.3.2  
MAXIMUM PERMITTED INDOOR BACKGROUND SOUND LEVELS IN ROOMS**

OCCUPANCY TYPE	ROOM	NOISE CRITERIA - MAXIMUM A-WEIGHTED SOUND LEVEL (dB)
Assembly A-1	Symphony, concert, recital halls	30
	Motion picture theaters	40
Assembly A-3	Places of religious worship, lecture halls not part of educational facilities	35
	Art gallery, exhibit hall, funeral parlor, libraries, and museums	40
	Courtroom	35
	Educational occupancies above 12th grade	(See Educational)
Assembly A-4	Gymnasiums, natatoriums and arenas with seating areas	45
Business B	Office—enclosed greater than 300 square feet	35
	Office—enclosed less than or equal to 300 square feet	40
	Office—open plan	45
	Corridors and lobbies	45
	Conference rooms	35
	Educational occupancies above 12th grade	(See Educational)
Educational E	Core learning lecture and classrooms that are less than or equal to 20,000 cubic feet in volume	ANSI/ASA S12.60-2010/Part 1 or ANSI/ASA S12.60-2009/Part 2
	Core learning lecture and classrooms that are greater than 20,000 cubic feet in volume	
	Open plan classrooms Administrative offices and rooms Music teaching studios	
	Music practice rooms	
Institutional I-2	All areas	2010 FGI-ASHE Guidelines for Design and Construction of Healthcare Facilities
Residential R-1 and R-2	Meeting rooms	35
	Corridors and lobbies	45
	Service areas	45

For SI: 1 square foot = 0.093 m<sup>2</sup>, 1 cubic foot = 28.31 L

**SECTION A110  
WHOLE BUILDING LIFE CYCLE ASSESSMENT**

Life cycle assessment shall conform to the requirements of ASTM E2921. The requirements for the execution of a whole building life cycle assessment shall be performed in accordance with the following:

1. The assessment shall demonstrate that the building project achieves not less than a 20-percent improvement in environmental performance for global warming potential and at least two of the following impact measures, as compared to a reference design of similar usable floor area, function and configuration that meets the minimum energy requirements of this code and the

structural requirements of the *International Building Code*. For relocatable buildings, the reference design shall be comprised of the number of reference buildings equal to the estimated number of uses of the relocatable building.

- 1.1. Primary energy use.
- 1.2. Acidification potential.
- 1.3. Eutrophication potential.
- 1.4. Ozone depletion potential.
- 1.5. Smog potential.
2. The life cycle assessment tool shall be *approved* by the code official.

**APPENDIX A**

3. Building operational energy shall be included. For relocatable buildings, an average building operational energy shall be estimated to reflect potential changes in location, siting, and configuration by adding or subtracting modules, or function.
4. For relocatable buildings, average transportation energy, material and waste generation associated with reuse of relocatable buildings shall be included in the assessment

**SECTION A111**

**REFERENCED STANDARDS FOR ELECTIVES**

ASHRAE	Energy Standard	A106.2.2.1
90.1-2010	for Buildings Except Low-Rise Residential Buildings	A106.2.2.2, A106.2.5, A106.3.3,
CDPH	Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers, Version 1.1 - 2010	A108.5, A108.6
EPA	Energy Star	A106.2.2.1, A106.2.2.2, A106.2.5, A106.3.3
ICC IBC—15	International Building Code	A104.1.2, A104.1.3, A107.5.1
IECC—15	International Energy Conservation Code	A104.9.1, A104.9.2, A104.9.3, A104.9.4, A106.2.2.1, A106.2.2.2, A106.2.4, A106.2.5, A106.3.3, A106.4.2, A106.4.3
IFC—15	International Fire Code	A107.5.3, A107.6, A107.6.1
IPC—15	International Plumbing Code	A107.4.3, A107.5, A107.6.2, A107.7.1, A107.9
NFPA 72-10	National Fire Alarm Code	A107.5.2
SMACNA	HVAC Air Duct Leakage Test Manual - 1985	A106.2.4



## APPENDIX B

# POST-OCCUPANCY COMMISSIONING REPORTING

*The provisions contained in this appendix are not mandatory but serve as a proposed methodology for tracking building operation. Establishing this procedure can be used to meet obtain one of the six required elective provisions.*

### SECTION B101 GENERAL

**B101.1 Post-occupancy report requirement.** Post-occupancy commissioning reporting shall be provided in accordance with Table B101.1 The post-occupancy commissioning reports shall be provided to the owner and shall be made available to the code official upon request. Any actions taken to address deficiencies cited in the post-occupancy commissioning reporting shall be solely at the discretion of the owner or the owner’s authorized agent, except where other more restrictive requirements exist in the jurisdiction.

