

# 2019 CALIFORNIA GREEN BUILDING STANDARDS CODE

*CAL*Green®

CALIFORNIA CODE OF REGULATIONS | TITLE 24, PART 11

California Building Standards Commission



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TITLE 24, PART 11

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**Effective January 1, 2020**

For Errata and Supplement effective dates see the History Note Appendix

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California Code of Regulations, Title 24, Part 11

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# PREFACE

This document is Part 11 of thirteen parts of the official triennial compilation and publication of the adoptions, amendments and repeal of administrative regulations to *California Code of Regulations, Title 24*, also referred to as the *California Building Standards Code*. This part is known as the *California Green Building Standards Code*, and it is intended that it shall also be known as the *CALGreen Code*.

The *California Building Standards Code* is published in its entirety every three years by order of the California legislature, with supplements published in intervening years. The California legislature delegated authority to various state agencies, boards, commissions and departments to create building regulations to implement the State’s statutes. These building regulations, or standards, have the same force of law, and take effect 180 days after their publication unless otherwise stipulated. The *California Building Standards Code* applies to occupancies in the State of California as annotated.

A city, county, or city and county may establish more restrictive building standards reasonably necessary because of local climatic, geological or topographical conditions. Findings of the local condition(s) and the adopted local building standard(s) must generally be filed with the California Building Standards Commission (or other filing if indicated) to become effective, and may not be effective sooner than the effective date of this edition of the *California Building Standards Code*. Local building standards that were adopted and applicable to previous editions of the *California Building Standards Code* do not apply to this edition without appropriate adoption and the required filing.

Should you find publication (e.g., typographical) errors or inconsistencies in this code or wish to offer comments toward improving its format, please address your comments to:

California Building Standards Commission  
2525 Natomas Park Drive, Suite 130  
Sacramento, CA 95833–2936  
Phone: (916) 263–0916  
Email: cbsc@dgs.ca.gov  
Web page: www.dgs.ca.gov/bsc

# ACKNOWLEDGEMENTS

The 2019 *California Building Standards Code* (Code) was developed through the outstanding collaborative efforts of the Department of Housing and Community Development, Division of State Architect, Office of the State Fire Marshal, Office of Statewide Health Planning and Development, California Energy Commission, California Department of Public Health, California State Lands Commission, Board of State and Community Corrections, and the California Building Standards Commission (Commission).

This collaborative effort included the assistance of the Commission’s Code Advisory Committees and many other volunteers who worked tirelessly to assist the Commission in the production of this Code.

Governor Edmund G. Brown Jr.  
Members of the California Building Standards Commission  
Secretary Marybel Batjer – Chair  
Steven Winkel – Vice-Chair  
James Barthman                      Larry Booth  
Erick Mikiten                          Elley Klausbruckner  
Rajesh Patel                           Juvilyn Alegre  
Peter Santillan                        Kent Sasaki  
Mia Marvelli – Executive Director  
Michael L. Nearman – Deputy Executive Director

For questions on California state agency amendments, please refer to the contact list on page v.

## LEGEND FOR AGENCY ADOPTIONS

Unless otherwise noted, state agency adoptions are indicated by the following banners in the section leaders:

Department of Housing and Community Development: **[HCD]**

California Building Standards Commission, *CALGreen*: **[BSC-CG]**

Division of the State Architect, Structural Safety: **[DSA-SS]**

Office of Statewide Health Planning and Development: **[OSHPD 1, 1R, 2, 4 & 5]**

See Chapter 1, Sections 103–106 for applications regulated by the respective state agencies.

## EFFECTIVE USE OF THIS CODE

The format of this code is common to other parts of the *California Building Standards Code* and contains building standards applicable to occupancies which fall under the authority of different state agencies. Occupancies and applications under the authority of a specific state agency are identified in Chapter 1, Sections 103 through 106. Sections of this code which are applicable and adopted by each state agency are identified in the Matrix Adoption Tables located at the beginning of each chapter. The following outline is provided as a guide to establish which provisions are applicable to a specific occupancy.

1. Establish the type of occupancy.
2. Verify which state agency has authority for the established occupancy by reviewing the authorities list in Sections 103 through 106.
3. Once the appropriate agency has been identified, find the chapter which covers the established occupancy.
4. The Matrix Adoption Tables at the beginning of Chapters 4 and 5 identify the required green building measures necessary to meet the minimum requirements of this code for the established occupancy.
5. Voluntary tier measures are contained in Appendix Chapters A4 and A5. A Checklist containing each green building measure, both required and voluntary is provided at the end of each appendix chapter. Each measure listed in the application checklist has a section number which correlates to a section where more information about the specific measure is available.
6. The Application Checklist identifies which measures are required by this code and allows users to check-off which voluntary items have been selected to meet voluntary tier levels if desired or mandated by a city, county, or city and county.

# CALIFORNIA CODE OF REGULATIONS, TITLE 24

## California Agency Information Contact List

The following state agencies may propose building standards for publication in Title 24. Request notice of such activity with each agency of interest. See Sections 1.2 through 1.14 of the California Building Code (Part 2 of Title 24) for more detailed information on the regulatory jurisdiction of each state agency.

### > Board of State and Community Corrections

www.bscc.ca.gov ..... (916) 445-5073

Local Adult and Juvenile  
Detention Facility Standards

### California Building Standards Commission

www.dgs.ca.gov/bsc ..... (916) 263-0916

State Buildings including UC and  
CSU Buildings, Parking Lot and Walkway Lighting,  
Green Building Standards for Non-residential Buildings

### California Energy Commission

www.energy.ca.gov ..... **Energy Hotline** (800) 772-3300

Building Efficiency Standards  
Appliance Efficiency Standards  
Compliance Manual/Forms

### California State Lands Commission

www.slc.ca.gov ..... (562) 499-6312

Marine Oil Terminal Standards

### California State Library

www.library.ca.gov ..... (916) 323-9843

### Department of Consumer Affairs:

#### Acupuncture Board

www.acupuncture.ca.gov ..... (916) 515-5200

Office Standards

#### Board of Pharmacy

www.pharmacy.ca.gov ..... (916) 574-7900

Pharmacy Standards

#### Bureau of Barbering and Cosmetology

www.barbercosmo.ca.gov ..... (800) 952-5210

Barber and Beauty Shop,  
and College Standards

#### Bureau of Household Goods and Services

www.bhgs.dca.ca.gov ..... (916) 999-2041

Insulation Testing Standards

#### Structural Pest Control Board

www.pestboard.ca.gov ..... (800) 737-8188

Structural Standards

#### Veterinary Medical Board

www.vmb.ca.gov ..... (916) 515-5220

Veterinary Hospital Standards

### Department of Food and Agriculture

www.cdffa.ca.gov

Meat & Poultry Packing Plant Standards

Rendering & Collection Center Standards ..... (916) 900-5004

Dairy Standards ..... (916) 900-5008

### Department of Housing and Community Development

www.hcd.ca.gov ..... (916) 445-9471

Residential—Hotels, Motels, Apartments,  
Single-Family Dwellings; and  
Permanent Structures in Mobilehome &  
Special Occupancy Parks

(916) 445-3338

Factory-Built Housing, Manufactured Housing &  
Commercial Modular

Mobilehome—Permits & Inspections

Northern Region—(916) 255-2501

Southern Region—(951) 782-4420

(916) 445-9471

Employee Housing Standards

### Department of Public Health

www.dph.ca.gov ..... (916) 449-5661

Organized Camps Standards

Public Swimming Pools Standards

### Division of the State Architect

www.dgs.ca.gov/dsa ..... (916) 445-8100

#### Access Compliance

#### Fire and Life Safety

#### Structural Safety

Public Schools Standards

Essential Services Building Standards

Community College Standards

### State Historical Building Safety Board

Historical Rehabilitation, Preservation,  
Restoration or Relocation Standards

### Office of Statewide Health Planning and Development

www.oshpd.ca.gov ..... (916) 440-8356

Hospital Standards

Skilled Nursing Facility Standards &

Clinic Standards

### Office of the State Fire Marshal

osfm.fire.ca.gov ..... (916) 568-3800

Code Development and Analysis

Fire Safety Standards

## HOW TO DETERMINE WHERE CHANGES HAVE BEEN MADE

Symbols in the margins indicate where changes have been made or language has been deleted.

|| This symbol indicates that a change has been made.

> This symbol indicates deletion of language.



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# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## CHAPTER 1 – ADMINISTRATION

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHPD						BSC C	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter																						
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below		X		X				X	X		X		X									
Chapter/Section																						
101		X		X				X	X		X		X									
102		X		X				X	X		X		X									
103		X																				
104				X																		
105								X														
106									X		X		X									

## CHAPTER 1

## ADMINISTRATION

### SECTION 101 GENERAL

**101.1 Title.** These regulations shall be known as the *California Green Building Standards Code*, may be cited as such, and will be referred to herein as “this code.” It is intended that it shall also be known as the *CALGreen Code*. The *California Green Building Standards Code* is Part 11 of thirteen parts of the official compilation and publication of the adoption, amendment and repeal of building regulations to the *California Code of Regulations*, Title 24, also referred to as the *California Building Standards Code*.

**101.2 Purpose.** The purpose of this code is to improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact and encouraging sustainable construction practices in the following categories:

1. Planning and design.
2. Energy efficiency.
3. Water efficiency and conservation.
4. Material conservation and resource efficiency.
5. Environmental quality.

**101.3 Scope.** The provisions of this code shall apply to the planning, design, operation, construction, use and occupancy of every newly constructed building or structure, unless otherwise indicated in this code, throughout the State of California.

It is not the intent that this code substitute or be identified as meeting the certification requirements of any green building program.

**101.3.1 State-regulated buildings, structures and applications.** Provisions of this code shall apply to the following buildings, structures and applications regulated by state agencies as specified in Sections 103 through 106, except where modified by local ordinance pursuant to Section 101.7. When adopted by a state agency, the provisions of this code shall be enforced by the appropriate enforcing agency, but only to the extent of authority granted to such agency by statute.

1. State-owned buildings, including buildings constructed by the Trustees of the California State University, and to the extent permitted by California law, buildings designed and constructed by the Regents of the University of California and regulated by the Building Standards Commission. See Section 103 for additional scoping provisions.
2. Energy efficiency standards regulated by the California Energy Commission.
3. All residential buildings constructed throughout the State of California, including but not limited to, hotels, motels, lodging houses, apartments, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing and other types of dwellings containing sleeping accommodations with or without common toilets or cooking facilities reg-

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ulated by the Department of Housing and Community Development. See Section 104 for additional scoping provisions.

4. Public elementary and secondary schools, and community college buildings regulated by the Division of the State Architect. See Section 105 for additional scoping provisions.
5. Qualified historical buildings and structures and their associated sites regulated by the State Historical Building Safety Board within the Division of the State Architect.
6. General acute care hospitals, acute psychiatric hospitals, skilled nursing and/or intermediate care facilities, clinics licensed by the Department of Public Health and correctional treatment centers regulated by the Office of Statewide Health Planning and Development. See Section 106 for additional scoping provisions.
7. Graywater systems regulated by the Department of Water Resources and the Department of Housing and Community Development.
8. Green building standards for occupancies where no state agency has authority or expertise, adopted by the California Building Standards Commission. See Section 103 for additional scoping provisions.

> **101.4 Appendices.** Provisions contained in the appendices of this code are not mandatory unless specifically adopted by a city, county, or city and county in compliance with *Health and Safety Code* Sections 18930 and 18941.5, respectively, for Building Standards Law; *Health and Safety Code* Section 17950 for State Housing Law; and *Health and Safety Code* Section 13869.7 for Fire Protection Districts. See Section 101.7 of this code.

**101.5 Referenced codes and standards.** The codes and standards referenced elsewhere in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference.

**101.5.1 Building.** The provisions of the *California Building Code*, *California Residential Code*, and *California Existing Building Code*, as applicable, shall apply to the construction, alteration, movement, enlargement, replacement, repair, use and occupancy, location, maintenance, removal and demolition of every structure or any appurtenances connected or attached to such buildings or structures.

**101.5.2 Electrical.** The provisions of the *California Electrical Code* shall apply to the installation of electrical systems, including but not limited to, alterations, repair, replacement, equipment, appliances, fixtures, fittings and appurtenances thereto.

**101.5.3 Mechanical.** The provisions of the *California Mechanical Code* shall apply to the installation, alterations, repair and replacement of mechanical systems, including equipment, appliances, fixtures, fittings and/or appurtenances, including ventilating, heating, cooling, air-conditioning and refrigeration systems, incinerators and other energy-related systems.

**101.5.4 Plumbing.** The provisions of the *California Plumbing Code* shall apply to the installation, alteration, repair and replacement of plumbing systems, including equipment, appliances, fixtures, fittings and appurtenances where connected to a water or sewage system.

**101.5.5 Fire prevention.** The provisions of CCR, Title 19, Division 1 and CCR, Title 24, Part 2 and Part 9 relating to fire and panic safety as adopted by the Office of the State Fire Marshal shall apply to all structures, processes and premises for protection from the hazard of fire, panic and explosion.

**101.5.6 Energy.** The provisions of the *California Energy Code* shall apply to the minimum design and construction of buildings for energy efficiency.

### 101.6 Order of precedence and use.

**101.6.1 Differences.** In the event of any differences between these building standards and the standard reference documents, the text of these building standards shall govern. In the event a local amendment to this code results in differences between these building standards and the amendment, the text of the amendment shall govern.

**101.6.2 Specific provision.** Where a specific provision varies from a general provision, the specific provision shall apply.

**101.6.3 Conflicts.** When the requirements of this code conflict with the requirements of any other part of the *California Building Standards Code*, Title 24, the most restrictive requirement shall prevail.

**101.6.4 Explanatory notes.** Explanatory material, such as references to websites or other sources where additional information may be found, is included in this code in the form of notes. Notes are informational only and are not enforceable requirements of this code.

**101.7 City, county, or city and county amendments, additions or deletions.** This code is intended to set mandatory minimum Green Building Standards and includes optional tiers that may, at the discretion of any city, county, or city and county, be applied.

This code does not limit the authority of city, county, or city and county governments to make necessary changes to the provisions contained in this code pursuant to Section 101.7.1. The effective date of amendments, additions, or deletions to this code for cities, counties, or cities and counties filed pursuant to Section 101.7.1 shall be the date on which it is filed. However, in no case shall the amendments, additions or deletions to this code be effective any sooner than the effective date of this code.

Local modifications shall comply with *Health and Safety Code* Section 18941.5(b) for Building Standards Law, *Health and Safety Code* Section 17958.5 for State Housing Law or *Health and Safety Code* Section 13869.7 for Fire Protection Districts.

### 101.7.1 Findings and filings.

1. The city, county, or city and county shall make express findings for each amendment, addition or deletion based upon climatic, topographical or geo-

logical conditions. For the purpose of this section, climatic, topographical or geological conditions include local environmental conditions as established by the city, county, or city and county.

2. The city, county, or city and county shall file the amendments, additions or deletions expressly marked and identified as to the applicable findings. Cities, counties, cities and counties, and fire departments shall file the amendments, additions or deletions and the findings with the California Building Standards Commission at 2525 Natomas Park Drive, Suite 130, Sacramento, CA 95833.
3. Findings prepared by fire protection districts shall be ratified by the local city, county, or city and county and filed with the California Department of Housing and Community Development at 9342 Tech Center Drive, Suite 500, Sacramento, CA 95826.
4. The city, county, or city and county shall obtain California Energy Commission approval for any energy-related ordinances consistent with *Public Resources Code* Section 25402.1(h)(2) and Title 24, Part 1, Section 10-106. Local governmental agencies may adopt and enforce energy standards for newly constructed buildings, additions, alterations and repairs, provided the California Energy Commission finds that the standards will require buildings to be designed to consume no more energy than permitted by Part 6. Such local standards include, but are not limited to, adopting the requirements of Part 6 before their effective date, requiring additional energy conservation measures, or setting more stringent energy budgets.

**101.8 Alternate materials, designs and methods of construction.** The provisions of this code are not intended to prevent the use of any alternate material, appliance, installation, device, arrangement, method, design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternate shall be approved on a case-by-case basis where the enforcing agency finds that the proposed alternate is satisfactory and complies with the intent of the provisions of this code and is at least the equivalent of that prescribed in this code in planning and design, energy, water, material conservation and resource efficiency, environmental air quality, performance, safety and the protection of life and health. Consideration and compliance provisions for occupancies regulated by adopting state agencies are found in the sections listed below.

1. Section 1.2.2 in the *California Building Code* (CBC) for the California Building Standards Commission.
2. Section 104.11 of Chapter 1, Division II for the Division of the State Architect.
- > 3. Section 1.8.7, Chapter 1, Division I, of the *California Building Code*; and Section 1.8.7, Chapter 1, Division I, of the *California Residential Code* for the Department of Housing and Community Development.
- > 4. Section 7-104, 2013 *California Administrative Code* for the Office of the Statewide Health Planning and Development.

**101.9 Effective date of this code.** Only those standards approved by the California Building Standards Commission that are effective at the time an application for a building permit is submitted shall apply to the plans and specifications for, and to the construction performed under, that permit. For the effective dates of the provisions contained in this code, see the appropriate application checklist and the History Note page of this code.

**101.10 Mandatory requirements.** This code contains both mandatory and voluntary green building measures. Mandatory and voluntary measures are identified in the appropriate application checklist contained in this code.

**101.11 Effective use of this code.** The following steps shall be used to establish which provisions of this code are applicable to a specific occupancy:

1. Establish the type of occupancy.
2. Verify which state agency has authority for the established occupancy by reviewing the authorities list in Sections 103 through 106.
3. Once the appropriate agency has been identified, find the chapter which covers the established occupancy.
4. The Matrix Adoption Tables at the beginning of Chapters 4 and 5 identify the mandatory green building measures necessary to meet the minimum requirements of this code for the established occupancy.
5. Voluntary tier measures are contained in Appendix Chapters A4 and A5. A checklist containing each green building measure, both required and voluntary, is provided at the end of each appendix chapter. Each measure listed in the application checklist has a section number which correlates to a section where more information about the specific measure is available.
6. The application checklist identifies which measures are required by this code and allows users to check off which voluntary items have been selected to meet voluntary tier levels if desired or mandated by a city, county, or city and county.

## SECTION 102 CONSTRUCTION DOCUMENTS AND INSTALLATION VERIFICATION

**102.1 Submittal documents.** Construction documents and other data shall be submitted in one or more sets with each application for a permit. Where special conditions exist, the enforcing agency is authorized to require additional construction documents to be prepared by a licensed design professional and may be submitted separately.

**Exception:** The enforcing agency is authorized to waive the submission of construction documents and other data not required to be prepared by a licensed design professional.

**102.2 Information on construction documents.** Construction documents shall be of sufficient clarity to indicate the location, nature and scope of the proposed green building feature and show that it will conform to the provisions of this code, the *California Building Standards Code* and other relevant laws, ordinances, rules and regulations as determined by the enforcing agency.



## ADMINISTRATION

**102.3 Verification.** Documentation of conformance for applicable green building measures shall be provided to the enforcing agency. Alternate methods of documentation shall be acceptable when the enforcing agency finds that the proposed alternate documentation is satisfactory to demonstrate substantial conformance with the intent of the proposed green building measure.

**(HCD)** Documentation of conformance for applicable green building measures shall be provided to the enforcing agency. All projects shall submit a completed Residential Occupancies Application Checklist that includes Chapter 4 residential mandatory measures and Tier 1 or Tier 2, as applicable. References to the measure-specific documentation used to show compliance shall be included. Alternate methods of documentation shall be acceptable when the enforcing agency finds that the proposed alternate documentation is satisfactory to demonstrate substantial conformance with the intent of the proposed green building measure.

**Note:** HCD's Residential Occupancies Application Checklist that includes the minimum criteria for documentation is available at: <http://www.hcd.ca.gov/building-standards/cal-green/cal-green-forms.shtml>.

## SECTION 103 BUILDING STANDARDS COMMISSION

**103.1 BSC-CG.** Specific scope of application of the agency responsible for enforcement, the enforcement agency, and the specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

- 1. Application**—All occupancies where no state agency has the authority to adopt green building standards applicable to those occupancies.

**Enforcing agency**—State or local agency specified by the applicable provisions of law.

**Authority cited**—*Health and Safety Code* Sections 18930.5(a), 18938, and 18940.5.

**Reference**—*Health and Safety Code*, Division 13, Part 2.5, commencing with Section 18901.

- 2. Graywater systems.** The construction, installation, and alteration of graywater systems for indoor and outdoor uses in nonresidential occupancies.

**Application**—All occupancies where no state agency has the authority to adopt green building standards applicable to those occupancies.

**Enforcing agency**—State or local agency specified by the applicable provisions of law.

**Authority cited**—*Health and Safety Code* Section 18941.8.

**Reference**—*Health and Safety Code* Section 18941.8.

**103.1.1 Adopting agency identification.** The provisions of this code applicable to buildings identified in this section will be identified in the Matrix Adoption Tables under the acronym **BSC-CG**.

## SECTION 104 DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

**104.1 Scope.** Specific scope of application of the agency responsible for enforcement, the enforcement agency and the specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

### 1. Housing construction.

**Application**—Hotels, motels, lodging houses, apartments, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing and other types of dwellings containing sleeping accommodations with or without common toilet or cooking facilities including accessory buildings, facilities and uses thereto.

**Enforcing agency**—Local building department or the Department of Housing and Community Development.

**Authority cited**—*Health and Safety Code* Sections 17921, 17922 and 19990.

**Reference**—*Health and Safety Code* Sections 17000 through 17060, 17910 through 17990, and 19960 through 19997.

## SECTION 105 DIVISION OF THE STATE ARCHITECT

**105.1** Specific scope of application of the agency responsible for enforcement, the enforcement agency, and the specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

**105.1.1 Application—Public elementary and secondary schools and community colleges.** New building construction and site work on a new or existing site.

*Note: The Application of Standards outlined in Title 24, Part 6 supersedes the above application as it applies to the California Energy Code.*

**Enforcing agency**—The Division of the State Architect-Structural Safety (DSA-SS) has been delegated the responsibility and authority by the Department of General Services to review and approve the design and observe the construction of public elementary and secondary schools, and community colleges.

**Authority cited**—*Education Code* Sections 17310 and 81142.

**Reference**—*Education Code* Sections 17280 through 17317, and 81130 through 81147.

### 105.1.2 Applicable administrative standards.

#### 1. Title 24, Part 1, California Code of Regulations:

Sections 4-301 through 4-355, Group 1, Chapter 4, for public elementary and secondary schools, and community colleges.

#### 2. Title 24, Part 2, California Code of Regulations:

2.1. Sections 1.1 and 1.9.2 of Chapter 1, Division I.

2.2. Sections 102.1, 102.2, 102.3, 102.4, 102.5, 104.9, 104.10 and 104.11 of Chapter 1, Division II.

**105.1.3 Applicable building standards.** *California Building Standards Code*, Title 24, Parts 2, 3, 4, 5, 6, 9, 11 and 12, *California Code of Regulations*, for school buildings and community colleges.

## SECTION 106 OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT

**106.1 OSHPD 1.** Specific scope of application of the agency responsible for enforcement, enforcement agency and the specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

**Application**—General acute care hospitals and acute psychiatric hospitals, excluding distinct part units or distinct part freestanding buildings providing skilled nursing or intermediate care services. For structural regulations: Skilled nursing facilities and/or intermediate care facilities except those skilled nursing facilities and intermediate care facilities of single-story, Type V, wood or light steel-frame construction.

**Enforcing agency**—Office of Statewide Health Planning and Development (OSHPD). The office shall enforce the Division of the State Architect—Access Compliance regulations and the regulations of the Office of the State Fire Marshal for the above-stated facility types.

### 106.1.1 Applicable administrative standards.

1. Title 24, Part 1, *California Code of Regulations*: Chapters 6 and 7.
2. Title 24, Part 2, *California Code of Regulations*: Sections 1.1 and 1.10 of Chapter 1, Division I and Chapter 1, Division II.

**106.1.2 Applicable building standards.** *California Building Standards Code*, Title 24, Parts 2, 3, 4, 5, 9, 11 and 12.

**106.1.3 Identification of amendments.** For applications listed in Section 106.1, amendments appear in this code preceded with the acronym [OSHPD 1].

**Authority**—*Health and Safety Code* Sections 127010, 127015, 1275 and 129850.

**Reference**—*Health and Safety Code* Sections 19958, 127010, 127015, 129680, 1275 and 129675 through 130070.

**106.2 OSHPD 2.** Specific scope of application of the agency responsible for enforcement, enforcement agency and the specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

**Application**—Skilled nursing facilities and intermediate care facilities, including distinct part skilled nursing and intermediate care services on a general acute care or acute psychiatric hospital license, provided either are in a separate unit or a freestanding building. For structural regulations: Single-story, Type V skilled nursing facility and/or

intermediate care facilities utilizing wood or light steel-frame construction.

**Enforcing agency**—Office of Statewide Health Planning and Development (OSHPD). The office shall also enforce the Division of the State Architect—Access Compliance regulations and the regulations of the Office of the State Fire Marshal for the above-stated facility type.

### 106.2.1 Applicable administrative standards.

1. Title 24, Part 1, *California Code of Regulations*: Chapter 7.
2. Title 24, Part 2, *California Code of Regulations*: Sections 1.1 and 1.10 of Chapter 1, Division I and Chapter 1, Division II.

**106.2.2 Applicable building standards.** *California Building Standards Code*, Title 24, Parts 2, 3, 4, 5, 9, 11 and 12.

**106.2.3 Identification of amendments.** For applications listed in Section 106.2, amendments appear in this code preceded with the acronym [OSHPD 2].

**Authority**—*Health and Safety Code* Sections 127010, 127015, 1275 and 129850.

**Reference**—*Health and Safety Code* Sections 127010, 127015, 1275 and 129680.

**106.3 OSHPD 4.** Specific scope of application of the agency responsible for enforcement, enforcement agency and the specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

**Application**—Correctional treatment centers.

**Enforcing agency**—Office of Statewide Health Planning and Development (OSHPD). The office shall also enforce the Division of the State Architect—Access Compliance regulations and the regulations of the Office of the State Fire Marshal for the above-stated facility types.

### 106.3.1 Applicable administrative standards.

1. Title 24, Part 1, *California Code of Regulations*: Chapter 7.
2. Title 24, Part 2, *California Code of Regulations*: Sections 1.1 and 1.10 of Chapter 1, Division I and Chapter 1, Division II.

**106.3.2 Applicable building standards.** *California Building Standards Code*, Title 24, Parts 2, 3, 4, 5, 9, 11 and 12.

**106.3.3 Identification of amendments.** For applications listed in Section 106.3, amendments appear in this code preceded with the acronym [OSHPD 4], unless the entire chapter is applicable.

**Authority**—*Health and Safety Code* Sections 127010, 127010, 127015 and 129790.

**References**—*Health and Safety Code* Sections 127010, 127015, 1275, and 129675 through 130070.





# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## CHAPTER 2 – DEFINITIONS

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHPD						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X		X				X														
Adopt entire chapter as amended (amended sections listed below)									X		X		X									
Adopt only those sections that are listed below																						
Chapter/Section																						
201																						
CALIFORNIA RESIDENTIAL CODE									†		†		†									
LOW-RISE RESIDENTIAL BUILDING									†		†		†									
PLANTS									†		†		†									
RESIDENTIAL BUILDING									†		†		†									
RESILIENT FLOORING									†		†		†									

The state agency does not adopt sections identified by the following symbol: †.

## CHAPTER 2

## DEFINITIONS

### SECTION 201

### GENERAL

**201.1 Scope.** Unless otherwise 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 future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

**201.3 Terms defined in other documents.** Where terms are not defined in this code and are defined in the *California Building Standards Code* or other referenced documents, such terms shall have the meanings ascribed to them as in those publications.

**201.4 Terms not defined.** Where terms are not defined as specified in this section, such terms shall have ordinarily accepted meanings such as the context implies.

### SECTION 202

### DEFINITIONS

**ACCESSORY DWELLING UNIT. [HCD]** An attached or a detached residential dwelling unit, which provides complete independent living facilities for one or more persons. It shall include permanent provisions for living, sleeping, eating, cooking, and sanitation on the same parcel as the primary sin-

gle-family dwelling is situated. (See Government Code Section 65852.2.)

**ACCESSORY OCCUPANCIES. [HCD]** Occupancies that are ancillary to the main occupancy of residential building(s) or portions thereof. Accessory occupancies shall include, but are not limited to, Group U occupancies. (See Section 312 of the *California Building Code*.)

**ACCESSORY STRUCTURE. [HCD]** A structure that is accessory to and incidental to that of the dwelling(s) and that is located on the same lot.

**ADDITION.** An extension or increase in floor area of an existing building or structure.

**ADJUST.** To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

**AGRIFIBER PRODUCTS.** Agrifiber products include wheatboard, strawboard, panel substrates and door cores, not including furniture, fixtures and equipment (FF&E) not considered base building elements.

**ALBEDO.** Synonymous with solar reflectance, which is a ratio of the energy reflected back into the atmosphere to the energy absorbed by the surface, with 100 percent being total reflectance.

**ALTERATION OR ALTER.** Any construction or renovation to an existing structure other than repair for the purpose of maintenance or addition.

## DEFINITIONS

**ARB (CARB).** The California Air Resources Board.

**ARTERIAL HIGHWAY.** A general term denoting a highway primarily for through traffic usually on a continuous route.

**ASSEMBLY (ASSEMBLY PRODUCT).** An assembly (assembly product) includes or has been formulated using multiple materials.

**AUTOMATIC.** Automatic means capable of operating without human intervention.

**A-WEIGHTED SOUND LEVEL (dba).** The sound pressure level in decibels as measured on a sound level meter using the internationally standardized A-weighting filter or as computed from sound spectral data to which A-weighting adjustments have been made.

**BALANCE.** To proportion flows within the distribution system, including submains, branches and terminals, according to design quantities.

**BIORETENTION.** A shallow depression that utilizes conditioned soil and vegetation for the storage, treatment or infiltration of storm water runoff.

**BROWNFIELD SITE.** Real property, the expansion, redevelopment or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant, with certain legal exclusions and additions.

**Note:** See the full text at the EPA's website.

**1 BTU/HOUR.** British thermal units per hour, also referred to as Btu. The amount of heat required to raise one pound of water one degree Fahrenheit per hour, a common measure of heat transfer rate. A ton of refrigeration is 12,000 Btu, the amount of heat required to melt a ton (2,000 pounds) of ice at 32° Fahrenheit.

**BUILDING COMMISSIONING.** A systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner's project requirements.

**BUILDING ENVELOPE.** The ensemble of exterior and demising partitions of a building that enclose conditioned space.

**CALIFORNIA BUILDING CODE.** The current version of the *California Building Code*.

**CALIFORNIA ELECTRICAL CODE.** The current version of the *California Electrical Code*.

**CALIFORNIA ENERGY CODE.** The current version of the *California Energy Code*, unless otherwise specified.

**CALIFORNIA MECHANICAL CODE.** The current version of the *California Mechanical Code*.

**CALIFORNIA PLUMBING CODE.** The current version of the *California Plumbing Code*.

**CALIFORNIA RESIDENTIAL CODE.** The current version of the *California Residential Code*.

**CHLOROFLUOROCARBON (CFC).** A class of compounds primarily used as refrigerants, consisting of only chlorine, fluorine and carbon.

**COMMUNITY NOISE EQUIVALENT LEVEL (CNEL) HIGHWAY.** A metric similar to the day-night average sound level (Ldn), except that a 5 decibel (dB) adjustment is added to the equivalent continuous sound exposure level for evening hours (7 p.m. to 10 p.m.) in addition to the 10 dB nighttime adjustment used in the Ldn.

**COMPACT DISHWASHER.** A dishwasher that has a capacity of less than eight place settings plus six serving pieces as specified in ANSI/AHAM DW-1.

**COMPOSITE WOOD PRODUCTS.** Composite wood products include hardwood plywood, particleboard and medium density fiberboard. "Composite wood products" does not include hardboard, structural plywood, structural panels, structural composite lumber, oriented strand board, glued laminated timber, prefabricated wood I-joists or finger-jointed lumber, all as specified in California Code of Regulations (CCR), Title 17, Section 93120.1(a).

**Note:** See CCR, Title 17, Section 93120.1.

**CONDITIONED FLOOR AREA.** The floor area (in square feet) of enclosed conditioned space on all floors of a building, as measured at the floor level of the exterior surfaces of exterior walls enclosing the conditioned space.

**CONDITIONED SPACE.** A space in a building that is either directly conditioned or indirectly conditioned.

**CONDITIONED SPACE, DIRECTLY.** An enclosed space that is provided with wood heating, is provided with mechanical heating that has a capacity exceeding 10 Btu/hr-ft<sup>2</sup>, or is provided with mechanical cooling that has a capacity exceeding 5 Btu/hr-ft<sup>2</sup>, unless the space-conditioning system is designed for a process space. (See Process Space.)

**CONDITIONED SPACE, INDIRECTLY.** Enclosed space, including but not limited to, unconditioned volume in atria, that (1) is not directly conditioned space; and (2) either (a) has a thermal transmittance area product (UA) to directly conditioned space exceeding that to the outdoors or to unconditioned space and does not have fixed vents or openings to the outdoors or to unconditioned space, or (b) is a space through which air from directly conditioned spaces is transferred at a rate exceeding three air changes per hour.

**CONSTRUCTION SITE.** A parcel of land bounded by lot line(s) or a designated portion of a public right-of-way where construction is taking place. A construction site may include, but not be limited to, buildings and accessory structures, walks, sidewalks, curbs, curb ramps, parking facilities, planting areas, pools, promenades, exterior gathering or assembly areas, raised or depressed paved areas, open spaces, golf courses, and/or landscape areas.

**COOL PAVEMENT(S).** Includes, but is not limited to, high albedo pavements and coatings, vegetative surfaces, porous or pervious pavements that allow water infiltration, and pavements shaded by trees and other sources of shade.

**COOLING EQUIPMENT.** Equipment used to provide mechanical cooling for a room or rooms in a building.

**CUTOFF LUMINAIRES.** Luminaires whose light distribution is such that the candela per 1000 lamp lumens does not numerically exceed 25 (2.5 percent) at an angle of 90 degrees

above nadir, and 100 (10 percent) at a vertical angle of 80 degrees above nadir. This applies to all lateral angles around the luminaire.

**DAY-NIGHT AVERAGE SOUND LEVEL ( $L_{dn}$ ).** The A-weighted equivalent continuous sound exposure level for a 24-hour period with a 10 dB adjustment added to sound levels occurring during nighttime hours (10 p.m. to 7 a.m.).

**DECIBEL (dB).** A measure on a logarithmic scale of the magnitude of a particular quantity (such as sound pressure, sound power, sound intensity) with respect to a reference quantity.

**DEMAND HOT WATER RECIRCULATION SYSTEM.** A hot water recirculation system requiring manual activation and equipped with a thermostat that will automatically shut off the recirculation pump when the water temperature reaches a preset level at the point of use.

**DEVELOPMENT FOOTPRINT.** The total area of the building footprint, hardscape, access roads and parking.

**DEWATERING.** Pumping of uncontaminated or treated groundwater for construction activities.

**DIRECT-VENT APPLIANCE.** A fuel-burning appliance with a sealed combustion system that draws all air for combustion from the outside atmosphere and discharges all flue gases to the outside atmosphere.

**DISINFECTED TERTIARY RECYCLED WATER.** Filtered and subsequently disinfected wastewater that meets the approved method of treatment and minimum level of water quality specified in California Code of Regulations, Title 22, Division 4, Chapter 3 for the purpose of direct beneficial use.

**DISPOSAL.** The management of solid waste through land-filling or transformation at permitted solid waste facilities.

**DIVERSION.** Activities which reduce or eliminate the amount of solid waste from solid waste disposal for purposes of this code.

**ELECTRIC VEHICLE (EV).** An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are considered electric vehicles. For purposes of the *California Electrical Code*, off-road, self-propelled electric vehicles, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not included.

**ELECTRIC VEHICLE (EV) CHARGER.** Off-board charging equipment used to charge an electric vehicle.

**ELECTRIC VEHICLE CHARGING SPACE (EV SPACE).** A space intended for future installation of EV charging equipment and charging of electric vehicles.

**ELECTRIC VEHICLE CHARGING STATION (EVCS).** One or more electric vehicle charging spaces served by electric vehicle charger(s) or other charging equipment allowing charging of electric vehicles. Electric vehicle charging stations are not considered parking spaces.

## **ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE).**

The conductors, including the ungrounded, grounded, and equipment grounding conductors and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

**EMBODIED ENERGY.** The energy used for raw material extraction, transportation, manufacturing, assembly, installation and disposal during the life of a product, including the potential energy stored within the product.

**ENERGY BUDGET.** The sum of the annual TDV energy consumption for energy use components included in the performance compliance approach for the Standard Design Building, as established in the Alternative Calculation Method Reference Manual approved by the Energy Commission and calculated by Compliance Software certified by the Energy Commission.

**ENERGY COMMISSION.** The California State Energy Resources Conservation and Development Commission.

**ENERGY DESIGN RATING.** The sum of the annual TDV energy consumption for energy use components included in the performance compliance approach for the Standard Design Building (Energy Budget) and the annual time dependent valuation (TDV) energy consumption for lighting and components not regulated by Title 24, Part 6 (such as domestic appliances and consumer electronics) and accounting for the annual TDV energy offset by an on-site renewable energy system. The Design Rating is calculated by Compliance Software certified by the Energy Commission.

**ENERGY EQUIVALENT (NOISE) LEVEL ( $L_{eq}$ ).** The level of a steady noise which would have the same energy as the fluctuating noise level integrated over the time period of interest.

**ENFORCING AGENCY.** The designated department or agency as specified by statute or regulation.

**EUTROPHICATION.** The excessive growth of aquatic plants, especially algae, producing bacteria which consume nearly all of the oxygen required to sustain fauna and other flora.

**EVAPOTRANSPIRATION ADJUSTMENT FACTOR (ETAF).** [DSA-SS] An adjustment factor when applied to reference evapotranspiration that adjusts for plant factors and irrigation efficiency, which are two major influences on the amount of water that needs to be applied to the landscape.

**EXFILTRATION.** The uncontrolled outward air leakage from inside a building, including leakage through cracks and interstices, around windows and doors, and through any other exterior partition or duct penetration.

**EXPRESSWAY.** An arterial highway for through traffic which may have partial control of access, but which may or may not be divided or have grade separations at intersections.

**FLOOR AREA RATIO.** Gross square footage of all structures on a site divided by gross square footage of the site.

**FOOTPRINT AREA.** [DSA-SS] The total area of the furthest exterior wall of the structure projected to natural grade, not including exterior areas such as stairs, covered walkways, patios and decks.

## DEFINITIONS

**FREEWAY.** A divided arterial highway with full control of access and with grade separations at intersections.

**FRENCH DRAIN.** A trench, hole or other depressed area loosely filled with rock, gravel, fragments of brick or similar pervious material used to collect or channel drainage or runoff water.

**GEO THERMAL.** Renewable energy generated by deep-earth water or steam.

**GLOBAL WARMING POTENTIAL (GWP).** The radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of carbon dioxide over a given period of time. Carbon dioxide is the reference compound with a GWP of one.

**GLOBAL WARMING POTENTIAL VALUE (GWP VALUE).** The 100-year GWP value published by the Intergovernmental Panel on Climate Change (IPCC) in either its Second Assessment Report (SAR) (IPCC, 1995); or its Fourth Assessment A-3 Report (AR4) (IPCC, 2007). The SAR GWP values are found in column “SAR (100-yr)” of Table 2.14.; the AR4 GWP values are found in column “100 yr” of Table 2.14.

**GRAYWATER.** Pursuant to *Health and Safety Code* Section 17922.12, “graywater” means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. “Graywater” includes, but is not limited to, wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers.

**Note:** For the purpose of applying the standards contained in this code, “Graywater,” as defined above, has the same meaning as “gray water,” “grey water,” and “greywater.”

**GREEN BUILDING.** A holistic approach to design, construction, and demolition that minimizes the building’s impact on the environment, the occupants and the community.

**GREENFIELDS.** Sites that are not previously developed or graded and remain in a natural state, able to support agriculture, open space or habitat.

**Note:** Previously developed sites are those that previously contained buildings, roadways or parking lots or were graded or altered by direct human activities.

**GREYFIELD SITE.** Any site previously developed with at least 50 percent of the surface area covered with impervious material.

**HALON.** Any of a class of chemical compounds derived from hydrocarbons by replacing one or more hydrogen atoms with bromine atoms, and other hydrogen atoms with other halogen atoms (chlorine, fluorine, iodine).

### HAZARDOUS WASTE.

(a) A waste, defined as a “hazardous waste” in accordance with Section 25117 of the *Health and Safety Code*, or a combination of wastes, which because of its quantity,

concentration or physical, chemical or infectious characteristics may do either of the following:

- (1) Cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness.
  - (2) Pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of, or otherwise managed.
- (b) Unless expressly provided otherwise, “hazardous waste” includes extremely hazardous waste and acutely hazardous waste.

**HEAT ISLAND EFFECT.** “Heat island effect” and “urban heat islands” refer to measurable elevated temperatures in developed areas as compared to more rural surroundings. Temperatures in developed areas are affected by absorption of heat by hardscapes and radiation of heat into surrounding areas resulting in local climate changes. Heat islands are influenced by geographic location and by local weather patterns, with effects changing on a daily or seasonal basis.

**HIGH-GWP REFRIGERANT.** A compound used as a heat transfer fluid or gas that is: (A) a chlorofluorocarbon, a hydrochlorofluorocarbon, a hydrofluorocarbon, a perfluorocarbon, or any compound or blend of compounds, with a GWP value equal to or greater than 150, or (B) any ozone depleting substance as defined in Title 40 of the Code of Federal Regulations, Part 82, §82.3 (as amended March 10, 2009).

**HIGH-RISE RESIDENTIAL BUILDING.** For the purposes of *CALGreen*, any building that is of Occupancy Group R and is four stories or greater in height.

**HOT WATER RECIRCULATION SYSTEM.** A hot water distribution system that reduces the time needed to deliver hot water to fixtures that are distant from the water heater, boiler or other water heating equipment. The recirculation system is comprised of hot water supply and return piping with shutoff valves, balancing valves, circulating pumps, and a method of controlling the circulating system.

**HOTEL OR MOTEL. (HCD-1)** Any building containing six or more guest rooms intended or designed to be used, or which are used, rented or hired out to be occupied or which are occupied for sleeping purposes by guests.

**HYDROCHLOROFLUOROCARBON (HCFC).** A class of compounds primarily used as refrigerants or foam expansion agents, consisting of only hydrogen, chlorine, fluorine, and carbon.

**HYDROFLUOROCARBON (HFC).** A class of compounds primarily used as refrigerants or foam expansion agents, consisting of only hydrogen, fluorine, and carbon.

**IESNA.** Illuminating Engineering Society of North America.

**INERT SOLIDS OR INERT WASTE.** A non-liquid solid waste including, but not limited to, soil and concrete, that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board pursuant to Division 7 (commencing with



## DEFINITIONS

Section 13000) of the *California Water Code* and does not contain significant quantities of decomposable solid waste.

**INFILL SITE.** A site in an urbanized area that meets criteria defined in *Public Resources Code* Section 21061.3.

**INFILTRATION.** An uncontrolled inward air leakage from outside a building or unconditioned space, including leakage through cracks and interstices, around windows and doors and through any other exterior or demising partition or pipe or duct penetration.

**INTERIOR BUILDING.** The inside of the weatherproofing system.

**JUNIOR ACCESSORY DWELLING UNIT. [HCD]** A unit that is no more than 500 square feet in size and contained entirely within an existing single-family structure. A junior accessory dwelling unit may include separate sanitation facilities, or may share sanitation facilities with the existing structure. (See Government Code Section 65852.22.)

**KITCHEN.** That portion in a residential dwelling unit that is a room or area used for cooking, food storage and preparation and washing dishes, including associated counter tops and cabinets, refrigerator, stove, ovens and floor area.

**LANDSCAPE WATER METER. [HCD]** An inline device installed at the irrigation supply point that measures the flow of water into the irrigation system and is connected to a totalizer to record water use.

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

**LIFE CYCLE INVENTORY (LCI).** A process of quantifying energy and raw material requirements, atmospheric emissions, waterborne emissions, solid wastes, and other releases for the entire life cycle of a product, process, or activity, including a whole building.

**LONG RADIUS ELBOW.** Pipe fitting installed between two lengths of pipe or tubing to allow a change of direction, with a radius 1.5 times the pipe diameter.