**TABLE B101.1  
POST-OCCUPANCY COMMISSIONING REPORTING**

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	METHOD	OCCURRENCE	GOVERNING SECTION(S)
<b>Chapter 4: Site Development and Land Use</b>			
Stormwater management system operation	Field inspection	See maintenance plan	403.1
Erosion and sediment control	Field inspection	See maintenance plan	405.1.1
Hardscape and shading provided by structures and vegetation	Field inspection and report	See maintenance plan	408.2
Vegetative roofs	Field inspection and report	See maintenance plan	408.3.2
<b>Chapter 6: Energy</b>			
Energy consumption, monitoring, targeting and reporting			
Calibration	Commissioning, testing and re-view and evaluation or test re-ports	Annually where required in maintenance plans	603, 610.1
Mechanical systems—buildings over 5,000 square feet total building floor area			
a. Balance HVAC systems (both air and hydronic)	HVAC system installer, TAB/contractor and commissioning provider	Where required in maintenance plans	611.7.1, 611.7.2 and through reference to IECC
b. Functional performance testing of HVAC equipment	HVAC system installer/contractor and commissioning provider	Where required in maintenance plans	611.1, 611.3, 611.3.1, 611.4.3, 611.6, 611.7, 611.7.2 and through reference to IECC
c. Functional performance testing of HVAC controls and control systems	HVAC system installer/contractor and commissioning provider	Where required in maintenance plans	611.1, 611.3.2, 611.7 and through reference to IECC
Lighting			
Calibration	System installer/contractor and commissioning provider	Where required in maintenance plans	611.3.2, 611.9.2, 611.9.2.1, 611.9.2.2 and through reference to IECC

For SI: 1 square foot = 0.0929 m<sup>2</sup>.



# INDEX

## A

<b>ACCOUSTICAL TILES AND WALL SYSTEMS</b> . . . . .	806.5
<b>ACIDIFICATION POTENTIAL</b> . . . . .	505.3
<b>ADDITIONS</b> . . . . .	1002
Building site improvements . . . . .	1102.1
<b>AFTERNOON ILLUMINATION</b> . . . . .	808.3.2.2
<b>AGENCY, APPROVED</b> . . . . .	902.1.1
Equipment . . . . .	902.1.1.3
Independence . . . . .	902.1.1.2
Qualification . . . . .	902.1.1.1
<b>AGRICULTURAL LAND</b> . . . . .	Table 302.1, 402.6
<b>AIR CURTAINS</b> . . . . .	202, 605.1.2.3
<b>AIR-HANDLING SYSTEM</b>	
Access . . . . .	802.2
Filters . . . . .	802.3
<b>AIR LEAKAGE</b> . . . . .	605.1.2
Testing . . . . .	605.1.2.2
<b>AIR POLLUTANTS</b> . . . . .	Table 804.2
<b>ALTERATIONS</b> . . . . .	1003
Building site improvements . . . . .	1103.1
<b>ALTERNATIVE MATERIALS, DESIGN, INNOVATIVE APPROACH AND METHODS OF CONSTRUCTION</b> . . . . .	105.4
<b>ANNUAL CO<sub>2</sub>e EMISSIONS REPORTING</b>	
For existing buildings . . . . .	Table 302.1, 1007.3
<b>ANNUAL NET ENERGY USE</b>	
For existing buildings . . . . .	1007.3
<b>APPLIANCES</b>	
Energy efficiency . . . . .	609.1, 609.2
Pilot lights . . . . .	608.7.1
<b>APPLICATION</b>	
Of the IgCC . . . . .	103.2
Of the IgCC and ASHRAE 189.1 . . . . .	301.1.1
<b>APPROVAL</b> . . . . .	105.2
<b>ASBESTOS</b> . . . . .	805.1
<b>ASHRAE 90.1, MODIFICATION</b> . . . . .	602.2.1
<b>AUTOCLAVES</b> . . . . .	702.17
<b>AUTOMATIC DAYLIGHT CONTROLS</b> . . . . .	608.5, 611.9.2.2
<b>AUTOMATED-DEMAND RESPONSE (AUTO DR)</b> . . . . .	202, 601.4, 604.1
Lighting, Groups B, E, M . . . . .	604.4
Peak heating/cooling . . . . .	604.1
Rebound avoidance . . . . .	604.3.2
<b>AUTOMATIC DEMAND REDUCTION SYSTEMS</b> . . . . .	604, Table 902.1

## B

<b>BICYCLES</b>	
Change of occupancy . . . . .	1104.2
Changing facilities . . . . .	407.2
Parking and storage . . . . .	407.3
Pathways . . . . .	407.1
Showers . . . . .	407.2
<b>BIKEWAYS</b> . . . . .	407.1
<b>BIO-BASED MATERIALS</b> . . . . .	505.2.4
<b>BOARD OF APPEALS</b> . . . . .	108
<b>BOILERS</b>	
For existing buildings . . . . .	1003.2.2
<b>BROWNFIELD SITES</b> . . . . .	202, 403.1.3
Record documents . . . . .	902.7
<b>BUILDING ENERGY MANAGEMENT AND CONTROL SYSTEM (EMCS)</b> . . . . .	604.2
<b>BUILDING SITE</b> . . . . .	202
Development . . . . .	Chapter 4
Waste management . . . . .	406.1
See: Development, Preservation, Protection, Site disturbance, Site improvements, Soils, Stormwater management and Vegetation	
<b>BUILDINGS UNDER 25,000 SQ. FT</b> . . . . .	603.4, 603.4.1

## C

<b>CARBON DIOXIDE EQUIVALENT EMISSIONS (see CO<sub>2</sub>e EMISSIONS)</b> . . . . .	202
<b>CERTIFICATE OF OCCUPANCY</b> . . . . .	902.4.1
<b>CFC-BASED REFRIGERANTS</b>	
In existing buildings . . . . .	1003.2.2
<b>CHANGE OF OCCUPANCY</b> . . . . .	1004, 1004.1
Bicycle parking . . . . .	1104.2
Building site improvements . . . . .	1104.1
<b>CHANGING FACILITIES</b> . . . . .	407.2
<b>CHILLERS</b>	
For existing buildings . . . . .	1003.2.2
<b>CIRCUIT ISOLATION</b> . . . . .	603.2
<b>CLEANING PRODUCTS</b> . . . . .	903.2
<b>CLOTHES WASHER</b> . . . . .	702.5.1
<b>CO<sub>2</sub>e EMISSIONS</b> . . . . .	602.1, 602.3, 602.3.1, 603.5.1, 612.2, 612.3.2
<b>COAL TAR SEALANTS</b> . . . . .	403.2
<b>CODE CONFLICTS</b> . . . . .	102.1, 102.4.1
<b>CODE OFFICIAL</b>	
Definition . . . . .	202
Duties and powers of . . . . .	103
<b>COMBINATION OVENS</b> . . . . .	702.16



**COMBINED HEAT AND POWER** . . . . . 603.3.6

**COMMERCIAL FOOD SERVICE EQUIPMENT**

Energy efficiency . . . . . 609.2.3

Water use . . . . . 609.2.3

**COMMISSIONING** . . . . . 902

Commissioning plan . . . . . 611.2

Final report requirement . . . . . 902.5

General . . . . . 902.1, Table 902.1

Post occupancy . . . . . Appendix B

Pre-certificate of occupancy report requirement . . . . . 902.4

**CONDENSATE COOLERS** . . . . . 703.3

**CONDENSATE RECOVERY** . . . . . 703.4

**CONSERVATION AREAS** . . . . . 202, Table 302.1, 402.1, 402.5

**CONSTRUCTION ACTIVITIES** . . . . . 405.1.1

Waste. . . . . 406.2

**CONSTRUCTION DOCUMENTS**

General . . . . . 104.1

Operations and maintenance. . . . . 903

Record . . . . . 903.2

**CONSTRUCTION WASTE MANAGEMENT.** . . . . . 503, 503.1

**CONVEYORS** . . . . . 609.2.4

**COOLING TOWERS.** . . . . . 703.7

**D**

**DATA ACQUISITION AND MANAGEMENT** . . . . 603.5

**DAYLIGHT ANALYSIS.** . . . . . 808.3.2.3

**DAYLIGHTING** . . . . . 808

Performance requirements . . . . . 808.3.2

Prescriptive requirement . . . . . 808.3.1

**DECONSTRUCTION AND DEMOLITION** . . . . . 1006, 1006.1

**DEVELOPMENT**

Agricultural land . . . . . 402.6

Conservation areas . . . . . 402.5

Flood hazard areas . . . . . 402.2.3

Greenfields . . . . . 402.7

Wetlands . . . . . 402.4

**DIMMING SYSTEMS, LIGHTING.** . . . . . 611.9.2.4

**DIPPER WELLS** . . . . . 702.11

**DISHWASHER** . . . . . 702.5.4

**DISTRICT HEATING AND COOLING** . . . . . 603.3.5

**DOCUMENTATION (see TESTING AND VERIFICATION)**

Commissioning . . . . . 611.1, 611.2, 611.3, 611.4.3, 611.5, 611.7, 611.8, 611.9, 611.10.2