**LOW-EMITTING AND FUEL EFFICIENT VEHICLES.** Eligible vehicles are limited to the following:

1. Zero emission vehicle (ZEV), including neighborhood electric vehicles (NEV), partial zero emission vehicle (PZEV), advanced technology PZEV (AT ZEV) or CNG fueled (original equipment manufacturer only) regulated under *Health and Safety Code* Section 43800 and CCR, Title 13, Sections 1961 and 1962.
2. High-efficiency vehicles, regulated by U.S. EPA, bearing High-occupancy Vehicle (HOV) car pool lane stickers issued by the Department of Motor Vehicles.

**LOW-GWP REFRIGERANT.** A compound used as a heat transfer fluid or gas that: (A) has a GWP value less than 150, and (B) is not an ozone depleting substance as defined in Title 40 of the Code of Federal Regulations, Part 82, §82.3 (as amended March 10, 2009).

**LOW IMPACT DEVELOPMENT (LID).** Control of stormwater at its source to mimic drainage services provided by an undisturbed site.

**LOW-RISE RESIDENTIAL BUILDING.** For the purpose of *CALGreen*, any building that is of Occupancy Group R and is three stories or less.

**MAXIMUM INCREMENTAL REACTIVITY (MIR).** The maximum change in weight of ozone formed by adding a compound to the “Base Reactive Organic Gas (ROG) Mixture” per weight of compound added, expressed to hundredths of a gram ( $\text{g O}_3/\text{g ROC}$ ).

**Note:** MIR values for individual compounds and hydrocarbon solvents are specified in CCR, Title 17, Sections 94700 and 94701.

**MERV** Filter minimum efficiency reporting value.

**METERING FAUCET.** A self-closing faucet that dispenses a specific volume of water for each actuation cycle. The volume or cycle duration can be fixed or adjustable.

**MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWEO) [BSC-CG & DSA-SS]** A California regulation commencing with Section 490 of Chapter 2.7, Division 2, Title 23, *California Code of Regulations*. The MWEO regulation establishes a structure for planning, designing, installing, maintaining and managing water efficient landscapes in new construction and rehabilitated projects.

**MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWEO). [HCD]** The California model ordinance (California Code of Regulations, Title 23, Division 2, Chapter 2.7), regulating landscape design, installation and maintenance practices. Local agencies are required to adopt the updated MWEO, or adopt a local ordinance at least as effective as the MWEO.

**MOISTURE CONTENT.** The weight of the water in wood expressed in percentage of the weight of the oven-dry wood.

**MOUNTING HEIGHT (MH).** The height of the photometric center of a luminaire above grade level.

**MULTI-OCCUPANT SPACES.** Indoor spaces used for presentations and training, including classrooms and conference rooms.

**NEIGHBORHOOD ELECTRIC VEHICLE (NEV).** A motor vehicle that meets the definition of “low-speed vehicle” either in Section 385.5 of the Vehicle Code or in 49 CFR 571.500 (as it existed on July 1, 2000), and is certified to zero-emission vehicle standards.

**NEWLY CONSTRUCTED (or NEW CONSTRUCTION).** A newly constructed building (or new construction) does not include additions, alterations or repairs.

**NO ADDED FORMALDEHYDE (NAF) BASED RESINS.** Resin formulated with no added formaldehyde as part of the resin cross linking structure for making hardwood plywood, particle board or medium density fiberboard. “No added formaldehyde resins” include, but are not limited to, resins made from soy, polyvinyl acetate, or methylene diisocyanate. [BSC] See CCR, Title 17, Section 93120.1(a).

## DEFINITIONS

**NON-STORMWATER DISCHARGES.** Discharges that do not originate from precipitation events. Including, but not limited to, dewatering activities, washout area discharge, vehicle and equipment cleaning, street cleaning, and irrigation runoff.

**ORGANIC WASTE.** Food waste, green waste, landscape and pruning waste, nonhazardous wood waste, and food-soiled paper waste that is mixed in with food waste.

**OUTDOOR AIR (Outside air).** Air taken from outdoors and not previously circulated in the building.

**OVE. [BSC-CG, DSA-SS]** Optimal Value Engineering, another term for advanced wood framing techniques.

**PERMEABLE PAVING.** Permeable paving materials and techniques which allow the movement of water around the paving material and allow precipitation to percolate through the paving surface to the soil below.

### PLANTS.

**Adaptive plants.** Adaptive plants are plants that grow well in a given habitat with minimal attention in the form of winter protection, pest protection, irrigation and fertilization once established.

**Note:** Adaptive plants are considered low in maintenance and are not invasive plants.

**Invasive plants.** Invasive plants are both indigenous and nonindigenous species with growth habits that are characteristically aggressive.

**Note:** Invasive plants typically have a high reproductive capacity and tendency to overrun the ecosystems they inhabit.

**Native plants.** Native plants are plants that have adapted to a given area and are not invasive.

**POSTCONSUMER CONTENT. [BSC-CG, DSA-SS]** Waste material generated by consumers after it is used and which would otherwise be discarded.

**POSTCONSUMER CONTENT. [HCD]** Any material which has been used by a consumer and then recycled for use in a new material or product.

**POTABLE WATER.** Water that is drinkable and meets the U.S. Environmental Protection Agency (EPA) Drinking Water Standards. See definition in the *California Plumbing Code*, Part 5.

**POTABLE WATER. [HCD]** Water that is satisfactory for drinking, culinary, and domestic purposes, and meets the U.S. Environmental Protection Agency (EPA) Drinking Water Standards and the requirements of the Health Authority Having Jurisdiction.

**PRECONSUMER (or POSTINDUSTRIAL) [BSC-CG, DSA-SS]** Material diverted from the waste stream during one manufacturing process, including scraps, damaged goods, and excess production, that is used in another manufacturing process.

**PRECONSUMER (OR POSTINDUSTRIAL) CONTENT. [HCD]** Material diverted from the waste stream during one manufacturing process, including scraps, damaged goods and excess production that is reclaimed and used

in another manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated those wastes.

**PROCESS.** An activity or treatment that is not related to the space conditioning, lighting, service water heating or ventilating of a building as it relates to human occupancy.

**PROCESS SPACE.** A space that is thermostatically controlled to maintain a process environment temperature less than 55°F or to maintain a process environment temperature greater than 90°F for the whole space that the system serves, or that is a space with a space-conditioning system designed and controlled to be incapable of operating at temperatures above 55°F or incapable of operating at temperatures below 90°F at design conditions.

**PRODUCT-WEIGHTED MIR (PWMIR).** The sum of all weighted-MIR for all ingredients in a product subject to this article. The PWMIR is the total product reactivity expressed to hundredths of a gram of ozone formed per gram of product (excluding container and packaging).

**Note:** PWMIR is calculated according to equations found in CCR, Title 17, Section 94521(a).

**PROPORTIONAL RECYCLED CONTENT (PRCM).** The amount of recycled content of a material in an assembly as related to the percentage of the material in an assembly product. PRCM is derived by multiplying the percentage of each material in an assembly by the percentage of recycled content in the material.

**PSIG.** Pounds per square inch, gauge.

**RAINWATER.** Precipitation on any public or private parcel that has not entered an offsite storm drain system or channel, a flood control channel, or any other stream channel, and has not previously been put to beneficial use.

**RAINWATER CATCHMENT SYSTEM.** A facility designed to capture, retain, and store rainwater flowing off a building, parking lot, or any other manmade impervious surface for subsequent onsite use. Rainwater catchment system is also known as “Rainwater Harvesting System” or “Rainwater Capture System.”

**REACTIVE ORGANIC COMPOUND (ROC).** Any compound that has the potential, once emitted, to contribute to ozone formation in the troposphere.

**RECLAIMED (RECYCLED) WATER.** Nonpotable water that meets California State Water Resources Control Board statewide uniform criteria for disinfected tertiary recycled water. Reclaimed (recycled) water is also known as “recycled water” or “reclaimed water.”

**RECYCLE or RECYCLING.** The process of collecting, sorting, cleansing, treating and reconstituting materials that would otherwise become solid waste, and returning them to the economic mainstream in the form of raw material for new, reused or reconstituted products which meet the quality standards necessary to be used in the marketplace. “Recycling” does not include transformation, as defined in *Public Resources Code* Section 40201.

**RECYCLED CONTENT. [BSC-CG, DSA-SS]** Refer to International Organization for Standardization ISO 14021—Environmental labels and declarations—Self-declared environmental claims (Type II environmental labeling).

**RECYCLED CONTENT (RC). [HCD]** The amount of recycled material in an assembly product or material. Refer to International Organization for Standardization ISO 14021—Environmental labels and declarations—Self-declared environmental claims (Type II environmental labeling).

**RECYCLED CONTENT VALUE (RCV). [BSC-CG, DSA-SS]** Material cost multiplied by postconsumer content plus  $\frac{1}{2}$  the preconsumer content, or  $RCV = \$X (\text{postconsumer content} + \frac{1}{2} \text{preconsumer content})$ .

**RECYCLED CONTENT VALUE (RCV). [HCD]**

**Assembly products (RCVA).** Assembly product cost multiplied by the recycled content of the assembly based on all of the postconsumer content and 50 percent of the preconsumer content.

**Materials (RCVM).** Material cost multiplied by recycled content of the material based on all of the postconsumer content and 50 percent of the preconsumer content.

**RECYCLED WATER.** Water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur [Water Code Section 13050 (n)]. Simply put, recycled water is water treated to remove waste matter, attaining a quality that is suitable to use the water again.

**RECYCLED WATER SUPPLY SYSTEM.** The building supply pipe, the water distribution pipes, and the necessary connecting pipes, fittings, control valves, backflow prevention devices, and all appurtenances carrying or supplying reclaimed (recycled) water in or adjacent to the building or within the premises.

**RESIDENTIAL BUILDING.** See “LOW-RISE RESIDENTIAL BUILDING” or “HIGH-RISE RESIDENTIAL BUILDING.”

**RESILIENT FLOORING.** Refers to nontextile flooring materials which have a relatively firm surface, yet characteristically have “give” and “bounce back” to their original surface profile from the weight of objects that compress its surface. Resilient flooring materials are made in various shapes and sizes including both tile and roll form. Common types of resilient flooring include but are not limited to:

1. Vinyl composition tile.
2. Vinyl tile and sheet flooring.
3. Linoleum tile and sheet.
4. Cork tile and sheet flooring.
5. Rubber tile and sheet flooring.
6. Polymeric poured seamless flooring.
7. Other types of non-textile synthetic flooring.

**RE-USE.** The use, in the same form as it was produced, of a material which might otherwise be discarded.

**SCHRADER ACCESS VALVES.** Access fittings with a valve core installed.

**SHORT RADIUS ELBOW.** Pipe fitting installed between two lengths of pipe or tubing to allow a change of direction, with a radius 1.0 times the pipe diameter.

**SINGLE OCCUPANT SPACES.** Private offices, workstations in open offices, reception workstations, and ticket booths.

**SOLAR ACCESS.** The ratio of solar insolation including shade to the solar insolation without shade. Shading from obstructions located on the roof or any other part of the building shall not be included in determination of annual solar access.

**SOLAR REFLECTANCE.** A measure of the fraction of solar energy that is reflected by a surface (measured on a scale of zero to one).

**SOLAR REFLECTANCE INDEX (SRI).** A measure of a material surface’s ability to reflect solar heat, as shown by a small temperature rise. It includes both solar reflectance and thermal emittance and is quantified such that a standard black surface (solar reflectance 0.05, thermal emittance 0.90) is zero and a standard white surface (solar reflectance 0.80, thermal emittance 0.90) is 100.

**SOLID WASTE.**

- (a) All putrescible and nonputrescible solid, semisolid and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, dewatered, treated or chemically fixed sewage sludge which is not hazardous waste, manure, vegetable or animal solid and semisolid wastes, and other discarded solid and semisolid wastes.
- (b) “Solid waste” does not include any of the following wastes:
  - (1) Hazardous waste, as defined in *Public Resources Code* Section 40141.
  - (2) Radioactive waste regulated pursuant to the Radiation Control Law (Chapter 8, commencing with Section 114960, of Part 9 of Division 104 of the *Health and Safety Code*).
  - (3) Medical waste regulated pursuant to the Medical Waste Management Act (Part 14 commencing with Section 117600) of Division 104 of the *Health and Safety Code*). Untreated medical waste shall not be disposed of in a solid waste landfill, as defined in *Public Resources Code* Section 40195.1. Medical waste that has been treated and deemed to be solid waste shall be regulated pursuant to this division.

**SPECIAL LANDSCAPE AREA (SLA). [DSA-SS]** An area of the landscape dedicated solely to edible plants, planting areas used for educational purposes, recreational areas, areas irrigated with recycled water, water features using recycled water, and where turf provides a playing surface or gathering space.

**STANDARD DISHWASHER.** A dishwasher that has a capacity equal to or greater than eight place settings plus six serving pieces as specified in ANSI/AHAM DW-1.



## DEFINITIONS

**SUBMETER.** A meter installed subordinate to a site meter. Usually used to measure water intended for one purpose, such as landscape irrigation. For the purposes of *CALGreen*, a dedicated meter may be considered a submeter.

**SUPERMARKET.** For the purposes of Section 5.508.2, a supermarket is any retail food facility with 8,000 square feet or more conditioned area, and that utilizes either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units.

**TENANT-OCCUPANTS.** Building occupants who inhabit a building during its normal hours of operation as permanent occupants, such as employees, as distinguished from customers and other transient visitors.

**TEST.** A procedure to determine quantitative performance of a system or equipment.

**THERMAL EMITTANCE.** The relative ability of a surface to radiate absorbed heat (measured on a scale of 0 to 1).

**TIME DEPENDENT VALUATION (TDV) ENERGY.** The time varying energy caused to be used by the building to provide space conditioning and water heating and for specified buildings lighting. TDV energy accounts for the energy used at the building site and consumed in producing and in delivering energy to a site, including, but not limited to, power generation, transmission and distribution losses.

**ULTRA-LOW EMITTING FORMALDEHYDE (ULEF) RESINS.** Resins formulated such that average formaldehyde emissions are consistently below the Phase 2 emission standards in Section 93120.2, as provided in Section 93120.3(d) of Title 17, California Code of Regulations. [BSC] See CCR, Title 17, Section 93120.1(a).

**UNIVERSAL WASTE.** [BSC-CG, DSA-SS] The wastes listed below are subject to regulation pursuant to Chapter 23 of Title 22, *California Code of Regulations*, and shall be known as “universal wastes.”

- (1) Batteries, as described in Title 22 CCR, Section 66273.2, Subsection (a);
- (2) Electronic devices, as described in Title 22 CCR, Section 66273.3, Subsection (a);
- (3) Mercury-containing equipment, as described in Title 22 CCR, Section 66273.4, Subsection (a);
- (4) Lamps, as described in Title 22 CCR, Section 66273.5, Subsection (a);
- (5) Cathode ray tubes, as described in Title 22 CCR, Section 66273.6, Subsection (a);
- (6) Cathode ray tube glass, as described in Title 22 CCR, Section 66273.7, Subsection (a); and
- (7) Aerosol cans, as specified in Health and Safety Code, Section 25201.16.

> **URINAL, HYBRID.** A urinal that conveys waste into the drainage system without the use of water for flushing and automatically performs a drain-cleansing action after a predetermined amount of time.

**VANPOOL VEHICLE.** Eligible vehicles are limited to any motor vehicle, other than a motortruck or truck tractor,

designed for carrying more than 10 but not more than 15 persons including the driver, which is maintained and used primarily for the nonprofit work-related transportation of adults for the purposes of ridesharing.

**Note:** Source: Vehicle Code, Division 1, Section 668.

**VAPOR BARRIER.** Material that has a permeance of one perm or less and that provides resistance to the transmission of water vapor.

**VEGETATED SPACE.** Vegetated spaces include, but are not limited to, native, undisturbed areas; rehabilitation of previously disturbed areas with landscaping; green belts; and recreation facilities that include landscaping, such as golf courses.

**VOC.** A volatile organic compound (VOC) broadly defined as a chemical compound based on carbon chains or rings with vapor pressures greater than 0.1 millimeters of mercury at room temperature. These compounds typically contain hydrogen and may contain oxygen, nitrogen and other elements. See CCR Title 17, Section 94508(a).

**Note:** Where specific regulations are cited from different agencies, such as South Coast Air Quality Management District (SCAQMD), California Air Resources Board (ARB or CARB), etc., the VOC definition included in that specific regulation is the one that prevails for the specific measure in question.

**WATTLES.** Wattles are used to reduce sediment in runoff. Wattles are often constructed of natural plant materials such as hay, straw or similar material shaped in the form of tubes and placed on a downflow slope. Wattles are also used for perimeter and inlet controls.

**ZEV.** Any vehicle certified to zero-emission standards.

## CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

### CHAPTER 3 – GREEN BUILDING

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHDP						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter																						
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below		X		X				X	X		X		X									
Chapter/Section																						
301		X		X					X				X									
301.1				X				X														
301.1.1				X																		
301.2				X																		
301.3		X																				
301.3.1		X																				
301.3.2		X																				
301.4								X														
301.5									X		X		X									
302		X		X				X	X		X		X									
303		X		X					X		X		X									
303.1		X																				
304		X		X					X		X		X									
305									X													
306								X														

## CHAPTER 3

## GREEN BUILDING

### SECTION 301 GENERAL

**301.1 Scope.** Buildings shall be designed to include the green building measures specified as mandatory in the application checklists contained in this code. Voluntary green building measures are also included in the application checklists and may be included in the design and construction of structures covered by this code, but are not required unless adopted by a city, county, or city and county as specified in Section 101.7.

**301.1.1 Additions and alterations. [HCD]** The mandatory provisions of Chapter 4 shall be applied to additions or alterations of existing residential buildings where the addition or alteration increases the building's conditioned area, volume, or size. The requirements shall apply only to and/or within the specific area of the addition or alteration.

**301.2 Low-rise and high-rise residential buildings. [HCD]** The provisions of individual sections of *CALGreen* may apply to either low-rise residential buildings, high-rise resi-

dential buildings, or both. Individual sections will be designated by banners to indicate where the section applies specifically to low-rise only (LR) or high-rise only (HR). When the section applies to both low-rise and high-rise buildings, no banner will be used.

### **301.3 Nonresidential additions and alterations. [BSC-CG]**

The provisions of individual sections of Chapter 5 apply to newly constructed buildings, building additions of 1,000 square feet or greater, and/or building alterations with a permit valuation of \$200,000 or above (for occupancies within the authority of California Building Standards Commission). Code sections relevant to additions and alterations shall only apply to the portions of the building being added or altered within the scope of the permitted work.

A code section will be designated by a banner to indicate where the code section only applies to newly constructed buildings [N] or to additions and/or alterations [A]. When the code section applies to both, no banner will be used.

## GREEN BUILDING

### 301.3.1 Nonresidential additions and alterations that cause updates to plumbing fixtures only:

**Note:** On and after January 1, 2014, certain commercial real property, as defined in Civil Code Section 1101.3, shall have its noncompliant plumbing fixtures replaced with appropriate water-conserving plumbing fixtures under specific circumstances. See Civil Code Section 1101.1 *et seq.* for definitions, types of commercial real property affected, effective dates, circumstances necessitating replacement of noncompliant plumbing fixtures, and duties and responsibilities for ensuring compliance.

**301.3.2 Waste diversion.** The requirements of Section 5.408 shall be required for additions and alterations whenever a permit is required for work.

**301.4 Mandatory measures for public schools and community colleges. [DSA-SS]** New building construction and site work on a new or existing site shall comply with Section 301.4.

**301.4.1** Building and site construction on a new site shall comply with Chapter 5 as adopted by DSA-SS.

**301.4.2** Work on an existing site shall comply with Section 301.4.2.

**301.4.2.1** Newly constructed site work shall comply with Chapter 5 as adopted by DSA-SS.

**301.4.2.2** Newly constructed buildings shall comply with Chapter 5 as adopted by DSA-SS and Section 301.4.3.

**301.4.2.3** Additions to existing buildings shall comply with Section 301.4.3.

**301.4.2.4** Rehabilitated landscape areas shall comply with Sections 5.304.6 and 5.106.12.

**301.4.3 Minimum rehabilitated landscape area requirement.** A minimum rehabilitated landscape area equal to 75 percent of the footprint area of the building shall comply with Section 5.304.6 and Section 5.106.12. New buildings or additions to existing buildings less than 1,600 square feet shall not be required to comply with Section 301.4.3.

**301.5 Health Facilities. [OSHPD 1, 2 & 4]** Health facilities under the jurisdiction of the Office of Statewide Health Planning and Development (OSHPD) are required to comply with the mandatory measures prescribed in Section 5.304, Outdoor Water Use. Compliance with Section 5.304, as adopted by the Building Standards Commission, is enforced by the local agency having jurisdiction. Evidence of local approval shall be submitted to OSHPD prior to issuance of plan approval or a building permit.

## SECTION 302 MIXED OCCUPANCY BUILDINGS

**302.1 Mixed occupancy buildings.** In mixed occupancy buildings, each portion of a building shall comply with the

specific green building measures applicable to each specific occupancy.

### Exceptions:

1. **[HCD]** Accessory structures and accessory occupancies serving residential buildings shall comply with Chapter 4 and Appendix A4, as applicable.
2. **[HCD]** For the purposes of *CALGreen*, live/work units, complying with Section 419 of the *California Building Code*, shall not be considered mixed occupancies. Live/work units shall comply with Chapter 4 and Appendix A4, as applicable.

## SECTION 303 PHASED PROJECTS

**303.1 Phased projects.** For shell buildings and others constructed for future tenant improvements, only those code measures relevant to the building components and systems considered to be new construction (or newly constructed) shall apply.

**303.1.1 Initial tenant improvements.** The provisions of this code shall apply only to the initial tenant improvements to a project. Subsequent tenant improvements shall comply with the scoping provisions in Section 301.3 nonresidential additions and alterations.

## SECTION 304 VOLUNTARY TIERS

**304.1 Purpose.** Voluntary tiers are intended to further encourage building practices that improve public health, safety and general welfare by promoting the use of building concepts which minimize the building's impact on the environment and promote a more sustainable design.

**304.1.1 Tiers.** The provisions of Divisions A4.6 and A5.6 outline means, in the form of voluntary tiers, for achieving enhanced construction levels by incorporating additional measures for residential and nonresidential new construction. Voluntary tiers may be adopted by local governments and, when adopted, enforced by local enforcing agencies. Buildings complying with tiers specified for each occupancy contain additional prerequisite and elective green building measures necessary to meet the threshold of each tier. See Section 101.7 of this code for procedures and requirements related to local amendments, additions or deletions, including changes to energy standards.

**[BSC & HCD]** Where there are practical difficulties involved in complying with the threshold levels of a tier, the enforcing agency may grant modifications for individual cases. The enforcing agency shall first find that a special individual reason makes the strict letter of the tier impractical and that modification is in conformance with the intent and purpose of the measure. The details of any action granting modification shall be recorded and entered in the files of the enforcing agency.

## SECTION 305 [OSHPD 1] CALGreen TIER 1 AND CALGreen TIER 2

**305.1** *CALGreen Tier 1 and CALGreen Tier 2* buildings contain voluntary green building measures necessary to meet the threshold of each level.

**305.1.1** *CALGreen Tier 1.* To achieve *CALGreen Tier 1*, buildings must comply with the latest edition of “Savings By Design, Healthcare Modeling Procedures” found online at [http://www.energysoft.com/main/page\\_downloads\\_sbd\\_healthcare.html](http://www.energysoft.com/main/page_downloads_sbd_healthcare.html).

**305.1.2** *CALGreen Tier 2.* To achieve *CALGreen Tier 2*, buildings must exceed the latest edition of “Savings By Design, Healthcare Modeling Procedures” by a minimum of 15 percent.

## SECTION 306 [DSA-SS] VOLUNTARY MEASURES

**306.1 Purpose.** For public schools and community colleges, voluntary measures further encourage building practices that improve public health, safety and general welfare by promoting the use of building concepts which minimize the building’s impact on the environment, and promote a more sustainable design.

**306.1.1** Appendix A5, Divisions A5.1 through A5.5, outline means of achieving enhanced sustainable design and construction by incorporating voluntary measures that exceed the mandatory measures.

**306.1.2** Chapter 5 Nonresidential Mandatory Measures that are not adopted as mandatory measures by DSA-SS are voluntary measures recommended and encouraged for the design, construction, verification, and maintenance of non-energy systems.

**Note:** The building commissioning requirements for energy efficiency specified in the *California Energy Code* are required.



## CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

### CHAPTER 4 – RESIDENTIAL MANDATORY MEASURES

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHPD						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter				X																		
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below																						
Chapter/Section																						
4.2				†																		

The state agency does not adopt sections identified by the following symbol: †.

## CHAPTER 4

### RESIDENTIAL MANDATORY MEASURES

#### *Division 4.1 – PLANNING AND DESIGN*

#### SECTION 4.101 GENERAL

**4.101.1 Scope.** The provisions of this division outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

#### SECTION 4.102 DEFINITIONS

**4.102.1 Definitions.** The following terms are defined in Chapter 2.

**FRENCH DRAIN.**

**WATTLES.**

#### SECTION 4.103 SITE SELECTION (Reserved)

#### SECTION 4.104 SITE PRESERVATION (Reserved)

#### SECTION 4.105 DECONSTRUCTION AND REUSE OF EXISTING STRUCTURES (Reserved)

#### SECTION 4.106 SITE DEVELOPMENT

**4.106.1 General.** Preservation and use of available natural resources shall be accomplished through evaluation and careful planning to minimize negative effects on the site and adjacent areas. Preservation of slopes, management of storm water drainage and erosion controls shall comply with this section.

**4.106.2 Storm water drainage and retention during construction.** Projects which disturb less than one acre of soil and are not part of a larger common plan of development which in total disturbs one acre or more, shall manage storm water drainage during construction. In order to manage storm water drainage during construction, one or more of the following measures shall be implemented to prevent flooding of adjacent property, prevent erosion and retain soil runoff on the site.

1. Retention basins of sufficient size shall be utilized to retain storm water on the site.
2. Where storm water is conveyed to a public drainage system, collection point, gutter or similar disposal method, water shall be filtered by use of a barrier system, wattle or other method approved by the enforcing agency.



## RESIDENTIAL MANDATORY MEASURES

3. Compliance with a lawfully enacted storm water management ordinance.

**Note:** Refer to the State Water Resources Control Board for projects which disturb one acre or more of soil, or are part of a larger common plan of development which in total disturbs one acre or more of soil.

(Website: [https://www.waterboards.ca.gov/water\\_issues/programs/stormwater/construction.html](https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html))

**4.106.3 Grading and paving.** Construction plans shall indicate how the site grading or drainage system will manage all surface water flows to keep water from entering buildings. Examples of methods to manage surface water include, but are not limited to, the following:

1. Swales
2. Water collection and disposal systems
3. French drains
4. Water retention gardens
5. Other water measures which keep surface water away from buildings and aid in groundwater recharge.

**Exception:** Additions and alterations not altering the drainage path.

**4.106.4 Electric vehicle (EV) charging for new construction.** New construction shall comply with Section 4.106.4.1, 4.106.4.2, or 4.106.4.3, to facilitate future installation and use of EV chargers. Electric vehicle supply equipment (EVSE) shall be installed in accordance with the *California Electrical Code*, Article 625.

### Exceptions:

1. On a case-by-case basis, where the local enforcing agency has determined EV charging and infrastructure are not feasible based upon one or more of the following conditions:
  - 1.1. Where there is no commercial power supply.
  - 1.2. Where there is evidence substantiating that meeting the requirements will alter the local utility infrastructure design requirements on the utility side of the meter so as to increase the utility side cost to the homeowner or the developer by more than \$400.00 per dwelling unit.
2. Accessory Dwelling Units (ADU) and Junior Accessory Dwelling Units (JADU) without additional parking facilities.

**4.106.4.1 New one- and two-family dwellings and townhouses with attached private garages.** For each dwelling unit, install a listed raceway to accommodate a dedicated 208/240-volt branch circuit. The raceway shall not be less than trade size 1 (nominal 1-inch inside diameter). The raceway shall originate at the main service or subpanel and shall terminate into a listed cabinet, box or other enclosure in close proximity to the proposed location of an EV charger. Raceways are required to be continuous at enclosed, inaccessible or concealed areas and spaces. The service panel and/or subpanel shall provide capacity to install a 40-ampere minimum dedicated branch circuit and space(s)

reserved to permit installation of a branch circuit overcurrent protective device.

**4.106.4.1.1 Identification.** The service panel or sub-panel circuit directory shall identify the overcurrent protective device space(s) reserved for future EV charging as “EV CAPABLE”. The raceway termination location shall be permanently and visibly marked as “EV CAPABLE”.

**4.106.4.2 New multifamily dwellings.** If residential parking is available, ten (10) percent of the total number of parking spaces on a building site, provided for all types of parking facilities, shall be electric vehicle charging spaces (EV spaces) capable of supporting future EVSE. Calculations for the required number of EV spaces shall be rounded up to the nearest whole number.

### Notes:

1. Construction documents are intended to demonstrate the project’s capability and capacity for facilitating future EV charging.
2. There is no requirement for EV spaces to be constructed or available until EV chargers are installed for use.

**4.106.4.2.1 Electric vehicle charging space (EV space) locations.** Construction documents shall indicate the location of proposed EV spaces. Where common use parking is provided at least one EV space shall be located in the common use parking area and shall be available for use by all residents.

**4.106.4.2.1.1 Electric vehicle charging stations (EVCS).** When EV chargers are installed, EV spaces required by Section 4.106.4.2.2, Item 3, shall comply with at least one of the following options:

1. The EV space shall be located adjacent to an accessible parking space meeting the requirements of the *California Building Code*, Chapter 11A, to allow use of the EV charger from the accessible parking space.
2. The EV space shall be located on an accessible route, as defined in the *California Building Code*, Chapter 2, to the building.

**Exception:** Electric vehicle charging stations designed and constructed in compliance with the *California Building Code*, Chapter 11B, are not required to comply with Section 4.106.4.2.1.1 and Section 4.106.4.2.2, Item 3.

**Note:** Electric vehicle charging stations serving public housing are required to comply with the *California Building Code*, Chapter 11 B.

**4.106.4.2.2 Electric vehicle charging space (EV space) dimensions.** The EV spaces shall be designed to comply with the following:

1. The minimum length of each EV space shall be 18 feet (5486 mm).



## RESIDENTIAL MANDATORY MEASURES

2. The minimum width of each EV space shall be 9 feet (2743 mm).
3. One in every 25 EV spaces, but not less than one, shall also have an 8-foot (2438 mm) wide minimum aisle. A 5-foot (1524 mm) wide minimum aisle shall be permitted provided the minimum width of the EV space is 12 feet (3658 mm).
  - a. Surface slope for this EV space and the aisle shall not exceed 1 unit vertical in 48 units horizontal (2.083 percent slope) in any direction.

**4.106.4.2.3 Single EV space required.** Install a listed raceway capable of accommodating a 208/240-volt dedicated branch circuit. The raceway shall not be less than trade size 1 (nominal 1-inch inside diameter). The raceway shall originate at the main service or subpanel and shall terminate into a listed cabinet, box or enclosure in close proximity to the proposed location of the EV space. Construction documents shall identify the raceway termination point. The service panel and/or subpanel shall provide capacity to install a 40-ampere minimum dedicated branch circuit and space(s) reserved to permit installation of a branch circuit over-current protective device.

**4.106.4.2.4 Multiple EV spaces required.** Construction documents shall indicate the raceway termination point and proposed location of future EV spaces and EV chargers. Construction documents shall also provide information on amperage of future EVSE, raceway method(s), wiring schematics and electrical load calculations to verify that the electrical panel service capacity and electrical system, including any on-site distribution transformer(s), have sufficient capacity to simultaneously charge all EVs at all required EV spaces at the full rated amperage of the EVSE. Plan design shall be based upon a 40-ampere minimum branch circuit. Required raceways and related components that are planned to be installed underground, enclosed, inaccessible or in concealed areas and spaces shall be installed at the time of original construction.

**4.106.4.2.5 Identification.** The service panel or sub-panel circuit directory shall identify the overcurrent protective device space(s) reserved for future EV charging purposes as "EV CAPABLE" in accordance with the *California Electrical Code*.

**4.106.4.3 New hotels and motels.** All newly constructed hotels and motels shall provide EV spaces capable of supporting future installation of EVSE. The construction documents shall identify the location of the EV spaces.

**Notes:**

1. Construction documents are intended to demonstrate the project's capability and capacity for facilitating future EV charging.

2. There is no requirement for EV spaces to be constructed or available until EV chargers are installed for use.

**4.106.4.3.1 Number of required EV spaces.** The number of required EV spaces shall be based on the total number of parking spaces provided for all types of parking facilities in accordance with Table 4.106.4.3.1. Calculations for the required number of EV spaces shall be rounded up to the nearest whole number.

**TABLE 4.106.4.3.1**

TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED EV SPACES
0–9	0
10–25	1
26–50	2
51–75	4
76–100	5
101–150	7
151–200	10
201 and over	6 percent of total

**4.106.4.3.2 Electric vehicle charging space (EV space) dimensions.** The EV spaces shall be designed to comply with the following:

1. The minimum length of each EV space shall be 18 feet (5486 mm).
2. The minimum width of each EV space shall be 9 feet (2743 mm).

**4.106.4.3.3 Single EV space required.** When a single EV space is required, the EV space shall be designed in accordance with Section 4.106.4.2.3.

**4.106.4.3.4 Multiple EV spaces required.** When multiple EV spaces are required, the EV spaces shall be designed in accordance with Section 4.106.4.2.4.

**4.106.4.3.5 Identification.** The service panels or sub-panels shall be identified in accordance with Section 4.106.4.2.5.

**4.106.4.3.6 Accessible EV spaces.** In addition to the requirements in Section 4.106.4.3, EV spaces for hotels/motels and all EVSE, when installed, shall comply with the accessibility provisions for EV charging stations in the *California Building Code*, Chapter 11B.



## CHAPTER 4

# RESIDENTIAL MANDATORY MEASURES

### *Division 4.2 – ENERGY EFFICIENCY*

#### SECTION 4.201 GENERAL

**4.201.1 Scope.** For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards.



## CHAPTER 4

# RESIDENTIAL MANDATORY MEASURES

### **Division 4.3 – WATER EFFICIENCY AND CONSERVATION**

#### **SECTION 4.301 GENERAL**

**4.301.1 Scope.** The provisions of this chapter shall establish the means of conserving water used indoors, outdoors and in wastewater conveyance.

#### **SECTION 4.302 DEFINITIONS**

**4.302.1 Definitions.** Reserved.

#### **SECTION 4.303 INDOOR WATER USE**

**4.303.1 Water conserving plumbing fixtures and fittings.** Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with Sections 4.303.1.1, 4.303.1.2, 4.303.1.3, and 4.303.1.4.

**Note:** All noncompliant plumbing fixtures in any residential real property shall be replaced with water-conserving plumbing fixtures. Plumbing fixture replacement is required prior to issuance of a certificate of final completion, certificate of occupancy, or final permit approval by the local building department. See Civil Code Section 1101.1, et seq., for the definition of a noncompliant plumbing fixture, types of residential buildings affected and other important enactment dates.

**4.303.1.1 Water closets.** The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-type Toilets.

**Note:** The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

**4.303.1.2 Urinals.** The effective flush volume of wall-mounted urinals shall not exceed 0.125 gallons per flush. The effective flush volume of all other urinals shall not exceed 0.5 gallons per flush.

**4.303.1.3 Showerheads.**

**4.303.1.3.1 Single showerhead.** Showerheads shall have a maximum flow rate of not more than 1.8 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

**4.303.1.3.2 Multiple showerheads serving one shower.** When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a sin-

gle valve shall not exceed 1.8 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.

**Note:** A hand-held shower shall be considered a showerhead.

**4.303.1.4 Faucets.**

**4.303.1.4.1 Residential lavatory faucets.** The maximum flow rate of residential lavatory faucets shall not exceed 1.2 gallons per minute at 60 psi. The minimum flow rate of residential lavatory faucets shall not be less than 0.8 gallons per minute at 20 psi.

**4.303.1.4.2 Lavatory faucets in common and public use areas.** The maximum flow rate of lavatory faucets installed in common and public use areas (outside of dwellings or sleeping units) in residential buildings shall not exceed 0.5 gallons per minute at 60 psi.

**4.303.1.4.3 Metering faucets.** Metering faucets when installed in residential buildings shall not deliver more than 0.2 gallons per cycle.

**4.303.1.4.4 Kitchen faucets.** The maximum flow rate of kitchen faucets shall not exceed 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

**Note:** Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.

**4.303.2 Standards for plumbing fixtures and fittings.** Plumbing fixtures and fittings shall be installed in accordance with the *California Plumbing Code*, and shall meet the applicable standards referenced in Table 1701.1 of the *California Plumbing Code*.

#### **SECTION 4.304 OUTDOOR WATER USE**

**4.304.1 Outdoor potable water use in landscape areas.** Residential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient Landscape Ordinance (MWELo), whichever is more stringent.

**Notes:**

1. The Model Water Efficient Landscape Ordinance (MWELo) is located in the *California Code of Regulations*, Title 23, Chapter 2.7, Division 2.

MWELo and supporting documents, including a water budget calculator, are available at: <https://www.water.ca.gov/>

**RESIDENTIAL MANDATORY MEASURES****SECTION 4.305  
WATER REUSE SYSTEMS**

**4.305.1 Recycled water supply systems.** Newly constructed residential developments, where disinfected tertiary recycled water is available from a municipal source to a construction site, may be required to have recycled water supply systems installed, allowing the use of recycled water for residential landscape irrigation systems. See Chapter 15 of the *California Plumbing Code*.

## CHAPTER 4

# RESIDENTIAL MANDATORY MEASURES

### *Division 4.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY*

#### SECTION 4.401 GENERAL

**4.401.1 Scope.** The provisions of this chapter shall outline means of achieving material conservation and resource efficiency through protection of buildings from exterior moisture; construction waste diversion; employment of techniques to reduce pollution through recycling of materials; and building commissioning or testing, adjusting and balancing.

#### SECTION 4.402 DEFINITIONS

**4.402.1 Definitions.** Reserved.

#### SECTION 4.403 FOUNDATION SYSTEMS (Reserved)

#### SECTION 4.404 EFFICIENT FRAMING TECHNIQUES (Reserved)

#### SECTION 4.405 MATERIAL SOURCES (Reserved)

#### SECTION 4.406 ENHANCED DURABILITY AND REDUCED MAINTENANCE

**4.406.1 Rodent proofing.** Annular spaces around pipes, electric cables, conduits or other openings in sole/bottom plates at exterior walls shall be protected against the passage of rodents by closing such openings with cement mortar, concrete masonry or a similar method acceptable to the enforcing agency.

#### SECTION 4.407 WATER RESISTANCE AND MOISTURE MANAGEMENT (Reserved)

#### SECTION 4.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

**4.408.1 Construction waste management.** Recycle and/or salvage for reuse a minimum of 65 percent of the nonhazard-

ous construction and demolition waste in accordance with either Section 4.408.2, 4.408.3 or 4.408.4, or meet a more stringent local construction and demolition waste management ordinance.

#### **Exceptions:**

1. Excavated soil and land-clearing debris.
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist or are not located reasonably close to the jobsite.
3. The enforcing agency may make exceptions to the requirements of this section when isolated jobsites are located in areas beyond the haul boundaries of the diversion facility.

**4.408.2 Construction waste management plan.** Submit a construction waste management plan in conformance with Items 1 through 5. The construction waste management plan shall be updated as necessary and shall be available during construction for examination by the enforcing agency.

1. Identify the construction and demolition waste materials to be diverted from disposal by recycling, reuse on the project or salvage for future use or sale.
2. Specify if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
3. Identify diversion facilities where the construction and demolition waste material will be taken.
4. Identify construction methods employed to reduce the amount of construction and demolition waste generated.
5. Specify that the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.

**4.408.3 Waste management company.** Utilize a waste management company, approved by the enforcing agency, which can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with Section 4.408.1.

**Note:** The owner or contractor may make the determination if the construction and demolition waste materials will be diverted by a waste management company.

**4.408.4 Waste stream reduction alternative [LR].** Projects that generate a total combined weight of construction and demolition waste disposed of in landfills, which do not exceed 3.4 pounds per square foot of the building area shall meet the minimum 65 percent construction waste reduction requirement in Section 4.408.1.



## RESIDENTIAL MANDATORY MEASURES

**4.408.4.1 Waste stream reduction alternative.** Projects that generate a total combined weight of construction and demolition waste disposed of in landfills, which do not exceed 2 pounds per square foot of the building area, shall meet the minimum 65 percent construction waste reduction requirement in Section 4.408.1.

**4.408.5 Documentation.** Documentation shall be provided to the enforcing agency which demonstrates compliance with Section 4.408.2, Items 1 through 5, Section 4.408.3 or Section 4.408.4.

### Notes:

1. Sample forms found in “A Guide to the California Green Building Standards Code (Residential)” located at <http://www.hcd.ca.gov/building-standards/calgreen/cal-green-form.shtml> may be used to assist in documenting compliance with this section.
2. Mixed construction and demolition debris (C&D) processors can be located at the California Department of Resources Recycling and Recovery (CalRecycle).

## SECTION 4.409 LIFE CYCLE ASSESSMENT (Reserved)

## SECTION 4.410 BUILDING MAINTENANCE AND OPERATION

**4.410.1 Operation and maintenance manual.** At the time of final inspection, a manual, compact disc, web-based reference or other media acceptable to the enforcing agency which includes all of the following shall be placed in the building:

1. Directions to the owner or occupant that the manual shall remain with the building throughout the life cycle of the structure.
2. Operation and maintenance instructions for the following:
  - a. Equipment and appliances, including water-saving devices and systems, HVAC systems, photovoltaic systems, electric vehicle chargers, water-heating systems and other major appliances and equipment.
  - b. Roof and yard drainage, including gutters and downspouts.
  - c. Space conditioning systems, including condensers and air filters.
  - d. Landscape irrigation systems.
  - e. Water reuse systems.
3. Information from local utility, water and waste recovery providers on methods to further reduce resource consumption, including recycle programs and locations.

4. Public transportation and/or carpool options available in the area.
5. Educational material on the positive impacts of an interior relative humidity between 30–60 percent and what methods an occupant may use to maintain the relative humidity level in that range.
6. Information about water-conserving landscape and irrigation design and controllers which conserve water.
7. Instructions for maintaining gutters and downspouts and the importance of diverting water at least 5 feet away from the foundation.
8. Information on required routine maintenance measures, including, but not limited to, caulking, painting, grading around the building, etc.
9. Information about state solar energy and incentive programs available.
10. A copy of all special inspection verifications required by the enforcing agency or this code.

**4.410.2 Recycling by occupants.** Where 5 or more multifamily dwelling units are constructed on a building site, provide readily accessible area(s) that serves all buildings on the site and are identified for the depositing, storage and collection of nonhazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals, or meet a lawfully enacted local recycling ordinance, if more restrictive.

**Exception:** Rural jurisdictions that meet and apply for the exemption in Public Resources Code Section 42649.82 (a)(2)(A) et seq. are not required to comply with the organic waste portion of this section.

## CHAPTER 4

# RESIDENTIAL MANDATORY MEASURES

### *Division 4.5 – ENVIRONMENTAL QUALITY*

#### **SECTION 4.501 GENERAL**

**4.501.1 Scope.** The provisions of this chapter shall outline means of reducing the quantity of air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of a building's installers, occupants and neighbors.

#### **SECTION 4.502 DEFINITIONS**

**4.502.1 Definitions.** The following terms are defined in Chapter 2.

**AGRIFIBER PRODUCTS.**

**COMPOSITE WOOD PRODUCTS.**

**DIRECT-VENT APPLIANCE.**

**MAXIMUM INCREMENTAL REACTIVITY (MIR).**

**MOISTURE CONTENT.**

**PRODUCT-WEIGHTED MIR (PWMIR).**

**REACTIVE ORGANIC COMPOUND (ROC).**

**VOC.**

#### **SECTION 4.503 FIREPLACES**

**4.503.1 General.** Any installed gas fireplace shall be a direct-vent sealed-combustion type. Any installed woodstove or pellet stove shall comply with U.S. EPA New Source Performance Standards (NSPS) emission limits as applicable, and shall have a permanent label indicating they are certified to meet the emission limits. Woodstoves, pellet stoves and fireplaces shall also comply with applicable local ordinances.

#### **SECTION 4.504 POLLUTANT CONTROL**

**4.504.1 Covering of duct openings and protection of mechanical equipment during construction.** At the time of rough installation, during storage on the construction site and until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of water, dust and debris, which may enter the system.