Energy display . . . . . 603.6

Energy metering . . . . . 603.5

Sequence of operation. . . . . 611.3.3

Soil protection, restoration . . . . . 405.1.6

Waste management . . . . . 406.1, 503

**DRAIN WATER HEAT RECOVERY** . . . . . 607.5

**DRINKING FOUNTAIN** . . . . . 702.4

**DUCT**

Air leakage testing . . . . . 606.3.1

Insulation and sealing . . . . . 606.3

**DWELLING UNITS**

Water heating . . . . . 607.2.2

Daylight responsive controls . . . . . 608.5

**E**

**ECONOMIZERS**

Air economizers . . . . . 606.5.1, 606.5.1.1

Commissioning. . . . . 611.7.3

For existing buildings . . . . . 1003.2.2

Water economizers . . . . . 606.5.1, 606.5.1.2

**eGRID** . . . . . 602.2.1.1, 602.2.1.2, 602.3.1, 602.3.2

**ELECTRIC POWER** . . . . . 602.2.1.2

CO<sub>2</sub>e emissions . . . . . 602.3.1

Metering . . . . . 603.3.4

Peak demand . . . . . 604.1

Prescriptive compliance . . . . . 608.1

System commissioning . . . . . 611.9

**ELECTRIC SYSTEMS EFFICIENCY** . . . . . 608.8

Voltage drop limits . . . . . 607.7.1.1, 608.8.1.2

**ELECTRICAL AND LIGHTING SYSTEMS** . . . . 903.2

**ELECTRICAL PANEL RATING** . . . . . 608.10

**ELEVATORS** . . . . . 609.2.1

**ENERGY CONSERVATION**

Building operations and maintenance documents. . . . . 903

Commissioning. . . . . 902.1, Table 902.1

Metering . . . . . 603

Minimum requirements. . . . . 601.3, 601.4

Mixed-use buildings . . . . . 601.5.2

Modeled performance . . . . . 602

Multiple buildings on site . . . . . 601.5.1

Outcome-based . . . . . 601.3.3, 612

Performance-based . . . . . 601.3.1, 602

Prescriptive-based . . . . . 601.3.2

**ENERGY SIMULATION** . . . . . 602.1.4

**ENERGY USE INTENSITY** . . . . 612.1, 612.1.2, 612.1.3

**ENFORCEMENT PROCEDURES** . . . . . 103, 104, 105, 106, 107, 108, 109, 301.2, 302.1, 612.3

**ENGINEERED GROWING MEDIA** . . . . . 405.1.5

**ENVIRONMENTAL CONDITIONS, INDOOR** . . . . 806

Control measures. . . . . 804, 806

Pollutant sources . . . . . 803.3

Thermal . . . . . 803.2

**ESCALATORS, MOVING WALKWAYS** . . . . . 609.2.2

**EUTROPHICATION POTENTIAL** . . . . . 505.3

**EVAPORATIVE COOLERS** . . . . . 703.9

**EXISTING BUILDINGS AND STRUCTURES**

- Additions . . . . . 1002
- Alterations . . . . . 1003
- Annual CO<sub>2</sub>e emissions reporting . . . . . 1007.3
- Annual net energy use . . . . . 1007.3
- Boilers . . . . . 1003.2.2
- CFC-based refrigerants . . . . . 1003.2.2
- Change of occupancy . . . . . 1004, 1004.1
- Chillers . . . . . 1003.2.2
- Compliance . . . . . 1001.3
- Deconstruction and demolition . . . . . 1006, 1006.1
- Economizers . . . . . 1003.2.2
- General . . . . . 102.6
- Heating, ventilating and air-conditioning . . . . . 1003.2.2
- Historic buildings . . . . . 1005, 1005.1
- HVAC piping and ducts . . . . . 1003.2.2
- Insulation of unconditioned attics . . . . . 1003.2.6
- Lighting . . . . . 1003.2.4
- Materials, assemblies, configurations and systems . . . . . 1001.4
- Metering . . . . . 1003.2.1
- Operations and maintenance . . . . . 1001.1
- Peak monthly energy demand reporting . . . . . 1007.3.3
- Post-certificate of occupancy, energy use, energy demand and CO<sub>2</sub>e emissions reporting . . . . . Table 302.1, 1007.3
- Reporting . . . . . 1007.3
- Service water systems . . . . . 1003.2.3
- Swimming pools and spas . . . . . 1003.2.5
- Time clock and automatic time switch controls . . . . . 1003.2.2

**EXISTING SITE MATERIALS, SYSTEMS** . . . . . 1101.4

**EXTERIOR LIGHTING**

- Pollution . . . . . 409.1
- Prescriptive . . . . . 608.9
- Reduction . . . . . 608.4.1
- Shutoff . . . . . 608.4.1
- Signage . . . . . 608.4.2

**F**

**FAN EFFICIENCY** . . . . . 606.2.2.3

**FEDERAL REQUIREMENTS**

- Appliances and equipment . . . . . 609.1
- HVAC equipment . . . . . 606.2.1
- Service water heating equipment . . . . . 607.2.1

**FENESTRATION**

- Minimum criteria . . . . . 605.1.1
- Shading devices . . . . . 605.1.1.1

**FILM PROCESSORS** . . . . . 702.19

**FILTERS** . . . . . 802.3, 803.4

**FIREPLACES** . . . . . 804.1

**FLOOD HAZARD AREA PRESERVATION**

- General . . . . . Table 302.1, 402.1, 402.2, 402.2.1
- Specific . . . . . Table 302.1, 402.2.2

**FLOOD HAZARD AREAS** . . . . . 202, 402.2, 406.1

**FLOORING** . . . . . 903.2

**FLOORING MATERIALS** . . . . . 806.4

**FOOD DISPOSERS** . . . . . 702.15

**FOOD STEAMER** . . . . . 702.5.3

**FOSSIL FUELS** . . . . . 602.2.1.1, 602.3.2

**FOUNTAINS** . . . . . 404.2

**FUEL GAS LIGHTING** . . . . . 608.7, 608.7.1

**FUNCTIONAL PERFORMANCE TESTING** . . . . . 611.3

**G**

**GASEOUS FUELS** . . . . . 603.3.1

**GLARE, LIGHT POLLUTION** . . . . . 409.3

**GLOBAL WARMING POTENTIAL** . . . . . 505.3

**GREENFIELD SITES** . . . . . Table 302.1, 402.7

**GREENFIELDS** . . . . . 202, 402.7, 406.1

**GROUND SOURCE HEAT PUMPS** . . . . . 606.2.2.1

**H**

**HANDWASHING FAUCETS** . . . . . 702.10

**HARDSCAPE, SITE** . . . . . 202, 408.2, 1103.2

**HEAT EXCHANGERS** . . . . . 703.5

**HEAT ISLAND MITIGATION** . . . . . 408

**HEAT PUMPS** . . . . . 606.2.2.1, 606.2.2.2

**HEAT RECOVERY** . . . . . 607.5

**HEATING, VENTILATING AND AIR-CONDITIONING**

- For existing buildings . . . . . 1003.2.2

**HIGH-OCCUPANCY VEHICLE PARKING** . . . . . Table 302.1, 407.4, 407.4.1

**HISTORIC BUILDING SITES** . . . . . 1105.1

**HISTORIC BUILDINGS** . . . . . 1005, 1005.1

**HOT TUBS** . . . . . 607.3

**HOT WATER DISTRIBUTION** . . . . . 702.7

**HOTEL SLEEPING ROOMS/UNITS** . . . . . 606.8, 607.5, 608.2

**HUMIDIFICATION/DEHUMIDIFICATION** . . . . . 903.2

**HUMIDIFICATION SYSTEMS** . . . . . 703.2, 703.6

**HVAC**

- Auto-DR . . . . . 604.2
- Commissioning . . . . . 611.1, 611.7
- Controls . . . . . 611.3.2
- Economizers . . . . . 606.5, 611.7.3
- Equipment performance . . . . . 606.2
- Fan efficiency . . . . . 606.2.2.3
- Heat pumps . . . . . 606.2.2.1, 606.2.2.2

Insulation . . . . . 606.3  
 Laboratory exhaust . . . . . 606.7  
 Prescriptive compliance . . . . . 606.1  
 VAV fans . . . . . 606.6  
**HVAC PIPING AND DUCTS**  
 For existing buildings . . . . . 1003.2.2  
**HYDRONIC SYSTEMS** . . . . . 703.1

**I**

**ICEMAKER** . . . . . 702.5.2  
**ILLUMINATION**  
 Bicycle parking . . . . . 407.3.1, 407.3.2  
 Light pollution . . . . . 409.1  
**INDIGENOUS MATERIALS** . . . . . 505.2.5  
**INDOOR AIR QUALITY**  
 Management plan . . . . . 801.2  
 Testing . . . . . 804.2  
 VOC levels . . . . . 806  
**INDOOR AIR QUALITY TESTING** . . . . . Table 302.1,  
 804.2  
**INNOVATIVE APPROACH** . . . . . 105.4  
**INSPECTIONS** . . . . . 103.4, 107, 902.1,  
 Table 902.1, Table 902.2  
 Commissioning . . . . . 611.10.2  
**INSULATION** . . . . . 806.6  
**INSULATION OF UNCONDITIONED ATTICS**  
 For existing buildings . . . . . 1003.2.6  
**INTENT**  
 Of the IgCC . . . . . 101.5  
**INTERIOR ENVIRONMENT** . . . . . Chapter 8  
**INVASIVE SPECIES** . . . . . 202  
 In landscaping . . . . . 405.2.2  
 Site inventory . . . . . 401.2  
 Vegetative roofs . . . . . 408.3.2  
**IRRIGATION, LANDSCAPE** . . . . . 404.1.1  
 System design . . . . . 404.1.2

**J**

**JANITORIAL ROOMS** . . . . . 803.3.1  
**JURISDICTIONAL REQUIREMENTS**  
 Checklist . . . . . Table 302.1  
 Requirements determined by  
 the jurisdiction . . . . . 302.1  
 When mandatory . . . . . 301.2  
 zEPI of 46 or less . . . . . 302.1.1

**L**

**LABORATORY EXHAUST** . . . . . 606.7  
**LAMPS**  
 Maintenance . . . . . 903.2

Mercury content of fluorescents . . . . . 506.1,  
 506.1.1, 506.1.2

**LANDSCAPE**

Invasive species . . . . . 405.2.2  
 Irrigation . . . . . 404.1  
 Native . . . . . 405.3  
 Vegetation . . . . . 405.2

**LIFE CYCLE ASSESSMENT** . . . . . 505.3

**LIGHT POLLUTION CONTROL** . . . . . Table 302.1,  
 409.1

Light pollution zones . . . . . 409.1.1  
 Light trespass . . . . . 409.3  
 Uplight . . . . . 409.2

**LIGHTING**

Auto-DR . . . . . 604.4  
 Automatic daylight responsive controls . . . . . 608.5  
 Commissioning . . . . . 611.9  
 Controls . . . . . 608.1, 608.2, 608.3,  
 608.4, 608.5, 608.6  
 Dimming systems . . . . . Table 302.1, 611.9.1  
 Exterior lighting controls . . . . . 608.4  
 For existing buildings . . . . . 1003.2.4  
 Interior light reduction . . . . . 608.3  
 Prescriptive compliance . . . . . 606.1

**LIQUID FUELS** . . . . . 603.3.2

**LOAD TYPES**

Metering . . . . . 603.2, 603.4, 603.5, 603.6

**LONG-TERM BICYCLE PARKING** . . . . . 202, 407.3.2

**LOW-EMISSIONS, HYBRID**

**AND ELECTRIC VEHICLE**

**PARKING** . . . . . Table 302.1, 407.4, 407.4.2

**M**

**MAINTENANCE**

Building sites . . . . . 1101.2  
 Landscaping . . . . . 405.1.1  
 Stormwater . . . . . 405.1.1