**4.504.2 Finish material pollutant control.** Finish materials shall comply with this section.

**4.504.2.1 Adhesives, sealants and caulks.** Adhesives, sealants and caulks used on the project shall meet the

requirements of the following standards unless more stringent local or regional air pollution or air quality management district rules apply:

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits, as shown in Table 4.504.1 or 4.504.2, as applicable. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products, as specified in Subsection 2 below.
2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than 1 pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of *California Code of Regulations*, Title 17, commencing with Section 94507.

**4.504.2.2 Paints and coatings.** Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Suggested Control Measure, as shown in Table 4.504.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 4.504.3 shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-high Gloss coating, based on its gloss, as defined in subsections 4.21, 4.36, and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure, and the corresponding Flat, Nonflat or Nonflat-high Gloss VOC limit in Table 4.504.3 shall apply.

**4.504.2.3 Aerosol paints and coatings.** Aerosol paints and coatings shall meet the Product-weighted MIR Limits for ROC in Section 94522(a)(2) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(e)(1) and (f)(1) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8, Rule 49.

**4.504.2.4 Verification.** Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

1. Manufacturer's product specification.
2. Field verification of on-site product containers.

## RESIDENTIAL MANDATORY MEASURES

**TABLE 4.504.1**  
**ADHESIVE VOC LIMIT<sup>1, 2</sup>**

Less Water and Less Exempt Compounds in Grams per Liter

ARCHITECTURAL APPLICATIONS	VOC LIMIT
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
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250
Other adhesives not specifically listed	50
<b>SPECIALTY APPLICATIONS</b>	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special purpose contact adhesive	250
Structural wood member adhesive	140
Top and trim adhesive	250
<b>SUBSTRATE SPECIFIC APPLICATIONS</b>	
Metal to metal	30
Plastic foams	50
Porous material (except wood)	50
Wood	30
Fiberglass	80

1. If an adhesive is used to bond dissimilar substrates together, the adhesive with the highest VOC content shall be allowed.
2. For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1168.

**TABLE 4.504.2**  
**SEALANT VOC LIMIT**

Less Water and Less Exempt Compounds in Grams per Liter

SEALANTS	VOC LIMIT
Architectural	250
Marine deck	760
Nonmembrane roof	300
Roadway	250
Single-ply roof membrane	450
Other	420
<b>SEALANT PRIMERS</b>	
Architectural	
Nonporous	250
Porous	775
Modified bituminous	500
Marine deck	760
Other	750

**TABLE 4.504.3**  
**VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS<sup>2, 3</sup>**  
Grams of VOC per Liter of Coating,  
Less Water and Less Exempt Compounds

COATING CATEGORY	VOC LIMIT
Flat coatings	50
Nonflat coatings	100
Nonflat-high gloss coatings	150
<b>SPECIALTY COATINGS</b>	
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 <sup>1</sup>	120
Magnesite cement coatings	450
Mastic texture coatings	100
Metallic pigmented coatings	500
Multicolor coatings	250
Pretreatment wash primers	420
Primers, sealers, and undercoaters	100
Reactive penetrating sealers	350
Recycled coatings	250
Roof coatings	50
Rust preventative coatings	250
Shellacs	
Clear	730
Opaque	550
Specialty primers, sealers and undercoaters	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

1. Grams of VOC per liter of coating, including water and including exempt compounds.
2. The specified limits remain in effect unless revised limits are listed in subsequent columns in the table.
3. Values in this table are derived from those specified by the California Air Resources Board, Architectural Coatings Suggested Control Measure, February 1, 2008. More information is available from the Air Resources Board.

## RESIDENTIAL MANDATORY MEASURES

**4.504.3 Carpet systems.** All carpet installed in the building interior shall meet the testing and product requirements of one of the following:

1. Carpet and Rug Institute's Green Label Plus Program.
2. California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.1, February 2010 (also known as Specification 01350.)
3. NSF/ANSI 140 at the Gold level.
4. Scientific Certifications Systems Indoor Advantage™ Gold.

**4.504.3.1 Carpet cushion.** All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute's Green Label program.

**4.504.3.2 Carpet adhesive.** All carpet adhesive shall meet the requirements of Table 4.504.1.

**4.504.4 Resilient flooring systems.** Where resilient flooring is installed, at least 80 percent of floor area receiving resilient flooring shall comply with one or more of the following:

1. Products compliant with the California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.1, February 2010 (also known as Specification 01350), certified as a CHPS Low-Emitting Material in the Collaborative for High Performance Schools (CHPS) High Performance Products Database.
2. Products certified under UL GREENGUARD Gold (formerly the Greenguard Children & Schools program).
3. Certification under the Resilient Floor Covering Institute (RFCI) FloorScore program.
4. Meet the California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.1, February 2010 (also known as Specification 01350).

**4.504.5 Composite wood products.** Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure for Composite Wood (17 CCR 93120 et seq.), by or before the dates specified in those sections, as shown in Table 4.504.5.

**4.504.5.1 Documentation.** Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

1. Product certifications and specifications.
2. Chain of custody certifications.
3. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, et seq.).

4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269, European 636 3S, and Canadian CSA O121, CSA O151, CSA O153 and CSA O325 standards.

5. Other methods acceptable to the enforcing agency.

**TABLE 4.504.5  
FORMALDEHYDE LIMITS<sup>1</sup>  
Maximum Formaldehyde Emissions in Parts per Million**

PRODUCT	CURRENT LIMIT
Hardwood plywood veneer core	0.05
Hardwood plywood composite core	0.05
Particleboard	0.09
Medium density fiberboard	0.11
Thin medium density fiberboard <sup>2</sup>	0.13

1. Values in this table are derived from those specified by the California Air Resources Board, Air Toxics Control Measure for Composite Wood as tested in accordance with ASTM E1333. For additional information, see *California Code of Regulations*, Title 17, Sections 93120 through 93120.12.

2. Thin medium density fiberboard has a maximum thickness of  $\frac{5}{16}$  inch (8 mm).

## SECTION 4.505 INTERIOR MOISTURE CONTROL

**4.505.1 General.** Buildings shall meet or exceed the provisions of the *California Building Standards Code*.

**4.505.2 Concrete slab foundations.** Concrete slab foundations required to have a vapor retarder by the *California Building Code*, Chapter 19 or concrete slab-on-ground floors required to have a vapor retarder by the *California Residential Code*, Chapter 5, shall also comply with this section.

**4.505.2.1 Capillary break.** A capillary break shall be installed in compliance with at least one of the following:

1. A 4-inch-thick (101.6 mm) base of  $\frac{1}{2}$  inch (12.7 mm) or larger clean aggregate shall be provided with a vapor retarder in direct contact with concrete and a concrete mix design, which will address bleeding, shrinkage, and curling, shall be used. For additional information, see American Concrete Institute, ACI 302.2R-06.
2. Other equivalent methods approved by the enforcing agency.
3. A slab design specified by a licensed design professional.

**4.505.3 Moisture content of building materials.** Building materials with visible signs of water damage shall not be installed. Wall and floor framing shall not be enclosed when the framing members exceed 19 percent moisture content. Moisture content shall be verified in compliance with the following:

1. Moisture content shall be determined with either a probe-type or contact-type moisture meter. Equivalent moisture verification methods may be approved by the enforcing agency and shall satisfy requirements found in Section 101.8 of this code.

## RESIDENTIAL MANDATORY MEASURES

2. Moisture readings shall be taken at a point 2 feet (610 mm) to 4 feet (1219 mm) from the grade stamped end of each piece to be verified.
3. At least three random moisture readings shall be performed on wall and floor framing with documentation acceptable to the enforcing agency provided at the time of approval to enclose the wall and floor framing.

Insulation products which are visibly wet or have a high moisture content shall be replaced or allowed to dry prior to enclosure in wall or floor cavities. Wet-applied insulation products shall follow the manufacturers' drying recommendations prior to enclosure.

*ment Selection*) or other equivalent design software or methods.

**Exception:** Use of alternate design temperatures necessary to ensure the systems function are acceptable.

### SECTION 4.508 OUTDOOR AIR QUALITY (Reserved)

### SECTION 4.506 INDOOR AIR QUALITY AND EXHAUST

**4.506.1 Bathroom exhaust fans.** Each bathroom shall be mechanically ventilated and shall comply with the following:

1. Fans shall be ENERGY STAR compliant and be ducted to terminate outside the building.
2. Unless functioning as a component of a whole house ventilation system, fans must be controlled by a humidity control.
  - a. Humidity controls shall be capable of adjustment between a relative humidity range of  $\leq 50$  percent to a maximum of 80 percent. A humidity control may utilize manual or automatic means of adjustment.
  - b. A humidity control may be a separate component to the exhaust fan and is not required to be integral (i.e., built-in).

#### Notes:

1. For the purposes of this section, a bathroom is a room which contains a bathtub, shower, or tub/shower combination.
2. Lighting integral to bathroom exhaust fans shall comply with the *California Energy Code*.

### SECTION 4.507 ENVIRONMENTAL COMFORT

**4.507.1 Reserved.**

**4.507.2 Heating and air-conditioning system design.** Heating and air-conditioning systems shall be sized, designed and have their equipment selected using the following methods:

1. The heat loss and heat gain is established according to ANSI/ACCA 2 Manual J—2016 (*Residential Load Calculation*), ASHRAE handbooks or other equivalent design software or methods.
2. Duct systems are sized according to ANSI/ACCA 1 Manual D—2016 (*Residential Duct Systems*), ASHRAE handbooks or other equivalent design software or methods.
3. Select heating and cooling equipment according to ANSI/ACCA 3 Manual S—2014 (*Residential Equip-*



# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## CHAPTER 5 – NONRESIDENTIAL MANDATORY MEASURES

### DIVISION 5.1 – PLANNING AND DESIGN

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.  
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHPD						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X																				
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below								X														
Chapter/Section																						
5.101								X														
5.102 Definitions								X														
5.106.4.2 and subsections								X														
5.106.5.3								X														
5.106.8								X														
5.106.10								X														
5.106.12								X														

## CHAPTER 5

# NONRESIDENTIAL MANDATORY MEASURES

### Division 5.1 – PLANNING AND DESIGN

#### SECTION 5.101 GENERAL

**5.101.1 Scope.** The provisions of this chapter outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

#### SECTION 5.102 DEFINITIONS

**5.102.1 Definitions.** The following terms are defined in Chapter 2.

**CUTOFF LUMINAIRES.**

**LOW-EMITTING AND FUEL EFFICIENT VEHICLES.**

**NEIGHBORHOOD ELECTRIC VEHICLE (NEV).**

**TENANT-OCCUPANTS.**

**VANPOOL VEHICLE.**

**ZEV.**

#### SECTION 5.103 SITE SELECTION (Reserved)

#### SECTION 5.104 SITE PRESERVATION (Reserved)

#### SECTION 5.105 DECONSTRUCTION AND REUSE OF EXISTING STRUCTURES (Reserved)

#### SECTION 5.106 SITE DEVELOPMENT

**5.106.1 Stormwater pollution prevention for projects that disturb less than one acre of land.** Newly constructed projects and additions which disturb less than one acre of land and are not part of a larger common plan of development or sale shall prevent the pollution of stormwater runoff from the construction activities through one or more of the following measures:

**5.106.1.1 Local ordinance.** Comply with a lawfully enacted stormwater management and/or erosion control ordinance.

**5.106.1.2 Best management practices (BMP's).** Prevent the loss of soil through wind or water erosion by implementing an effective combination of erosion and sediment control and good housekeeping BMP's.

1. Soil loss BMP's that should be considered for implementation as appropriate for each project include, but are not limited to, the following:
  - a. Scheduling construction activity during dry weather, when possible.
  - b. Preservation of natural features, vegetation, soil, and buffers around surface waters.
  - c. Drainage swales or lined ditches to control stormwater flow.
  - d. Mulching or hydroseeding to stabilize disturbed soils.
  - e. Erosion control to protect slopes.
  - f. Protection of storm drain inlets (gravel bags or catch basin inserts).
  - g. Perimeter sediment control (perimeter silt fence, fiber rolls).
  - h. Sediment trap or sediment basin to retain sediment on site.

## NONRESIDENTIAL MANDATORY MEASURES

- i. Stabilized construction exits.
  - j. Wind erosion control.
  - k. Other soil loss BMP's acceptable to the enforcing agency.
2. Good housekeeping BMP's to manage construction equipment, materials, non-stormwater discharges, and wastes that should be considered for implementation as appropriate for each project include, but are not limited to, the following:
  - a. Dewatering activities.
  - b. Material handling and waste management.
  - c. Building materials stockpile management.
  - d. Management of washout areas (concrete, paints, stucco, etc.).
  - e. Control of vehicle/equipment fueling to contractor's staging area.
  - f. Vehicle and equipment cleaning performed off site.
  - g. Spill prevention and control.
  - h. Other housekeeping BMP's acceptable to the enforcing agency.

**5.106.2 Stormwater pollution prevention for projects that disturb one or more acres of land.** Comply with all lawfully enacted stormwater discharge regulations for projects that (1) disturb one acre or more of land, or (2) disturb less than one acre of land but are part of a larger common plan of development or sale.

**Note:** Projects that (1) disturb one acre or more of land, or (2) disturb less than one acre of land but are part of a larger common plan of development or sale must comply with the postconstruction requirements detailed in the applicable National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities issued by the State Water Resources Control Board or the Lahontan Regional Water Quality Control Board (for projects in the Lake Tahoe Hydrologic Unit).

The NPDES permits require postconstruction runoff (post-project hydrology) to match the preconstruction runoff (pre-project hydrology) with the installation of postconstruction stormwater management measures. The NPDES permits emphasize runoff reduction through on-site stormwater use, interception, evapotranspiration, and infiltration through nonstructural controls, such as Low Impact Development (LID) practices, and conservation design measures. Stormwater volume that cannot be addressed using nonstructural practices is required to be captured in structural practices and be approved by the enforcing agency.

Refer to the current applicable permits on the State Water Resources Control Board website at: [www.waterboards.ca.gov/constructionstormwater](http://www.waterboards.ca.gov/constructionstormwater). Consideration to the stormwater runoff management measures should be given during the initial design process for appropriate integration into site development.

**5.106.4 Bicycle parking.** For buildings within the authority of California Building Standards Commission as specified in Section 103, comply with Section 5.106.4.1. For buildings within the authority of the Division of the State Architect pursuant to Section 105, comply with Section 5.106.4.2.

**5.106.4.1 Bicycle parking. [BSC-CG]** Comply with Sections 5.106.4.1.1 and 5.106.4.1.2; or meet the applicable local ordinance, whichever is stricter.

**5.106.4.1.1 Short-term bicycle parking.** If the new project or an addition or alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5 percent of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack.

**Exception:** Additions or alterations which add nine or less visitor vehicular parking spaces.

**5.106.4.1.2 Long-term bicycle parking.** For new buildings with tenant spaces that have 10 or more tenant-occupants, provide secure bicycle parking for 5 percent of the tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility.

**5.106.4.1.3.** For additions or alterations that add 10 or more tenant-occupant vehicular parking spaces, provide secure bicycle parking for 5 percent of the tenant vehicular parking spaces being added, with a minimum of one bicycle parking facility.

**5.106.4.1.4.** For new shell buildings in phased projects provide secure bicycle parking for 5 percent of the anticipated tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility.

**5.106.4.1.5.** Acceptable bicycle parking facility for Sections 5.106.4.1.2, 5.106.4.1.3, and 5.106.4.1.4 shall be convenient from the street and shall meet one of the following:

1. Covered, lockable enclosures with permanently anchored racks for bicycles;
2. Lockable bicycle rooms with permanently anchored racks; or
3. Lockable, permanently anchored bicycle lockers.

**Note:** Additional information on recommended bicycle accommodations may be obtained from Sacramento Area Bicycle Advocates.

**5.106.4.2 Bicycle parking. [DSA-SS]** For public schools and community colleges, comply with Sections 5.106.4.2.1 and 5.106.4.2.2.

**5.106.4.2.1 Student bicycle parking.** Provide permanently anchored bicycle racks conveniently accessed with a minimum of four two-bike capacity racks per new building.

**5.106.4.2.2 Staff bicycle parking.** Provide permanent, secure bicycle parking conveniently accessed with a minimum of two staff bicycle parking spaces per new building. Acceptable bicycle parking facilities shall be convenient from the street or staff parking area and shall meet one of the following:

1. Covered, lockable enclosures with permanently anchored racks for bicycles;
2. Lockable bicycle rooms with permanently anchored racks; or
3. Lockable, permanently anchored bicycle lockers.

**5.106.5.2 Designated parking for clean air vehicles.** In new projects or additions or alterations that add 10 or more vehicular parking spaces, provide designated park-

## NONRESIDENTIAL MANDATORY MEASURES

ing for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as follows:

TABLE 5.106.5.2

TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED SPACES
0–9	0
10–25	1
26–50	3
51–75	6
76–100	8
101–150	11
151–200	16
201 and over	At least 8 percent of total

**5.106.5.2.1 Parking stall marking.** Paint, in the paint used for stall striping, the following characters such that the lower edge of the last word aligns with the end of the stall striping and is visible beneath a parked vehicle:

CLEAN AIR/  
VANPOOL/EV

**Note:** Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces.

**5.106.5.3 Electric vehicle (EV) charging.** [N] Construction shall comply with Section 5.106.5.3.1 or Section 5.106.5.3.2 to facilitate future installation of electric vehicle supply equipment (EVSE). When EVSE(s) is/are installed, it shall be in accordance with the *California Building Code*, the *California Electrical Code* and as follows:

**5.106.5.3.1 Single charging space requirements.** [N] When only a single charging space is required per Table 5.106.5.3.3, a raceway is required to be installed at the time of construction and shall be installed in accordance with the *California Electrical Code*. Construction plans and specifications shall include, but are not limited to, the following:

1. The type and location of the EVSE.
2. A listed raceway capable of accommodating a 208/240-volt dedicated branch circuit.
3. The raceway shall not be less than trade size 1.”
4. The raceway shall originate at a service panel or a subpanel serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into a listed suitable cabinet, box, enclosure or equivalent.
5. The service panel or subpanel shall have sufficient capacity to accommodate a minimum 40-ampere dedicated branch circuit for the future installation of the EVSE.

**5.106.5.3.2 Multiple charging space requirements.** [N] When multiple charging spaces are required per Table 5.106.5.3.3 raceway(s) is/are required to be installed at the time of construction and shall be installed in accordance with the *California Electrical*

*Code*. Construction plans and specifications shall include, but are not limited to, the following:

1. The type and location of the EVSE.
2. The raceway(s) shall originate at a service panel or a subpanel(s) serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into listed suitable cabinet(s), box(es), enclosure(s) or equivalent.
3. Plan design shall be based upon 40-ampere minimum branch circuits.
4. Electrical calculations shall substantiate the design of the electrical system, to include the rating of equipment and any on-site distribution transformers and have sufficient capacity to simultaneously charge all required EVs at its full rated amperage.
5. The service panel or subpanel(s) shall have sufficient capacity to accommodate the required number of dedicated branch circuit(s) for the future installation of the EVSE.

**5.106.5.3.3 EV charging space calculation.** [N] Table 5.106.5.3.3 shall be used to determine if single or multiple charging space requirements apply for the future installation of EVSE.

**Exceptions:** On a case-by-case basis where the local enforcing agency has determined EV charging and infrastructure is not feasible based upon one or more of the following conditions:

1. Where there is insufficient electrical supply.
2. Where there is evidence suitable to the local enforcing agency substantiating that additional local utility infrastructure design requirements, directly related to the implementation of Section 5.106.5.3, may adversely impact the construction cost of the project.

TABLE 5.106.5.3.3

TOTAL NUMBER OF ACTUAL PARKING SPACES	NUMBER OF REQUIRED EV CHARGING SPACES
0-9	0
10-25	1
26-50	2
51-75	4
76-100	5
101-150	7
151-200	10
201 and over	6 percent of total <sup>1</sup>

1. Calculation for spaces shall be rounded up to the nearest whole number.

**5.106.5.3.4 [N] Identification.** The service panel or subpanel(s) circuit directory shall identify the reserved overcurrent protective device space(s) for future EV charging as “EV CAPABLE”. The raceway termination location shall be permanently and visibly marked as “EV CAPABLE.”

**5.106.5.3.5 [N] Future charging spaces.** Future charging spaces qualify as designated parking as

## NONRESIDENTIAL MANDATORY MEASURES

described in Section 5.106.5.2 Designated parking for clean air vehicles.

**5.106.8 Light pollution reduction.** [N] Outdoor lighting systems shall be designed and installed to comply with the following:

1. The minimum requirements in the *California Energy Code* for Lighting Zones 0-4 as defined in Chapter 10, Section 10-114 of the *California Administrative Code*; and
2. Backlight (B) ratings as defined in IES TM-15-11 (shown in Table A-1 in Chapter 8);
3. Uplight and Glare ratings as defined in *California Energy Code* (shown in Tables 130.2-A and 130.2-B in Chapter 8) and
4. Allowable BUG ratings not exceeding those shown in Table 5.106.8 [N], or

Comply with a local ordinance lawfully enacted pursuant to Section 101.7, whichever is more stringent.

### Exceptions: [N]

1. Luminaires that qualify as exceptions in Section 140.7 of the *California Energy Code*.
2. Emergency lighting.
3. Building facade meeting the requirements in Table 140.7-B of the *California Energy Code*, Part 6.
4. Custom lighting features as allowed by the local enforcing agency, as permitted by Section 101.8

Alternate materials, designs and methods of construction.

### Notes:

1. [N] See also *California Building Code*, Chapter 12, Section 1205.7 for college campus lighting requirements for parking facilities and walkways.
2. Refer to Chapter 8 (Compliance Forms, Worksheets and Reference Material) for IES TM-15-11 Table A-1, *California Energy Code* Tables 130.2-A and 130.2-B.
3. Refer to the *California Energy Code* for requirements for additions and alterations.

**5.106.10 Grading and paving.** Construction plans shall indicate how site grading or a drainage system will manage all surface water flows to keep water from entering buildings. Examples of methods to manage surface water include, but are not limited to, the following:

1. Swales.
2. Water collection and disposal systems.
3. French drains.
4. Water retention gardens.
5. Other water measures which keep surface water away from buildings and aid in groundwater recharge.

**Exception:** Additions and alterations not altering the drainage path.

**TABLE 5.106.8 [N]**  
**MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS<sup>1,2</sup>**

ALLOWABLE RATING	LIGHTING ZONE LZ0	LIGHTING ZONE LZ1	LIGHTING ZONE LZ2	LIGHTING ZONE LZ3	LIGHTING ZONE LZ4
<b>Maximum Allowable Backlight Rating<sup>3</sup> (B)</b>					
Luminaire greater than 2 mounting heights (MH) from property line	N/A	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1 – 2 MH from property line	N/A	B2	B3	B4	B4
Luminaire back hemisphere is 0.5 – 1 MH from property line	N/A	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	N/A	B0	B0	B1	B2
<b>Maximum Allowable Uplight Rating (U)</b>					
For area lighting <sup>4</sup>	N/A	U0	U0	U0	U0
For all other outdoor lighting, including decorative luminaires	N/A	U1	U2	U3	U4
<b>Maximum Allowable Glare Rating<sup>5</sup> (G)</b>					
Luminaire greater than 2 MH from property line	N/A	G1	G2	G3	G4
Luminaire front hemisphere is 1 – 2 MH from property line	N/A	G0	G1	G1	G2
Luminaire front hemisphere is 0.5 – 1 MH from property line	N/A	G0	G0	G1	G1
Luminaire front hemisphere is less than 0.5 MH from property line	N/A	G0	G0	G0	G1

1. IESNA Lighting Zones 0 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code*.
2. For property lines that abut public walkways, bikeways, plazas and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.
3. If the nearest property line is less than or equal to two mounting heights from the back hemisphere of the luminaire distribution, the applicable reduced Backlight rating shall be met.
4. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaires located in these areas shall meet U-value limits for "all other outdoor lighting."
5. If the nearest property line is less than or equal to two mounting heights from the front hemisphere of the luminaire distribution, the applicable reduced Glare rating shall be met.

## NONRESIDENTIAL MANDATORY MEASURES

**5.106.12 Shade trees. [DSA-SS]** Shade trees shall be planted to comply with Sections 5.106.12.1, 5.106.12.2, and 5.106.12.3. Percentages shown shall be measured at noon on the summer solstice. Landscape irrigation necessary to establish and maintain tree health shall comply with Section 5.304.6.

**5.106.12.1 Surface parking areas.** Shade tree plantings, minimum #10 container size or equal, shall be installed to provide shade over 50 percent of the parking area within 15 years.

**Exceptions:** The surface parking area covered by solar photovoltaic shade structures, or shade structures, with roofing materials that comply with Table A5.106.11.2.2 in Appendix A5, are not included in the total area calculation.

**5.106.12.2 Landscape areas.** Shade tree plantings, minimum #10 container size or equal shall be installed to provide shade of 20% of the landscape area within 15 years.

**Exception:** Playfields for organized sport activity are not included in the total area calculation.

**5.106.12.3 Hardscape areas.** Shade tree plantings, minimum #10 container size or equal shall be installed to provide shade over 20 percent of the hardscape area within 15 years.

**Exception:** Walks, hardscape areas covered by solar photovoltaic shade structures, and hardscape areas covered by shade structures with roofing materials that comply with Table A5.106.11.2.2 in Appendix A5, are not included in the total area calculation.





# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## CHAPTER 5 – NONRESIDENTIAL MANDATORY MEASURES

### DIVISION 5.2 – ENERGY EFFICIENCY

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC- CG	SFM	HCD			DSA		OSHDP						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X						X														
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below																						
Chapter/Section																						

## CHAPTER 5

# NONRESIDENTIAL MANDATORY MEASURES

### *Division 5.2 – ENERGY EFFICIENCY*

#### SECTION 5.201 GENERAL

**5.201.1 Scope. *California Energy Code.*** For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory building standards.



# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## CHAPTER 5 – NONRESIDENTIAL MANDATORY MEASURES

### DIVISION 5.3 – WATER EFFICIENCY AND CONSERVATION

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHDP						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X																				
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below								X														
Chapter/Section																						
5.301.1								X														
5.302.1 Definitions								X														
5.303.3.1								X														
5.303.3.2								X														
5.303.3.3								X														
5.303.3.4								X														
5.303.6								X														
5.304.6 and subsections								X														

## CHAPTER 5

# NONRESIDENTIAL MANDATORY MEASURES

### Division 5.3 – WATER EFFICIENCY AND CONSERVATION

#### SECTION 5.301 GENERAL

**5.301.1 Scope.** The provisions of this chapter shall establish the means of conserving water used indoors, outdoors and in wastewater conveyance.

#### SECTION 5.302 DEFINITIONS

**5.302.1 Definitions.** The following terms are defined in Chapter 2.

**CONSTRUCTION SITE.**

**DISINFECTED TERTIARY RECYCLED WATER.**

**EVAPOTRANSPIRATION ADJUSTMENT FACTOR (ETAF). [DSA-SS]**

**FOOTPRINT AREA [DSA-SS]**

**GRAYWATER.**

**METERING FAUCET.**

**MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELO).**

**POTABLE WATER.**

**RECLAIMED (RECYCLED) WATER.**

**RECYCLED WATER.**

**RECYCLED WATER SUPPLY SYSTEM.**

**SPECIAL LANDSCAPE AREA (SLA). [DSA-SS]**

**SUBMETER.**

#### SECTION 5.303 INDOOR WATER USE

**5.303.1 Meters.** Separate submeters or metering devices shall be installed for the uses described in Sections 5.303.1.1 and 5.303.1.2.

**5.303.1.1 New buildings or additions in excess of 50,000 square feet.** Separate submeters shall be installed as follows:

1. For each individual leased, rented, or other tenant space within the building projected to consume more than 100 gal/day (380 L/day), including, but not limited to, spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop.

## NONRESIDENTIAL MANDATORY MEASURES

2. Where separate submeters for individual building tenants are unfeasible, for water supplied to the following subsystems:

- a. Makeup water for cooling towers where flow through is greater than 500 gpm (30 L/s).
- b. Makeup water for evaporative coolers greater than 6 gpm (0.04 L/s).
- c. Steam and hot-water boilers with energy input more than 500,000 Btu/h (147 kW).

**5.303.1.2 Excess consumption.** A separate submeter or metering device shall be provided for any tenant within a new building or within an addition that is projected to consume more than 1,000 gal/day.

### 5.303.2 Reserved.

**5.303.3 Water conserving plumbing fixtures and fittings.** Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:

**5.303.3.1 Water closets.** The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type Toilets.

**Note:** The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

### 5.303.3.2 Urinals.

**5.303.3.2.1 Wall-mounted urinals.** The effective flush volume of wall-mounted urinals shall not exceed 0.125 gallons per flush.

**5.303.3.2.2 Floor-mounted urinals.** The effective flush volume of floor-mounted or other urinals shall not exceed 0.5 gallons per flush.

### 5.303.3.3 Showerheads.

**5.303.3.3.1 Single showerhead.** Showerheads shall have a maximum flow rate of not more than 1.8 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

**5.303.3.3.2 Multiple showerheads serving one shower.** When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.

**Note:** A hand-held shower shall be considered a showerhead.

### 5.303.3.4 Faucets and fountains.

**5.303.3.4.1 Nonresidential lavatory faucets.** Lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi.

**5.303.3.4.2 Kitchen faucets.** Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons

per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

**5.303.3.4.3 Wash fountains.** Wash fountains shall have a maximum flow rate of not more than 1.8 gallons per minute/20 [rim space (inches) at 60 psi].

**5.303.3.4.4 Metering faucets.** Metering faucets shall not deliver more than 0.20 gallons per cycle.

**5.303.3.4.5 Metering faucets for wash fountains.** Metering faucets for wash fountains shall have a maximum flow rate of not more than 0.20 gallons per cycle/20 [rim space (inches) at 60 psi].

**Note:** Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.

### 5.303.4 Commercial kitchen equipment.

**5.303.4.1 Food waste disposers.** Disposers shall either modulate the use of water to no more than 1 gpm when the disposer is not in use (not actively grinding food waste/no-load) or shall automatically shut off after no more than 10 minutes of inactivity. Disposers shall use no more than 8 gpm of water.

**Note:** This code section does not affect local jurisdiction authority to prohibit or require disposer installation.

**5.303.5 Areas of addition or alteration.** For those occupancies within the authority of the California Building Standards Commission as specified in Section 103, the provisions of Sections 5.303.3 and 5.303.4 shall apply to new fixtures in additions or areas of alteration to the building.

**5.303.6 Standards for plumbing fixtures and fittings.** Plumbing fixtures and fittings shall be installed in accordance with the *California Plumbing Code*, and shall meet the applicable standards referenced in Table 1701.1 of the *California Plumbing Code* and in Chapter 6 of this code.

## SECTION 5.304 OUTDOOR WATER USE

**5.304.1 Outdoor potable water use in landscape areas.** Nonresidential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient Landscape Ordinance (MWEL0), whichever is more stringent.

### Notes:

1. The Model Water Efficient Landscape Ordinance (MWEL0) is located in the *California Code of Regulations*, Title 23, Chapter 2.7, Division 2.
2. MWEL0 and supporting documents, including a water budget calculator, are available at: <https://www.water.ca.gov/>.



## NONRESIDENTIAL MANDATORY MEASURES

- > **5.304.6 Outdoor potable water use in landscape areas.** For public schools and community colleges, landscape projects as described in Sections 5.304.6.1 and 5.304.6.2 shall comply with the California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) commencing with Section 490 of Chapter 2.7, Division 2, Title 23, *California Code of Regulations*, except that the evapotranspiration adjustment factor (ETAF) shall be 0.65 with an additional water allowance for special landscape areas (SLA) of 0.35.
  - Exception:** Any project with an aggregate landscape area of 2,500 square feet or less may comply with the prescriptive measures contained in Appendix D of the MWELO.
- > **5.304.6.1 Newly constructed landscapes.** New construction projects with an aggregate landscape area equal to or greater than 500 square feet.
- > **5.304.6.2 Rehabilitated landscapes.** Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 1,200 square feet.

- 3. A potable water supply system is not required for landscape irrigation if the landscape irrigation system is supplied with recycled water at the time of final inspection.
- 4. Potable water may be used with the recycled water supply system on a temporary basis, as allowed by the authority having jurisdiction in consultation with the recycled water purveyor.

**5.305.1.2 Technical requirements for outdoor recycled water supply systems.** Recycled water supply systems for outdoor applications shall meet the requirements of this code, and the California Code of Regulations, Title 17, Division 1, Chapter 5, Subchapter 1; Title 22, Division 4, Chapter 3; and Title 23, Division 2, Chapter 2.7, as applicable.

## SECTION 5.305 WATER REUSE SYSTEMS

**5.305.1 Recycled water supply systems.** Recycled water supply systems shall be installed in accordance with Sections 5.305.1.1, 5.305.1.2, and the *California Plumbing Code*.

**5.305.1.1 Outdoor recycled water supply systems.** All newly constructed nonresidential developments, where disinfected tertiary recycled water is available from a municipal source to a construction site, shall be provided with both a potable water supply system and a recycled water supply system. The recycled water supply system shall allow the use of reclaimed (recycled) water for aboveground and subsurface irrigation to all landscape irrigation systems.

For the purposes of Section 5.305.1.1, when a recycled water supply pipe is located within 300 feet from a construction site boundary, it shall be considered that reclaimed (recycled) water is available from a municipal source.

### Exceptions:

- 1. Service areas in which the only reclaimed (recycled) water is used for potable purposes, or in which net nonpotable deliveries are anticipated to remain level or decrease as a result of the potable reuse project.
- 2. Where access to disinfected tertiary recycled water is not feasible and/or cost-efficient, as determined by the authority having jurisdiction in consultation with the recycled water purveyor.

**Note:** A city, county, or city and county, in consultation with the recycled water purveyor, may further reduce the area for the mandate to install recycled water supply systems if the recycled water purveyor is unable to accommodate new services or unable to provide uninterrupted service.



# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## CHAPTER 5 – NONRESIDENTIAL MANDATORY MEASURES

### DIVISION 5.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHDPD						BSC C	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X																				
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below								X														
Chapter/Section																						
5.401.1								X														
5.402.1 Definitions								X														
5.407 and subsections								X														
5.408.1 and subsections								X														
5.410.1								X														
5.410.1.2								X														

## CHAPTER 5

## NONRESIDENTIAL MANDATORY MEASURES

### *Division 5.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY*

#### SECTION 5.401 GENERAL

**5.401.1 Scope.** The provisions of this chapter shall outline means of achieving material conservation and resource efficiency through protection of buildings from exterior moisture, construction waste diversion, employment of techniques to reduce pollution through recycling of materials, and building commissioning or testing and adjusting.

#### SECTION 5.402 DEFINITIONS

**5.402.1 Definitions.** The following terms are defined in Chapter 2.

**ADJUST.**

**BALANCE.**

**BUILDING COMMISSIONING.**

**ORGANIC WASTE.**

**TEST.**

#### SECTION 5.403 FOUNDATION SYSTEMS (Reserved)

#### SECTION 5.404 EFFICIENT FRAMING TECHNIQUES (Reserved)

#### SECTION 5.405 MATERIAL SOURCES (Reserved)

#### SECTION 5.406 ENHANCED DURABILITY AND REDUCED MAINTENANCE (Reserved)

#### SECTION 5.407 WATER RESISTANCE AND MOISTURE MANAGEMENT

**5.407.1 Weather protection.** Provide a weather-resistant exterior wall and foundation envelope as required by *California Building Code* Section 1402.2 (Weather Protection), manufacturer's installation instructions or local ordinance, whichever is more stringent.

**5.407.2 Moisture control.** Employ moisture control measures by the following methods.

**5.407.2.1 Sprinklers.** Design and maintain landscape irrigation systems to prevent spray on structures.

## NONRESIDENTIAL MANDATORY MEASURES

**5.407.2.2 Entries and openings.** Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings as follows:

**5.407.2.2.1 Exterior door protection.** Primary exterior entries shall be covered to prevent water intrusion by using nonabsorbent floor and wall finishes within at least 2 feet around and perpendicular to such openings plus at least one of the following:

1. An installed awning at least 4 feet in depth.
2. The door is protected by a roof overhang at least 4 feet in depth.
3. The door is recessed at least 4 feet.
4. Other methods which provide equivalent protection.

**5.407.2.2.2 Flashing.** Install flashings integrated with a drainage plane.

### SECTION 5.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

**5.408.1 Construction waste management.** Recycle and/or salvage for reuse a minimum of 65 percent of the nonhazardous construction and demolition waste in accordance with Section 5.408.1.1, 5.408.1.2 or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.

**5.408.1.1 Construction waste management plan.** Where a local jurisdiction does not have a construction and demolition waste management ordinance that is more stringent, submit a construction waste management plan that

1. Identifies the construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.
2. Determines if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
3. Identifies diversion facilities where construction and demolition waste material collected will be taken.
4. Specifies that the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.

**5.408.1.2 Waste management company.** Utilize a waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with this section.

**Note:** The owner or contractor shall make the determination if the construction and demolition waste material will be diverted by a waste management company.

**Exceptions to Sections 5.408.1.1 and 5.408.1.2:**

1. Excavated soil and land-clearing debris.

2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets.

**5.408.1.3 Waste stream reduction alternative.** The combined weight of new construction disposal that does not exceed two pounds per square foot of building area may be deemed to meet the 65 percent minimum requirement as approved by the enforcing agency.

**5.408.1.4 Documentation.** Documentation shall be provided to the enforcing agency which demonstrates compliance with Sections 5.408.1.1 through 5.408.1.3. The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

#### Notes:

1. Sample forms found in “A Guide to the California Green Building Standards Code (Nonresidential)” located at <http://www.bsc.ca.gov/Home/CAL-Green.aspx> may be used to assist in documenting compliance with the waste management plan.
2. Mixed construction and demolition debris (C&D) processors can be located at the California Department of Resources Recycling and Recovery (CalRecycle).

**5.408.2 Universal waste.** [A] Additions and alterations to a building or tenant space that meet the scoping provisions in Section 301.3 for nonresidential additions and alterations, shall require verification that Universal Waste items such as fluorescent lamps and ballast and mercury containing thermostats as well as other California prohibited Universal Waste materials are disposed of properly and are diverted from landfills. A list of prohibited Universal Waste materials shall be included in the construction documents.

**Note:** Refer to the Universal Waste Rule link at: [http://www.dtsc.ca.gov/LawsRegsPolicies/Regs/upload/OEAR-A\\_REGS\\_UWR\\_FinalText.pdf](http://www.dtsc.ca.gov/LawsRegsPolicies/Regs/upload/OEAR-A_REGS_UWR_FinalText.pdf)

**5.408.3 Excavated soil and land clearing debris.** 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed.

**Exception:** Reuse, either on-or off-site, of vegetation or soil contaminated by disease or pest infestation.

#### Notes:

1. If contamination by disease or pest infestation is suspected, contact the County Agricultural Commissioner and follow its direction for recycling or disposal of the material. ([www.cdffa.ca.gov/exec/county/county\\_contacts.html](http://www.cdffa.ca.gov/exec/county/county_contacts.html))
2. For a map of known pest and/or disease quarantine zones, consult with the California Department of Food and Agriculture. ([www.cdffa.ca.gov](http://www.cdffa.ca.gov))

## SECTION 5.409 LIFE CYCLE ASSESSMENT (Reserved)

### SECTION 5.410 BUILDING MAINTENANCE AND OPERATION

**5.410.1 Recycling by occupants.** Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive.

**Exception:** Rural jurisdictions that meet and apply for the exemption in Public Resources Code 42649.82 (a)(2)(A) et seq. shall also be exempt from the organic waste portion of this section.

**5.410.1.1 Additions.** All additions conducted within a 12-month period under single or multiple permits, resulting in an increase of 30 percent or more in floor area, shall provide recycling areas on site.

**Exception:** Additions within a tenant space resulting in less than a 30-percent increase in the tenant space floor area.

**5.410.1.2 Sample ordinance.** Space allocation for recycling areas shall comply with Chapter 18, Part 3, Division 30 of the *Public Resources Code*. Chapter 18 is known as the California Solid Waste Reuse and Recycling Access Act of 1991 (Act).

**Note:** A sample ordinance for use by local agencies may be found in Appendix A of the document at the CalRecycle's web site.

**5.410.2 Commissioning.** [N] **New buildings 10,000 square feet and over.** For new buildings 10,000 square feet and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements. Commissioning shall be performed in accordance with this section by trained personnel with experience on projects of comparable size and complexity. For I-occupancies that are not regulated by OSHPD or for I-occupancies and L-occupancies that are not regulated by the *California Energy Code* Section 100.0 Scope, all requirements in Sections 5.410.2 through 5.410.2.6 shall apply.

**Note:** For energy-related systems under the scope (Section 100) of the *California Energy Code*, including heating, ventilation, air conditioning (HVAC) systems and controls, indoor lighting systems and controls, as well as water heating systems and controls, refer to *California Energy Code* Section 120.8 for commissioning requirements.

Commissioning requirements shall include:

1. Owner's or owner representative's project requirements.
2. Basis of design.
3. Commissioning measures shown in the construction documents.

4. Commissioning plan.
5. Functional performance testing.
6. Documentation and training.
7. Commissioning report.

#### Exceptions:

1. Unconditioned warehouses of any size.
2. Areas less than 10,000 square feet used for offices or other conditioned accessory spaces within unconditioned warehouses.
3. Tenant improvements less than 10,000 square feet as described in Section 303.1.1.
4. Open parking garages of any size, or open parking garage areas, of any size, within a structure.

**Note:** For the purposes of this section, unconditioned shall mean a building, area, or room which does not provide heating and or air conditioning.

#### Informational Notes:

1. IAS AC 476 is an accreditation criteria for organizations providing training and/or certification of commissioning personnel. AC 476 is available to the Authority Having Jurisdiction as a reference for qualifications of commissioning personnel. AC 476 does not certify individuals to conduct functional performance tests or to adjust and balance systems.
2. Functional performance testing for heating, ventilation, air conditioning systems and lighting controls must be performed in compliance with the *California Energy Code*.

**5.410.2.1 Owner's or Owner representative's Project Requirements (OPR).** [N] The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. This documentation shall include the following:

1. Environmental and sustainability goals.
2. Building sustainable goals.
3. Indoor environmental quality requirements.
4. Project program, including facility functions and hours of operation, and need for after hours operation.
5. Equipment and systems expectations.
6. Building occupant and operation and maintenance (O&M) personnel expectations.

**5.410.2.2 Basis of Design (BOD).** [N] A written explanation of how the design of the building systems meets the OPR shall be completed at the design phase of the building project. The Basis of Design document shall cover the following systems:

1. Renewable energy systems.
2. Landscape irrigation systems.
3. Water reuse systems.



## NONRESIDENTIAL MANDATORY MEASURES

**5.410.2.3 Commissioning plan.** [N] Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned. The commissioning plan shall include the following:

1. General project information.
2. Commissioning goals.
3. Systems to be commissioned. Plans to test systems and components shall include:
  - a. An explanation of the original design intent.
  - b. Equipment and systems to be tested, including the extent of tests.
  - c. Functions to be tested.
  - d. Conditions under which the test shall be performed.
  - e. Measurable criteria for acceptable performance.
4. Commissioning team information.
5. Commissioning process activities, schedules and responsibilities. Plans for the completion of commissioning shall be included.

**5.410.2.4 Functional performance testing.** [N] Functional performance tests shall demonstrate the correct installation and operation of each component, system and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized, and include any readings and adjustments made.

**5.410.2.5 Documentation and training.** [N] A systems manual and systems operations training are required, including Occupational Safety and Health Act (OSHA) requirements in *California Code of Regulations* (CCR), Title 8, Section 5142, and other related regulations.

**5.410.2.5.1 Systems manual.** [N] Documentation of the operational aspects of the building shall be completed within the systems manual and delivered to the building owner or representative. The systems manual shall include the following:

1. Site information, including facility description, history and current requirements.
2. Site contact information.
3. Basic operations and maintenance, including general site operating procedures, basic troubleshooting, recommended maintenance requirements, site events log.
4. Major systems.
5. Site equipment inventory and maintenance notes.
6. A copy of verifications required by the enforcing agency or this code.
7. Other resources and documentation, if applicable.

**5.410.2.5.2 Systems operations training.** [N] A program for training of the appropriate maintenance staff for each equipment type and/or system shall be developed and documented in the commissioning report and shall include the following:

1. System/equipment overview (what it is, what it does and with what other systems and/or equipment it interfaces).

2. Review and demonstration of servicing/preventive maintenance.
3. Review of the information in the systems manual.
4. Review of the record drawings on the system/equipment.