**MAINTENANCE, BUILDING** . . . . . 903

**MANUAL, OPERATING** . . . . . 611.4.4

**MATERIAL EMISSIONS** . . . . . 806

Adhesives and sealants . . . . . 806.2  
 Composite wood . . . . . 806.1

**MATERIAL RESOURCE CONSERVATION AND EFFICIENCY**

Bio-based . . . . . 505.2.4  
 Construction material management . . . . . 502, 502.1  
 Construction waste management . . . . . 503, 503.1  
 Existing . . . . . 1001.4  
 Indigenous . . . . . 505.2.5  
 Operations and maintenance plan . . . . . 903  
 Post-certificate of occupancy  
 waste management and recycling . . . . . 504, 504.1

Recyclable . . . . . 505.2.3  
 Recycled content . . . . . 505.2.2  
 Selection . . . . . 505, 505.1, 505.2, 505.3, 505.4  
 Used . . . . . 505.2.1

**MECHANICAL SYSTEMS**

Commissioning . . . . . 611.1, 611.7  
 Prescriptive compliance . . . . . 606.1

**MERCURY CONTENT,**

**FLUORESCENT LAMP** . . . . . 506, 506.1,  
 506.1.1, 506.1.2

**METER**

Building metering . . . . . 603.1  
 Energy type . . . . . 603.3  
 For existing buildings . . . . . 1003.2.1  
 Renewable energy systems . . . . . 603.3.7  
 Tenant meters . . . . . 603.1.1  
 Utility . . . . . 602.2.1.1, 602.2.1.2  
 Water . . . . . 701.2