**5.410.2.6 Commissioning report.** [N] A report of commissioning process activities undertaken through the design and construction phases of the building project shall be completed and provided to the owner or representative.

**5.410.4 Testing and adjusting. New buildings less than 10,000 square feet.** Testing and adjusting of systems shall be required for new buildings less than 10,000 square feet or new systems to serve an addition or alteration subject to Section 303.1.

### 5.410.4.1 (Reserved)

**Note:** For energy-related systems under the scope (Section 100) of the *California Energy Code*, including heating, ventilation, air conditioning (HVAC) systems and controls, indoor lighting system and controls, as well as water heating systems and controls, refer to *California Energy Code* Section 120.8 for commissioning requirements and Sections 120.5, 120.6, 130.4, and 140.9(b)3 for additional testing requirements of specific systems.

**5.410.4.2 Systems.** Develop a written plan of procedures for testing and adjusting systems. Systems to be included for testing and adjusting shall include, as applicable to the project:

1. Renewable energy systems.
2. Landscape irrigation systems.
3. Water reuse systems.

**5.410.4.3 Procedures.** Perform testing and adjusting procedures in accordance with manufacturer's specifications and applicable standards on each system.

**5.410.4.3.1 HVAC balancing.** In addition to testing and adjusting, before a new space-conditioning system serving a building or space is operated for normal use, balance the system in accordance with the procedures defined by the Testing Adjusting and Balancing Bureau National Standards; the National Environmental Balancing Bureau Procedural Standards; Associated Air Balance Council National Standards or as approved by the enforcing agency.

**5.410.4.4 Reporting.** After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.

**5.410.4.5 Operation and maintenance (O & M) manual.** Provide the building owner or representative with detailed operating and maintenance instructions and copies of guarantees/warranties for each system. O & M instructions shall be consistent with OSHA requirements in CCR, Title 8, Section 5142, and other related regulations.

**5.410.4.5.1 Inspections and reports.** Include a copy of all inspection verifications and reports required by the enforcing agency.

# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## CHAPTER 5 – NONRESIDENTIAL MANDATORY MEASURES

### DIVISION 5.5 – ENVIRONMENTAL QUALITY

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHDP						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X																				
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below								X														
Chapter/Section																						
5.501.1								X														
5.502.1 Definitions								X														
5.504.3								X														
5.504.4								X														
5.504.4.1								X														
Table 5.504.4.1								X														
Table 5.504.4.2								X														
5.504.4.3								X														
5.504.4.3.1								X														
Table 5.504.4.3								X														
5.504.4.3.2								X														
5.504.4.4 and subsections								X														
5.504.4.5								X														
Table 5.504.4.5								X														
5.504.4.6								X														
5.504.5.3								X														
5.505								X														
5.506.1								X														
5.507.4 and subsections								X														
5.508.1 and subsections								X														

## CHAPTER 5

## NONRESIDENTIAL MANDATORY MEASURES

### *Division 5.5 – ENVIRONMENTAL QUALITY*

#### SECTION 5.501 GENERAL

**5.501.1 Scope.** The provisions of this chapter shall outline means of reducing the quantity of air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of a building's installers, occupants and neighbors.

#### SECTION 5.502 DEFINITIONS

**5.502.1 Definitions.** The following terms are defined in Chapter 2.

**ARTERIAL HIGHWAY.**

**A-WEIGHTED SOUND LEVEL (dBA).**

**1 BTU/HOUR.**

**COMMUNITY NOISE EQUIVALENT LEVEL (CNEL).**

**COMPOSITE WOOD PRODUCTS.**

**DAY-NIGHT AVERAGE SOUND LEVEL (L<sub>dn</sub>).**

**DECIBEL (dB).**

**ENERGY EQUIVALENT (NOISE) LEVEL (L<sub>eq</sub>).**

**EXPRESSWAY.**

**FREEWAY.**

**GLOBAL WARMING POTENTIAL (GWP).**

**GLOBAL WARMING POTENTIAL VALUE (GWP VALUE).**

**HIGH-GWP REFRIGERANT.**

## NONRESIDENTIAL MANDATORY MEASURES

**LONG RADIUS ELBOW.**

**LOW-GWP REFRIGERANT.**

**MERV.**

**MAXIMUM INCREMENTAL REACTIVITY (MIR).**

**PRODUCT-WEIGHTED MIR (PWMIR).**

**PSIG.**

**REACTIVE ORGANIC COMPOUND (ROC).**

**SCHRADER ACCESS VALVES.**

**SHORT RADIUS ELBOW.**

**SUPERMARKET.**

**VOC.**

### SECTION 5.503 FIREPLACES

**5.503.1 Fireplaces.** Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace, or a sealed woodstove or pellet stove, and refer to residential requirements in the *California Energy Code*, Title 24, Part 6, Subchapter 7, Section 150. Woodstoves, pellet stoves and fireplaces shall comply with applicable local ordinances.

**5.503.1.1 Woodstoves.** Woodstove and pellet stoves shall comply with U.S. EPA New Source Performance Standards (NSPS) emission limits as applicable, and shall have a permanent label indicating they are certified to meet the emission limits.

### SECTION 5.504 POLLUTANT CONTROL

**5.504.1 Temporary ventilation.** The permanent HVAC system shall only be used during construction if necessary to condition the building or areas of addition or alteration within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2-1999, or an average efficiency of 30 percent based on ASHRAE 52.1-1992. Replace all filters immediately prior to occupancy, or, if the building is occupied during alteration, at the conclusion of construction.

**5.504.3 Covering of duct openings and protection of mechanical equipment during construction.** At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.

**5.504.4 Finish material pollutant control.** Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.6.

**5.504.4.1 Adhesives, sealants and caulks.** Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards:

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall

comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in subsection 2, below.

2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of *California Code of Regulations*, Title 17, commencing with Section 94507.

**TABLE 5.504.4.1  
ADHESIVE VOC LIMIT<sup>1,2</sup>  
Less Water and Less Exempt Compounds in Grams Per Liter**

ARCHITECTURAL APPLICATIONS	CURRENT VOC LIMIT
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
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250
Other adhesive not specifically listed	50
<b>SPECIALTY APPLICATIONS</b>	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special purpose contact adhesive	250
Structural wood member adhesive	140
Top and trim adhesive	250
<b>SUBSTRATE SPECIFIC APPLICATIONS</b>	
Metal to metal	30
Plastic foams	50
Porous material (except wood)	50
Wood	30
Fiberglass	80

1. If an adhesive is used to bond dissimilar substrates together the adhesive with the highest VOC content shall be allowed.
2. For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1168, <http://www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF>.

## NONRESIDENTIAL MANDATORY MEASURES

**TABLE 5.504.4.2**  
**SEALANT VOC LIMIT**  
**Less Water and Less Exempt Compounds in Grams per Liter**

SEALANTS	CURRENT VOC LIMIT
Architectural	250
Marine deck	760
Nonmembrane roof	300
Roadway	250
Single-ply roof membrane	450
Other	420
SEALANT PRIMERS	
Architectural	
Nonporous	250
Porous	775
Modified bituminous	500
Marine deck	760
Other	750

Note: For additional information regarding methods to measure the VOC content specified in these tables, see South Coast Air Quality Management District Rule 1168.

**5.504.4.3 Paints and coatings.** Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3 shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board Suggested Control Measure, and the corresponding Flat, Nonflat or Nonflat-High Gloss VOC limit in Table 5.504.4.3 shall apply.

**5.504.4.3.1 Aerosol paints and coatings.** Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

**5.504.4.3.2 Verification.** Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

1. Manufacturer's product specification
2. Field verification of on-site product containers

**TABLE 5.504.4.3**  
**VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS<sup>2,3</sup>**  
**Grams of VOC per Liter of Coating,**  
**Less Water and Less Exempt Compounds**

COATING CATEGORY	CURRENT LIMIT
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 <sup>1</sup>	120
Magnesite cement coatings	450
Mastic texture coatings	100
Metallic pigmented coatings	500
Multicolor coatings	250
Pretreatment wash primers	420
Primers, sealers, and undercoaters	100
Reactive penetrating sealers	350
Recycled coatings	250
Roof coatings	50
Rust preventative coatings	250
Shellacs	
Clear	730
Opaque	550
Specialty primers, sealers and undercoaters	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

1. Grams of VOC per liter of coating, including water and including exempt compounds.
2. The specified limits remain in effect unless revised limits are listed in subsequent columns in the table.
3. Values in this table are derived from those specified by the California Air Resources Board, Architectural Coatings Suggested Control Measure, February 1, 2008. More information is available from the Air Resources Board.



NONRESIDENTIAL MANDATORY MEASURES

**5.504.4.4 Carpet systems.** All carpet installed in the building interior shall meet at least one of the following testing and product requirements:

- 1. Carpet and Rug Institute’s Green Label Plus Program;
- 2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CDPH Standard Method V1.1 or *Specification 01350*);
- 3. NSF/ANSI 140 at the Gold level or higher;
- 4. Scientific Certifications Systems Sustainable Choice; or
- 5. Compliant with the Collaborative for High Performance Schools California (2014 CA-CHPS) Criteria and listed in the CHPS High Performance Product Database.

**5.504.4.4.1 Carpet cushion.** All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute’s Green Label program.

**5.504.4.4.2 Carpet adhesive.** All carpet adhesive shall meet the requirements of Table 5.504.4.1.

**5.504.4.5 Composite wood products.** Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB’s Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.) Those materials not exempted under the ATCM must meet the specified emission limits, as shown in Table 5.504.4.5.

TABLE 5.504.4.5  
FORMALDEHYDE LIMITS¹  
Maximum Formaldehyde Emissions in Parts per Million

PRODUCT	CURRENT LIMIT
Hardwood plywood veneer core	0.05
Hardwood plywood composite core	0.05
Particleboard	0.09
Medium density fiberboard	0.11
Thin medium density fiberboard²	0.13

1. Values in this table are derived from those specified by the California Air Resources Board, Air Toxics Control Measure for Composite Wood as tested in accordance with ASTM E1333. For additional information, see *California Code of Regulations*, Title 17, Sections 93120 through 93120.12.  
2. Thin medium density fiberboard has a maximum thickness of 5/16 inch (8 mm).

**5.504.4.5.1 Early compliance.** Reserved.

**5.504.4.5.3 Documentation.** Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

- 1. Product certifications and specifications.

- 2. Chain of custody certifications.
- 3. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, *et seq.*).
- 4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards.
- 5. Other methods acceptable to the enforcing agency.

**5.504.4.6 Resilient flooring systems.** For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:

- 1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
- 2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health’s 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
- 3. Compliant with the Collaborative for High Performance Schools California (2014 CA-CHPS) Criteria and listed in the CHPS High Performance Product Database; or
- 4. Products certified under UL GREENGUARD Gold (formerly the Greenguard Children’s & Schools Program).

**5.504.4.6.1 Verification of compliance.** Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

**5.504.5.3 Filters.** In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air that provides at least a Minimum Efficiency Reporting Value (MERV) of 13. MERV 13 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

**Exception:** Existing mechanical equipment.

**5.504.5.3.1 Labeling.** Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.

**5.504.7 Environmental tobacco smoke (ETS) control.** Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building as already prohibited by other laws or regulations; or as enforced by ordinances, regulations or policies of any city, county, city and county, California Community College, campus of the California State University, or campus of the University of California, whichever are more stringent. When ordinances, regulations or policies are not in place, post signage to inform building occupants of the prohibitions.

## SECTION 5.505 INDOOR MOISTURE CONTROL

**5.505.1 Indoor moisture control.** Buildings shall meet or exceed the provisions of *California Building Code*, CCR, Title 24, Part 2, Sections 1202 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures, see Section 5.407.2 of this code.

## SECTION 5.506 INDOOR AIR QUALITY

**5.506.1 Outside air delivery.** For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 120.1 (Requirements For Ventilation) of the *California Energy Code*, or the applicable local code, whichever is more stringent, and Division 1, Chapter 4 of CCR, Title 8.

**5.506.2 Carbon dioxide (CO<sub>2</sub>) monitoring.** For buildings or additions equipped with demand control ventilation, CO<sub>2</sub> sensors and ventilation controls shall be specified and installed in accordance with the requirements of the *California Energy Code*, Section 120.1(c)(4).

## SECTION 5.507 ENVIRONMENTAL COMFORT

**5.507.4 Acoustical control.** Employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E90 and ASTM E413 or Outdoor-Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E1332, using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.

**Exception:** Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.

**Exception:** [DSA-SS] For public schools and community colleges, the requirements of this section and all subsections apply only to new construction.

**5.507.4.1 Exterior noise transmission, prescriptive method.** Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:

1. Within the 65 CNEL noise contour of an airport.

### Exceptions:

1.  $L_{dn}$  or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.
2.  $L_{dn}$  or CNEL for other airports and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.

2. Within the 65 CNEL or  $L_{dn}$  noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan.

**5.507.4.1.1 Noise exposure where noise contours are not readily available.** Buildings exposed to a noise level of 65 dB  $L_{eq}$ -1-hr during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

**5.507.4.2 Performance method.** For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ( $L_{eq}$ -1Hr) of 50 dBA in occupied areas during any hour of operation.

**5.507.4.2.1 Site features.** Exterior features such as sound walls or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.

**5.507.4.2.2 Documentation of compliance.** An acoustical analysis documenting complying interior sound levels shall be prepared by personnel approved by the architect or engineer of record.

**5.507.4.3 Interior sound transmission.** Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.

**Note:** Examples of assemblies and their various STC ratings may be found at the California Office of Noise Control: [http://www.toolbase.org/PDF/CaseStudies/stc\\_icc\\_ratings.pdf](http://www.toolbase.org/PDF/CaseStudies/stc_icc_ratings.pdf).

## SECTION 5.508 OUTDOOR AIR QUALITY

**5.508.1 Ozone depletion and greenhouse gas reductions.** Installations of HVAC, refrigeration and fire suppression equipment shall comply with Sections 5.508.1.1 and 5.508.1.2.

**5.508.1.1 Chlorofluorocarbons (CFCs).** Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.

**5.508.1.2 Halons.** Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.

**5.508.2 Supermarket refrigerant leak reduction.** New commercial refrigeration systems shall comply with the provisions of this section when installed in retail food stores 8,000 square feet or more conditioned area, and that utilize either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units. The leak reduction measures apply to refrigeration systems containing high-global-warming potential (high-GWP) refrigerants with a GWP of 150 or greater. New refrigeration



## NONRESIDENTIAL MANDATORY MEASURES

systems include both new facilities and the replacement of existing refrigeration systems in existing facilities.

**Exception:** Refrigeration systems containing low-global warming potential (low-GWP) refrigerant with a GWP value less than 150 are not subject to this section. Low-GWP refrigerants are nonozone-depleting refrigerants that include ammonia, carbon dioxide (CO<sub>2</sub>), and potentially other refrigerants.

**5.508.2.1 Refrigerant piping.** Piping compliant with the *California Mechanical Code* shall be installed to be accessible for leak protection and repairs. Piping runs using threaded pipe, copper tubing with an outside diameter (OD) less than 1/4 inch, flared tubing connections and short radius elbows shall not be used in refrigerant systems except as noted below.

**5.508.2.1.1 Threaded pipe.** Threaded connections are permitted at the compressor rack.

**5.508.2.1.2 Copper pipe.** Copper tubing with an OD less than 1/4 inch may be used in systems with a refrigerant charge of 5 pounds or less.

**5.508.2.1.2.1 Anchorage.** One-fourth-inch OD tubing shall be securely clamped to a rigid base to keep vibration levels below 8 mils.

**5.508.2.1.3 Flared tubing connections.** Double-flared tubing connections may be used for pressure controls, valve pilot lines and oil.

**Exception:** Single-flared tubing connections may be used with a multiring seal coated with industrial sealant suitable for use with refrigerants and tightened in accordance with manufacturer's recommendations.

**5.508.2.1.4 Elbows.** Short radius elbows are only permitted where space limitations prohibit use of long radius elbows.

**5.508.2.2 Valves.** Valves and fittings shall comply with the *California Mechanical Code* and as follows.

**5.508.2.2.1 Pressure relief valves.** For vessels containing high-GWP refrigerant, a rupture disc shall be installed between the outlet of the vessel and the inlet of the pressure relief valve.

**5.508.2.2.1.1 Pressure detection.** A pressure gauge, pressure transducer or other device shall be installed in the space between the rupture disc and the relief valve inlet to indicate a disc rupture or discharge of the relief valve.

**5.508.2.2.2 Access valves.** Only Schrader access valves with a brass or steel body are permitted for use.

**5.508.2.2.2.1 Valve caps.** For systems with a refrigerant charge of 5 pounds or more, valve caps shall be brass or steel and not plastic.

**5.508.2.2.2.2 Seal caps.** If designed for it, the cap shall have a neoprene O-ring in place.

**5.508.2.2.2.1 Chain tethers.** Chain tethers to fit over the stem are required for valves designed to have seal caps.

**Exception:** Valves with seal caps that are not removed from the valve during stem operation.

**5.508.2.3 Refrigerated service cases.** Refrigerated service cases holding food products containing vinegar and salt shall have evaporator coils of corrosion-resistant material, such as stainless steel; or be coated to prevent corrosion from these substances.

**5.508.2.3.1 Coil coating.** Consideration shall be given to the heat transfer efficiency of coil coating to maximize energy efficiency.

**5.508.2.4 Refrigerant receivers.** Refrigerant receivers with capacities greater than 200 pounds shall be fitted with a device that indicates the level of refrigerant in the receiver.

**5.508.2.5 Pressure testing.** The system shall be pressure tested during installation prior to evacuation and charging.

**5.508.2.5.1 Minimum pressure.** The system shall be charged with regulated dry nitrogen and appropriate tracer gas to bring system pressure up to 300 psig minimum.

**5.508.2.5.2 Leaks.** Check the system for leaks, repair any leaks, and retest for pressure using the same gauge.

**5.508.2.5.3 Allowable pressure change.** The system shall stand, unaltered, for 24 hours with no more than a +/- one pound pressure change from 300 psig, measured with the same gauge.

**5.508.2.6 Evacuation.** The system shall be evacuated after pressure testing and prior to charging.

**5.508.2.6.1 First vacuum.** Pull a system vacuum down to at least 1000 microns (+/- 50 microns), and hold for 30 minutes.

**5.508.2.6.2 Second vacuum.** Pull a second system vacuum to a minimum of 500 microns and hold for 30 minutes.

**5.508.2.6.3 Third vacuum.** Pull a third vacuum down to a minimum of 300 microns, and hold for 24 hours with a maximum drift of 100 microns over a 24-hour period.

## CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE CHAPTER 6 – REFERENCED ORGANIZATIONS AND STANDARDS

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC- CG	SFM	HCD			DSA		OSHDP						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X		X				X	X		X		X									
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below																						
Chapter/Section																						

### CHAPTER 6

## REFERENCED ORGANIZATIONS AND STANDARDS

### SECTION 601 GENERAL

**601.1** This chapter lists the organizations and standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard.

ORGANIZATION	STANDARD	REFERENCED SECTION
<b>AHAM</b> Association of Home Appliance Manufacturers		
1119 19th Street NW, Suite 402 Washington, D.C. 20026-3627 <a href="http://www.aham.org">http://www.aham.org</a>	ANSI/AHAM DW-1-2010	202
<b>AABC</b> Associated Air Balance Council		
1518 K St NW Washington, DC 20005 <a href="http://www.aabc.com">www.aabc.com</a>	National Standards, 1989	5.410.4.3.1 A5.410.5.3.1
<b>ACCA</b> Air Conditioning Contractors of America		
2800 Shirlington Road, Suite 300 Arlington, VA 22206 <a href="http://www.acca.org">www.acca.org</a>	ANSI/ACCA 2 Manual J–2016 ANSI/ACCA 1 Manual D–2016 ANSI/ACCA 3 Manual S–2014	4.507.2 4.507.2 4.507.2
<b>ANSI</b> American National Standards Institute		
Operations Office 25 West 43rd Street, Fourth Floor New York, NY 10036 <a href="http://www.ansi.org">www.ansi.org</a>	ANSI/AHAM DW-1-2010 NSF/ANSI 140-2014 ANSI/ACCA 2 Manual J–2016 ANSI/ACCA 1 Manual D–2016 ANSI/ACCA 3 Manual S–2014	202 4.504.3, 5.504.4.4 4.507.2 4.507.2 4.507.2
<b>ASHRAE</b> American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.		
1791 Tullie Circle, NE Atlanta, GA 30329 <a href="http://www.ashrae.org">www.ashrae.org</a>	52.1-92 52.2-2007 62.2 90.1	A5.504.1 202 A5.504.1 5.108.8

*continued*

## REFERENCED ORGANIZATIONS AND STANDARDS

<b>ASME American Society of Mechanical Engineers</b>		
Three Park Avenue New York, NY 10016-5990 www.asme.org	ASME A112.18.1 ASME A112.19 ASME A112.19.2 ASME A112.19.14	5.303.6 5.303.6 5.303.2 5.303.6
<b>ASTM ASTM International</b>		
100 Barr Harbor Drive West Conshohocken, PA 19428-2859 www.astm.org	ASTM C33 ASTM C150 ASTM C595 ASTM C618 ASTM C989 ASTM C1157 ASTM C1240 ASTM C1371-98 ASTM C1549-09(2014) ASTM C1602 ASTM C1697 ASTM E90 ASTM E408-02 ASTM E413 ASTM E1332 ASTM E1333-14 ASTM E1903-11 ASTM E1918-06(2015) ASTM E1980-11	A5.405.5.3.2 A5.405.5.1 A5.405.5.1 A5.405.5.2.1 A5.405.5.2.1 A5.405.5.1 A5.405.5.2.1 A5.106.11.2.2 A4.106.7, A5.106.11.1 A5.405.5.3.2.3 A5.405.5.2.1 5.507.4 A5.10, 6.11.2.2 5.507.4 5.507.4 Table 4.504.5, 5.504.4.5 A5.103.4 A4.106.7, A5.106.11.1 A4.106.5.3, A5.106.11.2.3
<b>CSA Canadian Standards Association</b>		
5060 Spectrum Way, Suite 100 Mississauga, Ontario, Canada L4W 5N6 www.csa.ca	CSA B125.1, CSA O121, CSA O151, CSA O153, CSA O325	4.504.5.1
<b>IAPMO International Association of Plumbing and Mechanical Officials</b>		
4755 E. Philadelphia St. Ontario, CA 91761 iapmo@iapmo.org	IAPMO Z124.9	5.303.6
<b>IESNA Illuminating Engineering Society of North America</b>		
170 Wall St., Floor 17 New York, NY 10005-4001 http://www.ies.org	IES TM-15-11	5.10 6.6 A4.106.10
<b>NEBB National Environmental Balancing Bureau</b>		
8575 Grovemont Cir Gaithersburg, MD 20877 http://nebb.org/index.php	Procedural Standards, 1983	5.410.4.3.1 A5.410.5.3.1
<b>NSF International</b>		
789 Dixboro Rd. Ann Arbor, MI 48113-0140 http://www.nsf.org/	NSF/ANSI 140-2014	4.504.3, 5.504.4.4
<b>TABB Testing, Adjusting and Balancing Bureau</b>		
601 N Fairfax St, Ste 250 Alexandria, VA 22314 http://www.tabbcertified.org/contact.html	National Standards, 2003	5.410.3.3.1 A5.410.5.3.1
<b>US EPA United States Environmental Protection Agency</b>		
Office of Wastewater Management (4204M) 1200 Pennsylvania Avenue Washington, D.C. 20460 http://www.epa.gov/watersense/	WaterSense	4.303.1

## CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE CHAPTER 7 – INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC- CG	SFM	HCD			DSA		OSHPD						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter				X																		
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below		X																				
Chapter/Section																						
702.2		X																				
703.1		X																				

### CHAPTER 7

## INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS

### SECTION 701 GENERAL (Reserved)

### SECTION 702 QUALIFICATIONS

**702.1 Installer training.** HVAC system installers shall be trained and certified in the proper installation of HVAC systems including ducts and equipment by a nationally or regionally recognized training or certification program. Uncertified persons may perform HVAC installations when under the direct supervision and responsibility of a person trained and certified to install HVAC systems or contractor licensed to install HVAC systems. Examples of acceptable HVAC training and certification programs include but are not limited to the following:

1. State certified apprenticeship programs.
2. Public utility training programs.
3. Training programs sponsored by trade, labor or state-wide energy consulting or verification organizations.
4. Programs sponsored by manufacturing organizations.
5. Other programs acceptable to the enforcing agency.

**702.2 Special inspection. [HCD]** When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed.

formed. In addition to other certifications or qualifications acceptable to the enforcing agency, the following certifications or education may be considered by the enforcing agency when evaluating the qualifications of a special inspector:

1. Certification by a national or regional green building program or standard publisher.
2. Certification by a statewide energy consulting or verification organization, such as HERS raters, building performance contractors, and home energy auditors.
3. Successful completion of a third party apprentice training program in the appropriate trade.
4. Other programs acceptable to the enforcing agency.

#### Notes:

1. Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.
2. HERS raters are special inspectors certified by the California Energy Commission (CEC) to rate homes in California according to the Home Energy Rating System (HERS).

**[BSC-CG]** When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition, the special inspector shall have a certification from a recognized state, national or international association, as determined by the local agency. The area of certification shall

## INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS

be closely related to the primary job function, as determined by the local agency.

**Note:** Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.

### SECTION 703 VERIFICATIONS

**703.1 Documentation.** Documentation used to show compliance with this code shall include but is not limited to, construction documents, plans, specifications, builder or installer certification, inspection reports, or other methods acceptable to the enforcing agency which demonstrate substantial conformance. When specific documentation or special inspection is necessary to verify compliance, that method of compliance will be specified in the appropriate section or identified in the application checklist.

## CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE CHAPTER 8 – COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHDP					BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5							
Adopt entire CA chapter		X																			
Adopt entire chapter as amended (amended sections listed below)																					
Adopt only those sections that are listed below								X													
Chapter/Section																					
IES TM-15-11 Table A-1								X													
Table 130.2-A								X													
Table 130.2-B								X													

### CHAPTER 8

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

**[BSC]** Sample forms found in “A Guide to the California Green Building Standards Code (Nonresidential)” located at <http://www.bsc.ca.gov/Home/CALGreen.aspx> may be used to assist in documenting compliance with the waste management plan and other provisions of this code.

**[HCD 1]** Sample forms located at [www.hcd.ca.gov/building-standards/cal-green-forms.shtml](http://www.hcd.ca.gov/building-standards/cal-green-forms.shtml) may be used to assist in documenting compliance with *CALGreen*.

#### WORKSHEET (WS-1) BASELINE WATER USE

BASELINE WATER USE CALCULATION TABLE									
FIXTURE TYPE	FLOW RATE		DURATION		DAILY USES		OCCUPANTS <sup>1</sup>		GALLONS PER DAY
Showerheads	2.0 gpm @ 80 psi	×	5 min.	×	1	×	Note 1a	=	
Lavatory faucets nonresidential	0.5 gpm @ 60 psi	×	.25 min.	×	3	×		=	
Kitchen faucets	1.8 gpm @ 60 psi	×	4 min.	×	1	×	Note 1b	=	
Replacement aerators	2.2 gpm	×		×		×		=	
Wash fountains	1.8 gpm/20 [rim space(in.)@ 60 psi]	×		×		×		=	
Metering faucets	0.20 gal/cycle	×		×	3	×		=	
Metering faucets for wash fountains	0.20 gal/cycle/20 [rim space(in.)@ 60 psi]	×	.25 min.	×		×		=	
Gravity tank-type water closets	1.28 gal/flush	×	1 flush	×	1 male <sup>2</sup> 3 female	×		=	
Flushometer tank water closets	1.28 gal/flush	×	1 flush	×	1 male <sup>2</sup> 3 female	×		=	
Flushometer valve water closets	1.28 gal/flush	×	1 flush	×	1 male <sup>2</sup> 3 female	×		=	
Electromechanical hydraulic water closets	1.28 gal/flush	×	1 flush	×	1 male <sup>2</sup> 3 female	×		=	
Urinals	0.5 or 0.125 <sup>3</sup> gal/flush	×	1 flush	×	2 male	×		=	
Total daily baseline water use (BWU)									=

1. For nonresidential occupancies, refer to Table A, Chapter 4, 2019 *California Plumbing Code*, for occupant load factors.

a. Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the anticipated number of users.

b. Kitchen faucet use is determined by the occupant load of the area served by the fixture.

2. The daily use number shall be increased to three if urinals are not installed in the room.

3. Floor-mounted urinals @ 0.5 GPF or wall-mounted urinals @ 0.125 GPF.



## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

**WORKSHEET (WS-2)**  
**WATER USE REDUCTION**

12-, 20- 25-PERCENT REDUCTION WATER USE CALCULATION TABLE									
FIXTURE TYPE	FLOW RATE		DURATION		DAILY USES		OCCUPANTS <sup>1</sup>		GALLONS PER DAY
Showerheads		×	5 min.	×	1	×	Note 1a	=	
Lavatory faucets nonresidential <sup>4</sup>		×	.25 min.	×	3	×		=	
Kitchen faucets		×	4 min.	×	1	×	Note 1b	=	
Replacement aerators		×		×		×		=	
Wash fountains		×		×		×		=	
Metering faucets		×	.25 min.	×	3	×		=	
Metering faucets for wash fountains		×	.25 min.	×		×		=	
Gravity tank-type water closets		×	1 flush	×	1 male <sup>3</sup> 3 female	×		=	
Flushometer tank water closets		×	1 flush	×	1 male <sup>3</sup> 3 female	×		=	
Flushometer valve water closets		×	1 flush	×	1 male <sup>3</sup> 3 female	×		=	
Electromechanical hydraulic water closets		×	1 flush	×	1 male <sup>3</sup> 3 female	×		=	
Urinals		×	1 flush	×	2 male	×		=	
Urinals Nonwater supplied	0.0 gal/flush		1 flush		2 male	×			
Proposed water use								=	
12% Reduction _____ (BWU from WS-1) × .88 = _____ Allowable water use 20% Reduction _____ (BWU from WS-1) × .80 = _____ Allowable water use 25% Reduction _____ (BWU from WS-1) × .75 = _____ Allowable water use									

- For occupancies, refer to Table A, Chapter 4, 2019 *California Plumbing Code*, for occupant load factors.
  - Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the anticipated number of users.
  - Kitchen faucet use is determined by the occupant load of the area served by the fixture.
- Includes single and dual flush water closets with an effective flush of 1.28 gallons or less.
 

Single flush toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the average flush volume when tested in accordance with ASME A112.19.2.

Dual flush toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with ASME A112.19.2 and ASME A112.19.14.
- The daily use number shall be increased to three if urinals are not installed in the room.
- Where complying faucets are unavailable, aerators rated at 35 gpm or other means may be used to achieve reduction.

## Construction Waste Management (CWM) Plan

Note: This sample form may be used to assist in documenting compliance with the waste management plan.

Project Name: \_\_\_\_\_

Job #: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Waste Hauling Company: \_\_\_\_\_

Contact Name: \_\_\_\_\_

All Subcontractors shall comply with the project's Construction Waste Management Plan.

All Subcontractor foremen shall sign the CWM Plan Acknowledgment Sheet.

Subcontractors who fail to comply with the Waste Management Plan will be subject to backcharges or withholding of payment, as deemed appropriate. For instance, Subcontractors who contaminate debris boxes that have been designated for a single material type will be subject to backcharge or withheld payment, as deemed appropriate.

1. The project's overall rate of waste diversion will be \_\_\_\_ %.
2. This project shall generate the least amount of waste possible by planning and ordering carefully, following all proper storage and handling procedures to reduce broken and damaged materials and reusing materials whenever possible. The majority of the waste that is generated on this jobsite will be diverted from the landfill and recycled for other use.
3. Spreadsheet 1, enclosed, identifies the waste materials that will be generated on this project, the diversion strategy for each waste type and the anticipated diversion rate.
4. Waste prevention and recycling activities will be discussed at the beginning of weekly subcontractor meetings. As each new subcontractor comes on-site, the WMP Coordinator will present him/her with a copy of the CWM Plan and provide a tour of the jobsite to identify materials to be salvaged and the procedures for handling jobsite debris. All Subcontractor foremen will acknowledge in writing that they have read and will abide by the CWM Plan. Subcontractor Acknowledgment Sheet enclosed. The CWM Plan will be posted at the jobsite trailer.
5. Salvage: Excess materials that cannot be used in the project, nor returned to the vendor, will be offered to site workers, the owner, or donated to charity if feasible.
6. [HAULING COMPANY] will provide a commingled drop box at the jobsite for most of the construction waste. These commingled drop boxes will be taken to [Sorting Facility Name and Location]. The average diversion rate for commingled waste will be \_\_\_\_%. As site conditions permit, additional drop boxes will be used for particular phases of construction (e.g., concrete and wood waste) to ensure the highest waste diversion rate possible.
7. In the event that the waste diversion rate achievable via the strategy described in (6) above, is projected to be lower than what is required, then a strategy of source-separated waste diversion and/or waste stream reduction will be implemented. Source separated waste refers to jobsite waste that is not commingled but is instead allocated to a debris box designated for a single material type, such as clean wood or metal.

### Notes:

1. Waste stream reduction refers to efforts taken by the builder to reduce the amount of waste generated by the project to below four (4) pounds per square foot of building area.
2. When using waste stream reduction measures, the gross weight of the product is subtracted from a base weight of four (4) pounds per square foot of building area. This reduction is considered additional diversion and can be used in the waste reduction percentage calculations.
8. [HAULING COMPANY] will track and calculate the quantity (in tons) of all waste leaving the project and calculate the waste diversion rate for the project. [HAULING COMPANY] will provide Project Manager with an updated monthly report on gross weight hauled and the waste diversion rate being achieved on the project. [HAULING COMPANY]'s monthly report will track separately the gross weights and diversion rates for commingled debris and for each source-separated waste stream leaving the project. In the event that [HAULING COMPANY] does not service any or all of the debris boxes on the project, the [HAULING COMPANY] will work with the responsible parties to track the material type and weight (in tons) in such debris boxes in order to determine waste diversion rates for these materials.
9. In the event that Subcontractors furnish their own debris boxes as part of their scope of work, such Subcontractors shall not be excluded from complying with the CWM Plan and will provide [HAULING COMPANY] weight and waste diversion data for their debris boxes.
10. In the event that site use constraints (such as limited space) restrict the number of debris boxes that can be used for collection of designated waste the project Superintendent will, as deemed appropriate, allocate specific areas onsite where individual material types are to be consolidated. These collection points are not to be contaminated with non-designated waste types.
11. Debris from jobsite office and meeting rooms will be collected by [DISPOSAL SERVICE COMPANY]. [DISPOSAL SERVICE COMPANY] will, at a minimum, recycle office paper, plastic, metal and cardboard.



## Construction Waste Management (CWM) Worksheet

Note: This sample form may be used to assist in documenting compliance with the waste management plan.

<b>Project Name:</b> _____			
<b>Job Number:</b> _____			
<b>Project Manager:</b> _____			
<b>Waste Hauling Company:</b> _____			
<b>Construction Waste Management (CWM) Plan</b>			
WASTE MATERIAL TYPE	DIVERSION METHOD:		PROJECTED DIVERSION RATE
	COMMINGLED AND SORTED OFF SITE	SOURCE SEPARATED ON SITE	
Asphalt			
Concrete			
Shotcrete			
Metals			
Wood			
Rigid insulation			
Fiberglass insulation			
Acoustic ceiling tile			
Gypsum drywall			
Carpet/carpet pad			
Plastic pipe			
Plastic buckets			
Plastic			
Hardiplank siding and boards			
Glass			
Cardboard			
Pallets			
Job office trash, paper, glass & plastic bottles, cans, plastic			
Alkaline and rechargeable batteries, toner cartridges, and electronic devices			
Other:			
Other:			
Other:			
Other:			



Note: This sample form may be used to assist in documenting compliance with the waste management plan.

**Project Name:** \_\_\_\_\_

**Job Number:** \_\_\_\_\_

**Project Manager:**\_\_\_\_\_

**Waste Hauling Company:** \_\_\_\_\_

## CWM Plan Acknowledgment

**The Foreman for each new Subcontractor that comes on site is to receive a copy of the Construction Waste Management Plan and complete this Acknowledgment Form.**

I have read the Waste Management Plan for the project; I understand the goals of this plan and agree to follow the procedures described in this plan.

[illegible]



## Title 23, Waters, California Code of Regulations

MWELO and supporting documents, including a water budget calculator, are available at: <https://www.water.ca.gov/>.



# Commissioning Referenced Standards for Non-Energy Systems

*The following CALGreen Referenced Standards are included herein as a convenience for the users of the California Green Building Standards Code, but they are not considered to be part of the code unless they are officially adopted by a local jurisdiction.*

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## Part 1

# STANDARDS FOR COMPLIANCE WITH BUILDING COMMISSIONING

**Reference:** Section 5.410.2, Commissioning.

## Introduction:

The purpose of this code is to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of concepts that reduce negative and increase positive environmental impacts. Commissioning is a vital element in this effort.

## Definitions used in the *CALGreen Cx* Reference standard:

### Acronyms

BOD	Basis of Design
Cx	Commissioning
FPT	Functional Performance Test
HVAC	Heating, Ventilating, and Air-Conditioning
O&M	Operations and Maintenance
OPR	Owner's Project Requirements

### Glossary:

**Acceptance Criteria**—The conditions that must be met for systems or equipment to meet defined and expected outcomes.

**Commissioning (Cx)**—Building commissioning as required in this code involves a quality assurance process that begins during design and continues to occupancy. Commissioning verifies that the new building operates as the owner intended and that building staff are prepared to operate and maintain its systems and equipment. Exceptions are allowed for dry storage warehouses of any size and conditioned spaces under 10,000 square feet accessory to them; and for tenant improvements under 10,000 square feet within a larger space.

**Owner**—The individual or entity holding title to the property on which the building is constructed.

**Commissioning Coordinator**—The person who coordinates the commissioning process. This can be either a third-party commissioning provider or an experienced member of the design team or owner in-house staff member.

**Commissioning Team**—The key members of each party involved with the project designated to provide insight and carry out tasks necessary for a successful commissioning project. Team members may include the commissioning coordinator, owner or owner's representative, building staff, design professionals, contractors or manufacturer's representatives, and testing specialists.

**Independent Third-Party Commissioning Professional**—A commissioning consultant contracted directly by the owner who is not responsible to, or affiliated with, any other member of the design and construction team.

**Operation and Maintenance (O&M) Manuals**—Documents that provide information necessary for operating and maintaining installed equipment and systems.

**Owner Representative**—An individual or entity assigned by the owner to act and sign on the owner's behalf.

**Process Equipment**—Energy-using equipment and components that are not used for HVAC, electrical, plumbing, and irrigation operations. Such devices would include but are not limited to heat transfer, water purifying, air cleaning, air vacuum, and air compressing.

**Sequence of Operation**—A written description of the intended performance and operation of each control element and feature of the equipment and systems.

### Selecting Trained Personnel (for Commissioning)

This code requires that "Commissioning shall be performed in accordance with this section by trained personnel with experience on projects of comparable size and complexity." The trained personnel manage and facilitate the commissioning process. The trained personnel develop and implement the commissioning tasks and documentation identified in Sections 5.410.2.1 through 5.410.2.6. Trained personnel may include appropriate members of owner staff, contractor, and design team as well as independent commissioning professionals.

It is essential that there is a single person designated to lead and manage the commissioning activities. In practice, this individual has been referenced by various identifiers such as commissioning authority, agent, provider, coordinator, lead, etc. In this guide the term “commissioning coordinator” is used.

The designated commissioning coordinator may be an independent, third-party commissioning professional, a project design team member (e.g., engineer or architect), an owner’s engineer or facility staff, contractor or specialty subcontractor. Methods of evaluating the designated commissioning coordinator and trained personnel include review of the following:

1. Technical knowledge;
2. Relevant experience;
3. Potential conflict of interest concerns;
4. Professional certifications and training;
5. Communication and organizational skills; and
6. Reference and sample work products.

Selection of “trained,” qualified personnel is required by this code. In order to meet this requirement, the commissioning provider should be evaluated via the methods discussed above. In addition, various organizations have training and certification programs that may be a source for identification of qualified commissioning providers.

*For information about enforcement and compliance of each commissioning element see Sections 5.410.2.1 through 5.410.2.6. For compliance forms and templates see Part 2 following this standard.*

## **Reference: 1 Owner’s Project Requirements**

### **CALGreen Section 5.410.2.1, Owner’s or Owner representative’s Project Requirements (OPR).**

#### **1.1 Intent:**

The Owner’s Project Requirements (OPR) documents the functional requirements of a project and expectations of the building use and operation as it relates to systems being commissioned. The document describes the physical and functional building characteristics desired by the owner and establishes performance and acceptance criteria. The OPR is most effective when developed during predesign and used to develop the Basis of Design (BOD) during the design process. The level of detail and complexity of the OPR will vary according to building use, type, and systems.

#### **1.2 Compliance Method:**

Compliance is demonstrated by the owner or owner’s representative developing and/or approving the Owner’s Project Requirements (OPR) document and can be defined as follows:

1. Environmental and Sustainability Goals—Establish environmental project goals and objectives exceeding the code for the project’s sustainability, which may include:
  - a. CALGreen voluntary measures or Tiers sought, or other specific green building rating system or program credits and/or level of certification sought
  - b. Specific environmental or sustainability goals such as water efficiency, water reuse, CO<sub>2</sub> monitoring, xeriscaping, etc.
2. Building Sustainable Goals—Establish goals and targets affecting energy efficiency, which may include:
  - a. Measures affecting building sustainability desired by owner
    - i. Building orientation and siting
    - ii. Daylighting
    - iii. Facade, envelope, and fenestration
    - iv. Roof
    - v. Natural ventilation
    - vi. Onsite renewable power generation and net-zero energy use
    - vii. Landscaping and shading
3. Indoor Environmental Quality Requirements—For each program space describe indoor environmental requirements including intended use and anticipated schedule, and the following:
  - a. Temperature and humidity
  - b. Acoustics
  - c. Air quality, ventilation, and filtration

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

- d. Desired adjustability of system controls
  - e. Accommodations for after-hours use
  - f. Other owner requirements including natural ventilation, operable windows, daylight, views, etc.
4. Project Program, including facility functions and hours of operation, and need for after-hours operation—Describe primary purpose, program, and use of proposed project include the following:
- a. Building size, number of stories, construction type, occupancy type and number
  - b. Building program areas including intended use and anticipated occupancy schedules
  - c. Future expandability and flexibility of spaces
  - d. Quality and/or durability of materials and building lifespan desired
  - e. Budget or operational constraints
  - f. Applicable codes
5. Equipment and Systems Expectations—Describe the following for each system commissioned:
- a. Level of quality, reliability, equipment type, automation, flexibility, maintenance, and complexity desired
  - b. Specific efficiency targets, desired technologies, or preferred manufacturers for building systems, acoustics and vibration
  - c. Degree of system integration, automation, and functionality for controls
6. Building Occupant and O&M Personnel Expectations—Describe the following:
- a. How building will be operated and by whom
  - b. Level of training and orientation required to understand, operate, and use the building systems for building operation and maintenance staff, as well as occupants
  - c. Building operation and maintenance staff location and capabilities

### 1.3 Enforcement:

At their discretion, the inspector confirms demonstrated compliance at Plan Intake by:

- a) Receipt of a copy of the OPR document, or
- b) Receipt of a form signed by the owner or owner representative attesting that the OPR has been completed and approved by the owner.

### Reference: 2 Basis of Design (BOD)

**CALGreen Section 5.410.2.2, Basis of Design (BOD).**

#### 2.1 Intent:

The Basis of Design (BOD) describes the building systems to be commissioned and outlines design assumptions not indicated in the design documents. The design team develops the BOD to describe how the building systems' design meets the Owner's Project Requirements (OPR), and why the systems were selected. The BOD is most effective when developed early in the project design and updated as necessary throughout the design process.

#### 2.2 Compliance Method:

Compliance requires the completion of the BOD document and should include the following where applicable:

- 1. Renewable Energy Systems
  - a. Provide narrative description of system—type, performance, control type, energy savings, payback period
  - b. Describe reason for system selection—why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference
  - c. Sequence of Operation—operating schedules, setpoints, storage capacity
  - d. Describe how system meets the OPR
- 2. Landscape Irrigation Systems
  - a. Provide narrative description of system—type, performance, water usage
  - b. Describe reason for system selection—why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, expandability, cost, owner preference, simplicity

- c. Sequence of Operation—operating schedules, setpoints
  - d. Describe how system meets the OPR
3. Water Reuse Systems
- a. Provide narrative description of system—type, performance, capacity, reuse purpose
  - b. Describe reason for system selection—why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, expandability, cost, owner preference, simplicity
  - c. Sequence of Operation—operating schedules, setpoints
  - d. Describe how system meets the OPR

### 2.3 Enforcement:

At their discretion, the building official confirms demonstrated compliance at Plan Intake by:

- a) Receipt of a copy of the BOD document, or
- b) Receipt of a form signed by the architect, engineer or designer of record, attesting that the BOD has been completed and meets the requirements of the OPR.

### Reference: 3 Commissioning measures shown in the construction documents

#### *CALGreen Section 5.410.2, Commissioning.*

This section provides details for element 3: Commissioning measures shown in the construction documents.

### 3.1 Intent:

Include commissioning measures or requirements in the construction documents (plans and specifications). Commissioning measures or requirements should be clear, detailed, and complete to clarify the commissioning process.

### 3.2 Compliance Method:

Compliance is achieved by including commissioning requirements in the project specifications. The commissioning specifications should include the following:

1. Primary (and optionally all) commissioning requirements are included in the general specification division (typically Division 1) and clear cross references of all commissioning requirements to and from the general division are included to ensure all subcontractors are held to them.
2. A list of the systems and assemblies covered by the commissioning requirements.
3. Roles and responsibilities of all parties, including:
  - i. General contractor and subcontractors, vendors, construction manager
  - ii. Commissioning provider lead
  - iii. Owner, facility staff
  - iv. Architect and design engineers
  - v. Include the noncontractor parties in the construction specifications (information used only to provide the contractor with context for their work).
  - vi. Include who writes checklists and tests, who reviews and approves test forms, who directs tests, who executes tests, who documents test results, and who approves completed tests. These roles may vary by system or assembly.
4. Meeting requirements
5. Commissioning schedule management procedures
6. Issue and noncompliance management procedures
7. Requirements for execution and documentation of installation, checkout, and start up, including controls point-to-point checks and calibrations
8. Specific testing requirements by system, including:
  - i. Monitoring and trending
  - ii. Opposite season or deferred testing requirements, functions, and modes to be tested
  - iii. Conditions of test
  - iv. Acceptance criteria, and any allowed sampling
  - v. Include details of the format and rigor of the test forms required to document test execution
  - vi. Include example forms is recommended



## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

9. Submittal review requirements and approval process.
10. Content, authority, and approval process of the commissioning plan.
11. Commissioning documentation and reporting requirements.
12. Facility staff training requirements and verification procedures.
13. O&M manual review and approval procedures.
14. System's manual development and approval requirements and procedures.
15. Definitions section.

### 3.3 Enforcement:

At their discretion, the inspector confirms demonstrated compliance at Plan Intake by:

- a) Receipt of a copy of the commissioning specifications, or
- b) Receipt of a form signed by the owner or owner's representative or designer of record attesting that the owner-approved commissioning specifications are included in the construction documents.

### Reference: 4 Commissioning plan

**CALGreen Section 5.410.2.3, Commissioning plan.**

#### 4.1 Intent:

The Commissioning Plan (Cx Plan) establishes the commissioning process guideline for the project and commissioning team's level of effort by identifying the required Cx activities to ensure that the Owner's Project Requirements (OPR) and the Basis of Design (BOD) are met. The Cx Plan also includes a commissioning schedule from design to occupancy.

#### 4.2 Compliance Method:

Compliance is demonstrated by preparation of a project-specific Cx Plan that includes the elements listed in the code section above. The following gives guidance for developing the components of the commissioning plan:

1. General project information - Provide project-identifying information including but not limited to the following:
  - i. Project name, owner, location.
  - ii. Building type, building area.
  - iii. Project schedule.
  - iv. Contact information of individual/company providing the commissioning services.
2. Commissioning goals – Document the commissioning goals, including but not limited to:
  - i. Meeting *CALGreen* code requirements for commissioning.
  - ii. Meeting OPR and BOD requirements.
  - iii. Carrying out requirements for commissioning activities as specified in plans and specifications.
3. Systems to be commissioned – See BOD
  - a. An explanation of the original design intent - Document the performance objectives and design intent for each system listed to be commissioned in a written narrative
    - Refer to the OPR and BOD documents
  - b. Equipment and systems to be tested, including the extent of tests
    - i. Provide a list of equipment and systems to be tested
    - ii. Describe the range and extent of tests to be performed for each system component, and interface between systems
  - c. Functions to be tested - Provide example functional test procedures to identify the level of testing detail required
    - See (Section 5.410.2.4) FPT guidance for more information
  - d. Conditions under which the test shall be performed - Identify the conditions under which the major operational system functions are to be tested, including:
    - i. Normal operations and part-load operations.
    - ii. Seasonal testing requirements.
    - iii. Restart of equipment and systems after power loss.

- iv. System alarm confirmations.
- e. Measurable criteria for acceptable performance - Include measurable criteria for acceptable performance of each system to be tested
- 4. Commissioning team information - Provide a contact list for all commissioning team members, including but not limited to:
  - i. Owner, owner's representative.
  - ii. Architect, engineers.
  - iii. Designated commissioning representative.
  - iv. General contractor, subcontractors, and construction manager.
- 5. Commissioning process activities, schedules and responsibilities
  - i. Establish prescribed commissioning process steps and activities to be accomplished by the Cx team throughout the design to occupancy.
  - ii. For each phase of the work, define the roles and responsibilities for each member of the Cx team.
  - iii. List the required Cx deliverables, reports, forms and verifications expected at each stage of the commissioning effort.
  - iv. Include the confirmation process for the O&M manual, systems manual, and the facility operator and maintenance staff training.

#### 4.3 Enforcement:

At their discretion, the inspector confirms demonstrated compliance at Plan Intake by:

- a) Receipt of a copy of the commissioning plan, or
- b) Receipt of a form signed by the owner or owner's representative attesting that the Cx Plan has been completed.

#### Reference: 5 Functional performance testing

**CALGreen Section 5.410.2.4, Functional performance testing.**

##### 5.1 Intent:

Develop and implement the functional performance tests to document, as set forth in the commissioning plan, that all components, equipment, systems and system-to-system interfaces were installed as specified, and operate according to the Owner's Project Requirements, Basis of Design, and plans and specifications.

The following systems to be functionally tested are listed in the Basis of Design (Section 5.410.2.2 of the code):

- 1. Renewable energy systems
- 2. Landscape irrigation systems
- 3. Water reuse systems

##### 5.2 Compliance Method:

Compliance is demonstrated by developing and implementing test procedures for each piece of commissioned equipment and interfaces between equipment and systems according to the building-specific commissioning plan. Tests should include verification of proper operation of all equipment features, each part of the sequence of operation, overrides, lockouts, safeties, alarms, occupied and unoccupied modes, loss of normal power, exercising a shutdown, startup, low load through full load (as much as is possible) and back, staging and standby functions, scheduling, energy efficiency strategies and loop tuning.

##### Elements of acceptable test procedures include:

- 1. Date and party—Identification of the date of the test and the party conducting the test.
- 2. Signature block—Signature of the designated commissioning lead and the equipment installing contractor attesting that the recorded test results are accurate.
- 3. Prerequisites—Any conditions or related equipment checkout or testing that needs to be completed before conducting this test.
- 4. Precautions—Identification of the risks involved to the test team members and the equipment and how to mitigate them.
- 5. Instrumentation—Listing of the instrumentation and tools necessary to complete the test.
- 6. Reference—In each procedure item, identify the source for what is being confirmed (e.g., sequence of operation ID, operating feature, specification requirement, etc.).
- 7. Test instructions—Step-by-step instructions of how to complete the test, including functions to test and the conditions under which the tests should be performed.

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8. Acceptance criteria—Measurable pass / fail criteria for each step of the test, as applicable.
9. Results—Expected system response and space to document the actual response, readings, results and adjustments.
10. Return to normal—Instructions that all systems and equipment are to be returned to their as-found state at the conclusion of the tests.
11. Deficiencies—A list of deficiencies and how they were mitigated.

### 5.3 Enforcement:

At their discretion, the inspector confirms demonstrated compliance during onsite enforcement by:

- a) Receipt of a copy of completed and signed functional performance tests and corrected deficiencies, or
- b) Receipt of a form signed by the owner, owner's representative or commissioning coordinator attesting that the functional performance tests have been completed and any deficiencies corrected.

### Reference: 6.1 Documentation and training

**CALGreen Section 5.410.2.5, Documentation and training.**

**Section 5.410.2.5.1, Systems manual.**

#### 6.1.1 Intent:

The Systems Manual documents information focusing on the operation of the building systems. This document provides information needed to understand, operate, and maintain the equipment and systems and informs those not involved in the design and construction of the building systems. This document is in addition to the record construction drawings, documents, and the Operation & Maintenance (O&M) manuals supplied by the contractor. The Systems Manual is assembled during the construction phase and available during the contractors' training of the facility staff.

#### A6.1.6.1.2 Compliance Method:

Compliance is demonstrated by providing the Systems Manual. The information in the Systems Manual includes the following:

1. Site information, including facility description, history and current requirements
  - a. Site information
    - i. Location of property - address
    - ii. Site acreage
    - iii. Local utility information
      - Water service provider
      - Natural/LPG gas service provider
      - Electrical service provider
      - Telecommunications service provider
      - Other service providers
  - b. Facility description
    - i. Use/function
    - ii. Square footage
    - iii. Occupancy type
    - iv. Construction type
    - v. Basis of Design
    - vi. Location of major systems and equipment
  - c. Project history
    - i. Project requirements
      - Owner's Project Requirements (OPR)
      - Basis of Design (BOD)
    - ii. Project undocumented events
    - iii. Record drawings and documents
    - iv. Final control drawings and schematics
    - v. Final control sequences

- vi. Construction documents - location or delivery information
  - Mechanical and electrical drawings
  - Specifications
  - Submittals
  - Project change orders and information
- d. Current requirements
  - i. Building operating schedules
  - ii. Space temperature, humidity, and pressure, CO<sub>2</sub> setpoints
  - iii. Summer and winter setback schedules
  - iv. Chilled and hot water temperatures
  - v. As-built control setpoints and parameters
- 2. Site contact information
  - a. Owner information
  - b. Emergency contacts
  - c. Design team: architect, mechanical engineer, electrical engineer, etc.
  - d. Prime contractor contact information
  - e. Subcontractor information
  - f. Equipment supplier contact information
- 3. Basic operation and maintenance, including general site operating procedures, basic trouble shooting, recommended maintenance requirements site events log
  - a. Basic operation
    - i. Written narratives of basic equipment operation
    - ii. Interfaces, interlocks and interaction with other equipment and systems
    - iii. Initial maintenance provided by contractor
  - b. General site operating procedures
    - i. Instructions for changes in major system operating schedules
    - ii. Instructions for changes in major system holiday and weekend schedules
  - c. Basic troubleshooting
    - i. Cite any recommended troubleshooting procedures specific to the major systems and equipment installed in the building.
    - ii. Manual operation procedures
    - iii. Standby/backup operation procedures
    - iv. Bypass operation procedures
    - v. Major system power fail resets and restarts
    - vi. Trend log listing
  - d. Recommended maintenance events log
  - e. Operation & Maintenance manuals - location or delivery information
- 4. Major systems
  - a. Renewable energy systems
    - i. Photovoltaic panels and inverters
    - ii. Wind-powered electrical generators and inverters
  - b. Landscape irrigation systems
    - i. Water distribution diagrams
    - ii. Control system
  - c. Water reuse systems
    - i. Reclaimed water system for indoor use
    - ii. Reclaimed water for irrigation use

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5. Site equipment inventory and maintenance notes
  - a. Spare parts inventory
  - b. Frequently required parts and supplies
  - c. Special equipment required to operate or maintain systems
  - d. Special tools required to operate or maintain systems
6. A copy of all special inspection verifications required by the enforcing agency of this code
7. Other resources and documentation

### 6.1.3 Enforcement:

At their discretion, the inspector confirms demonstrated compliance during on-site enforcement by:

- a. Receipt of a copy of the Systems Manual, or
- b. Receipt of a form signed by the owner or owner's representative attesting that the systems manual has been completed.

### Reference: 6.2 Documentation and training

**CALGreen Section 5.410.2.5, Documentation and training.**

**Section 5.410.2.5.2, Systems operations training.**

### 6.2.1 Intent:

The systems operation training verifies that a training program is developed to provide training to the appropriate maintenance staff for each equipment type and/or system and that this training program is documented in the commissioning report. The systems operations training program is specified in the project specifications for the major systems listed. The systems manual, Operation and Maintenance (O&M) documentation, and record drawings are prepared and available to the maintenance staff prior to implementation of any training or the development of a written training program. The training program is to be administered when the appropriate maintenance staff is made available to receive training.

### A6.1.6.2.2 Compliance Method:

The written training program includes: (a) learning goals and objectives for each session, (b) training agenda, topics, and length of instruction for each session, (c) instructor information and qualifications, (d) location of training sessions (on-site, off-site, manufacturer's or vendor's facility), (e) attendance forms, (f) training materials, and (g) description on how the training will be archived for future use.

1. Systems/equipment overview
  - a. Review OPR and BOD related to the major systems and equipment
  - b. Describe system type and configuration
  - c. Explain operation of all major systems and equipment and how it interfaces with other systems and equipment
  - d. Describe operation of critical devices, controls, and accessories
  - e. Review location of the major systems and equipment
  - f. Describe operation of control system for each system, location of critical control elements, and procedures to properly operate control system
  - g. Review recommendations for implementation to reduce energy and water use
2. Review and demonstration of servicing/preventive maintenance
  - a. Explain location or delivery contact of the Operation & Maintenance manuals
  - b. Review of all manufacturer's recommended maintenance activities to maintain warranty
  - c. Review and demonstrate frequent maintenance activities and suggested schedule
  - d. Review and demonstrate typical servicing procedures and techniques (electrical current, pressure, and flow readings, etc; calibration procedures, point trending, power fail restart procedures, etc.)
  - e. Locate, observe, and identify major equipment, systems, accessories, and controls
  - f. Review emergency shut-offs and procedures
3. Review the information in the systems manual
  - a. Describe use of systems manual
  - b. Review elements of systems manual
  - c. Explain how to update and add revisions to systems manual

4. Review record drawings on the systems/equipment
  - a. Explain location or delivery contact of the record drawings
  - b. Review record drawings, revisions, and changes to original design drawings.
  - c. Review equipment schedules and compare with actual installed systems

### 6.2.3 Enforcement:

At their discretion, the inspector confirms demonstrated compliance during on-site enforcement by:

1. In the event appropriate maintenance staff is made available to receive training for each equipment type and/or system installed in the building.
  - a. Receipt of a copy of the written training program and completed attendance forms, or
  - b. Receipt of a form signed by the owner or owner's representative attesting that the training program and delivery of training has been completed.
2. In the event appropriate maintenance staff are unavailable to receive training for each equipment type and/or system installed in the building.
  - a. Receipt of a copy of the training program provided to the owner or owner's representative, or
  - b. Receipt of a form signed by the owner or owner's representative attesting that the written training program has been provided.

### Reference: 7 Commissioning report

*CALGreen Section 5.410.2.6, Commissioning report.*

### 7.1 Intent:

The commissioning report documents the commissioning process and test results. The report includes confirmation from the commissioning agent verifying that commissioned systems meet the conditions of the Owner's Project Requirements (OPR), Basis of Design (BOD), and contract documents.

### 7.2 Compliance Method:

The components of the commissioning report include the following and are defined as follows:

1. Executive summary of process and results of commissioning program, including observations, conclusions, and any outstanding items.
2. History of any system deficiencies and how resolved
  - a. Include outstanding deficiencies and plans for resolution
  - b. Include plans for seasonal testing scheduled for a later date
3. System performance test results and evaluations
4. Summary of training process completed and scheduled
5. Attach commissioning process documents
  - a. Commissioning plan
  - b. Owner's Project Requirements (OPR)
  - c. Basis of Design (BOD)
  - d. Executed installation checklists
  - e. Executed Functional Performance Test (FPT) forms
  - f. Recommendations for end-of-warranty review activities

### 7.3 Enforcement:

At their discretion, the inspector confirms demonstrated compliance during on-site enforcement by:

- a) Receipt of a copy of the commissioning report, or
- b) Receipt of a form signed by the owner or owner's representative attesting that the Cx Report has been completed.



## Part 2

**SAMPLE FORMS and TEMPLATES for COMMISSIONING**

**Note:** Following are examples of templates and/or forms that may be used or adopted for verification compliance with commissioning. Code users may provide their own documents as permitted by the enforcing agency. For each subsection of commissioning, samples are provided; in a few cases with narrative templates, and in most cases with compliance forms. Simplified forms or more detailed forms, but not both, may be selected to submit for each project.

**CALGreen COMPLIANCE FORM  
OWNER'S PROJECT REQUIREMENTS (OPR)**

The following form may be required to be printed on the permit set of construction drawings or submitted separately. Italicized text indicates direct or partial quotes from the *CALGreen Code*.

*CALGreen* Commissioning Requirement 5.410.2.1, Owner's Project Requirements (OPR)

**5.410.2.1 Owner's or Owner representative's Project Requirements (OPR).** *[N] The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. This documentation shall include the following:*

1. *Environmental and sustainability goals.*
2. *Building sustainable goals.*
3. *Indoor environmental quality requirements.*
4. *Project program, including facility functions and hours of operation, and need for after hours operation.*
5. *Equipment and systems expectations.*
6. *Building occupant and operation and maintenance (O&M) personnel expectations.*

	OPR ELEMENTS	INCLUDED
1.	Environmental and sustainability goals.	<input type="checkbox"/>
2.	Building sustainable goals.	<input type="checkbox"/>
3.	Indoor environmental quality requirements.	<input type="checkbox"/>
4.	Project program, including facility functions and hours of operation, and need for after-hours operation.	<input type="checkbox"/>
5.	Equipment and systems expectations.	<input type="checkbox"/>
6.	Building occupant and O&M personnel expectations.	<input type="checkbox"/>

Owner/Owner's Representative Signature

Date

**OWNER'S PROJECT REQUIREMENTS (OPR)  
COMPLIANCE CHECKLIST**

**INCORPORATE THIS FORM IN THE PLANS**

Project Address: \_\_\_\_\_

Permit Number: \_\_\_\_\_

ITEM #	OPR ITEMS	PAGE NUMBER IN OPR DOCUMENT
	<b>OWNER AND USER REQUIREMENTS—PROJECT PROGRAM</b>	
1	General building information (size, stories, construction type, occupancy type, and number)	
2	Intended uses and schedules	
3	Future expandability and flexibility of spaces	
4	Quality and/or durability of materials and desired building lifespan	
5	Budget or operation constraints	
	<b>ENVIRONMENTAL AND SUSTAINABILITY GOALS</b>	
6	Level of compliance with the <i>California Green Building Standards Code</i> : Mandatory, Tier 1, or Tier 2	
7	Specific environmental or sustainability goals (e.g., water efficiency, water reuse, CO <sub>2</sub> monitoring, xeriscaping, etc.)	
	<b>BUILDING SUSTAINABLE GOALS</b>	
8	Measures affecting energy efficiency desired by owner (e.g., building orientation, shading, daylighting, natural ventilation, renewable power, etc.)	
	<b>INDOOR ENVIRONMENTAL QUALITY REQUIREMENTS</b>	
9	Lighting	
10	Temperature and humidity	
11	Acoustics	
12	Air quality, ventilation, and filtration	
13	Desired adjustability of system controls	
14	Accommodations for after-hours use	
15	Other owner requirements (e.g., natural ventilation, daylight, views, etc.)	

*continued*

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

ITEM #	OPR ITEMS	PAGE NUMBER IN OPR DOCUMENT
	<b>EQUIPMENT AND SYSTEMS EXPECTATIONS</b>	
16	Level of quality, reliability, equipment type, flexibility, maintenance, and complexity desired	
17	Specific efficiency targets, desired technologies, or preferred manufacturers for building systems, acoustics, and vibration	
18	Degree of system integration, automation, and functionality for controls (i.e., load shedding, demand response, energy management)	
	<b>BUILDING OCCUPANT AND O&amp;M PERSONNEL EXPECTATIONS</b>	
19	Description of how the building will be operated and by whom	
20	Level of training and orientation required to understand, operate, and use the building systems for building operation and maintenance staff, as well as occupants	
21	Building operation and maintenance staff location and capabilities	
	<b>COMMISSIONING AGENT INFORMATION</b>	
22	Name of commissioning agency:	
23	Address of agency:	
24	Contact person(s) name(s):	

**Owner/Owner's Representative Acknowledgement**

Owner's Project Requirements (OPR). The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. The OPR includes the elements listed above and they have been approved by the Owner or Owner's Representative.

Name: \_\_\_\_\_ ☐ Owner ☐ Owner's Representative

Company Name (if applicable): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## BASIS OF DESIGN (BOD) COMPLIANCE TEMPLATE

*Documentation of the Basis of Design (BOD) is a step required for compliance with CALGreen Code, Section 5.410.2.2, for newly constructed buildings greater than 10,000 square feet. This template is a guide for use by the design team.*

### 1. Renewable Energy Systems

#### 1.1. Narrative Description of System

- A. [System type(s), location, inverter type, control type, performance, efficiency, energy savings, payback period]
- B. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

#### 1.2. Reasons for System Selection

[Reasons that the selected renewable energy systems are a better choice than alternatives (e.g., performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference, space constraints, cost, owner preferences, ease of maintenance, etc.)]

#### 1.3. Renewable Energy System Generation Calculations

[Describe sizing calculation method, assumptions, and results]

### 2. Landscape Irrigation Systems

#### 2.1. Narrative Description of System

- A. [System type(s), location, control type, performance, efficiency, water savings]
- B. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

#### 2.2. Reasons for System Selection

[Reasons that the selected landscape irrigation systems are a better choice than alternatives (e.g., performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference, cost, owner preferences, ease of maintenance, etc.)]

#### 2.3. Landscape Irrigation System Calculations

[Describe sizing calculation method, assumptions, and results]

### 3. Water Reuse Systems

#### 3.1. Narrative Description of System

- A. [System type(s), location, space requirements, equipment requirements, control type, performance, efficiency, potable water savings, payback period]
- B. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

#### 3.2. Reasons for System Selection

[Reasons that the selected water reuse systems are a better choice than alternatives (e.g., performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference, space constraints, cost, owner preferences, ease of maintenance, etc.)]

#### 3.3. Water Reuse System Calculations

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

**BASIS OF DESIGN (BOD)  
COMPLIANCE CHECKLIST**

[Describe sizing calculation method, assumptions, and results]

**INCORPORATE THIS FORM IN THE PLANS**

Project Address: \_\_\_\_\_

Permit Number: \_\_\_\_\_

ITEM #	BOD ITEMS	PAGE NUMBER IN BOD DOCUMENT
	<b>RENEWABLE ENERGY SYSTEMS (IF ANY)</b>	
1	Narrative description of system (i.e., system type(s), location, inverter type, control type, performance, efficiency, energy savings, payback period, other)	
2	Description of how the system meets requirements listed in OPR	
3	Reasons for system selection, as opposed to alternatives (e.g., performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, etc.)	
4	Renewable energy system generation calculations: sizing calculation method, assumptions, and results	
	<b>LANDSCAPE IRRIGATION SYSTEMS</b>	
5	Narrative description of system (i.e. system type(s), location, control type, performance, efficiency, water savings, other)	
6	Description of how the system meets requirements in OPR	
7	Reasons for system selection, as opposed to alternatives (e.g., performance, efficiency, reliability, flexibility, cost, utility company incentives, etc.)	
8	Landscape irrigation system calculations: sizing calculation method, assumptions, and results	
	<b>WATER REUSE SYSTEM (IF ANY)</b>	
11	Narrative description of system (i.e., system type(s), location, space requirements, equipment requirements, control type, performance, efficiency, potable water savings, payback period, other)	
12	Description of how the system meets requirements in OPR	
13	Reasons for system selection, as opposed to alternatives (e.g., performance, efficiency, reliability, flexibility, simplicity, cost, payback period, etc.)	
14	Water reuse system calculations: sizing calculation method, assumptions, and results	

**Architect/Engineer/Designer Acknowledgement**

I hereby acknowledge the Basis of Design (BOD) document has been completed and meets the Owner's Project Requirements (OPR).

	Name	License Number	Signature	Date
Architect of Record				
Landscape Architect				
Renewable Energy System Designer				
Other (specify):				

**Commissioning Agent Acknowledgment**

I have reviewed the Basis of Design (BOD) and verified that it meets the Owner's Project Requirements (OPR):

Name: \_\_\_\_\_

Company Name (if applicable): \_\_\_\_\_

Agent's Signature: \_\_\_\_\_ Date: \_\_\_\_\_



## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

**Cx MEASURES IN CONSTRUCTION DOCUMENTS  
COMPLIANCE FORM**

The following form may be required to be printed on the permit set of construction drawings or submitted separately.

*CALGreen* Commissioning Requirement 5.410.2, Commissioning Measures in the Construction Documents

**5.410.2.** *Commissioning measures shall be shown in the construction documents.*

The commissioning measures shown in the construction documents include the checked elements listed below and have been approved by the owner, owner's representative or designer of record.

	COMMISSIONING MEASURE ELEMENTS <sup>1</sup>	INCLUDED
1.	Measures shown in the specifications and cross referenced	<input type="checkbox"/>
2.	List of commissioned equipment and systems	<input type="checkbox"/>
3.	Cx roles and responsibilities of all parties	<input type="checkbox"/>
4.	Meeting requirements	<input type="checkbox"/>
5.	Commissioning schedule management procedures	<input type="checkbox"/>
6.	Procedures for addressing outstanding issues or noncompliance	<input type="checkbox"/>
7.	Requirements for execution and documentation of installation and equipment start-up	<input type="checkbox"/>
8.	Specific testing requirements for each system type <sup>1</sup>	<input type="checkbox"/>
9.	Submittal review and approval requirements	<input type="checkbox"/>
10.	Contents and approval process of the commissioning plan	<input type="checkbox"/>
11.	Cx documentation and reporting requirements	<input type="checkbox"/>
12.	Facility staff training requirements and verification procedures	<input type="checkbox"/>
13.	O&M manual review and approval procedures	<input type="checkbox"/>
14.	Systems manual development and approval procedures	<input type="checkbox"/>
15.	Definitions	<input type="checkbox"/>

<sup>1</sup> These are not the detailed step-by-step test procedures but are lists of features, elements, modes, and conditions of tests for specific equipment.

\_\_\_\_\_  
Owner / Owner's Representative  
or Designer of Record Signature

\_\_\_\_\_  
Date

**Cx MEASURES IN CONSTRUCTION DOCUMENTS****INCORPORATE THIS FORM IN THE PLANS**

Project Address: \_\_\_\_\_

Permit Number: \_\_\_\_\_

ITEM #	COMMISSIONING MEASURES ITEMS
1	Measures shown in the specifications and cross referenced
2	List of commissioned equipment and systems
3	Cx roles and responsibilities of all parties
4	Meeting requirements
5	Commissioning schedule management procedures
6	Procedures for addressing outstanding issues or noncompliance
7	Requirements for execution and documentation of installation and equipment start-up
8	Specific testing requirements for each system type
9	Submittal review and approval requirements
10	Contents and approval process of the commissioning plan
11	Cx documentation and reporting requirements
12	Facility staff training requirements and verification procedures
13	O&M manual review and approval procedures
14	Systems manual development and approval procedures
15	Definitions

**Commissioning Agent Acknowledgment**

I have reviewed the construction documents listed above and verified their compliance with the Owner's Project Requirements (OPR), Basis of Design (BOD), and commissioning plan.

Name: \_\_\_\_\_

Company Name (if applicable): \_\_\_\_\_

Agent's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

<b>COMMISSIONING PLAN COMPLIANCE FORM</b>
---

The following form may be required to be printed on the permit set of construction drawings or submitted separately.

*CALGreen* Commissioning Requirement 5.410.2.3, Commissioning Plan

**5.410.2.3 Commissioning plan.** [N] Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned. The commissioning plan shall include the following:

(See Cx plan elements checklist below.)

The commissioning plan should be started during the design phase of the building project. Include the checked elements listed below and approved by the owner or owner's representative.

	COMMISSIONING PLAN ELEMENTS <sup>1</sup>	INCLUDED
1.	General project information	<input type="checkbox"/>
2.	Commissioning goals	<input type="checkbox"/>
3.	Systems to be commissioned—see BOD	
3a.	An explanation of original design intent	<input type="checkbox"/>
3b.	Equipment and systems to be commissioned and tested, including extent of tests	<input type="checkbox"/>
3c.	Functions to be tested and conditions of tests <sup>1</sup>	<input type="checkbox"/>
3d.	Conditions under which the test shall be performed	
3e.	Measurable criteria for acceptable performance	<input type="checkbox"/>
4.	Cx team information	<input type="checkbox"/>
5.	Cx process activities, schedules, and responsibilities	<input type="checkbox"/>

1. These are not the detailed step-by-step test procedures but are lists of features, elements, modes, and conditions of tests for specific equipment.

\_\_\_\_\_  
Owner / Owner's Representative Signature

\_\_\_\_\_  
Date

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

**COMMISSIONING PLAN  
COMPLIANCE CHECKLIST**

**INCORPORATE THIS FORM IN THE PLANS**

Project Address: \_\_\_\_\_

Permit Number: \_\_\_\_\_

ITEM #	COMMISSIONING PLAN ITEMS <sup>1</sup>	PAGE NUMBER IN COMMISSIONING PLAN DOCUMENT
	<b>GENERAL PROJECT INFORMATION</b>	
1	Project name, owner, location	
2	Building type, building area	
3	Overall project commissioning schedule	
4	Contact information for individual/company providing commissioning services	
	<b>COMMISSIONING GOALS</b>	
5	Meet <i>California Green Building Standards Code</i> requirements for commissioning	
6	Meeting OPR and BOD requirements	
7	Carrying out requirements for commissioning activities as specified in plans and specifications	
	<b>SYSTEMS TO BE COMMISSIONED</b>	
8	Explanation of the original design intent (refer to OPR and BOD documents)	
9	Equipment and systems to be tested, functions to be tested, conditions under which the test shall be performed, and measurable criteria for acceptable performance	
	<b>COMMISSIONING TEAM INFORMATION</b>	
10	List of all team members and contact information (i.e., owner, owner's representative, architect, engineers, designated commissioning representative, and (if available): general contractor, subcontractors, and construction manager)	
	<b>COMMISSIONING PROCESS ACTIVITIES, SCHEDULES, AND RESPONSIBILITIES</b>	
11	Prescribed commissioning process steps and activities to be accomplished by the Cx team throughout the design to occupancy	
12	Roles and responsibilities for each member of the Cx team for each phase of the work	
13	Required Cx deliverables, reports, forms, and verifications expected at each stage of the commissioning effort	
14	Confirmation process for the O&M manual, systems manual, and the facility operator and maintenance staff training	

1. The following systems shall be tested: renewable energy systems, landscape irrigation systems, and water reuse systems.

**Owner/Owner's Representative Acknowledgment**

The commissioning plan includes the items listed above and have been approved by the Owner or Owner's Representative:

Name: \_\_\_\_\_ ☐ Owner ☐ Owner's Representative

Company Name (if applicable): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

<b>FUNCTIONAL PERFORMANCE TESTING COMPLIANCE FORM</b>
---

CALGreen Commissioning Requirement 5.410.2.4, Functional Performance Testing

**5.410.2.4 Functional performance testing.** [N] Functional performance tests shall demonstrate the correct installation and operation of each component, system, and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized, and include any readings and adjustments made.

Test forms have been developed for each piece of commissioned equipment and system and include the checked elements listed below. These tests have been executed with deficiencies corrected.

	FUNCTIONAL TEST ELEMENTS	INCLUDED
1.	Date and parties participating	<input type="checkbox"/>
2.	Signature block attesting test is complete and accurate	<input type="checkbox"/>
3.	Prerequisites	<input type="checkbox"/>
4.	Precautions	<input type="checkbox"/>
5.	Instrumentation required	<input type="checkbox"/>
6.	Reference to the source of what is being confirmed (sequences, packaged features, etc.)	<input type="checkbox"/>
7.	Detailed step-by-step test instructions	<input type="checkbox"/>
8.	Acceptance criteria	<input type="checkbox"/>
9.	Results	<input type="checkbox"/>
10.	Confirmation of returning to normal	<input type="checkbox"/>
11.	Deficiency list	<input type="checkbox"/>

\_\_\_\_\_  
Cx Coordinator Signature

\_\_\_\_\_  
Date

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

**FUNCTIONAL PERFORMANCE TESTING  
COMPLIANCE FORM**

<b>REPORT # (e.g., FPT-003)</b>	<b>SYSTEM/EQUIPMENT TEST REPORT (See minimum report requirements on page 2 of this form.)</b>	<b>PAGE/TAB # IN COMMISSIONING REPORT</b>

**THIS FORM IS TO COMPLETED FOR THE TIME OF INSPECTION**

Project Address: \_\_\_\_\_

Permit Number: \_\_\_\_\_

List the functional test reports below for all systems to be tested (see Form 5.4-8.1, item #9).

**Minimum Requirements for Test Report**

1. Date and Party – Identification of the date of the test and the party conducting the test.
2. Signature Block – Signature of the designated commissioning lead and the equipment-installing contractor attesting that the recorded test results are accurate.
3. Prerequisites – Any conditions or related equipment checkout or testing that needs to be completed before conducting this test.
4. Precautions – Identification of the risks involved to the test team members and the equipment and how to mitigate them.
5. Instrumentation – Listing of the instrumentation and tools necessary to complete the test.
6. Reference – In each procedure item, identify the source for what is being confirmed (e.g., sequence of operation ID, operating feature, specification requirement, etc.)
7. Test Instructions – Step-by-step instructions of how to complete the test, including functions to test and the conditions under which the tests should be performed.
8. Acceptance Criteria – Measurable pass/fail criteria for each step of the test, as applicable.
9. Results – Expected system response and space to document the actual response, readings, results, and adjustments.
10. Return to Normal – Instructions that all systems and equipment are to be returned to their as-found state at the conclusion of the tests.
11. Deficiencies – A list of deficiencies and how they were mitigated.

**Commissioning Agent Acknowledgment**

I have reviewed the test reports listed above and verified that they are complete; these tests have been executed with deficiencies corrected.

Name: \_\_\_\_\_

Company Name (if applicable): \_\_\_\_\_

Agent's Signature: \_\_\_\_\_ Date: \_\_\_\_\_



## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

<b>SYSTEMS MANUAL COMPLIANCE FORM</b>	<b>CALGreen Std. BSC-5.4-10 10-08-10</b>
---	--

CALGreen Commissioning Requirement 5.410.2.5.1, Documentation and Training—Systems Manual

**5.410.2.5.1 Systems Manual.** [N] Documentation of the operational aspects of the building shall be completed within the systems manual and delivered to the building owner or representative. The systems manual shall include the following:

(See elements checklist below.)

	SYSTEM MANUAL ELEMENTS	INCLUDED
1.	Site information including facility description, history, and current requirements	<input type="checkbox"/>
2.	Site contact information	<input type="checkbox"/>
3.	Basic operations and maintenance and troubleshooting	<input type="checkbox"/>
4.	Systems covered include major systems listed under the BOD	<input type="checkbox"/>
5.	Site equipment inventory and maintenance notes	<input type="checkbox"/>
6.	Special inspection verifications	<input type="checkbox"/>
7.	Other resources and documentation	<input type="checkbox"/>

\_\_\_\_\_  
Owner or Owner's Representative Signature

\_\_\_\_\_  
Date

<b>SYSTEM OPERATIONS TRAINING COMPLIANCE FORM</b>
---

CALGreen Commissioning Requirement 5.410.2.5.2, System Operations Training

**5.410.2.5.2 Systems Operations Training.** [N] A program for training of the appropriate maintenance staff for each equipment type and/or system shall be developed and documented in the commissioning report and shall include the following.

(See elements checklist below.)

The written training program includes the checked elements listed below.

	TRAINING PROGRAM ELEMENTS	INCLUDED
1.	System/equipment overview (what it is, what it does, and with what other systems and/or equipment it interfaces)	<input type="checkbox"/>
2.	Review and demonstration of servicing and preventive maintenance	<input type="checkbox"/>
3.	Review of the information in the systems manual	<input type="checkbox"/>
4.	Review of the record drawings on the system/equipment	<input type="checkbox"/>

The owner or owner's representative attests that when the appropriate maintenance staff are made available prior to certificate of occupancy that the written training program was executed with these staff. Or, if appropriate maintenance staff are not available, that the written training program was submitted and approved by the owner or owner's representative.

\_\_\_\_\_  
Owner or Owner's Representative Signature

\_\_\_\_\_  
Date

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

# **SYSTEM OPERATIONS TRAINING COMPLIANCE FORM**

**THIS FORM IS TO BE COMPLETED PRIOR TO INSPECTION**

Project Address: \_\_\_\_\_

Permit Number: \_\_\_\_\_

## **Part One: Systems Manual**

ITEM #	SYSTEMS MANUAL ELEMENTS	PAGE NUMBER IN MANUAL
	<b>SITE INFORMATION</b>	
1	General (i.e., address, acreage, local utility information, other)	
2	Facility description (i.e., use/function, square footage, occupancy type, construction type, basis of design, location of major systems and equipment)	
3	Project history (i.e., project requirements (BOD/OPR), project undocumented events, record drawings and documents, final control drawings and schematics, final control sequences, construction documents)	
4	Current requirements (i.e., building operating schedules, space temperature, humidity, pressure, CO <sub>2</sub> setpoints, summer and winter setback schedules, chilled and hot water temperatures, as-built control setpoints and parameters)	
	<b>SITE CONTACT INFORMATION</b>	
5	Owner information	
6	Emergency contacts	
7	Design team (i.e., architect, mechanical engineer, electrical engineer, other)	
8	Prime contractor contact information	
9	Subcontractor information	
10	Equipment supplier contact information	
	<b>BASIC OPERATIONS AND MAINTENANCE</b>	
11	Basic operation (i.e., narratives of basic equipment operation, interfaces, interlocks and interaction with other equipment and systems, initial maintenance provided by the contractor)	
12	General site-operating schedules (i.e., instructions for changes in major system operating schedules, instructions for changes in major system holiday and weekend schedules)	
13	Basic troubleshooting (i.e., cite recommended troubleshooting procedures specific to major systems and equipment, manual operation procedures, standby/backup/bypass operation procedures, major system power fail resets and restarts, trend log listing)	
14	Recommended maintenance events log (i.e., HVAC air filter replacement schedule and log, building control system sensor calibration schedule and log)	
15	Operation and maintenance manuals (location or delivery information)	
	<b>MAJOR SYSTEMS</b>	
19	Water heating systems	
20	Landscape irrigation systems (i.e., water distribution diagrams and control system)	
21	Water reuse systems (i.e., reclaimed water system for indoor use, reclaimed water for irrigation use)	
	<b>SITE EQUIPMENT INVENTORY AND MAINTENANCE NOTES</b>	
22	Spare parts inventory	
23	Frequently required parts and supplies	
24	Special equipment required to operate or maintain systems	
25	Special tools required to operate or maintain systems	
	<b>SPECIAL INSPECTIONS</b>	
26	Copies of all special inspection verifications required by the enforcing agency of this code	
	<b>OTHER</b>	
27	Other resources and documentation	

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

## Part Two: Training

ITEM #	TRAINING PROGRAM ELEMENTS	PAGE NUMBER IN TRAINING DOCUMENT
1	System/equipment overview (i.e., what it is, what it does, and with what other systems and/or equipment it interfaces)	
2	Review and demonstration of servicing and preventative maintenance	
3	Review of the information in the systems manual	
4	Review of the record drawings on the system/equipment	

## Owner/Owner's Representative Acknowledgment

☐ Documentation of the operation aspects of the building shall be completed within the systems manual and delivered to the building owner or representative and facilities operator. The systems manual includes the elements listed in part one of this form; or

☐ When the appropriate maintenance staff is made available prior to the certificate of occupancy, the written training program will be executed to these staff. The written training program includes the elements listed in part two of this form.

Name: \_\_\_\_\_ ☐ Owner ☐ Owner's Representative

Company Name (if applicable): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

**COMMISSIONING REPORT  
COMPLIANCE FORM**

CALGreen Commissioning Requirement 5.410.2.6, Commissioning Report

**5.410.2.6 Commissioning Report.** [N] A report of commissioning process activities undertaken through the design and construction phases of the building project shall be completed and provided to the owner or representative.

The commissioning report should include the checked elements listed below and should be approved by the owner or owner's representative.

	COMMISSIONING REPORT ELEMENTS	INCLUDED
1.	Executive summary with conclusions and outstanding issues	<input type="checkbox"/>
2.	History of system deficiencies and resolution	<input type="checkbox"/>
3.	Summary of system functional test results	<input type="checkbox"/>
4.	Summary of training completion	<input type="checkbox"/>
5.	Attachments of commissioning plan, OPR, BOD, executed (filled in) installation checklists, executed functional tests, recommendations for end-of-warranty review	<input type="checkbox"/>

\_\_\_\_\_  
Owner / Owner's Representative Signature

\_\_\_\_\_  
Date

**COMMISSIONING REPORT  
COMPLIANCE FORM**

**THIS FORM IS TO BE COMPLETED PRIOR TO INSPECTION**

Project Address: \_\_\_\_\_

Permit Number: \_\_\_\_\_

ITEM #	COMMISSIONING REPORT ELEMENTS	PAGE NUMBER IN COMMISSIONING REPORT DOCUMENT
<b>1</b>	<b>EXECUTIVE SUMMARY</b>	
	Executive summary of process and results of commissioning program (include observations, conclusions, and any outstanding items)	
<b>2</b>	<b>HISTORY OF ANY SYSTEM DEFICIENCIES AND HOW RESOLVED</b>	
	Outstanding deficiencies and plans for resolution	
	Plans for seasonal testing scheduled for a later date	
<b>3</b>	<b>RESULTS</b>	
	System performance test results and evaluations	
<b>4</b>	<b>SUMMARY OF TRAINING</b>	
	Summary of training process completed and scheduled	
<b>5</b>	<b>ATTACH COMMISSIONING PROCESS DOCUMENTS</b>	
	Commissioning plan	
	Owner's Project Requirements (OPR)	
	Basis of Design (BOD)	
	Executed installation checklists	
	Executed Functional Performance Test (FPT) forms	
	Recommendations for end-of-warranty review activities	

**Owner and Commissioning Agent Acknowledgment**

The commissioning report includes the items listed above and is approved by the owner/owner's representative and commissioning agent below.

**1. Owner/Owner's Representative**

The commissioning report includes the items listed above and have been approved by the owner or owner's representative.

Name: \_\_\_\_\_ ☐ Owner ☐ Owner's Representative

Company Name (if applicable): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**2. Commissioning Agent**

Name: \_\_\_\_\_

Company Name (if applicable): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_



## COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

FOR REFERENCE ONLY: The following table has been reprinted from the IES TM-15-11 Reference standard, see Section 5.106.8.

IES TM-15-11 TABLE A-1 Backlight Ratings (Maximum Zonal Lumens)

SECONDARY SOLID ANGLE	MAXIMUM ZONAL LUMENS PER OUTDOOR LIGHTING ZONE				
	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Backlight High (BH) 60 to 80 degrees	110	500	1,000	2,500	5,000
Backlight Medium (BM) 30 to < 60 degrees	220	1,000	2,500	5,000	8,500
Backlight Low (BL) 0 to < 30 degrees	110	500	1,000	2,500	5,000

FOR REFERENCE ONLY: The following table has been reprinted from the *California Energy Code, Part 6, Title 24*, see Section 5.106.8.

TABLE 130.2-A Uplight Ratings (Maximum Zonal Lumens)

SECONDARY SOLID ANGLE	MAXIMUM ZONAL LUMENS PER OUTDOOR LIGHTING ZONE				
	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Uplight High (UH) 100 to 180 degrees	0	10	50	500	1,000
Uplight Low (UL) 90 to < 100 degrees	0	10	50	500	1,000

FOR REFERENCE ONLY: The following table has been reprinted from the *California Energy Code, Part 6, Title 24*, see Section 5.106.8.