**MIXED OCCUPANCY** . . . . . 102.7

**MODIFICATIONS TO THE CODE** . . . . . 105.3

**MOISTURE CONTROL** . . . . . 502.1.2

**MORNING ILLUMINATION** . . . . . 808.3.2.1

**MUNICIPAL RECLAIMED WATER** . . . . . 702.6

**N**

**NATURAL RESOURCES,**

**PRESERVATION** . . . . . 402, 402.1

**NONPOTABLE WATER** . . . . . 404.1.1, 404.2

**NONRENEWABLE ENERGY** . . . . . 602.3.2,  
 612.2.2

**O**

**OCCUPANT SENSORS** . . . . . 608.1, 608.2.1,  
 608.3, 611.9.2.1

**OPERATION AND MAINTENANCE**

Building site facilities . . . . . 1101.2

**OPERATIONAL ENERGY** . . . . . 505.3

**OPERATIONS, BUILDING** . . . . . 903

**ORDINANCE**

Sample . . . . . xv

**OUTCOME-BASED PATHWAY** . . . . . 601.3.3, 612

Energy use intensity . . . . . 612.1.2

CO<sub>2</sub>e emissions . . . . . 612.2

Temporary certificate of occupancy . . . . . 612.3.1

**OUTDOOR WATER FOUNTAINS**

**AND FEATURES** . . . . . 404.2

Recirculation . . . . . 404.2.2

Signage . . . . . 404.2.3

Treatment of water . . . . . 404.2.1

**OZONE DEPLETION POTENTIAL** . . . . . 505.3

**P**

**PAINTS AND COATINGS** . . . . . 806.3

**PEAK ENERGY DEMAND REPORTING**

For existing building . . . . . 1007.3.2

**PEAK HEATING AND COOLING** . . . . . 604.1

Rebound avoidance . . . . . 604.3.2

**PERFORMANCE VERIFICATION/TESTING HVAC**

Commissioning . . . . . 611.3, 611.7

**PERMITS** . . . . . 103.2, 106.1

Post-occupancy verification . . . . . 612.3.3

**PERVIOUS PAVING** . . . . . 202, 408.2.4

**PHOTOVOLTAIC SYSTEMS**

Limitation . . . . . 610.2

**PLUG LOADS** . . . . . 603.2, 608.6

**POOLS, HOT TUBS, SPAS** . . . . . 607.3, 607.3.1

**POST-CERTIFICATE OF OCCUPANCY**

**ANNUAL NET ENERGY USE,**

**ENERGY DEMAND AND CO<sub>2</sub>e**

**EMISSIONS REPORTING** . . . . . 1007.3

**POST-OCCUPANCY**

**COMMISSIONING** . . . . . Appendix B

**POTABLE WATER** . . . . . 202, 404.1.1, 404.2

**PRERINSE VALVES** . . . . . 702.3

**PRESERVATION**

Agricultural lands . . . . . 402.6

Flood hazard areas . . . . . 402.2

Natural resources . . . . . 402

Surface water . . . . . 402.3

Wetlands . . . . . 402.4

**PRIMARY ENERGY USE** . . . . . 505.3

**PRINTER AND COPIER ROOMS** . . . . . 803.3.1

**PROHIBITED MATERIALS** . . . . . 805.1

**PROJECT ELECTIVES** . . . . . Appendix A

**PROTECTION**

By area . . . . . 402.1

Flood hazard areas . . . . . 402.2

Soils . . . . . 405.1, 405.2

Surface waters . . . . . 402.3

Trees . . . . . 405.2.1.1

Vegetation . . . . . 405.2.1

Water quality . . . . . 405.1

Wetlands . . . . . 402.4

**R**

**RADON MITIGATION** . . . . . Table 302.1, Appendix B

**RECLAIMED WATER**

Municipal . . . . . Table 302.1, 702.6

**RECLAIMED WATER**

**TREATMENT SYSTEM** . . . . . 704.3

**RECYCLE, RECYCLED, RECYCLING,**  
**RECYCLABLE**

Areas . . . . . 504.1

Construction material and waste . . . . . 503.1  
 Post-certificate of occupancy waste  
 management and recycling waste . . . . . 504, 504.1  
 Recycled content . . . . . 505.2.2  
**REFERENCE DESIGN** . . . . . 602.3  
**REFERENCED CODES AND STANDARDS** . . . . . 102.4  
**REGISTERED DESIGN**  
**PROFESSIONAL** . . . . . 611.1, 611.2, 611.4  
**RELOCATABLE BUILDINGS**  
 Existing . . . . . 1003.1  
 Life cycle assessment . . . . . 505.3  
**RENEWABLE ENERGY** . . . . . 601.5.1, 603.3.7,  
 603.3.7.5, 607.3, 610  
 Commissioning . . . . . 611  
 Metering, monitoring . . . . . 603.3.7  
 Where required . . . . . 601.3  
**REPLACEMENT MATERIALS** . . . . . 1101.4.2  
**REPORTING**  
 For existing buildings . . . . . 1007.3  
 For outcome-based buildings . . . . . 612.3.2  
**RESEARCH REPORTS** . . . . . 105.4.1  
**REVERSE OSMOSIS** . . . . . 704.2  
**ROOF**  
 Replacement insulation for existing  
 buildings . . . . . 1003.2.7  
 Vegetative . . . . . 408.3.2  
**ROOFS, ROOFING**  
 Product testing . . . . . 408.3.1.1  
 Solar reflectance . . . . . 202, 408.3.1  
 Surfaces . . . . . 408.3  
 Vegetative . . . . . 408.3.2

**S**

**SALVAGE** . . . . . 503.1  
**SCOPE**  
 Of Chapter 3 . . . . . 301.1  
 Of Chapter 5 . . . . . 501.1  
 Of Chapter 9 . . . . . 901.1  
 Of Chapter 10 . . . . . 1001.1  
 Of the IgCC . . . . . 101.3  
**SEQUENCE OF OPERATIONS** . . . . . 611.5.3  
**SERVICE WATER HEATING**  
 Equipment performance . . . . . 607.2  
 Prescriptive compliance . . . . . 607.1  
 Water heating, dwellings . . . . . 607.2.1.1  
**SERVICE WATER SYSTEMS**  
 For existing buildings . . . . . 1003.2.3  
**SHORT-TERM BICYCLE PARKING** . . . . . 202, 407.3.1  
**SHOWERS**  
 Changing facilities . . . . . 407.2  
**SIGNAGE** . . . . . 706.2  
 Exterior lighting shutoff . . . . . 608.4.2

Water fountains/features . . . . . 404.2.3  
**SITE DEVELOPMENT** . . . . . Chapter 4  
**SITE DISTURBANCE** . . . . . 202, 402.2,  
 402.3, 402.4, 402.5,  
 402.6, 402.7  
**SITE HARDSCAPE** . . . . . 408.2  
 Materials . . . . . 408.2.1  
 Pervious and permeable paving . . . . . 408.2.4  
 Shading . . . . . 408.2.2, 408.2.3  
**SITE IMPROVEMENTS** . . . . . 402.2, 402.3, 402.4,  
 402.5, 402.6, 402.7  
**SITE INVENTORY AND ASSESSMENT** . . . . . 401.2  
**SKY TYPES** . . . . . 808.4  
 International . . . . . 808.4.2  
 United States . . . . . 808.4.1  
**SLEEPING ROOMS**  
 HVAC controls . . . . . 606.8  
 Lighting controls . . . . . 608.2, 608.2.1  
**SMOG POTENTIAL** . . . . . 505.3  
**SNOWMELT SYSTEMS** . . . . . 607.4  
**SOILS (see also TOPSOIL)**  
 Engineered growing media . . . . . 405.1.5, 408.3.2  
 Imported soils . . . . . 405.1.3  
 Plan . . . . . 405.1.1  
 Preparation . . . . . 405.1.4.1  
 Protection . . . . . 405.1, 405.2  
 Restoration . . . . . 405.1.4, 405.1.4.2  
 Reuse . . . . . 405.1.4  
**SOLAR ENERGY**  
 Electric . . . . . 603.3.7.1  
 Thermal . . . . . 603.3.7.2  
**SOLAR REFLECTANCE INDEX** . . . . . 202, 408.3.1.2  
**SOLID FUELS** . . . . . 603.3.3  
**SOUND LEVELS** . . . . . A109.3  
 HVAC systems . . . . . A109.3.2  
 Inspection for . . . . . A109.5.2  
 Interior sound transmission . . . . . 807.2.1  
 Outside equipment . . . . . 807.3.1  
**SOUND TRANSMISSION** . . . . . Table 302.1,  
 807.1, 807.2  
 Inspection . . . . . 807.5.2  
 Walls and floors . . . . . 807.2.1  
**SPAS** . . . . . 607.3  
**STORMWATER MANAGEMENT** . . . . . 403  
 Adjoining lots . . . . . 403.1.2  
 Runoff . . . . . 403.1.1  
 Sedimentation . . . . . 405.1.1  
 Walkways, bikeways . . . . . 407.1  
**STRUCTURE-BORNE SOUND** . . . . . 807.4  
**SURFACE WATER PROTECTION** . . . . . Table 302.1,  
 402.1, 402.3  
**SWIMMING POOLS AND SPAS**  
 For existing buildings . . . . . 1003.2.5