TABLE 130.2-B Glare Ratings (Maximum Zonal Lumens)

SECONDARY SOLID ANGLE	GLARE RATING FOR ASYMMETRICAL LUMINAIRE TYPES (Type I, Type II, Type III, Type IV)				
	Maximum Zonal Lumens per Outdoor Lighting Zone				
	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Forward Very High (FVH) 80 to 90 degrees	10	100	225	500	750
Backlight Very High (BVH) 80 to 90 degrees	10	100	225	500	750
Forward High (FH) 60 to < 80 degrees	660	1,800	5,000	7,500	12,000
Backlight High (BH) 60 to < 80 degrees	110	500	1,000	2,500	5,000
SECONDARY SOLID ANGLE	GLARE RATING FOR QUADRILATERAL SYMMETRICAL LUMINAIRE TYPES (Type V, Type V Square)				
	Maximum Zonal Lumens per Outdoor Lighting Zone				
	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Forward Very High (FVH) 80 to 90 degrees	10	100	225	500	750
Backlight Very High (BVH) 80 to 90 degrees	10	100	225	500	750
Forward High (FH) 60 to < 80 degrees	660	1,800	5,000	7,500	12,000
Backlight High (BH) 60 to < 80 degrees	660	1,800	5,000	7,500	12,000

## CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE APPENDIX A4 – RESIDENTIAL VOLUNTARY MEASURES

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC- CG	SFM	HCD			DSA		OSHDP						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter				X																		
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below																						
Chapter/Section																						
A4.2				†														X				

The state agency does not adopt sections identified by the following symbol: †.

### APPENDIX A4

## RESIDENTIAL VOLUNTARY MEASURES

*Some of the measures contained in this appendix are not mandatory unless adopted by a city, county, or city and county as specified in Section 101.7 and provide additional measures that designers, builders and property owners may wish to consider during the planning, design and construction process.*

#### **Division A4.1 – PLANNING AND DESIGN**

##### **PREFACE**

Given that land use and planning are largely regulated locally, cities, counties, and cities and counties should consider reducing greenhouse gas emissions associated with development through local land-use practices in conjunction with enforcing the provisions of this code. Specific land use strategies a city, county, or city and county may wish to consider include but are not limited to the following:

**Site selection.** Develop sites for buildings, hardscape, roads or parking areas consistent with the local general plan and regional transportation plan pursuant to SB 375 (Stats 2008, Ch. 728).

**Regional sustainable communities strategy.** Site selection and building design and use shall conform the project with the prevailing regional sustainable communities strategy or alternative planning strategy, whichever meets the greenhouse gas target established by the California Air Resources Board pursuant to SB 375 (Stats. 2008, Ch. 728), including the general location of uses, residential densities and building intensities.

**Transit priority projects.** To qualify as a transit priority project, the project shall meet three criteria:

- (1) (a) contain at least 50 percent residential use, based on total building square footage and, if the project contains

between 26 and 50 percent nonresidential uses, a floor area ratio of not less than 0.75; (b) provide a minimum net density of at least 20 dwelling units per acre; and (c) be within one-half mile of a major transit stop or high-quality transit corridor included in a regional transportation plan as described in Section 21155 of Stats. 2008, Ch. 728;

(2) be consistent with the prevailing sustainable communities strategy or alternative planning strategy, whichever meets the greenhouse gas target established by the California Air Resources Board, including the general location of uses, residential densities and building intensities; and

(3) have all necessary entitlements required by the applicable local government.

**Note:** For additional information, see *Government Code* Sections 65080, 65080.1, 65400, and 65470, and *Public Resources Code* Sections 21061.3 and 21155.

#### **SECTION A4.101 GENERAL**

**A4.101.1 Scope.** The provisions of this division outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

## RESIDENTIAL VOLUNTARY MEASURES

### SECTION A4.102 DEFINITIONS

**A4.102.1 Definitions.** The following terms are defined in Chapter 2.

**BROWNFIELD SITE.**

**DEVELOPMENT FOOTPRINT.**

**GREENFIELDS.**

**GREYFIELD SITE.**

**INFILL SITE.**

**PERMEABLE PAVING.**

### SECTION A4.103 SITE SELECTION

**A4.103.1 Selection.** A site which complies with at least one of the following characteristics is selected:

1. An infill site is selected.
2. A greyfield site is selected.
3. An EPA-recognized and remediated Brownfield site is selected.

**A4.103.2 Community connectivity.** Facilitate community connectivity by one of the following methods:

1. Locate project within a  $\frac{1}{4}$ -mile true walking distance of at least four basic services, readily accessible by pedestrians.
2. Locate project within a  $\frac{1}{2}$ -mile true walking distance of at least seven basic services, readily accessible by pedestrians.
3. Other methods increasing access to additional resources.

**Note:** Examples of services include, but are not limited to, bank, place of worship, convenience grocery, day care, cleaners, fire station, barber shop, beauty shop, hardware store, laundry, library, medical clinic, dental clinic, senior care facility, park, pharmacy, post office, restaurant, school, supermarket, theater, community center, fitness center, museum or farmers market. Other services may be considered on a case-by-case basis.

### SECTION A4.104 SITE PRESERVATION

**A4.104.1 Supervision and education.** Individuals with oversight authority on the project who have been trained in areas related to environmentally friendly development can teach green concepts to other members of the development staff and ensure that training is provided to all parties associated with the development of the project.

Prior to beginning the construction activities, all parties involved with the development process shall receive a written guideline and instruction specifying the green goals of the project.

**Note:** Lack of adequate supervision and dissemination of the project goals can result in negative effects on green building projects. If the theme of green building is not carried throughout the project, the overall benefit can be substantially reduced by the lack of knowledge and information provided to the various entities involved with the construction of the project.

### SECTION A4.105 DECONSTRUCTION AND REUSE OF EXISTING MATERIALS

**A4.105.1 General.** Existing buildings on the site are deconstructed and the salvaged materials are reused. Reused materials or products must comply with current building standards requirements or be an accepted alternate method or material.

**A4.105.2 Reuse of materials.** Materials which can be easily reused include but are not limited to the following:

1. Light fixtures.
2. Plumbing fixtures.
3. Doors and trim.
4. Masonry.
5. Electrical devices.
6. Appliances.
7. Foundations or portions of foundations.

**Note:** Reused material must be in compliance with the appropriate Title 24 requirements.

### SECTION A4.106 SITE DEVELOPMENT

**A4.106.1 Reserved.**

**A4.106.2 Soil analysis and protection.** The soils at the building site are analyzed and protected as specified in this section.

**A4.106.2.1 Soil analysis.** Soil analysis is performed by a licensed design professional and the findings utilized in the structural design of the building.

**A4.106.2.2 Soil protection.** The effect of development on building sites is evaluated and the soil is protected by one or more of the following:

1. Natural drainage patterns are evaluated and erosion controls are implemented to minimize erosion during construction and after occupancy.
2. Site access is accomplished by minimizing the amount of cut and fill needed to install access roads and driveways.
3. As allowed by other parts of the *California Building Standards Code* underground construction activities are coordinated to utilize the same trench, minimize the amount of time the disturbed soil is exposed and the soil is replaced using accepted compaction methods.

**A4.106.2.3 Topsoil protection.** Topsoil shall be protected or saved for reuse as specified in this section.

**Tier 1.** Displaced topsoil shall be stockpiled for reuse in a designated area and covered or protected from erosion.

**Note:** Protection from erosion includes covering with tarps, straw, mulch, chipped wood, vegetative cover, or other means acceptable to the enforcing agency to protect the topsoil for later use.

**Tier 2.** The construction area shall be identified and delineated by fencing or flagging to limit construction activity to the construction area. Heavy equipment or vehicle traffic and material storage outside the construction area shall be limited to areas that are planned to be paved.

**A4.106.3 Landscape design.** Postconstruction landscape designs shall accomplish one or more of the following:

1. Areas disrupted during construction are restored to be consistent with native vegetation species and patterns.
2. Utilize at least 75 percent native California or drought tolerant plant and tree species appropriate for the climate zone region.

**A4.106.4 Water permeable surfaces.** Permeable paving is utilized for the parking, walking or patio surfaces in compliance with the following.

**Tier 1.** Not less than 20 percent of the total parking, walking or patio surfaces shall be permeable.

**Tier 2.** Not less than 30 percent of the total parking, walking or patio surfaces shall be permeable.

**Exceptions:**

1. The primary driveway, primary entry walkway and entry porch or landing shall not be included when calculating the area required to be a permeable surface.
2. Required accessible routes for persons with disabilities as required by *California Code of Regulations*, Title 24, Part 2, Chapter 11A and/or Chapter 11B as applicable.

**A4.106.5 Cool roof for reduction of heat island effect.** Roofing materials for Tier 1 and Tier 2 buildings shall comply with this section:

**Exceptions:**

1. Roof constructions that have a thermal mass over the roof membrane including areas of vegetated (green) roofs, weighing at least 25 pounds per square foot.
2. Roof areas covered by building integrated solar photovoltaic panels and building integrated solar thermal panels.

**A4.106.5.1 Solar reflectance.** Roofing materials shall have a minimum 3-year aged solar reflectance equal to or greater than the values specified in Tables A4.106.5.1(1)

and A4.106.5.1(3) for Tier 1 and Tables A4.106.5.1(2) and A4.105.5.1(4) for Tier 2.

If CRRC testing for aged solar reflectance is not available for any roofing products, the aged value shall be determined using the Cool Roof Rating Council (CRRC) certified initial value using the equation  $\rho_{\text{aged}} = [0.2 + \beta[\rho_{\text{initial}} - 0.2]]$ , where  $\rho_{\text{initial}}$  = the initial Solar Reflectance and soiling resistance,  $\beta$ , is listed by product type in Table A4.106.5.1.

Solar reflectance may also be certified by other supervisory entities approved by the Energy Commission pursuant to Title 24, Part 1, Section 10-113.

**TABLE A4.106.5.1  
VALUES OF SOILING RESISTANCE ( $\beta$ ) BY PRODUCT TYPE**

PRODUCT TYPE	CRRC PRODUCT CATEGORY	$\beta$
Field-applied coating	Field-applied coating	0.65
Other	Not a field-applied coating	0.70

**A4.106.5.2 Thermal emittance.** Roofing materials shall have a CRRC initial or aged thermal emittance equal to or greater than those specified in Tables A4.106.5.1(1) and A4.106.5.1(3) for Tier 1 and Tables A4.106.5.1(2) and A4.106.5.1(4) for Tier 2.

Thermal emittance may also be certified by other supervisory entities approved by the Energy Commission pursuant to Title 24, Part 1, *California Administrative Code*.

**A4.106.5.3 Solar reflectance index alternative.** Solar Reflectance Index (SRI) equal to or greater than the values specified in Tables A4.106.5.1(1) and A4.106.5.1(3) for Tier 1 and Tables A4.106.5.1(2) and A4.106.5.1(4) for Tier 2 may be used as an alternative to compliance with the 3-year aged solar reflectance values and thermal emittance.

SRI values used to comply with this section shall be calculated using the Solar Reflectance Index (SRI) Calculation Worksheet (SRI-WS) developed by the California Energy Commission or in compliance with ASTM E1980-01 as specified in the 2019 *California Energy Code*. Solar reflectance values used in the SRI-WS shall be based on the aged reflectance value of the roofing product or the equation in Section A4.106.5.1 if the CRRC certified aged solar reflectance are not available. Certified thermal emittance used in the SRI-WS may be either the initial value or the aged value listed by the CRRC.

Solar reflectance and thermal emittance may also be certified by other supervisory entities approved by the Commission pursuant to Title 24, Part 1, *California Administrative Code*.

**Note:** The Solar Reflectance Index Calculation Worksheet (SRI-WS) is available by contacting the Energy Standards Hotline at 1-800-772-3300, website at [www.energy.ca.gov](http://www.energy.ca.gov) or by email at [Title24@energy.state.ca.us](mailto:Title24@energy.state.ca.us).

## RESIDENTIAL VOLUNTARY MEASURES

**TABLE A4.106.5.1(1)**  
**TIER 1 – LOW-RISE RESIDENTIAL**

ROOF SLOPE	CLIMATE ZONE	MINIMUM 3-YEAR AGED SOLAR REFLECTANCE	THERMAL EMITTANCE	SRI
≤ 2:12	13 & 15	0.63	0.75	75
> 2:12	10 – 15	0.20	0.75	16

**TABLE A4.106.5.1(2)**  
**TIER 2 – LOW-RISE RESIDENTIAL**

ROOF SLOPE	CLIMATE ZONE	MINIMUM 3-YEAR AGED SOLAR REFLECTANCE	THERMAL EMITTANCE	SRI
≤ 2:12	2, 4, 6 – 15	0.65	0.85	78
> 2:12	2, 4, 6 – 15	0.23	0.85	20

**TABLE A4.106.5.1(3)**  
**TIER 1 – HIGH-RISE RESIDENTIAL BUILDINGS, HOTELS AND MOTELS**

ROOF SLOPE	CLIMATE ZONE	MINIMUM 3-YEAR AGED SOLAR REFLECTANCE	THERMAL EMITTANCE	SRI
≤ 2:12	9, 10, 11, 13, 14, 15	0.55	0.75	64
> 2:12	2 – 15	0.20	0.75	16

**TABLE A4.106.5.1(4)**  
**TIER 2 – HIGH-RISE RESIDENTIAL BUILDINGS, HOTELS AND MOTELS**

ROOF SLOPE	CLIMATE ZONE	MINIMUM 3-YEAR AGED SOLAR REFLECTANCE	THERMAL EMITTANCE	SRI
≤ 2:12	2 – 15	0.65	0.75	78
> 2:12	2 – 15	0.23	0.75	20

**A4.106.5.4 Verification.** Inspection shall be conducted to ensure roofing materials meet cool roof aged solar reflectance and thermal emittance or SRI values.

**A4.106.6 Vegetated roof.** Install a vegetated roof for at least 50 percent of the roof area. Vegetated roofs shall comply with requirements for roof gardens and landscaped roofs in the *California Building Code*, Chapter 15 and Chapter 16.

**A4.106.7 Reduction of heat island effect for nonroof areas.** Reduce nonroof heat islands for 50 percent of sidewalks, patios, driveways or other paved areas by using one or more of the methods listed.

1. Trees or other plantings to provide shade and that mature within 15 years of planting. Trees should be native or adaptive to the region and climate zones and noninvasive; hardy and resistant to drought, insects and disease; easy to maintain (no frequent shedding of twigs, branches, unwanted fruit or seed pods); and suitable in mature size and environmental requirements for the site. Tree selection and placement should consider location and size of areas to be shaded, location of utilities, views from the structure, distance to sidewalks and foundations, overhangs onto adjacent properties and streets; other infrastructure and adjacent to landscaping. In addition, shading shall not cast a shadow, as specified, on any neighboring solar collectors pursuant

to *Public Resources Code* Section 25981, et seq. (Solar Shade Control Act).

2. Use high albedo materials with an initial solar reflectance value of at least 0.30 as determined in accordance with American Society for Testing and Materials (ASTM) Standards E1918 or C1549.
3. Use open grid pavement system or pervious or permeable pavement system.
4. Locate 50 percent of parking underground or use multi-level parking.
5. Other methods of reducing heat island effects acceptable to the enforcing agency.

**Note:** Local agencies may have ordinances requiring mitigation of heat island effects through building or parking lot shading, tree plantings, landscaping, use of pervious pavements and other approved methods.

**A4.106.8 Electric vehicle (EV) charging for new construction.** New construction shall comply with Sections A4.106.8.1, A4.106.8.2 or A4.106.8.3, to facilitate future installation and use of electric vehicle chargers. Electric vehicle supply equipment (EVSE) shall be installed in accordance with the *California Electrical Code*, Article 625.

#### **A4.106.8.1 New one- and two-family dwellings and townhouses with attached private garages.**

**Tier 1 and Tier 2.** For each dwelling unit, a dedicated 208/240-volt branch circuit shall be installed in the raceway required by Section 4.106.4.1. The branch circuit and associated overcurrent protective device shall be rated at 40 amperes minimum. Other electrical components, including a receptacle or blank cover, related to this section shall be installed in accordance with the *California Electrical Code*.

**A4.106.8.1.1 Identification.** The service panel or sub-panel circuit directory shall identify the overcurrent protective device designated for future EV charging purposes as “EV READY” in accordance with the *California Electrical Code*. The receptacle or blank cover shall be identified as “EV READY.”

#### **A4.106.8.2 New multifamily dwellings.**

**Tier 1.** Fifteen (15) percent of the total number of parking spaces on a building site, provided for all types of parking facilities, but in no case less than one, shall be electric vehicle charging spaces (EV spaces) capable of supporting future EVSE. Calculations for the required number of EV spaces shall be rounded up to the nearest whole number.

**Tier 2.** Twenty (20) percent of the total number of parking spaces on a building site, provided for all types of parking facilities, but in no case less than one, shall be electric vehicle charging spaces (EV spaces) capable of supporting future EVSE. Calculations for the required number of EV spaces shall be rounded up to the nearest whole number.

**A4.106.8.2.1 Technical requirements.** The EV spaces required by Section A4.106.8.2 shall be designed and



constructed in accordance with Sections 4.106.4.2.1, 4.106.4.2.2, 4.106.4.2.3, 4.106.4.2.4, and 4.106.4.2.5.

#### A4.106.8.3 New hotels and motels.

**Tier 1. Number of required EV spaces.** The number of required EV spaces shall be based on the total number of parking spaces provided for all types of parking facilities in accordance with Table A4.106.8.3.1. Calculations for the required number of EV spaces shall be rounded up to the nearest whole number.

TABLE A4.106.8.3.1

TOTAL NUMBER OF PARKING SPACES	TIER 1 NUMBER OF REQUIRED EV SPACES
0-9	0
10-25	2
26-50	3
51-75	5
76-100	7
101-150	10
151-200	14
201 and over	8 percent of total

**Tier 2. Number of required EV spaces.** The number of required EV spaces shall be based on the total number of parking spaces provided for all types of parking facilities in accordance with Table A4.106.8.3.2. Calculations for the required number of EV spaces shall be rounded up to the nearest whole number.

TABLE A4.106.8.3.2

TOTAL NUMBER OF PARKING SPACES	TIER 2 NUMBER OF REQUIRED EV SPACES
0-9	1
10-25	2
26-50	4
51-75	6
76-100	9
101-150	12
151-200	17
201 and over	10 percent of total

**A4.106.8.3.1 Technical requirements.** The EV spaces required by Section A4.106.8.3 shall be designed and constructed in accordance with Sections 4.106.4.3, 4.106.4.3.2, 4.106.4.3.3, 4.106.4.3.4, 4.106.4.3.5, and 4.106.4.3.6.

**A4.106.9 Bicycle parking.** Comply with Sections A4.106.9.1 through A4.106.9.3 or meet a local ordinance, whichever is more stringent.

**Exception:** Number of bicycle parking spaces shall be permitted to be reduced, as approved by the enforcing agency, due to building site characteristics, including but not limited to, isolation from other development.

**A4.106.9.1 Short-term bicycle parking.** Provide permanently anchored bicycle racks within 100 feet of the visitor's entrance, readily visible to passers-by, for 5 percent of visitor motorized vehicle parking capacity with a minimum of one two-bike capacity rack.

**A4.106.9.2 Long-term bicycle parking for multifamily buildings.** Provide on-site bicycle parking for at least one bicycle per every two dwelling units. Acceptable parking facilities shall be conveniently reached from the street and may include, but not be limited to:

1. Covered, lockable enclosures with permanently anchored racks for bicycles.
2. Lockable bicycle rooms with permanently anchored racks.
3. Lockable, permanently anchored bicycle lockers.

**A4.106.9.3 Long-term bicycle parking for hotel and motel buildings.** Provide one on-site bicycle parking space for every 25,000 square feet, but not less than two. Acceptable parking facilities shall be conveniently reached from the street and may include, but not be limited to:

1. Covered, lockable enclosures with permanently anchored racks for bicycles.
2. Lockable bicycle rooms with permanently anchored racks.
3. Lockable, permanently anchored bicycle lockers.

**A4.106.10 Light pollution reduction. [HR]** Outdoor lighting systems shall be designed and installed to comply with the following:

1. The minimum requirements in the *California Energy Code* for Lighting Zones 1-4 as defined in Chapter 10 of the *California Administrative Code*; and
2. Backlight, Uplight and Glare (BUG) ratings as defined in IES TM-15-11; and
3. Allowable BUG ratings not exceeding those shown in Table A4.106.10; or

Comply with a local ordinance lawfully enacted pursuant to Section 101.7 of this code, whichever is more stringent.

#### Exceptions:

1. Luminaires that qualify as exceptions in the *California Energy Code*.
2. Emergency lighting.
3. One- and two-family dwellings.

**Note:** The International Dark-Sky Association (IDA) and the Illuminating Engineering Society of North America (IESNA) have developed a Model Lighting Ordinance (MLO). The MLO was designed to help municipalities develop outdoor lighting standards that reduce glare, light trespass, and skyglow. The model ordinance and user guides for the ordinance may be accessed at the International Dark-Sky Association web site.



## RESIDENTIAL VOLUNTARY MEASURES

SECTION A4.107  
[RESERVED]SECTION A4.108  
INNOVATIVE CONCEPTS AND LOCAL  
ENVIRONMENTAL CONDITIONS

**A4.108.1 Innovative concepts and local environmental conditions.** The provisions of this code are not intended to prevent the use of any alternate material, appliance, installa-

tion, device, arrangement, method, design or method of construction not specifically prescribed by this code. This code does not limit the authority of city, county, or city and county government to make necessary changes to the provisions contained in this code pursuant to Section 101.7.1.

**TABLE A4.106.10**  
**MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS<sup>1,2</sup>**

ALLOWABLE RATING	LIGHTING ZONE 1	LIGHTING ZONE 2	LIGHTING ZONE 3	LIGHTING ZONE 4
<b>Maximum Allowable Backlight Rating<sup>3</sup></b>				
Luminaire greater than 2 mounting heights (MH) from property line	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1 – 2 MH from property line	B2	B3	B4	B4
Luminaire back hemisphere is 0.5 – 1 MH from property line	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	B0	B0	B1	B2
<b>Maximum Allowable Uplight Rating</b>				
For area lighting <sup>4</sup>	U0	U0	U0	U0
For all other outdoor lighting, including decorative luminaires	U1	U2	U3	U4
<b>Maximum Allowable Glare Rating<sup>5</sup></b>				
Luminaire greater than 2 MH from property line	G1	G2	G3	G4
Luminaire front hemisphere is 1 – 2 MH from property line	G0	G1	G1	G2
Luminaire front hemisphere is 0.5 – 1 MH from property line	G0	G0	G1	G1
Luminaire back hemisphere is less than 0.5 MH from property line	G0	G0	G0	G1

1. IESNA Lighting Zones 0 and 5 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code*.
2. For property lines that abut public walkways, bikeways, plazas and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.
3. If the nearest property line is less than or equal to two mounting heights from the back hemisphere of the luminaire distribution, the applicable reduced Backlight rating shall be met.
4. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaires located in these areas shall meet U-value limits for "all other outdoor lighting."
5. If the nearest property line is less than or equal to two mounting heights from the front hemisphere of the luminaire distribution, the applicable reduced Glare rating shall be met.

## APPENDIX A4

# RESIDENTIAL VOLUNTARY MEASURES

### Division A4.2 – ENERGY EFFICIENCY

#### SECTION A4.201 GENERAL

**A4.201.1 Scope.** For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards. It is the intent of these voluntary provisions to encourage local jurisdictions through codification to achieve exemplary performance in the area of building energy efficiency. Local jurisdictions adopting these voluntary provisions as mandatory local energy efficiency standards shall submit the required application and receive the required approval of the California Energy Commission in compliance with Title 24, Part 1, Section 10-106 prior to enforcement. Once approval is granted by the Energy Commission, local jurisdictions shall file an ordinance expressly marking the local modification along with findings and receive the required acceptance from the California Building Standards Commission in compliance with Section 101.7 of this code, prior to enforcement. (Title 24, Part 1, Section 10-106 is available at <http://www.energy.ca.gov/title24/2019standards/>)

#### SECTION A4.202 DEFINITIONS

**A4.202.1 Definitions.** The following terms are defined in Chapter 2.

**ENERGY BUDGET.**

**ENERGY DESIGN RATING (EDR).**

**ENERGY DESIGN RATING, ENERGY EFFICIENCY.**

**ENERGY DESIGN RATING, SOLAR ELECTRIC GENERATION AND DEMAND FLEXIBILITY.**

**ENERGY DESIGN RATING, TOTAL**

**TIME DEPENDENT VALUATION (TDV) ENERGY.**

#### SECTION A4.203 PERFORMANCE APPROACH FOR NEWLY CONSTRUCTED BUILDINGS

**A4.203.1 Energy efficiency.** Newly constructed low-rise residential buildings shall comply with Sections A4.203.1.1 through A4.203.1.4.

**A4.203.1.1 Tier 1 and Tier 2 prerequisites.** A4.203.1.1.1 Energy design ratings and A4.203.1.1.2 Quality Insulation Installation are required for all applicable components of the building project.

**A4.203.1.1.1 Energy design ratings: Total Energy Design Rating (Total EDR) and Energy Efficiency Design Rating (Efficiency EDR).** Total EDR and Efficiency EDR ratings for the Proposed Design Building shall be computed by Compliance Software certified by the Energy Commission as described in Title 24, Part 6, Section 100.1 and 150.1(b), and these ratings shall be included in the Certificate of Compliance documentation.

**A4.203.1.1.2 Quality Insulation Installation (QII).** The QII procedures specified in the Building Energy Efficiency Standards Reference Appendices RA3.5 shall be completed.

**A4.203.1.2 Tier 1 and Tier 2 prerequisite options.** In addition, ONE of the following efficiency measures will be required: A4.203.1.2.1 Roof deck insulation, or ducts in conditioned space; OR A4.203.1.2.2 High Performance Walls; OR A4.203.1.2.3 HERS-Verified Compact Hot Water Distribution System; OR A4.203.1.2.4 HERS-Verified Drain Water Heat Recovery.

**A4.203.1.2.1 Roof deck insulation, or ducts in conditioned space.** Meet one of the three options for the location of ducts and air handlers as well as insulation R-values and installation of a radiant barrier as specified in Title 24, Part 6, Section 150.1(c)9A or B:

1. Below roof deck insulation with a minimum *R*-value of 19; or,
2. Continuous above deck insulation with a minimum *R*-8 and with an air space present between the roofing and the roof deck; or,
3. All ducts and air handlers in conditioned space as specified in the Title 24, Part 6 Reference Appendices RA3.1.

**A4.203.1.2.2 High Performance Walls (HPW).** HPW meet the climate zone dependent *U*-factor and insulation values for either 2x6 or 2x4 framing as specified in Title 24, Part 6, Section 150.1(c)1B: maximum *U*-factor of 0.048.

**A4.203.1.2.3 HERS-Verified Compact Hot Water Distribution System (CHWDS-H).** CHWDS-H shall be installed as specified in the Title 24, Part 6 Reference Appendix RA3.6.5.

**A4.203.1.2.4 HERS-Verified Drain Water Heat Recovery (DWHR-H).** DWHR-H shall be installed as specified in Title 24, Part 6 Reference Appendix RA4.4.21.

## RESIDENTIAL VOLUNTARY MEASURES

**A4.203.1.3 Performance standard.** Comply with one of the advanced efficiency levels, either A4.201.1.3.1 OR A4.201.1.3.2, indicated below.

TABLE A4.203.1.1.1

RECOMMENDED EDR TARGETS BY CLIMATE ZONES				
CZ	Tier 1		Tier 2	
	Mixed Fuel	All-Electric	Mixed Fuel	All-Electric
1	23	36	13	0
2	12	16	5	0
3	10	14	0	0
4	8	12	0	0
5	10	16	0	0
6	10	12	0	0
7	5	7	0	0
8	10	10	0	0
9	13	13	0	0
10	10	11	0	0
11	11	12	0	0
12	12	13	0	0
13	11	13	0	0
14	15	16	5	0
15	11	8	0	7
16	22	39	14	10

**Note:** Community shared options complying with Title 24, Part 1, Section 10-115 may be used to achieve Total EDR targets.

**Note:** For Energy Budget calculations, high-rise residential and hotel/motel buildings are considered nonresidential buildings.

**A4.203.1.3.1 Tier 1.** Buildings complying with the first level of advanced energy efficiency shall have additional integrated efficiency and onsite renewable energy generation sufficient to achieve a Total EDR of the Tier 1 value indicated by Table A4.203.1.1.1 or lower as calculated by Title 24, Part 6 Compliance Software approved by the Energy Commission. This requirement is in addition to meeting the Efficiency EDR required for compliance with Title 24, Part 6. Measures considered to meet the Total EDR targets calculated by the compliance software include, but are not limited to, the prerequisite options specified in Section A4.203.1.2, use of Demand Response, additional

energy efficiency measures (e.g., triple-pane windows), as well as onsite electric battery and/or thermal storage.

**A4.203.1.3.2 Tier 2.** Buildings complying with this second elective designation shall have additional integrated efficiency and onsite renewable energy generation sufficient to achieve a Total EDR of the Tier 2 value indicated by Table A4.203.1.1.1 or lower as calculated by Title 24, Part 6 Compliance Software approved by the Energy Commission. This may be reached by various paths, including improved space and water heating efficiencies, advanced electric battery controls, as well as modest oversizing of the photovoltaic system. This requirement is in addition to meeting the Efficiency EDR required for compliance with Title 24, Part 6. Measures considered to meet the Total EDR targets calculated by the compliance software include, but are not limited to, the prerequisite options specified in Section A4.203.1.2, use of Demand Response, additional energy efficiency measures (e.g., triple-pane windows), as well as onsite electric battery and/or thermal storage.

**A4.203.1.4 Consultation with local electric service provider.** Local jurisdictions considering adoption of Tier I as specified by A4.203.1.3.1 or Tier II as specified by A4.203.1.3.2, including local jurisdictions considering community shared solar or storage options consistent with Part 1 Section 10-115, shall consult with the local electric service provider to ensure that solar system sizing required to comply will be acceptable to the local electric service provider. The local jurisdiction shall not require onsite renewable energy generation systems that are larger than the local electric service provider will allow to be interconnected.

## APPENDIX A4

# RESIDENTIAL VOLUNTARY MEASURES

### Division A4.3 – WATER EFFICIENCY AND CONSERVATION

#### SECTION A4.301 GENERAL (Reserved)

#### SECTION A4.302 DEFINITIONS (Reserved)

#### SECTION A4.303 INDOOR WATER USE

**A4.303.1 Kitchen faucets.** The maximum flow rate of kitchen faucets shall not exceed 1.5 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.5 gallons per minute at 60 psi.

**Note:** Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.

**A4.303.2 Alternate water sources for nonpotable applications.** Alternate nonpotable water sources are used for indoor potable water reduction. Alternate nonpotable water sources shall be installed in accordance with the *California Plumbing Code*.

**A4.303.3 Appliances.** Install at least one qualified ENERGY STAR dishwasher or clothes washer.

**Note:** See Section A5.303.3 for nonresidential dishwashers and clothes washers.

**A4.303.4 Nonwater urinals and waterless toilets.** Nonwater urinals or composting toilets are installed.

Where approved, hybrid urinals, as defined in Chapter 2, shall be considered nonwater urinals.

**A4.303.5 Hot water recirculation systems.** One- and two-family dwellings shall be equipped with a demand hot water recirculation system, as defined in Chapter 2. The demand hot water recirculation system shall be installed in accordance with the *California Plumbing Code*, *California Energy Code*, and the manufacturer's installation instructions.

#### SECTION A4.304 OUTDOOR WATER USE

**A4.304.1 Rainwater catchment systems.** An approved rainwater catchment system is designed and installed to use rainwater generated by at least 65 percent of the available roof area. Rainwater catchment systems shall be designed and installed in accordance with the *California Plumbing Code*.

**A4.304.2 Potable water elimination.** When landscaping is provided and as allowed by local ordinance, a water efficient landscape irrigation design that eliminates the use of potable water beyond the initial requirements for plant installation and establishment shall be provided. Methods used to accomplish the requirements of this section shall comply with the requirements of the *California Building Standards Code* and shall include, but not be limited to, the following:

1. Use of captured rainwater.
2. Use of recycled water.
3. Water treated for irrigation purposes and conveyed by a water district or public entity.
4. Use of graywater.
5. Use of drought tolerant plants.

**A4.304.3 Landscape water meters.** For new water service connections, landscaped irrigated areas less than 5,000 square feet shall be provided with separate submeters or metering devices for outdoor potable water use.

#### SECTION A4.305 WATER REUSE SYSTEMS

**A4.305.1 Graywater.** Alternative plumbing piping is installed to permit the discharge from the clothes washer or other fixtures to be used for an irrigation system in compliance with the *California Plumbing Code*.

**A4.305.2 Recycled water piping.** Based on projected availability, dual water piping is installed for future use of recycled water at the following locations:

1. Interior piping for the use of recycled water is installed to serve all water closets, urinals and floor drains.
2. Exterior piping is installed to transport recycled water from the point of connection to the structure. Recycled water systems shall be designed and installed in accordance with the *California Plumbing Code*.

**A4.305.3 Recycled water for landscape irrigation.** Recycled water is used for landscape irrigation.

#### SECTION A4.306 INNOVATIVE CONCEPTS AND LOCAL ENVIRONMENTAL CONDITIONS

**A4.306.1 Innovative concepts and local environmental conditions.** The provisions of this code are not intended to prevent the use of any alternate material, appliance, installation, device, arrangement, method, design or method of construction not specifically prescribed by this code. This code does not limit the authority of city, county, or city and county government to make necessary changes to the provisions contained in this code pursuant to Section 101.7.1.



## APPENDIX A4

# RESIDENTIAL VOLUNTARY MEASURES

### **Division A4.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY**

#### **SECTION A4.401 GENERAL (Reserved)**

#### **SECTION A4.402 DEFINITIONS**

**A4.402.1 Definitions.** The following terms are defined in Chapter 2.

**ASSEMBLY (ASSEMBLY PRODUCT).**

**POSTCONSUMER CONTENT.**

**PRECONSUMER (OR POSTINDUSTRIAL) CONTENT.**

**PROPORTIONAL RECYCLED CONTENT (PRC<sub>M</sub>).**

**RECYCLED CONTENT (RC).**

**RECYCLED CONTENT VALUE (RCV).**

**Assembly products (RCV<sub>A</sub>).**

**Materials (RCV<sub>M</sub>).**

#### **SECTION A4.403 FOUNDATION SYSTEMS**

**A4.403.1 Frost protected foundation systems.** As allowed by local conditions, utilize a Frost-Protected Shallow Foundation (FPSF) in compliance with the *California Residential Code* (CRC). When an FPSF foundation system is installed, the manual required by Section 4.410.1 shall include instructions to the owner or occupant regarding the necessity for heating the structure as required in Section R403.3 of the *California Residential Code*.

**A4.403.2 Reduction in cement use.** As allowed by the enforcing agency, cement used in foundation mix design shall be reduced as follows:

**Tier 1.** Not less than a 20 percent reduction in cement use.

**Tier 2.** Not less than a 25 percent reduction in cement use.

**Note:** Products commonly used to replace cement in concrete mix designs include, but are not limited to:

1. Fly ash.
2. Slag.
3. Silica fume.
4. Rice hull ash.

#### **SECTION A4.404 EFFICIENT FRAMING TECHNIQUES**

**A4.404.1 Lumber size.** Beams, headers and trimmers are sized and installed as specified in Chapter 23 of the *California*

*Building Code*, or Chapter 6 of the *California Residential Code*, as applicable. Other calculations acceptable to the enforcing agency which use the minimum size member for the tributary load shall be acceptable.

**A4.404.2 Dimensions and layouts.** Building dimensions and layouts are designed to minimize waste by one or more of the following measures in at least 80 percent of the structure:

1. Building design dimensions in 2-foot increments are used.
2. Windows and doors are located at regular 16" or 24" stud positions.
3. Other methods acceptable to the enforcing agency.

**A4.404.3 Building systems.** Use premanufactured building systems to eliminate solid sawn lumber whenever possible. One or more of the following premanufactured building systems is used:

1. Composite floor joist or premanufactured floor framing system.
2. Composite roof rafters or premanufactured roof framing system.
3. Panelized (SIPS, ICF or similar) framing systems.
4. Other methods approved by the enforcing agency.

**A4.404.4 Pre-cut materials and details.** Material lists are included in the plans which specify the material quantity and provide direction for on-site cuts to be made from the material provided. Material lists and direction shall be provided for the following systems:

1. Floor framing.
2. Wall framing.
3. Ceiling and roof framing.
4. Structural panels and roof sheathing.

#### **SECTION A4.405 MATERIAL SOURCES**

**A4.405.1 Prefinished building materials.** Utilize prefinished building materials which do not require additional painting or staining when possible. One or more of the following building materials that do not require additional resources for finishing are used:

1. Exterior trim not requiring paint or stain.
2. Windows not requiring paint or stain.
3. Siding or exterior wall coverings which do not require paint or stain.

**A4.405.2 Concrete floors.** Floors that do not require additional coverings are used including but not limited to stained, natural or stamped concrete floors.



## RESIDENTIAL VOLUNTARY MEASURES

**A4.405.3 Recycled content.** Comply with the requirements for recycled content in Section A4.405.3.1.

**A4.405.3.1 Recycled content.** Use materials, equivalent in performance to virgin materials with a total (combined) recycled content value (RCV) of:

**Tier 1.** The RCV shall not be less than 10 percent of the total material cost of the project.

$$\text{Required Total RCV (dollars)} = \text{Total Material Cost (dollars)} \times 10 \text{ percent} \quad (\text{Equation A4. 4-1})$$

**Tier 2.** The RCV shall not be less than 15 percent of the total material cost of the project.

$$\text{Required Total RCV (dollars)} = \text{Total Material Cost (dollars)} \times 15 \text{ percent} \quad (\text{Equation A4. 4-2})$$

For the purposes of this section, materials used as components of the structural frame shall not be used to calculate recycled content. The structural frame includes the load bearing structural elements, such as wall studs, plates, sills, columns, beams, girders, joists, rafters and trusses.

### Notes:

1. Sample forms which allow user input and automatic calculation are located at <http://www.hcd.ca.gov/building-standards/calgreen/calgreen-form.shtml> and may be used to simplify documenting compliance with this section and for calculating recycled content value of materials or assembly products.
2. Sources and recycled content of some recycled materials can be obtained from CalRecycle if not provided by the manufacturer.

**A4.405.3.1.1 Total material cost.** Total material cost is the total estimated or actual cost of materials and assembly products used in the project. The required total recycled content value for the project (in dollars) shall be determined by Equation A4.4-1 or Equation A4.4-2.

Total material cost shall be calculated by using one of the methods specified below:

1. **Simplified method.** To obtain the total cost of the project, multiply the square footage of the residential structure by the square foot valuation established pursuant to the ICC Building Valuation Data (BVD) or other valuation data approved and/or established by the enforcing agency. The total material cost is 45 percent of the total cost of the project. Use Equations A4.4-3A or A4.4-3B to determine total material costs using the simplified method.

$$\text{Total material costs} = \text{Project square footage} \times \text{square foot valuation} \times 45 \text{ percent} \quad (\text{Equation A4.4-3A})$$

$$\text{Total estimated or actual cost of project} \times 45 \text{ percent} \quad (\text{Equation A4.4-3B})$$

2. **Detailed method.** To obtain the total cost of the project, add the estimated and/or actual costs of materials used for the project, including the struc-

ture (steel, concrete, wood or masonry); the enclosure (roof, windows, doors and exterior walls); the interior walls, ceilings and finishes (gypsum board, ceiling tiles, etc.). The total estimated and/or actual costs shall not include fees, labor and installation costs, overhead, appliances, equipment, furniture or furnishings.

**A4.405.3.1.2 Determination of total recycled content value (RCV).** Total RCV may be determined either by dollars or percentage as noted below.

1. **Total recycled content value for the project (in dollars).** This is the sum of the recycled content value of the materials and/or assemblies considered and shall be determined by Equation A4.4-4. The result of this calculation may be directly compared to Equations A4.4-1 and A4.4-2 to determine compliance with Tier 1 or Tier 2 prerequisites.

$$\text{Total Recycled Content Value (dollars)} = (\text{RCV}_M + \text{RCV}_A) \quad (\text{Equation A4.4-4})$$

2. **Total recycled content value for the project (by percentage).** This is expressed as a percentage of the total material cost and shall be determined by Equation A4.4-4 and Equation A4.4-5. The result of this calculation may be directly compared for compliance with Tier 1 (10 percent) or Tier 2 (15 percent) prerequisites.

$$\text{Total Recycled Content Value (percent)} = \frac{[\text{Total Recycled Content Value (dollars)}]}{\text{Total Material Cost (dollars)}} \times 100$$

(Equation A4.4-5)

**A4.405.3.1.3 Determination of recycled content value of materials (RCV<sub>M</sub>).** The recycled content value of each material (RCV<sub>M</sub>) is calculated by multiplying the cost of material, as defined by the recycled content. See Equations A4.4-6 and A4.4-7.

$$\text{RCV}_M \text{ (dollars)} = \text{Material cost (dollars)} \times \text{RC}_M \text{ (percent)}$$

(Equation A4.4-6)

$$\text{RC}_M \text{ (percent)} = \text{Postconsumer content percentage} + \left(\frac{1}{2}\right) \text{Preconsumer content percentage} \quad (\text{Equation A4.4-7})$$

### Notes:

1. If the postconsumer and preconsumer recycled content is provided in pounds, Equation A4.4-7 may be used, but the final result (in pounds) must be multiplied by 100 to show RC<sub>M</sub> as a percentage.
2. If the manufacturer reports total recycled content of a material as one percentage in lieu of separately reporting preconsumer and postconsumer values, the total shall be considered preconsumer recycled material.

**A4.405.3.1.4 Determination of recycled content value of assemblies – (RCV<sub>A</sub>).** Recycled content value of assemblies is calculated by multiplying the total cost

of the assembly by the total recycled content of the assembly ( $RC_A$ ), and shall be determined by Equation A4.4-8.

$$RCV_A \text{ (dollars)} = \text{Assembly cost (dollars)} \times \text{Total } RC_A \text{ (percent)} \quad (\text{Equation A4.4-8})$$

If not provided by the manufacturer, Total  $RC_A$  (percent) is the sum ( $\Sigma$ ) of the Proportional Recycled Content ( $PRC_M$ ) of each material in the assembly.  $RC_A$  shall be determined by Equation A4.4-9.

$$RC_A = \Sigma PRC_M \quad (\text{Equation A4.4-9})$$

$PRC_M$  of each material may be calculated by one of two methods using the following formulas:

**Method 1: Recycled content (postconsumer and preconsumer) of each material provided in percentages**

$$PRC_M \text{ (percent)} = \frac{\text{Weight of material (percent)}}{\text{Weight of assembly (percent)}} \times RC_M \text{ (percent)} \quad (\text{Equation A4.4-10})$$

$$\text{Weight of material (percent)} = \frac{[\text{Weight of material (lbs)} \div \text{Weight of assembly (lbs)}] \times 100}{RC_M \text{ (percent)}} \quad (\text{Equation A4.4-11})$$

$$RC_M \text{ (percent)} = \text{Postconsumer content percentage} + \left(\frac{1}{2}\right) \text{Preconsumer content percentage} \quad (\text{See Equation A4.4-7})$$

**Method 2: Recycled content (postconsumer and preconsumer) provided in pounds**

$$PRC_M \text{ (percent)} = \frac{RC_M \text{ (lbs)}}{\text{Weight of material (lbs)}} \times 100 \quad (\text{Equation A4.4-12})$$

$$RC_M \text{ (lbs)} = \text{Postconsumer content (lbs)} + \left(\frac{1}{2}\right) \text{Preconsumer content (lbs)} \quad (\text{Equation A4.4-13})$$

**Note:** If the manufacturer reports total recycled content of a material as one percentage in lieu of separately reporting preconsumer and postconsumer values, the total shall be considered preconsumer recycled material.

**A4.405.3.1.5 Alternate method for concrete.** When Supplementary Cementitious Materials (SCMs), such as fly ash or ground blast furnace slag cement, are used in concrete, an alternate method of calculating and reporting recycled content in concrete products shall be permitted. When determining the recycled content value, the percent recycled content shall be multiplied by the cost of the cementitious materials only, not the total cost of the concrete.

**A4.405.4 Use of building materials from rapidly renewable sources.** One or more of the following materials manufactured from rapidly renewable sources or agricultural by-products is used:

1. Insulation.
2. Bamboo or cork.
3. Engineered products.

4. Agricultural based products.

5. Other products acceptable to the enforcing agency.

**Note:** The intent of this section is to utilize building materials and products which are typically harvested within a 10-year or shorter cycle.

## SECTION A4.406 ENHANCED DURABILITY AND REDUCED MAINTENANCE (Reserved)

## SECTION A4.407 WATER RESISTANCE AND MOISTURE MANAGEMENT

**A4.407.1 Drainage around foundations.** Install foundation and landscape drains which discharge to a dry well, sump, bioswale or other approved on-site location.

**A4.407.2 Roof drainage.** Install gutter and downspout systems to route water at least 5 feet away from the foundation or connect to landscape drains which discharge to a dry well, sump, bioswale, rainwater capture system or other approved on-site location.

**A4.407.3 Flashing details.** Provide flashing details on the building plans which comply with accepted industry standards or manufacturer's instructions. Details are shown on house plans at all of the following locations:

1. Around windows and doors.
2. Roof valleys.
3. Deck connections to the structure.
4. Roof-to-wall intersections.
5. Chimneys to roof intersections.
6. Drip caps above windows and doors with architectural projections.

**Note:** Reference details may be found in the *Residential Sheet Metal Guidelines* published by the Sheet Metal and Air Conditioning Contractors' National Association Inc.

**A4.407.4 Material protection.** Protect building materials delivered to the construction site from rain and other sources of moisture.

**A4.407.5 Ice and water barriers.** In Climate Zone 16, an ice and water barrier is installed at valley, eaves and wall to roof intersections. The ice and water barrier shall extend at least 24 inches inside the exterior wall line or as specified by the manufacturer's installation instructions.

**A4.407.6 Door protection.** Exterior doors to the dwelling are covered to prevent water intrusion by one or more of the following:

1. An awning at least 4 feet in depth is installed.

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2. The door is protected by a roof overhang at least 4 feet in depth.
3. The door is recessed at least 4 feet.
4. Other methods which provide equivalent protection.

**A4.407.7 Roof overhangs.** A permanent overhang or awning at least 2 feet in depth is provided at all exterior walls.

does not limit the authority of city, county, or city and county government to make necessary changes to the provisions contained in this code pursuant to Section 101.7.1.

### SECTION A4.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

**A4.408.1 Enhanced construction waste reduction.** Non-hazardous construction and demolition debris generated at the site is diverted to recycle or salvage in compliance with one of the following:

**Tier 1.** At least a 65 percent reduction. Any mixed recyclables that are sent to mixed-waste recycling facilities shall include a qualified third party verified facility average diversion rate. Verification of diversion rates shall meet minimum certification eligibility guidelines, acceptable to the local enforcing agency.

**Tier 2.** At least a 75 percent reduction with a third-party verification as required for Tier 1.

**Exceptions:**

1. Equivalent or alternative waste reduction methods are developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
2. The enforcing agency may make exceptions to the requirements of this section when jobsites are located in areas beyond the haul boundaries of the diversion facility.

**A4.408.1.1 Documentation.** Documentation shall be provided to the enforcing agency which demonstrates compliance with this section. Documentation shall be in compliance with Section 4.408.5.

### SECTION A4.409 LIFE CYCLE ASSESSMENT (Reserved)

### SECTION A4.410 BUILDING MAINTENANCE AND OPERATION (Reserved)

### SECTION A4.411 INNOVATIVE CONCEPTS AND LOCAL ENVIRONMENTAL CONDITIONS

**A4.411.1 Innovative concepts and local environmental conditions.** The provisions of this code are not intended to prevent the use of any alternate material, appliance, installation, device, arrangement, method, design or method of construction not specifically prescribed by this code. This code

## APPENDIX A4

# RESIDENTIAL VOLUNTARY MEASURES

### Division A4.5 – ENVIRONMENTAL QUALITY

#### SECTION A4.501 GENERAL (Reserved)

#### SECTION A4.502 DEFINITIONS

**A4.502.1 Definitions.** The following terms are defined in Chapter 2.

**MERV.**

**NO ADDED FORMALDEHYDE (NAF) BASED RESINS.**

**ULTRA-LOW EMITTING FORMALDEHYDE (ULEF) RESINS.**

#### SECTION A4.503 FIREPLACES (Reserved)

#### SECTION A4.504 POLLUTANT CONTROL

**A4.504.1 Compliance with formaldehyde limits.** Use composite wood products made with either California Air Resources Board approved no-added formaldehyde (NAF) resins or ultra-low emitting formaldehyde (ULEF) resins.

**Note:** Documentation must be provided that verifies that finish materials are certified to meet the pollutant emission limits.

**A4.504.2 Resilient flooring systems.** Resilient flooring systems installed in the building shall meet the percentages specified in this section and comply with the VOC-emission limits defined in at least one of the following:

1. Products compliant with the California Department of Public Health, “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers,” Version 1.1, February 2010 (also known as Specification 01350), certified as a CHPS Low-Emitting Material in the Collaborative for High Performance Schools (CHPS) High Performance Products Database.
2. Products certified UL GREENGUARD Gold (formerly the Greenguard Children & Schools program.)
3. Certification under the Resilient Floor Covering Institute (RFCI) FloorScore program.
4. Meet the California Department of Public Health, “Standard Method for the Testing and Evaluation of

Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers,” Version 1.1, February 2010 (also known as Specification 01350.)

**Tier 1.** At least 90 percent of the total area of resilient flooring installed shall comply.

**Tier 2.** At least 100 percent of the total area of resilient flooring installed shall comply.

**Exception for Tier 2:** An allowance for up to 5 percent specialty purpose flooring may be permitted.

**Note:** Documentation must be provided that verifies that finish materials are certified to meet the pollutant emission limits in this section.

**A4.504.3 Thermal insulation.** Thermal insulation installed in the building shall meet the following requirements:

**Tier 1.** Install thermal insulation in compliance with the California Department of Public Health, “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers,” Version 1.1, February 2010 (also known as Specification 01350), certified as a CHPS Low-Emitting Material in the Collaborative for High Performance Schools (CHPS) High Performance Products Database; products certified under the UL GREENGUARD Gold (formerly Greenguard Children & Schools program); or meet California Department of Public Health, “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers,” Version 1.1, February 2010 (also known as Specification 01350).

**Tier 2.** Install insulation which complies with Tier 1 plus does not contain any added formaldehyde.

**Note:** Documentation must be provided that verifies the materials are certified to meet the pollutant emission limits in this section.

#### SECTION A4.505 INTERIOR MOISTURE CONTROL (Reserved)

#### SECTION A4.506 INDOOR AIR QUALITY AND EXHAUST

**A4.506.1 Reserved.**

**A4.506.2 Construction filter.** [HR] Provide filters on return air openings rated at MERV 8 or higher during construction.

**A4.506.3 Direct-vent appliances.** Direct-vent heating and cooling equipment shall be utilized if the equipment will be located in the conditioned space or install the space heating and water heating equipment in an isolated mechanical room.

**RESIDENTIAL VOLUNTARY MEASURES****SECTION A4.507  
ENVIRONMENTAL COMFORT  
(Reserved)****SECTION A4.508  
OUTDOOR AIR QUALITY  
(Reserved)****SECTION A4.509  
INNOVATIVE CONCEPTS AND LOCAL  
ENVIRONMENTAL CONDITIONS**

**A4.509.1 Innovative concepts and local environmental conditions.** The provisions of this code are not intended to prevent the use of any alternate material, appliance, installation, device, arrangement, method, design or method of construction not specifically prescribed by this code. This code does not limit the authority of city, county, or city and county government to make necessary changes to the provisions contained in this code pursuant to Section 101.7.1.



## APPENDIX A4

# RESIDENTIAL VOLUNTARY MEASURES

### *Division A4.6 – TIER 1 AND TIER 2*

#### SECTION A4.601 GENERAL

**A4.601.1 Scope.** The measures contained in this appendix are not mandatory unless adopted by a city, county, or city and county as specified in Section 101.7. The provisions of this section outline means of achieving enhanced construction or reach levels by incorporating additional green building measures. In order to meet one of the tier levels designers, builders or property owners are required to incorporate additional green building measures necessary to meet the threshold of each level.

**A4.601.2 Prerequisite measures.** Tier 1 and Tier 2 thresholds require compliance with the mandatory provisions of this code and incorporation of the required prerequisite measures listed in Section A4.601.4.2 for Tier 1 and A4.601.5.2 for Tier 2. Prerequisite measures are also identified in the Residential Occupancies Application Checklist in Section A4.602.

As specified in Section 101.7, additional prerequisite measures may be included by the enforcing agency to address specific local environmental conditions and may be listed in the Innovative Concepts and Local Environmental Conditions portions of the checklist.

**A4.601.3 Elective measures.** In addition to the required measures, Tier 1 and Tier 2 buildings must incorporate at least the number of elective measures specified in Sections A4.601.4.2 and A4.601.5.2.

**A4.601.4 Tier 1.** To achieve Tier 1 status a project must comply with the following:

**A4.601.4.1 Mandatory measures for Tier 1.** The project shall meet or exceed all of the mandatory measures in Chapter 4, Divisions 4.1 through 4.5 and Chapter 7 as applicable.

**A4.601.4.2 Prerequisite and elective measures for Tier 1.** In addition to the mandatory measures, compliance with the following prerequisite and elective measures from Appendix A4 is also required to achieve Tier 1 status:

1. From Division A4.1, Planning and Design.
  - 1.1. Comply with the topsoil protection requirements in Section A4.106.2.3.
  - 1.2. Comply with the 20 percent permeable paving requirements in Section A4.106.4.
  - 1.3. Comply with the cool roof requirements in Section A4.106.5.
  - 1.4. Comply with the Tier 1 electric vehicle (EV) charging requirements in Section A4.106.8.
  - 1.5. Comply with at least two elective measures selected from Division A4.1.

2. From Division A4.2, Energy Efficiency.

- 2.1. For newly constructed low-rise residential buildings, comply with the energy efficiency requirements in Sections A4.203.1.1.1, A4.203.1.1.2, Table A4.203.1.1.1, A4.203.1.2, A4.203.1.3.1 and A4.203.1.4.

3. From Division A4.3, Water Efficiency and Conservation.

- 3.1. Comply with at least two elective measures selected from Division A4.3.

4. From Division A4.4, Material Conservation and Resource Efficiency.

- 4.1. Comply with the 20 percent cement reduction requirements in Section A4.403.2.
- 4.2. Comply with the 10 percent recycled content requirements in Section A4.405.3.1.
- 4.3. Comply with the 65 percent reduction in construction waste in Section A4.408.1.
- 4.4. Comply with at least two elective measures selected from Division A4.4.

5. From Division A4.5, Environmental Quality.

- 5.1. Comply with the 90 percent resilient flooring systems requirements in Section A4.504.2.
- 5.2. Comply with the thermal insulation requirements for Tier 1 in Section A4.504.3.
- 5.3. Comply with at least one elective measure selected from Division A4.5.

**Note:** The Residential Occupancies Application Checklist contained in Section A4.602 may be used to show which elective measures are selected.

**A4.601.5 Tier 2.** To achieve Tier 2 status a project must comply with the following.

**Note:** The measures necessary to achieve Tier 2 status are very stringent. Cities, counties, and cities and counties considering adoption of Tier 2 as mandatory should carefully consider the stringency of each measure and ensure that the measures are achievable in their location.

**A4.601.5.1 Mandatory measures for Tier 2.** The project shall meet or exceed all of the mandatory measures in Chapter 4, Divisions 4.1 through 4.5 and Chapter 7 as applicable.

**A4.601.5.2 Prerequisite and elective measures for Tier 2.** In addition to the mandatory measures, compliance with the following prerequisite and elective measures from Appendix A4 is also required to achieve Tier 2 status.

1. From Division A4.1, Planning and Design.
  - 1.1. Comply with the topsoil protection requirements for Tier 1 and Tier 2 in Section A4.106.2.3.



## RESIDENTIAL VOLUNTARY MEASURES

- 1.2. Comply with the 30 percent permeable paving requirements in Section A4.106.4.
- 1.3. Comply with the cool roof requirements in Section A4.106.5.
- 1.4. Comply with the Tier 2 electric vehicle (EV) charging requirements in Section A4.106.8.
- 1.5. Comply with at least four elective measures selected from Division A4.1.
2. From Division A4.2, Energy Efficiency.
  - 2.1. For newly constructed low-rise residential buildings, comply with the energy efficiency requirements in Sections A4.203.1.1.1, A4.203.1.1.2, Table A4.203.1.1.1, A4.203.1.2, A4.203.1.3.2 and A4.303.1.4.
3. From Division A4.3, Water Efficiency and Conservation.
  - 3.1. Comply with at least three elective measures selected from Division A4.3.
4. From Division A4.4, Material Conservation and Resource Efficiency.
  - 4.1. Comply with the 25 percent cement reduction requirements in Section A4.403.2.
  - 4.2. Comply with the 15 percent recycled content requirements in Section A4.405.3.1.
  - 4.3. Comply with the 75 percent reduction in construction waste in Section A4.408.1.
  - 4.4. Comply with at least four elective measures selected from Division A4.4.
5. From Division A4.5, Environmental Quality.
  - 5.1. Comply with the 100 percent resilient flooring systems requirements in Section A4.504.2.
  - 5.2. Comply with the thermal insulation requirements for Tier 1 and Tier 2 in Section A4.504.3.
  - 5.3. Comply with at least one elective measure selected from Division A4.5.

**Note:** The Residential Occupancies Application Checklist contained in Section A4.602 may be used to show which elective measures are selected.

# DIVISION A4.6 – TIER 1 AND TIER 2—continued

## SECTION A4.602 RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD				
		Prerequisites and electives <sup>1</sup>		Enforcing Agency  <input type="checkbox"/> All	Installer or Designer  <input type="checkbox"/> All	Third party  <input type="checkbox"/> All		
		Mandatory	Tier 1	Tier 2				
<b>PLANNING AND DESIGN</b>								
<b>Site Selection</b>								
<b>A4.103.1</b> A site which complies with at least one of the following characteristics is selected: 1. An infill site is selected. 2. A greyfield site is selected. 3. An EPA-recognized Brownfield site is selected.		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
<b>A4.103.2</b> Facilitate community connectivity by one of the following methods: 1. Locate project within a 1/4-mile true walking distance of at least 4 basic services; 2. Locate project within 1/2-mile true walking distance of at least 7 basic services; 3. Other methods increasing access to additional resources.		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
<b>Site Preservation</b>								
<b>A4.104.1</b> An individual with oversight responsibility for the project has participated in an educational program promoting environmentally friendly design or development and has provided training or instruction to appropriate entities.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>Deconstruction and Reuse of Existing Materials</b>								
<b>A4.105.2</b> Existing buildings are disassembled for reuse or recycling of building materials. The proposed structure utilizes at least one of the following materials which can be easily reused: 1. Light fixtures 2. Plumbing fixtures 3. Doors and trim 4. Masonry 5. Electrical devices 6. Appliances 7. Foundations or portions of foundations		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>Site Development</b>								
<b>4.106.2</b> A plan is developed and implemented to manage storm water drainage during construction.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>4.106.3</b> Construction plans shall indicate how site grading or a drainage system will manage all surface water flows to keep water from entering buildings.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>4.106.4</b> Provide capability for electric vehicle charging for one- and two-family dwellings; townhouses with attached private garages; multifamily dwellings; and hotels/motels in accordance with Section 4.106.4.1, 4.106.4.2, or 4.106.4.3, as applicable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>A4.106.1 Reserved</b>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

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## RESIDENTIAL VOLUNTARY MEASURES

**SECTION A4.602**  
**RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST—continued**

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD		
	Mandatory	Prerequisites and electives <sup>1</sup>		Enforcing Agency	Installer or Designer	Third party
		Tier 1	Tier 2	<input type="checkbox"/> All	<input type="checkbox"/> All	<input type="checkbox"/> All
<b>A4.106.2.1</b> Soil analysis is performed by a licensed design professional and the findings utilized in the structural design of the building.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.106.2.2</b> Soil disturbance and erosion are minimized by at least one of the following: 1. Natural drainage patterns are evaluated and erosion controls are implemented to minimize erosion during construction and after occupancy. 2. Site access is accomplished by minimizing the amount of cut and fill needed to install access roads and driveways. 3. Underground construction activities are coordinated to utilize the same trench, minimize the amount of time the disturbed soil is exposed and the soil is replaced using accepted compaction methods.		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>A4.106.2.3</b> Topsoil shall be protected or saved for reuse as specified in this section. <b>Tier 1.</b> Displaced topsoil shall be stockpiled for reuse in a designated area and covered or protected from erosion. <b>Tier 2.</b> The construction area shall be identified and delineated by fencing or flagging to limit construction activity to the construction area.		<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup> <input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.106.3</b> Postconstruction landscape designs accomplish one or more of the following: 1. Areas disrupted during construction are restored to be consistent with native vegetation species and patterns. 2. Utilize at least 75 percent native California or drought tolerant plant and tree species appropriate for the climate zone region.		<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
<b>A4.106.4</b> Permeable paving is utilized for the parking, walking or patio surfaces in compliance with the following: <b>Tier 1.</b> Not less than 20 percent of the total parking, walking or patio surfaces shall be permeable. <b>Tier 2.</b> Not less than 30 percent of the total parking, walking or patio surfaces shall be permeable.		<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
<b>A4.106.5</b> Roofing materials shall have a minimum 3-year aged solar reflectance and thermal emittance or a minimum Solar Reflectance Index (SRI) equal to or greater than the values specified in the applicable tables. <b>Low-rise Residential</b> <b>Tier 1</b> roof covering shall meet or exceed the values contained in Table A4.106.5.1(1). <b>Tier 2</b> roof covering shall meet or exceed the values contained in Table A4.106.5.1(2). <b>High-rise Residential, Hotels and Motels</b> <b>Tier 1</b> roof covering shall meet or exceed the values contained in Table A4.106.5.1(3). <b>Tier 2</b> roof covering shall meet or exceed the values contained in Table A4.106.5.1(4).		<input checked="" type="checkbox"/> <sup>2</sup>  <input checked="" type="checkbox"/> <sup>2</sup>	 <input checked="" type="checkbox"/> <sup>2</sup>  <input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

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## RESIDENTIAL VOLUNTARY MEASURES

**SECTION A4.602**  
**RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST—continued**

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD		
		Prerequisites and electives <sup>1</sup>		Enforcing Agency  <input type="checkbox"/> All	Installer or Designer  <input type="checkbox"/> All	Third party  <input type="checkbox"/> All
		Mandatory	Tier 1	Tier 2		
<b>A4.106.6</b> Install a vegetated roof for at least 50 percent of the roof area. Vegetated roofs shall comply with requirements for roof gardens and landscaped roofs in the <i>California Building Code</i> , Chapters 15 and 16.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.106.7</b> Reduce nonroof heat islands for 50 percent of sidewalks, patios, driveways or other paved areas by using one or more of the methods listed.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.106.8.1 Tier 1 and Tier 2</b> for one- and two-family dwellings and townhouses with attached private garages. Install a dedicated 208/240-volt branch circuit, including an overcurrent protective device rated at 40 amperes minimum per dwelling unit.			<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.106.8.2</b> Provide capability for future electric vehicle charging in new multifamily dwellings, as specified. <b>Tier 1.</b> In 15 percent of total parking spaces. <b>Tier 2.</b> In 20 percent of total parking spaces.			<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
<b>A4.106.8.3</b> Provide electric vehicle spaces for new hotels and motels. <b>Tier 1.</b> Install EV spaces per Table A4.106.8.3.1. <b>Tier 2.</b> Install EV spaces per Table A4.106.8.3.2.			<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
<b>A4.106.9</b> Provide bicycle parking facilities as noted below or meet a local ordinance, whichever is more stringent. Number of bicycle parking spaces may be reduced, as approved by the enforcing agency, due to building site characteristics, including but not limited to, isolation from other development. 1. Provide short-term bicycle parking, per Section A4.106.9.1. 2. Provide long-term bicycle parking for multifamily buildings, per Section A4.106.9.2. 3. Provide long-term bicycle parking for hotel and motel buildings, per Section A4.106.9.3.			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>A4.106.10 [HR]</b> Outdoor lighting systems shall be designed and installed to comply with: 1. The minimum requirements in the <i>California Energy Code</i> for Lighting Zones 1-4; and 2. Backlight, Uplight and Glare (BUG) ratings as defined in IES TM-15-11; and 3. Allowable BUG ratings not exceeding those shown in Table A4.106.10; or Comply with a lawfully enacted local ordinance, whichever is more stringent.			<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>

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## RESIDENTIAL VOLUNTARY MEASURES

**SECTION A4.602**  
**RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST—continued**

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD		
		Prerequisites and electives <sup>1</sup>		Enforcing Agency  <input type="checkbox"/> All	Installer or Designer  <input type="checkbox"/> All	Third party  <input type="checkbox"/> All
		Mandatory	Tier 1			
Innovative Concepts and Local Environmental Conditions						
A4.108.1 Items in this section are necessary to address innovative concepts or local environmental conditions.						
Item 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Item 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Item 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENERGY EFFICIENCY						
General						
4.201.1 Building meets or exceeds the requirements of the <i>California Building Energy Efficiency Standards</i> <sup>3</sup> .	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Performance Approach for Newly Constructed Buildings						
A4.203.1.1.1 Tier 1 and Tier 2. Total Energy Design Rating (Total EDR) and Energy Efficiency Design Rating (Efficiency EDR) for the Proposed Design Building is included in the Certificate of Compliance documentation.		<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A4.203.1.1.2 Tier 1 and Tier 2. Quality Insulation Installation procedures specified in the Building Energy Efficiency Standards Reference Appendices RA3.5 are completed.		<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A4.203.1.2 Tier 1 and Tier 2 prerequisite options. One of the following options is required. • Roof deck insulation or ducts in conditioned space. • High-performance walls. • HERS-verified compact hot water distribution system. • HERS-verified drain water heat recovery.		<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A4.203.1.3.1 Tier 1: Buildings complying with the first level of advanced energy efficiency shall have additional integrated efficiency and onsite renewable energy generation to achieve a Total EDR for Tier 1 as specified in Table A4.203.1.1.1 or lower as calculated by Title 24, Part 6 Compliance Software approved by the Energy Commission. This Total EDR is in addition to meeting the Efficiency EDR.		<input checked="" type="checkbox"/> <sup>2</sup>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A4.203.1.3.2 Tier 2: Buildings complying with the second level of advanced energy efficiency shall have additional integrated efficiency and onsite renewable energy generation to achieve a Total EDR for Tier 2 as specified in Table A4.203.1.1.1 or lower as calculated by Title 24, Part 6 Compliance Software approved by the Energy Commission. This Total EDR is in addition to meeting the Efficiency EDR.			<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A4.203.1.4 Local jurisdictions adopting Tier 1 or Tier 2, or considering community shared solar or storage options as specified, shall consult with the local electric service for acceptance.		<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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## RESIDENTIAL VOLUNTARY MEASURES

**SECTION A4.602**  
**RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST—continued**

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD		
	Mandatory	Prerequisites and electives <sup>1</sup>		Enforcing Agency  <input type="checkbox"/> All	Installer or Designer  <input type="checkbox"/> All	Third party  <input type="checkbox"/> All
		Tier 1	Tier 2			
<b>WATER EFFICIENCY AND CONSERVATION</b>						
<b>Indoor Water Use</b>						
<b>4.303.1</b> Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) installed in residential buildings shall comply with the prescriptive requirements of Sections 4.303.1.1 through 4.303.1.4.4.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.303.2</b> Plumbing fixtures and fittings required in Section 4.303.1 shall be installed in accordance with the <i>California Plumbing Code</i> , and shall meet the applicable referenced standards.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.303.1</b> The maximum flow rate of kitchen faucets shall not exceed 1.5 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.5 gallons per minute at 60 psi. <b>Note:</b> Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.303.1.4.3</b> Metering faucets in residential buildings shall not deliver more than 0.2 gallons per cycle.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.303.2</b> Alternate water source for nonpotable applications. Alternate nonpotable water sources are used for indoor potable water reduction. Alternate nonpotable water sources shall be installed in accordance with the <i>California Plumbing Code</i> .		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.303.3</b> Install at least one qualified ENERGY STAR dishwasher or clothes washer.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.303.4</b> Nonwater urinals or waterless toilets are installed.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.303.5</b> One- and two-family dwellings shall be equipped with a demand hot water recirculation system.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Outdoor Water Use</b>						
<b>4.304.1</b> Residential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient Landscape Ordinance (MWELO), whichever is more stringent.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.304.1</b> A rainwater capture, storage and re-use system is designed and installed.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.304.2</b> A landscape design is installed, which does not utilize potable water.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.304.3</b> For new water service connections, landscaped irrigated areas less than 5,000 square feet shall be provided with separate submeters or metering devices for outdoor potable water use.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

continued



## RESIDENTIAL VOLUNTARY MEASURES

**SECTION A4.602**  
**RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST—continued**

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD		
	Mandatory	Prerequisites and electives <sup>1</sup>		Enforcing Agency  ☐ All	Installer or Designer  ☐ All	Third party  ☐ All
		Tier 1	Tier 2			
Water Reuse Systems						
A4.305.1 Piping is installed to permit future use of a graywater irrigation system served by the clothes washer or other fixtures.		☐	☐	☐	☐	☐
A4.305.2 Recycled water piping is installed.		☐	☐	☐	☐	☐
A4.305.3 Recycled water is used for landscape irrigation.		☐	☐	☐	☐	☐
Innovative Concepts and Local Environmental Conditions						
A4.306.1 Items in this section are necessary to address innovative concepts or local environmental conditions.						
Item 1	☐	☐	☐	☐	☐	☐
Item 2	☐	☐	☐	☐	☐	☐
Item 3	☐	☐	☐	☐	☐	☐
MATERIAL CONSERVATION AND RESOURCE EFFICIENCY						
Foundation Systems						
A4.403.1 A Frost-protected Shallow Foundation (FPSF) is designed and constructed.		☐	☐	☐	☐	☐
A4.403.2 Cement use in foundation mix design is reduced. Tier 1. Not less than a 20 percent reduction in cement use. Tier 2. Not less than a 25 percent reduction in cement use.		☒ <sup>2</sup>	☒ <sup>2</sup>	☐	☐	☐
Efficient Framing Techniques						
A4.404.1 Beams and headers and trimmers are the minimum size to adequately support the load.		☐	☐	☐	☐	☐
A4.404.2 Building dimensions and layouts are designed to minimize waste.		☐	☐	☐	☐	☐
A4.404.3 Use premanufactured building systems to eliminate solid sawn lumber whenever possible.		☐	☐	☐	☐	☐
A4.404.4 Material lists are included in the plans which specify material quantity and provide direction for on-site cuts.		☐	☐	☐	☐	☐

continued

## RESIDENTIAL VOLUNTARY MEASURES

**SECTION A4.602**  
**RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST—continued**

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD		
		Prerequisites and electives <sup>1</sup>		Enforcing Agency  <input type="checkbox"/> All	Installer or Designer  <input type="checkbox"/> All	Third party  <input type="checkbox"/> All
		Mandatory	Tier 1	Tier 2		
<b>Material Sources</b>						
<b>A4.405.1</b> One or more of the following building materials, that do not require additional resources for finishing are used: 1. Exterior trim not requiring paint or stain 2. Windows not requiring paint or stain 3. Siding or exterior wall coverings which do not require paint or stain		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.405.2</b> Floors that do not require additional coverings are used including but not limited to stained, natural or stamped concrete floors.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.405.3</b> Postconsumer or preconsumer recycled content value (RCV) materials are used on the project. <b>Tier 1.</b> Not less than a 10 percent recycled content value. <b>Tier 2.</b> Not less than a 15 percent recycled content value.		<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.405.4</b> Renewable source building products are used.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Enhanced Durability and Reduced Maintenance</b>						
<b>4.406.1</b> Annular spaces around pipes, electric cables, conduits or other openings in plates at exterior walls shall be protected against the passage of rodents by closing such openings with cement mortar, concrete masonry or similar method acceptable to the enforcing agency.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Water Resistance and Moisture Management</b>						
<b>A4.407.1</b> Install foundation and landscape drains.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.407.2</b> Install gutter and downspout systems to route water at least 5 feet away from the foundation or connect to landscape drains which discharge to a dry well, sump, bioswale, rainwater capture system or other approved on-site location.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.407.3</b> Provide flashing details on the building plans and comply with accepted industry standards or manufacturer's instructions.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.407.4</b> Protect building materials delivered to the construction site from rain and other sources of moisture.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.407.5</b> In Climate Zone 16 an ice/water barrier is installed at roof valleys, eaves and wall to roof intersections.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.407.6</b> Exterior doors to the dwelling are protected to prevent water intrusion.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.407.7</b> A permanent overhang or awning at least 2 feet in depth is provided.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*continued*

## RESIDENTIAL VOLUNTARY MEASURES

**SECTION A4.602**  
**RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST—continued**

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD		
		Prerequisites and electives <sup>1</sup>		Enforcing Agency  <input type="checkbox"/> All	Installer or Designer  <input type="checkbox"/> All	Third party  <input type="checkbox"/> All
		Mandatory	Tier 1	Tier 2		
<b>Construction Waste Reduction, Disposal and Recycling</b>						
<b>4.408.1</b> Recycle and/or salvage for reuse a minimum of 65 percent of the nonhazardous construction and demolition waste in accordance with one of the following: 1. Comply with a more stringent local construction and demolition waste management ordinance; or 2. A construction waste management plan, per Section 4.408.2; or 3. A waste management company, per Section 4.408.3; or 4. The waste stream reduction alternative, per Section 4.408.4.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.408.1</b> Construction waste generated at the site is diverted to recycle or salvage in compliance with one of the following: 1. <b>Tier 1</b> at least a 65 percent reduction with a third-party verification. 2. <b>Tier 2</b> at least a 75 percent reduction with a third-party verification. <b>Exception:</b> Equivalent waste reduction methods are developed by working with local agencies.			<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Building Maintenance and Operation</b>						
<b>4.410.1</b> An operation and maintenance manual shall be provided to the building occupant or owner.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.410.2</b> Where 5 or more multifamily dwelling units are constructed on a building site, provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive. <b>Exception:</b> Rural jurisdictions that meet and apply for the exemption in Public Resources Code Section 42649.82 (a)(2)(A) et seq. will also be exempt from the organic waste portion of this section.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Innovative Concepts and Local Environmental Conditions</b>						
<b>A4.411.1</b> Items in this section are necessary to address innovative concepts or local environmental conditions.						
Item 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Item 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Item 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>ENVIRONMENTAL QUALITY</b>						
<b>Fireplaces</b>						
<b>4.503.1</b> Any installed gas fireplace shall be a direct-vent sealed-combustion type. Any installed woodstove or pellet stove shall comply with U.S. EPA New Source Performance Standards (NSPS) emission limits as applicable, and shall have a permanent label indicating they are certified to meet the emission limits. Woodstoves, pellet stoves and fireplaces shall also comply with applicable local ordinances.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Pollutant Control</b>						
<b>4.504.1</b> Duct openings and other related air distribution component openings shall be covered during construction.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.504.2.1</b> Adhesives, sealants and caulks shall be compliant with VOC and other toxic compound limits.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.504.2.2</b> Paints, stains and other coatings shall be compliant with VOC limits.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.504.2.3</b> Aerosol paints and coatings shall be compliant with product weighted MIR limits for ROC and other toxic compounds.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.504.2.4</b> Documentation shall be provided to verify that compliant VOC limit finish materials have been used.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

continued

## RESIDENTIAL VOLUNTARY MEASURES

**SECTION A4.602**  
**RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST—continued**

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD		
		Prerequisites and electives <sup>1</sup>		Enforcing Agency	Installer or Designer	Third party
		Mandatory	Tier 1			
<b>4.504.3</b> Carpet and carpet systems shall be compliant with VOC limits.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.504.4</b> 80 percent of floor area receiving resilient flooring shall comply with specified VOC criteria.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.504.5</b> Particleboard, medium density fiberboard (MDF) and hardwood plywood used in interior finish systems shall comply with low formaldehyde emission standards.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.504.1</b> Use composite wood products made with either California Air Resources Board approved no-added formaldehyde (NAF) resins or ultra-low emitting formaldehyde (ULEF) resins.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.504.2</b> Install VOC compliant resilient flooring systems. <b>Tier 1.</b> At least 90 percent of the resilient flooring installed shall comply. <b>Tier 2.</b> At least 100 percent of the resilient flooring installed shall comply.		<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.504.3</b> Thermal insulation installed in the building shall meet the following requirements: <b>Tier 1.</b> Install thermal insulation in compliance with VOC limits. <b>Tier 2.</b> Install insulation which contains No-Added Formaldehyde (NAF) and is in compliance with Tier 1.		<input checked="" type="checkbox"/> <sup>2</sup>	<input checked="" type="checkbox"/> <sup>2</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Interior Moisture Control</b>						
<b>4.505.2</b> Vapor retarder and capillary break is installed at slab-on-grade foundations.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4.505.3</b> Moisture content of building materials used in wall and floor framing is checked before enclosure.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Indoor Air Quality and Exhaust</b>						
<b>4.506.1</b> Each bathroom shall be provided with the following: 1. ENERGY STAR fans ducted to terminate outside the building. 2. Fans must be controlled by a humidity control (separate or built-in); OR functioning as a component of a whole-house ventilation system. 3. Humidity controls with manual or automatic means of adjustment, capable of adjustment between a relative humidity range of ≤ 50 percent to a maximum of 80 percent.	<input checked="" type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.506.1 Reserved.</b>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.506.2 [HR]</b> Provide filters on return air openings rated MERV 8 or higher during construction when it is necessary to use HVAC equipment.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A4.506.3</b> Direct-vent appliances shall be used when equipment is located in conditioned space; or the equipment must be installed in an isolated mechanical room.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

continued

## RESIDENTIAL VOLUNTARY MEASURES

**SECTION A4.602**  
**RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST—continued**

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD		
	Mandatory	Prerequisites and electives <sup>1</sup>		Enforcing Agency  ☐ All	Installer or Designer  ☐ All	Third party  ☐ All
		Tier 1	Tier 2			
Environmental Comfort						
4.507.2 Duct systems are sized, designed, and equipment is selected using the following methods: 1. Establish heat loss and heat gain values according to ANSI/ACCA 2 Manual J-2016 or equivalent. 2. Size duct systems according to ANSI/ACCA 1 Manual D-2016 or equivalent. 3. Select heating and cooling equipment according to ANSI/ACCA 3 Manual S-2014 or equivalent.	☒			☐	☐	☐
Outdoor Air Quality Reserved						
Innovative Concepts and Local Environmental Conditions						
A4.509.1 Items in this section are necessary to address innovative concepts or local environmental conditions.						
Item 1		☐	☐	☐	☐	☐
Item 2		☐	☐	☐	☐	☐
Item 3		☐	☐	☐	☐	☐
Installer and Special Inspector Qualifications						
Qualifications						
702.1 HVAC system installers are trained and certified in the proper installation of HVAC systems.	☒			☐	☐	☐
702.2 Special inspectors employed by the enforcing agency must be qualified and able to demonstrate competence in the discipline they are inspecting.	☒			☐	☐	☐
Verifications						
703.1 Verification of compliance with this code may include construction documents, plans, specifications builder or installer certification, inspection reports, or other methods acceptable to the enforcing agency which show substantial conformance.	☒			☐	☐	☐

1. Green building measures listed in this table may be mandatory if adopted by a city, county, or city and county as specified in Section 101.7.

2. Required prerequisite for this Tier.

3. These measures are currently required elsewhere in statute or in regulation.

## RESIDENTIAL VOLUNTARY MEASURES

**Division A4.7– RESIDENTIAL MODEL ORDINANCE**

**A4.701.1 General.** The voluntary measures of this code are designed and promulgated to be adopted by reference and made mandatory by local ordinance pursuant to Section 101.7. Jurisdictions wishing to adopt the voluntary provisions of this code as an enforceable regulation governing structures and premises should ensure that certain factual information is included in the adopting ordinance and that the measures are appropriate and achievable and are considered to be suitable

as mandatory by the city, county, or city and county. The following sample adoption ordinance addresses several key elements of a code adoption ordinance, including the information required for insertion into the code text.

This code does not limit the authority of city, county, or city and county government to make necessary changes to the provisions contained in this code.

**SAMPLE RESOLUTION FOR ADOPTION OF  
THE TIER 1 OR TIER 2 PROVISIONS OF THE CALIFORNIA GREEN BUILDING STANDARDS CODE WITH OR WITHOUT  
ADDITIONAL ITEMS NECESSARY TO ADDRESS INNOVATIVE CONCEPTS OR LOCAL ENVIRONMENTAL CONDITIONS.**

ATTACHMENT \_\_\_\_.

**SAMPLE RESOLUTION ADOPTING THE CALIFORNIA GREEN BUILDING STANDARDS CODE  
APPENDICES AS A MANDATORY REFERENCE STANDARD**

CITY OF \_\_\_\_\_

RESOLUTION # \_\_\_\_\_

**RESOLUTION ADOPTING ENHANCED GREEN BUILDING MEASURES FOR NEW AND EXISTING RESIDENTIAL CONSTRUCTION.**

**WHEREAS**, the City/County of \_\_\_\_\_ 's (City or County) General Plan sets forth goals for preserving and improving the natural and built environment of the City/County, protecting the health of its residents and visitors, and fostering its economy; and

**WHEREAS**, green building is a holistic approach to design, construction, and demolition that minimizes the building's impact on the environment, the occupants, and the community; and

**WHEREAS**, green buildings benefit building industry professionals, residents, and communities by improving construction quality; increasing building durability; reducing utility, maintenance, water and energy costs; creating healthier homes; and enhancing comfort and livability; and

**WHEREAS**, the *California Green Building Standards Code* appendices have included voluntary tiers to provide a city, county, or city and county, building professionals, and the general public with a range of voluntary green building measures for builders to choose from when constructing homes in California; and

**WHEREAS**, the *California Green Building Standards Code* appendices benefited from extensive input from a city, county, or city and county, building professionals, State agencies, and recognized green building professionals and the practices contained in these guidelines were selected for their viability in today's market and their ability to promote sustainable buildings and communities; and

**WHEREAS**, adoption of the *California Green Building Standards Code* appendices promotes statewide consistency and predictability for building professionals; and

**NOW THEREFORE, BE IT RESOLVED**, that the City/County hereby finds that green building design, construction and operation furthers the goals set forth in the City/County General Plan, including land use, conservation, open space and (include others, if applicable.)

**NOW THEREFORE, BE IT RESOLVED**, that newly constructed residential buildings, alterations or additions to residential buildings shall meet the \_\_\_\_\_ (Tier 1 or Tier 2) measures contained in the *California Green Building Standards Code* appendices and the green building design, construction, and operation innovative concepts or additions or amendment thereto contained in Attachment \_\_\_\_\_ to address local environmental conditions; and;

**NOW THEREFORE, BE IT FURTHER RESOLVED**, that the City Council or County Board of Supervisors of the City/County of \_\_\_\_\_ adopts the *California Green Building Standards Code* appendices, as they may be amended from time to time, as a City/County mandatory reference document and directs City/County staff to enforce these green building measures as mandatory standards within the City/County.

**ADOPTED BY THE FOLLOWING VOTE:**

**AYES:**

**NOES:**

**ABSENT:**





# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## APPENDIX A5 – NONRESIDENTIAL VOLUNTARY MEASURES

### DIVISION A5.1 – PLANNING AND DESIGN

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHPD						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X																				
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below																						
Chapter/Section																						

## APPENDIX A5

# NONRESIDENTIAL VOLUNTARY MEASURES

The measures contained in this appendix are not mandatory unless adopted by a city, county, or city and county as specified in Section 101.7 and provide additional measures that designers, builders and property owners may wish to consider during the planning, design and construction process.

### *Division A5.1 – PLANNING AND DESIGN*

#### PREFACE

Given that land use and planning are largely regulated locally, cities, counties and cities and counties should consider reducing greenhouse gas emissions associated with development through local land-use practices in conjunction with enforcing the provisions of this code. Specific land use strategies a city, county or city and county may wish to consider include but are not limited to the following:

**Site selection.** Develop sites for buildings, hardscape, roads or parking areas consistent with the local general plan and regional transportation plan pursuant to SB 375 (Stats. 2008, Ch. 728).

**Regional sustainable communities strategy.** Site selection and building design and use shall conform the project with the prevailing regional sustainable communities strategy or alternative planning strategy, whichever meets the greenhouse gas target established by the California Air Resources Board pursuant to SB375 (Stats. 2008, Ch. 728), including the general location of uses, residential densities and building intensities.

**Transit priority projects.** To qualify as a transit priority project, the project shall meet three criteria:

- (1) (a) contain at least 50 percent residential use, based on total building square footage and, if the project contains between 26 and 50 percent nonresidential uses, a floor area ratio of not less than 0.75; (b) provide a minimum net density of at least 20 dwelling units per acre; and (c) be within one-half mile of a major transit stop or high-quality

transit corridor included in a regional transportation plan as described in Section 21155 of Stats. 2008, Ch. 728;

(2) be consistent with the prevailing sustainable communities strategy or alternative planning strategy, whichever meets the greenhouse gas target established by the California Air Resources Board, including the general location of uses, residential densities and building intensities; and

(3) have all necessary entitlements required by the applicable local government.

**Note:** For additional information, see Government Code Sections 65080, 65080.1 and 65400 and Public Resources Code Sections 21061.3 and 21155.

#### SECTION A5.101 GENERAL

**A5.101.1 Scope.** The provisions of this chapter outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

#### SECTION A5.102 DEFINITIONS

**A5.102.1 Definitions.** The following terms are defined in Chapter 2.

**ALBEDO.**

**BIORETENTION.**

**BROWNFIELD SITE.**

## NONRESIDENTIAL VOLUNTARY MEASURES

**DEVELOPMENT FOOTPRINT.**

**FLOOR AREA RATIO.**

**GREENFIELDS.**

**GREYFIELD SITE.**

**INFILL SITE.**

**LOW-EMITTING AND FUEL EFFICIENT VEHICLES.**

**LOW IMPACT DEVELOPMENT (LID).**

**NEIGHBORHOOD ELECTRIC VEHICLE (NEV).**

**PERMEABLE PAVING.**

**SOLAR REFLECTANCE.**

**SOLAR REFLECTANCE INDEX (SRI).**

**THERMAL EMITTANCE.**

**VANPOOL VEHICLE.**

**VEGETATED SPACE.**

**ZEV.**

### SECTION A5.103 SITE SELECTION

**A5.103.1 Community connectivity.** Where feasible, locate project on a previously developed site within a  $\frac{1}{2}$  mile radius of at least ten basic services, readily accessible by pedestrians, including, but not limited, to one each of bank, place of worship, convenience grocery, day care, cleaners, fire station, barber shop, beauty shop, hardware store, laundry, library, medical clinic, dental clinic, senior care facility, park, pharmacy, post office, restaurant (two may be counted), school, supermarket, theater, community center, fitness center, museum or farmers market. Other services may be considered on a case-by-case basis.

**A5.103.2 Brownfield or greyfield site redevelopment or infill area development.** If feasible, select for development a brownfield in accordance with Section A5.103.2.1 or on a greyfield or infill site as defined in Section A5.102.

**A5.103.2.1 Brownfield redevelopment.** Develop a site documented as contaminated by means of an ASTM E1903-97 Phase II Environmental Site Assessment or on a site defined as a brownfield by a local, state or federal government agency. The site must be fully remediated in accordance with EPA regulations to the level required of the anticipated land use.

### SECTION A5.104 SITE PRESERVATION

**A5.104.1 Reduce development footprint and optimize open space.** Optimize open space on the project site in accordance with Sections A5.104.1.1, A5.104.1.2 or A5.104.1.3.

**A5.104.1.1 Local zoning requirement in place.** Exceed the zoning's open space requirement for vegetated open space on the site by 25 percent.

**A5.104.1.2 No local zoning requirement in place.** Provide vegetated open space area adjacent to the building equal to the building footprint area.

**A5.104.1.3 No open space required in zoning ordinance.** Provide vegetated open space equal to 20 percent of the total project site area.

### SECTION A5.105 DECONSTRUCTION AND REUSE OF EXISTING STRUCTURES

**A5.105.1** If feasible, disassemble existing buildings instead of demolishing to allow reuse or recycling of building materials.

**A5.105.1.1 Existing building structure.** Maintain at least 75 percent of existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing) based on surface area.

#### Exceptions:

1. Window assemblies and nonstructural roofing material.
2. Hazardous materials that are remediated as a part of the project.
3. A project with an addition of more than two times the square footage of the existing building.

**A5.105.1.2 Existing nonstructural elements.** Reuse existing interior nonstructural elements (interior walls, doors, floor coverings and ceiling systems) in at least 50 percent of the area of the completed building (including additions).

**Exception:** A project with an addition of more than two times the square footage of the existing building.

**A5.105.1.3 Salvage.** Salvage additional items in good condition such as light fixtures, plumbing fixtures and doors as follows. Document the weight or number of the items salvaged.

1. Salvage for reuse on the project items that conform to other provisions of Title 24 in an on-site storage area.
2. Nonconforming items may be salvaged in dedicated collection bins for exempt projects or other uses.