**SYSTEM COMPLETION** . . . . . 611.1

**T**

**TAKEBACK PROGRAM** . . . . . 505.2.3  
**TEMPERED WATER DISTRIBUTION** . . . . . 702.7  
**TEMPORARY CERTIFICATE OF OCCUPANCY** . . . . . 612.3.1  
**TENANT SPACES**  
 Energy metering . . . . . 603.1.1  
**TESTING AND VERIFICATION**  
 Building envelope . . . . . 611.10  
 Commissioning . . . . . 611.2, 611.3  
 Duct air leakage . . . . . 605.1.2.2, 606.3.1  
 Lighting controls . . . . . 611.9  
 Metering . . . . . 603.5  
 Post-occupancy verification permit . . . . . 612.3.3  
 Roof products . . . . . 408.3.1.1  
**TESTS** . . . . . 105.4.2  
**TIME CLOCK AND AUTOMATIC TIME SWITCH CONTROLS**  
 For existing buildings . . . . . 1003.2.2  
**TIME SWITCH CONTROLS** . . . . . 608.4, 611.9.3.3  
**TOPSOIL** . . . . . 202, 405.1.1, 405.1.2  
**TRANSPORTATION IMPACTS** . . . . . 407  
**TRAP PRIMING WATER** . . . . . 702.8  
**TREE PROTECTION** . . . . . 405.2.1, 405.2.2  
**TUB SPOUT** . . . . . 702.2

**U**

**UREA-FORMALDEHYDE** . . . . . 805.1  
**USED MATERIALS, PRODUCTS AND EQUIPMENT** . . . . . 505.2.1

**V**

**VACUUM PUMPS** . . . . . 702.18  
**VARIABLE AIR VOLUME FANS** . . . . . 606.6  
**VEGETATION**  
 Invasive species . . . . . 202, 401.2, 405.2.2  
 Native species . . . . . 202, 401.2  
 Protection . . . . . 405.1.1, 405.2  
**VEGETATIVE ROOFS** . . . . . 202, 408.3.2  
**VEHICLE PARKING**  
 Alterations . . . . . 1103.2  
 Electric/hybrid . . . . . 407.4.2  
 High-occupancy . . . . . 202, 407.4.1  
 Low-emission . . . . . 202, 407.4.2  
 Preferred . . . . . 407.4  
**VEHICLE WASH FACILITIES** . 702.12, 702.13, 702.14  
**VENTILATION OF BUILDINGS**  
 Construction phase . . . . . 803.1

**VOC LIMITS**

Accoustical tiles and wall systems . . . . . 806.5  
 Adhesives and sealants . . . . . 806.2  
 Composite wood products . . . . . 806.1  
 Flooring . . . . . 806.4  
 Insulation . . . . . 806.6  
 Paints and coatings . . . . . 806.3

**W**

**WALKWAYS** . . . . . 402.7, 407.1  
**WASTE ENERGY** . . . . . 603.3.7.3  
**WASTE HEAT RECOVERY** . . . . . 607.3, 607.4, 607.5  
**WASTE MATERIALS**  
 Percentage diverted . . . . . Table 302.1, 503.1  
**WATER**  
 Nonpotable . . . . . 202, 404.1.1, 404.2, 701.2, 701.2.1, 702.8, 702.8.3, 702.12, 703.4, 704.3  
 Potable . . . . . 202, 404.1.1, 404.2  
 Protection of quality . . . . . 405.1, 405.1.1  
 Recirculation . . . . . 404.2.2  
 Treatment . . . . . 404.2.1  
**WATER CONSERVATION**  
 Building operations and maintenance documents . . . . . 903  
**WATER CONSUMPTION** . . . . . 702.1, Table 702.5.4  
**WATER HEATING, DWELLINGS** . . . . . 607.2.2  
**WATER-POWERED PUMPS** . . . . . 702.9  
**WATER QUALITY** . . . . . 703.7.5  
**WATER SOFTENERS** . . . . . 704.1  
**WET-HOOD EXHAUST SCRUBBERS** . . . . . 703.8  
**WETLAND, PROTECTION** . . . . . 202, 402.4  
**WIND POWER** . . . . . 603.3.7.4

**Z**

**zEPI** . . . . . 202, 602.1, 602.3, 612.1.1  
 By occupancy . . . . . Table 302.1  
 Of 46 or less . . . . . Table 302.1, 302.1.1  
 Of jurisdictional choice . . . . . Table 302.1