### SECTION A5.106 SITE DEVELOPMENT

**A5.106.2 Storm water design.** Design storm water runoff rate, quantity, and quality in conformance with Section A5.106.3 Low Impact Development (LID) or by local requirements, whichever are stricter.

**A5.106.3 Low Impact Development (LID).** All newly constructed projects shall mitigate (infiltrate, filter, or treat) stormwater runoff from the 85<sup>th</sup> percentile 24-hour runoff event (for volume-based BMP's) or the runoff produced by a rain event equal to two times the 85<sup>th</sup> percentile hourly intensity (for flow-based BMP's) through the application of LID strategies. Employ at least two of the following methods or other best management practices to allow rainwater to soak into the ground, evaporate into the air or collect in storage

## NONRESIDENTIAL VOLUNTARY MEASURES

receptacles for irrigation or other beneficial uses. LID strategies include, but are not limited to:

1. Bioretention (rain gardens)/filtration planters;
2. Precipitation capture (Cisterns and rain barrels);
3. Green roofs meeting the structural requirements of the building code;
4. Roof leader or impervious area disconnection;
5. Permeable and porous paving;
6. Vegetative swales and filter strips; tree preservation; and
7. Tree preservation and tree plantings;
8. Landscaping soil quality;
9. Stream buffer; and
10. Volume retention suitable for previously developed sites.

**A5.106.3.1 Implementation.** If applicable, coordinate LID projects with the local Regional Water Quality Control Board, which may issue a permit or otherwise require LID.

**Note:** Further information on design of specific control measures may be found on U.S. EPA's website, on SWRCB's website and from local boards that require LID.

**A5.106.3.2 Greyfield or infill site.** Manage 40 percent of the average annual rainfall on the site's impervious surfaces through infiltration, reuse or evapotranspiration.

#### A5.106.4 Reserved.

##### A5.106.4.1 Reserved.

##### A5.106.4.2 Reserved.

**A5.106.4.3 Changing rooms.** For buildings with over 10 tenant-occupants, provide changing/shower facilities for tenant-occupants only in accordance with Table A5.106.4.3 or document arrangements with nearby changing/shower facilities.

**Note:** Additional information on recommended bicycle accommodations may be obtained from Sacramento Area Bicycle Advocates.

**A5.106.5.1 Designated parking for clean air vehicles.** Provide designated parking for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as shown in Table A5.106.5.1.1 or A5.106.5.1.2.

**TABLE A5.106.4.3**

NUMBER OF TENANT-OCCUPANTS	SHOWER/CHANGING FACILITIES REQUIRED <sup>2</sup>	2-TIER (12" X 15" X 72") PERSONAL EFFECTS LOCKERS <sup>1,2</sup> REQUIRED
0-10	0	0
11-50	1 unisex shower	2
51-100	1 unisex shower	3
101-200	1 shower stall per gender	4
Over 200	1 shower stall per gender for each 200 additional tenant-occupants	One 2-tier locker for each 50 additional tenant-occupants

1. One 2-tier locker serves two people. Lockers shall be lockable with either padlock or combination lock.
2. Tenant spaces housing more than 10 tenant-occupants within buildings sharing common toilet facilities need not comply; however, such common shower facilities shall accommodate the total number of tenant-occupants served by the toilets and include a minimum of one unisex shower and two 2-tier lockers.

**A5.106.5.1.1 Tier 1.** Ten percent of total spaces. [BSC-CG] Provide 10 percent of total designated parking spaces for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as follows:

**TABLE A5.106.5.1.1**

TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED SPACES
0-9	0
10-25	2
26-50	4
51-75	6
76-100	9
101-150	11
151-200	18
201 and over	At least 10 percent of total

**A5.106.5.1.2 Tier 2.** Provide 12 percent of total designated parking spaces for any combination of low-emitting, fuel-efficient, and carpool/van pool vehicles as follows:

**TABLE A5.106.5.1.2**

TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED SPACES
0-9	1
10-25	2
26-50	5
51-75	7
76-100	9
101-150	13
151-200	19
201 and over	At least 12 percent of total

## NONRESIDENTIAL VOLUNTARY MEASURES

**A5.106.5.1.3 Parking stall marking.** Paint, in the paint used for stall striping, the following characters such that the lower edge of the last word aligns with the end of the stall striping and is visible beneath a parked vehicle:

CLEAN AIR/  
VANPOOL/EV

**Note:** Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces.

**A5.106.5.1.4 Vehicle designations.** Building managers may consult with local community Transit Management Associations (TMAs) for methods of designating qualifying vehicles, such as issuing parking stickers.

**Notes:**

1. Information on qualifying vehicles, car labeling regulations and DMV CAV decals may be obtained from the following sources:
  - a. California DriveClean.
  - b. California Air Resources Board.
  - c. U.S. EPA fuel economy regulations and standards.
  - d. DMV Registration Operations.
2. Purchasing policy and refueling sites for low emitting vehicles for state employees use can be found at the Department of General Services.

**A5.106.5.3 Electric vehicle (EV) charging.** Construction shall comply with Section A5.106.5.3.1 and A5.106.5.3.2 to facilitate future installation of electric vehicle supply equipment (EVSE). When EVSE(s) is/are installed, it shall be in accordance with the *California Building Code* and the *California Electrical Code* and as follows:

**A5.106.5.3.1 Tier 1.** Table A5.106.5.3.1 shall be used to determine the number of multiple charging spaces required for future installation of EVSE. Refer to Section 5.106.5.3.2 for design space requirements.

**A5.106.5.3.2 Tier 2.** Table A5.106.5.3.2 shall be used to determine if single or multiple charging space requirements apply for future installation of EVSE. When a single charging space is required, refer to Section 5.106.5.3.1 for design requirements. When multiple charging spaces are required, refer to Section 5.106.5.3.2 for design requirements.

**TABLE A5.106.5.3.1**

TOTAL NUMBER OF ACTUAL PARKING SPACES	TIER 1 NUMBER OF REQUIRED EV CHARGING SPACES
0-9	0
10-25	2
26-50	3
51-75	5
76-100	7
101-150	10
151-200	14
201 and over	8 percent of total <sup>1</sup>

1. Calculation for spaces shall be rounded up to the nearest whole number.

**TABLE A5.106.5.3.2**

TOTAL NUMBER OF ACTUAL PARKING SPACES	TIER 2 NUMBER OF REQUIRED EV CHARGING SPACES
0-9	1
10-25	2
26-50	4
51-75	6
76-100	9
101-150	12
151-200	17
201 and over	10 percent of total <sup>1</sup>

1. Calculation for spaces shall be rounded up to the nearest whole number.

**A5.106.5.3.3 Identification.** The service panel or sub-panel circuit directory shall identify the reserved over-current protective device space(s) for future EV charging as “EV CAPABLE.” The raceway termination location shall be permanently and visibly marked as “EV CAPABLE.”

**A5.106.5.3.4 Future charging spaces qualify as designated parking as described in Section A5.106.5.1 Designated parking for clean air vehicles.**

**Notes:**

1. The California Department of Transportation adopts and publishes the California Manual on Uniform Traffic Control Devices (California MUTCD) to provide uniform standards and specifications for all official traffic control devices in California. Zero Emission Vehicle Signs and Pavement Markings can be found in the New Policies & Directives number 13-01. [www.dot.ca.gov/hq/traffops/policy/13-01.pdf](http://www.dot.ca.gov/hq/traffops/policy/13-01.pdf).
2. See Vehicle Code Section 22511 EV charging spaces signage in offstreet parking facilities and for use of EV charging spaces.
3. The Governor’s Office of Planning and Research published a Zero-Emission Vehicle Community Readiness Guidebook which provides helpful information for local governments, residents and businesses. [www.opr.ca.gov/docs/ZEV\\_Guidebook.pdf](http://www.opr.ca.gov/docs/ZEV_Guidebook.pdf).

**A5.106.6 Parking capacity.** Design parking capacity to meet but not exceed minimum local zoning requirements.

**A5.106.6.1 Reduce parking capacity.** With the approval of the enforcement authority, employ strategies to reduce on-site parking area by

1. Use of on street parking or compact spaces, illustrated on the site plan or
2. Implementation and documentation of programs that encourage occupants to carpool, ride share or use alternate transportation.

**Note:** Strategies for programs may be obtained from local TMAs.



**A5.106.7 Exterior wall shading.** Meet requirements in the current edition of the *California Energy Code* and comply with either Section A5.106.7.1 or A5.106.7.2 for wall surfaces. If using vegetative shade, plant species documented to reach desired coverage within 5 years of building occupancy.

**A5.106.7.1 Fenestration.** Provide vegetative or man-made shading devices for all fenestration on east-, south-, and west-facing walls.

**A5.106.7.1.1 East and west walls.** Shading devices shall have 30-percent coverage to a height of 20 feet or to the top of the exterior wall, whichever is less. Calculate shade coverage on the summer solstice at 10 AM for east-facing walls and at 3 PM for west-facing walls.

**A5.106.7.1.2 South walls.** Shading devices shall have 60-percent coverage to a height of 20 feet or to the top of the exterior wall, whichever is less.

**A5.106.7.2 Opaque wall areas.** Use wall surfacing with minimum SRI 25 (aged), for 75 percent of opaque wall areas.

**Exception:** Use of vegetated shade in Wildland-Urban Interface Areas as defined in Chapter 7A (Materials and Construction Methods for Exterior Wildfire Exposure) of the *California Building Code* shall meet the requirements of that chapter.

**Note:** If not available from the manufacturer, aged SRI value calculations may be found at the California Energy Commission's web site at [www.energy.ca.gov](http://www.energy.ca.gov).

**A5.106.11 Heat island effect.** Reduce nonroof heat islands by Section A5.106.11.1 and roof heat islands by Section A5.106.11.2.

**A5.106.11.1 Hardscape alternatives.** Use one or a combination of strategies 1 and 2 for 50 percent of site hardscape or put 50 percent of parking underground.

1. Use light colored materials with an initial solar reflectance value of at least 30 as determined in accordance with American Society for Testing and Materials (ASTM) Standards E1918 or C1549.
2. Use open-grid pavement system or pervious or permeable pavement system.

**A5.106.11.2 Cool roof for reduction of heat island effect.** Use roofing materials having a minimum aged solar reflectance and thermal emittance complying with Sections A5.106.11.2.1 and A5.106.11.2.2 or a minimum aged Solar Reflectance Index (SRI) complying with Section A5.106.11.2.3 and as shown in Table A5.106.11.2.2 for Tier 1 or Table A5.106.11.2.3 for Tier 2.

**Exceptions:**

1. Roof constructions that have a thermal mass over the roof membrane, including areas of vegetated (green) roofs, weighing at least 25 pounds per square foot.
2. Roof area covered by building integrated solar photovoltaic and building integrated solar thermal panels.

**A5.106.11.2.1 Solar reflectance.** Roofing materials shall have a minimum aged solar reflectance equal to or greater than the values specified in Table A5.106.11.2.2 for Tier 1 and Table A5.106.11.2.3 for Tier 2.

If Cool Roof Rating Council (CRRC) testing for aged reflectance is not available for any roofing products, the aged value shall be determined using the CRRC certified initial value using the equation  $\rho_{\text{aged}} = [0.2 + \beta [\rho_{\text{initial}} - 0.2]]$ , where  $\rho_{\text{initial}}$  = the initial solar reflectance and soiling resistance,  $\beta$ , listed by product type in Table A5.106.11.2.1.

Solar reflectance may also be certified by other supervisory entities approved by the Energy Commission pursuant to Title 24, Part 1, *California Administrative Code*.

**A5.106.11.2.2 Thermal emittance.** Roofing materials shall have a CRRC initial or aged thermal emittance as determined in accordance with ASTM E408 or C1371 equal to or greater than those specified in Table A5.106.11.2.2 for Tier 1 and Table A5.106.11.2.3 for Tier 2.

Thermal emittance may also be certified by other supervisory entities approved by the Energy Commission pursuant to Title 24, Part 1, *California Administrative Code*.

**A5.106.11.2.3 Solar reflectance index alternative.** Solar Reflectance Index (SRI) equal to or greater than the values specified in Table A5.106.11.2.2 for Tier 1 and Table A5.106.11.2.3 for Tier 2 may be used as an alternative to compliance with the aged solar reflectance values and thermal emittance.

SRI values used to comply with this section shall be calculated using the Solar Reflectance Index (SRI) Calculation Worksheet (SRI-WS) developed by the California Energy Commission or in compliance with ASTM E1980-01 as specified in the *California Energy Code*, Section 118(i)3. Solar reflectance values used in the SRI-WS shall be based on the aged reflectance value of the roofing product or the equation in section A5.106.11.2.1 if the CRRC certified aged solar reflectance are not available. Certified Thermal emittance used in the SRI-WS may be either the initial value or the aged value listed by the CRRC.

Solar reflectance and thermal emittance may also be certified by other supervisory entities approved by the Commission pursuant to Title 24, Part 1, *California Administrative Code*.

**Note:** The Solar Reflectance Index Calculation Worksheet (SRI-WS) is available by contacting the Energy Standard Hotline at 1-800-772-3300, website at [www.energy.ca.gov](http://www.energy.ca.gov) or by email at [Title24@energy.state.ca.us](mailto:Title24@energy.state.ca.us).

**A5.106.11.3 Verification of compliance.** If no documentation is available, an inspection shall be conducted to ensure roofing materials meet cool roof aged solar reflectance and thermal emittance or SRI values.



## NONRESIDENTIAL VOLUNTARY MEASURES

**TABLE A5.106.11.2.1  
VALUES OF SOILING RESISTANCE,  $\beta$ , BY PRODUCT TYPE**

PRODUCT TYPE	CRRC PRODUCT CATEGORY	$\beta$
Field-applied coating	Field-applied coating	0.65
Other	Not a field-applied coating	0.70

**TABLE A5.106.11.2.2 [BSC]  
TIER 1**

ROOF SLOPE	CLIMATE ZONE	MINIMUM AGED SOLAR REFLECTANCE	THERMAL EMITTANCE	SRI
$\leq 2:12$	1–16	0.63	0.75	75
$> 2:12$	1–16	0.20	0.75	16

**TABLE A5.106.11.2.3 [BSC]  
TIER 2**

ROOF SLOPE	CLIMATE ZONE	MINIMUM AGED SOLAR REFLECTANCE	THERMAL EMITTANCE	SRI
$\leq 2:12$	1–16	0.68	0.85	82
$> 2:12$	1–16	0.28	0.85	27

# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## APPENDIX A5 – NONRESIDENTIAL VOLUNTARY MEASURES

### DIVISION A5.2 – ENERGY EFFICIENCY

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.  
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHPD						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter																			X			
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below																						
Chapter/Section																						
A5.201.1																						
A5.202.1 Definitions																						
A5.203.1																						
A5.203.1.1																						
A5.203.1.1.1																						
A5.203.1.1.2																						
A5.203.1.1.3																						
A5.203.1.2																						
A5.203.1.2.1																						
A5.203.1.2.2																						
A5.211.1																						
A5.211.1.1																						
A5.211.3																						
A5.212.1																						
A5.212.1.1 and subsection																						
A5.212.1.2																						
A5.212.1.4																						
A5.213																						

## APPENDIX A5

## NONRESIDENTIAL VOLUNTARY MEASURES

### *Division A5.2 – ENERGY EFFICIENCY*

#### SECTION A5.201 GENERAL

**A5.201.1 Scope.** For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards. It is the intent of these voluntary provisions to encourage local jurisdictions through codification to achieve exemplary performance in the area of building energy efficiency. Local jurisdictions adopting these voluntary provisions as mandatory local energy efficiency standards shall submit the required application and receive the required approval of the California Energy Commission in compliance with Title 24, Part 1, Section 10-106, prior to enforcement. Once approval is granted by the Energy Commission, local jurisdictions shall file an ordinance expressly marking the local modifica-

tions along with findings and receive the required acceptance from the California Building Standards Commission in compliance with Section 101.7 of this code, prior to enforcement (Title 24, Part 1, Section 10-106 is available at <http://www.energy.ca.gov/title24/2016standards/>).

#### SECTION A5.202 DEFINITIONS

**A5.202.1 Definitions.** The following terms are defined in Chapter 2.

**ENERGY BUDGET.**

**GEOTHERMAL.**

**PROCESS.**

**SOLAR ACCESS.**

**TIME DEPENDENT VALUATION (TDV).**

## NONRESIDENTIAL VOLUNTARY MEASURES

### SECTION A5.203 PERFORMANCE APPROACH

**A5.203.1 Energy efficiency.** Nonresidential, high-rise residential and hotel/motel buildings that include lighting and/or mechanical systems shall comply with Sections A5.203.1.1 and A5.203.1.2. Newly constructed buildings and additions are included in the scope of these sections. Buildings permitted without lighting or mechanical systems shall comply with Section A5.203.1.1 but are not required to comply with Section A5.203.1.2.

**A5.203.1.1 Tier 1 and Tier 2 prerequisites.** To comply with Tier 1, ONE of the following efficiency measures is required for all applicable components of the building project. To comply with Tier 2, TWO of the following efficiency measures are required.

**A5.203.1.1.1 Outdoor lighting.** Newly installed outdoor lighting power shall be no greater than 90 percent of the Allowed Outdoor Lighting Power, and general hardscape lighting within the scope of Title 24, Part 6, Section 140.7(b)1 shall have a color temperature no higher than 3000K. The Allowed Outdoor Lighting Power calculation is specified in Title 24, Part 6, Section 140.7, Requirements For Outdoor Lighting.

**Exception:** The color temperature requirement is not applicable to the applications identified in the exceptions to Section 140.7(a) nor to the applications identified as "specific applications" in Section 140.7(b)2 and Table 140.7.

**A5.203.1.1.2 Service water heating in restaurants.** Newly constructed restaurants 8,000 square feet or greater and with service water heaters rated 75,000 Btu/h or greater shall install a solar water-heating system with a minimum solar savings fraction of 0.15.

**Exceptions:**

1. Buildings with a natural gas service water heater with a minimum of 95-percent thermal efficiency.
2. Buildings where greater than 75 percent of the total roof area has annual solar access that is less than 70 percent. Solar access is the ratio of solar insolation, including shade, to the solar insolation without shade. Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access.

**A5.203.1.1.3 Warehouse dock seal doors.** Exterior loading dock doors that are adjacent to conditioned or indirectly conditioned spaces shall have dock seals or dock shelters installed at the time of permitting. This requirement shall apply to newly constructed buildings and to loading dock doors added to existing buildings.

**A5.203.1.1.4 Daylight Design Power Adjustments Factors (PAFs).** Daylighting devices shall be installed as specified in Title 24, Part 6, Section 140.3(d).

**A5.203.1.1.5 Exhaust air heat recovery.** Heat recovery requirements based on ASHRAE 90.1, Section 6.5.6.1 are adapted and modified for California climate zones as described below.

1. Systems with minimum design outdoor air fraction of 80 percent or greater and supply air flow of 200 cfm or greater in climate zones 2, 9, 10, 11, 12, 13, 14, 15 shall have a heat recovery system.
2. Heat recovery systems required by this section shall result in a net sensible energy recovery ratio of at least 60 percent for both heating and cooling as tested using AHRI 1060-2014 or 1061-2014 and certified by AHRI. A 60 percent sensible energy recovery ratio shall mean a change in the dry-bulb of the outdoor air supply equal to 60 percent of the difference between the outdoor air and exhaust air dry-bulb at design conditions. Provisions shall be made to bypass or control the energy recovery system to permit air economizer operation as required by Title 24, Part 6, Section 140.4(e), Economizers.

**Exceptions:**

1. Systems serving spaces that are not cooled and that are heated to less than 60°F.
2. Where more than 60 percent of the outdoor air heating energy is provided from site-recovered energy.
3. Where the sum of the airflow rates exhausted and relieved within 20 feet of each other is less than 75 percent of the design outdoor airflow rate, excluding exhaust air that is:
  1. Used for another energy recovery system;
  2. Not allowed by ASHRAE Standard 170 for use in energy recovery systems with leakage potential; or
  3. Of Class 4 as defined in ASHRAE Standard 62.1.
4. Systems expected to operate less than 20 hours per week.

**A5.203.1.2 Performance standard.** Comply with one of the advanced efficiency levels indicated below.

**A5.203.1.2.1 Tier 1.** Buildings complying with the first level of advanced energy efficiency shall have an Energy Budget that is no greater than indicated below, depending on building type and the type of energy systems included in the building project. If the newly constructed building or addition does not include indoor lighting or mechanical systems, then no additional performance requirements above Title 24, Part 6 are required.

1. For nonresidential building projects that include indoor lighting or mechanical systems, but not both: No greater than 95 percent of the Title 24,

## NONRESIDENTIAL VOLUNTARY MEASURES

Part 6, Energy Budget for the Standard Design Building as calculated by compliance software certified by the Energy Commission.

2. For nonresidential building projects that include indoor lighting and mechanical systems: No greater than 90 percent of the Title 24, Part 6 Energy Budget for the Standard Design Building as calculated by compliance software certified by the Energy Commission.

3. For high-rise residential and hotel/motel building projects: No greater than 95 percent of the Title 24, Part 6, Energy Budget for the Standard Design Building as calculated by compliance software certified by the Energy Commission.

**A5.203.1.2.2 Tier 2.** Buildings complying with the second level of advanced energy efficiency shall have an Energy Budget that is no greater than indicated below, depending on building type and the type of energy systems included in the building project. If the newly constructed building or addition does not include indoor lighting or mechanical systems, then no additional performance requirements above Title 24, Part 6 are required.

1. For nonresidential building projects that include indoor lighting or mechanical systems, but not both: No greater than 90 percent of the Title 24, Part 6, Energy Budget for the Standard Design Building as calculated by compliance software certified by the Energy Commission.

2. For nonresidential building projects that include indoor lighting and mechanical systems: No greater than 85 percent of the Title 24, Part 6, Energy Budget for the Standard Design Building as calculated by compliance software certified by the Energy Commission.

3. For high-rise residential and hotel/motel building projects: No greater than 95 percent of the Title 24, Part 6, Energy Budget for the Standard Design Building as calculated by compliance software certified by the Energy Commission.

**Note:** For Energy Budget calculations, high-rise residential and hotel/motel buildings are considered nonresidential buildings.

## SECTION A5.211 RENEWABLE ENERGY

**A5.211.1 On-site renewable energy.** Use on-site renewable energy sources such as solar, wind, geothermal, low-impact hydro, biomass and bio-gas for at least 1 percent of the electric power calculated as the product of the building service voltage and the amperage specified by the electrical service overcurrent protection device rating or 1kW, (whichever is greater), in addition to the electrical demand required to meet 1 percent of the natural gas and propane use. The building

project's electrical service overcurrent protection device rating shall be calculated in accordance with the *California Electrical Code*. Natural gas or propane use is calculated in accordance with the *California Plumbing Code*.

**A5.211.1.1 Documentation.** Using a calculation method approved by the California Energy Commission, calculate the renewable onsite energy system to meet the requirements of Section A5.211.1, expressed in kW. Factor in net-metering, if offered by local utility, on an annual basis.

**A5.211.3 Green power.** If offered by local utility provider, participate in a renewable energy portfolio program that provides a minimum of 50-percent electrical power from renewable sources. Maintain documentation through utility billings.

## SECTION A5.212 ELEVATORS, ESCALATORS AND OTHER EQUIPMENT

**A5.212.1 Elevators and escalators.** In buildings with more than one elevator or two escalators, provide systems and controls to reduce the energy demand of elevators and escalators as follows. Document systems operation and controls in the project specifications and commissioning plan.

**A5.212.1.1 Elevators.** Traction elevators shall have a regenerative drive system that feeds electrical power back into the building grid when the elevator is in motion.

**A5.212.1.1.1 Car lights and fan.** A parked elevator shall turn off its car lights and fan automatically until the elevator is called for use.

**A5.212.1.2 Escalators.** An escalator shall have a VVVF motor drive system that is fully regenerative when the escalator is in motion.

**A5.212.1.4 Controls.** Controls that reduce energy demand shall meet requirements of CCR, Title 8, Chapter 4, Subchapter 6 and shall not interrupt emergency operations for elevators required in CCR, Title 24, Part 2, *California Building Code*.

## SECTION A5.213 ENERGY EFFICIENT STEEL FRAMING

**A5.213.1 Steel framing.** Design steel framing for maximum energy efficiency. Techniques for avoiding thermal bridging in the envelope include:

1. Exterior rigid insulation;
2. Punching large holes in the stud web without affecting the structural integrity of the stud;
3. Spacing the studs as far as possible while maintaining the structural integrity of the structure; and
4. Detailed design of intersections of wall openings and building intersections of floors, walls and roofs.



# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## APPENDIX A5 – NONRESIDENTIAL VOLUNTARY MEASURES

### DIVISION A5.3 – WATER EFFICIENCY AND CONSERVATION

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHPD						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X																				
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below																						
Chapter/Section																						

## APPENDIX A5

# NONRESIDENTIAL VOLUNTARY MEASURES

## Division A5.3 – WATER EFFICIENCY AND CONSERVATION

### SECTION A5.301 GENERAL

#### A5.301.1 Scope.

### SECTION A5.302 DEFINITIONS

**A5.302.1 Definitions.** The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

**COMPACT DISHWASHER.**

**MODEL WATER EFFICIENT LANDSCAPE ORDINANCE.**

**PLANTS.**

**POTABLE WATER.**

**RECYCLED WATER.**

**STANDARD DISHWASHER.**

**SUBMETER.**

### SECTION A5.303 INDOOR WATER USE

**A5.303.2.3.1 Tier 1 – 12-percent savings.** A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 12 percent shall be provided. The reduction shall be based on the maximum allowable water use per plumbing

fixture and fitting as required by the *California Building Standards Code*. The 12-percent reduction in potable water use shall be demonstrated by one of the following methods:

1. Prescriptive method. Each plumbing fixture and fitting shall not exceed the maximum flow rate at greater than or equal to 12-percent reduction as specified in Table A5.303.2.3.1; or
2. Performance method. A calculation demonstrating a 12-percent reduction in the building “water use baseline” as established in Table A5.303.2.2 shall be provided.

**A5.303.2.3.2 Tier 2 – 20-percent savings.** A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 20 percent shall be provided. A calculation demonstrating a 20-percent reduction in the building “water use baseline” as established in Table A5.303.2.2 shall be provided.

**A5.303.2.3.3 25-percent savings.** A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 25 percent shall be provided. A calculation demonstrating a 25-percent reduction in the building “water use baseline” as established in Table A5.303.2.2 shall be provided.

**A5.303.2.3.4 Nonpotable water systems for indoor use.** Utilizing nonpotable water systems (such as captured rainwater, treated graywater and recycled water) intended to supply water closets, urinals, and other allowed uses, may be used in the calculations demonstrating the 12-, 20- or 25-percent reduction. The nonpotable water systems shall comply with the current edition of the *California Plumbing Code*.



## NONRESIDENTIAL VOLUNTARY MEASURES

**TABLE A5.303.2.2  
WATER USE BASELINE<sup>3</sup>**

FIXTURE TYPE	BASELINE FLOW RATE	DURATION	DAILY USES	OCCUPANTS <sup>2</sup>
Showerheads	2.0 gpm @ 80 psi	5 min.	1	X <sup>2a</sup>
Lavatory faucets nonresidential	0.5 gpm @ 60 psi	.25 min.	3	X
Kitchen faucets	1.8 gpm @ 60 psi	4 min.	1	X <sup>2b</sup>
Replacement aerators	2 gpm @ 60 psi			X
Wash fountains	1.8 gpm/20 [rim space (in.) @ 60 psi]			X
Metering faucets	0.20 gallons/cycle	.25 min.	3	X
Metering faucets for wash fountains	0.20 gallons/cycle/20 [rim space (in.) @ 60 psi]	.25 min.	1 male <sup>1</sup> 3 female	X
Gravity tank type water closets	1.28 gallons/flush	1 flush	1 male <sup>1</sup> 3 female	X
Flushometer tank water closets	1.28 gallons/flush	1 flush	1 male <sup>1</sup> 3 female	X
Flushometer valve water closets	1.28 gallons/flush	1 flush	1 male <sup>1</sup> 3 female	X
Electromechanical hydraulic water closets	1.28 gallons/flush	1 flush	1 male <sup>1</sup> 3 female	X
Urinals	0.5 or 0.125 <sup>4</sup> gallons/flush	1 flush	2 male	X

1. The daily use number shall be increased to three if urinals are not installed in the room.

2. Refer to Table A, Chapter 4, 2019 *California Plumbing Code*, for occupant load factors.

a. Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the anticipated number of users.

b. Kitchen faucet use is determined by the occupant load of the area served by the fixture.

3. Use worksheet WS-1 to calculate baseline water use.

4. Floor-mounted urinals @ 0.5 GPF or wall-mounted urinals @ 0.125 GPF.

**TABLE A5.303.2.3.1  
FIXTURE FLOW RATES**

FIXTURE TYPE	BASELINE FLOW RATE <sup>2</sup>	MAXIMUM FLOW RATE AT ≥ 12 PERCENT REDUCTION
Showerheads	2.0 gpm @ 80 psi	1.8 gpm @ 80 psi
Lavatory faucets nonresidential <sup>3</sup>	0.5 gpm @ 60 psi	0.35 gpm @ 60 psi
Kitchen faucets <sup>3</sup>	1.8 gpm @ 60 psi	1.6 gpm @ 60 psi
Wash fountains	1.8 gallons/cycle/20 [rim space (in.) @ 60 psi]	1.6 gpm/20 [rim space (in.) @ 60 psi]
Metering faucets	0.20 gallons/cycle	0.18 gallons/cycle
Metering faucets for wash fountains	0.20 gallons/cycle/20 [rim space (in.) @ 60 psi]	0.18 gallons/cycle 20 [rim space (in.) @ 60 psi]
Gravity tank type water closets	1.28 gallons/flush	1.12 gallons/flush <sup>1</sup>
Flushometer tank water closets	1.28 gallons/flush	1.12 gallons/flush <sup>1</sup>
Flushometer valve water closets	1.28 gallons/flush	1.12 gallons/flush <sup>1</sup>
Electromechanical hydraulic water closets	1.28 gallons/flush	1.12 gallons/flush <sup>1</sup>
Urinals	0.5 or 0.125 <sup>4</sup> gallons/flush	0.44 or 0.11 gallons/flush

1. Includes water closets with an effective flush rate of 1.12 gallons or less when tested per ASME A 112.19.2 and ASME A 112.19.14.

2. See Table A5.503.2.2 for additional notes and references.

3. Where complying faucets are unavailable, aerators rated at 0.35 gpm or other means may be used to achieve reduction.

4. Floor-mounted urinals @ 0.5 GPF or wall-mounted urinals @ 0.125 GPF.

### A5.303.3 Appliances and fixtures for commercial application. Appliances and fixtures shall meet the following:

1. Clothes washers shall have a maximum Water Factor (WF) that will reduce the use of water by 10 percent below the California Energy Commissions' WF standards for commercial clothes washers located in Title 20 of the *California Code of Regulations*.
2. Dishwashers shall meet the following water use standards:
  - a. Residential—ENERGY STAR.
    - i. Standard Dishwashers – 4.25 gallons per cycle.
    - ii. Compact Dishwashers – 3.5 gallons per cycle.
  - b. Commercial—Shall be in accordance with ENERGY STAR requirements. Refer to Table A5.303.3.
3. Ice makers shall be air cooled.
4. Food steamers shall be connectionless or boilerless – and shall consume no more than 2 gallons of water per pan per hour, including condensate water, for batch type steamers, and no more than 5 gallons of water per pan per hour, including condensate water, for cook to order steamers.
5. The use and installation of water softeners that discharge to the community sewer system may be limited or prohibited by local agencies if certain conditions are met.
6. Combination ovens shall use a maximum of 1.5 gallons of water per hour per pan, including condensate water.
7. Commercial pre-rinse spray valves manufactured on or after January 1, 2006 shall function at equal to or less than 1.6 gpm (0.10 L/s) at 60 psi (414 kPa) and
  - a. Be capable of cleaning 60 plates in an average time of not more than 30 seconds per plate.
  - b. Be equipped with an integral automatic shutoff.
  - c. Operate at static pressure of at least 30 psi (207 kPa) when designed for a flow rate of 1.3 gpm (0.08 L/s) or less.
8. Food waste pulping systems shall use no more than 2 gpm of potable water.
  - 8.1. Note: potable water excludes on-site graywater use, such as dishwasher discharge water.

### A5.303.4 Water conserving plumbing fixtures and fittings.

**A5.303.4.1 Nonwater supplied urinals.** Nonwater supplied urinals are installed in accordance with the *California Plumbing Code*.

Where approved, urinal, hybrids as defined in Chapter 2, shall be considered waterless urinals.

**A5.303.5 Dual plumbing.** New buildings and facilities shall be dual plumbed for potable and recycled water systems for toilet flushing when recycled water is available as determined by the enforcement authority.

## SECTION A5.304 OUTDOOR WATER USE

### A5.304.1 Reserved.

**A5.304.2 Outdoor water use.** For new water service not subject to the provisions of *Water Code* Section 535, separate meters or submeters shall be installed for indoor and outdoor potable water use for landscaped areas of at least 500 square feet but not more than 1,000 square feet.

**A5.304.6 Restoration of areas disturbed by construction.** Restore all landscape areas disturbed during construction by planting with local adaptive and/or noninvasive vegetation.

**A5.304.7 Previously developed sites.** On previously developed or graded sites, restore or protect at least 50 percent of the site area with adaptive and/or noninvasive vegetation. Projects complying with Section A5.106.3, Item 3 may apply vegetated roof surface to this calculation if the roof plants meet the definition of adaptive and noninvasive.

**Exception:** Area of the building footprint is excluded from the calculation.

**A5.304.8 Graywater irrigation system.** Install a graywater collection system for onsite subsurface irrigation using graywater collected from bathtubs, showers, bathroom wash basins and laundry water. See *California Plumbing Code*.

**TABLE A5.303.3  
COMMERCIAL DISHWASHER WATER USE**

TYPE	HIGH-TEMPERATURE— MAXIMUM GALLONS PER RACK	LOW-TEMPERATURE— MAXIMUM GALLONS PER RACK
Single Tank Conveyor	0.70 (2.6 L)	≤ 0.79 (3 L)
Multiple Tank Conveyor	≤ 0.54 (2 L)	≤ 0.54 (2 L)
Stationary Single Tank Door	≤ 0.89 (3.4 L)	≤ 1.18 (4.5 L)
Under Counter	≤ 0.86 (3.3 L)	≤ 1.19 (4.5 L)
Pot, Pan, and Utensil	≤ 0.58 GPSF	≤ 0.58 GPSF
Single Tank Flight Type	GPH ≤ 2.975x + 55.00	GPH ≤ 2.975x + 55.00
Multiple Tank Flight Type	GPH ≤ 4.96x + 17.00	GPH ≤ 4.96x + 17.00

Note: GPSF = gallons per square foot of rack; GPH = gallons per hour;

X = square feet of conveyor belt/minute (max conveyor speed sf/min as tested and certified to NSF/ANSI Standard 3)

**NONRESIDENTIAL VOLUNTARY MEASURES****SECTION A5.305  
WATER REUSE**

**A5.305.1 Nonpotable water systems.** Nonpotable water systems for indoor and outdoor use shall comply with the current edition of the *California Plumbing Code*.

**A5.305.2 Irrigation systems.** Irrigation systems regulated by a local water efficient landscape ordinance or by the California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) shall use recycled water.

# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## APPENDIX A5 – NONRESIDENTIAL VOLUNTARY MEASURES

### DIVISION A5.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHDP						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X																				
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below																						
Chapter/Section																						

## APPENDIX A5

# NONRESIDENTIAL VOLUNTARY MEASURES

### *Division A5.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY*

### SECTION A5.403 FOUNDATION SYSTEMS (Reserved)

#### SECTION A5.401 GENERAL

**A5.401.1 Scope.** The provisions of this chapter shall outline means of achieving material conservation and resource efficiency through reuse of existing building stock and materials; use of recycled, regional, rapidly renewable and certified wood materials; and employment of techniques to reduce pollution through recycling of materials.

#### SECTION A5.402 DEFINITIONS

**A5.402.1 Definitions.** The following terms are defined in Chapter 2.

**BUILDING COMMISSIONING.**

**EMBODIED ENERGY.**

**EUTROPHICATION.**

**LIFE CYCLE ASSESSMENT (LCA).**

**LIFE CYCLE INVENTORY (LCI).**

**OVE.**

**POSTCONSUMER CONTENT.**

**PRECONSUMER (or POSTINDUSTRIAL) CONTENT.**

**RECYCLED CONTENT.**

**RECYCLED CONTENT VALUE (RCV).**

#### SECTION A5.404 EFFICIENT FRAMING TECHNIQUES

**A5.404.1 Wood framing.** Employ advanced wood framing techniques or OVE, as recommended by the U.S. Department of Energy's Office of Building Technology, State and Community Programs and as permitted by the enforcing agency.

**A5.404.1.1 Structural or fire-resistance integrity.** The OVE selected shall not conflict with structural framing methods or fire-rated assemblies required by the *California Building Code*.

**A5.404.1.2 Framing specifications.** Advanced framing techniques include the following:

1. Building design using 2-foot modules;
2. Spacing wall studs up to 24 inches on center;
3. Spacing floor and roof framing members up to 24 inches on center;
4. Using 2-stud corner framing and drywall clips or scrap lumber for drywall backing;
5. Eliminating solid headers in non-load-bearing walls;
6. Using in-line framing, aligning floor, wall and roof framing members vertically for direct transfer of loads; and
7. Using single lumber headers and top plates where appropriate.

**Note:** Additional information can be obtained from the U.S. DOE Energy Efficiency and Renewable Energy (EERE) website.

## NONRESIDENTIAL VOLUNTARY MEASURES

### SECTION A5.405 MATERIAL SOURCES

**A5.405.1 Regional materials.** Compared to other products in a given product category, select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1. For those materials locally manufactured, select materials manufactured using low embodied energy or those that will result in net energy savings over their useful life.
2. Regional materials shall make up at least 10 percent, based on cost, of total materials value.
3. If regional materials make up only part of a product, their values are calculated as percentages based on weight.
4. Provide documentation of the origin, net projected energy savings and value of regional materials.

**A5.405.2 Bio-based materials.** Select bio-based building materials and products made from solid wood, engineered wood, bamboo, wool, cotton, cork, straw, natural fibers, products made from crops (soy-based, corn-based) and other bio-based materials with at least 50-percent bio-based content.

**A5.405.2.1 Certified wood.** Certified wood is an important component of green building strategies and the California Building Standards Commission will continue to develop a standard through the next code cycle.

**A5.405.2.2 Rapidly renewable materials.** Use materials made from plants harvested within a ten-year cycle for at least 2.5 percent of total materials value, based on estimated cost.

**A5.405.3 Reused materials.** Use salvaged, refurbished, refinished or reused materials for a minimum of 5 percent of the total value, based on estimated cost of materials on the project. Provide documentation as to the respective values.

**Note:** Sources of some reused materials can be found at CalRecycle. See also Appendix A5, Division A5.1, Section A5.105.1 for on-site materials reuse.

**A5.405.4 Recycled content.** Use materials, equivalent in performance to virgin materials with a total (combined) recycled content value (RCV) of:

**Tier 1.** The RCV shall not be less than 10 percent of the total material cost of the project, or use two products which meet the minimum recycled content levels in Table A5.405.4 for at least 75%, by cost, of all products in that category in the project.

Required Total RCV (dollars) = Total  
Material Cost (dollars)  $\times$  10 percent **(Equation A5.4-1)**

**Tier 2.** The RCV shall not be less than 15 percent of the total material cost of the project, or use three products which meet the minimum recycled content levels in Table A5.405.4 for at least 75%, by cost, of all products in that category in the project.

Required Total RCV (dollars) = Total  
Material Cost (dollars)  $\times$  15 percent **(Equation A5.4-2)**

For the purposes of this section, materials used as components of the structural frame shall not be used to calculate recycled content. The structural frame includes the load bearing structural elements such as wall studs, plates, sills, columns, beams, girders, joists, rafters and trusses.

#### Notes:

1. Sample forms which allow user input and automatic calculation are located at [www.hcd.ca.gov/CALGreen.html](http://www.hcd.ca.gov/CALGreen.html) and may be used to simplify documenting compliance with this section and for calculating recycled content value of materials or assembly products.
2. Sources and recycled content of some recycled materials can be obtained from CalRecycle if not provided by the manufacturer.

**A5.405.4.1 Total material cost.** Total material cost is the total estimated or actual cost of materials and assembly products used in the project. The required total recycled content value for the project (in dollars) shall be determined by Equation A5.4-1 or A5.4-2.

Total material cost shall be calculated by using one of the methods specified below:

1. **Simplified method.** To obtain the total cost of the project multiply the square footage of the structure by the square foot valuation established by the enforcing agency. The total material cost is 45 percent of the total cost of the project. Use Equations A5.4-3A or A5.4-3B to determine total material costs using the simplified method.

Total material costs =  
Project square footage  $\times$  square foot  
valuation  $\times$  45 percent **(Equation A5.4-3A)**

Total estimated or actual cost of  
project  $\times$  45 percent **(Equation A5.4-3B)**

2. **Detailed method.** To obtain the total cost of the project, add the estimated and/or actual costs of materials used for the project including the structure (steel, concrete, wood or masonry); the enclosure (roof, windows, doors and exterior walls); the interior walls, ceilings and finishes (gypsum board, ceiling tiles, etc.). The total estimated and/or actual costs shall not include fees, labor and installation costs, overhead, appliances, equipment, furniture or furnishings.

**A5.405.4.2 Determination of total recycled content value (RCV).** Total RCV may be determined either by dollars or percentage as noted below.

1. **Total recycled content value for the project (in dollars).** This is the sum of the recycled content value of the materials and/or assemblies considered and shall be determined by Equation A5.4-4. The result of this calculation may be directly compared to Equations A5.4-1 and A5.4-2 to determine compliance with Tier 1 or Tier 2 prerequisites.



## NONRESIDENTIAL VOLUNTARY MEASURES

Total Recycled Content Value (dollars) =  
(RCV<sub>M</sub> + RCV<sub>A</sub>) (Equation A5.4-4)

2. **Total recycled content value for the project (by percentage).** This is expressed as a percentage of the total material cost and shall be determined by Equations A5.4-4 and A5.4-5. The result of this calculation may be directly compared for compliance with Tier 1 (10 percent) or Tier 2 (15 percent) prerequisites.

Total Recycled Content Value (percent) =  
[Total Recycled Content Value (dollars)  
÷ Total Material Cost (dollars)] × 100

(Equation A5.4-5)

**A5.405.4.3 Determination of recycled content value of materials (RCV<sub>M</sub>).** The recycled content value of each material (RCV<sub>M</sub>) is calculated by multiplying the cost of material, as defined by the recycled content. See Equations A5.4-6 and A5.4-7.

RCV<sub>M</sub> (dollars) = Material  
cost (dollars) × RC<sub>M</sub> (percent) (Equation A5.4-6)

RC<sub>M</sub> (percent) = Postconsumer content  
percentage + (1/2) Preconsumer content percentage  
(Equation A5.4-7)

**Notes:**

1. If the postconsumer and preconsumer recycled content is provided in pounds, Equation A5.4-7 may be used, but the final result (in pounds) must be multiplied by 100 to show RC<sub>M</sub> as a percentage.
2. If the manufacturer does not separately identify the pre-consumer and post-consumer recycled content of a material but reports it as a total single percentage, the total amount shall be considered preconsumer recycled material.

**A5.405.4.4 Determination of recycled content value of assemblies – (RCV<sub>A</sub>).** Recycled content value of assemblies is calculated by multiplying the total cost of assembly by the total recycled content of the assembly (RC<sub>A</sub>), and shall be determined by Equation A5.4-8.

RCV<sub>A</sub> (dollars) = Assembly cost  
(dollars) × Total RC<sub>A</sub> (percent) (Equation A5.4-8)

If not provided by the manufacturer, Total RC<sub>A</sub> (percent) is the sum (Σ) of the Proportional Recycled Content (PRC<sub>M</sub>) of each material in the assembly. RC<sub>A</sub> shall be determined by Equation A4.4-9.

RC<sub>A</sub> = Σ PRC<sub>M</sub> (Equation A5.4-9)

PRC<sub>M</sub> of each material may be calculated by one of two methods using the following formulas:

**Method 1:** Recycled content (Postconsumer and Preconsumer) of each material provided in percentages

PRC<sub>M</sub> (percent) = Weight of material  
(percent) × RC<sub>M</sub> (percent) (Equation A5.4-10)

Weight of material (percent) =  
[Weight of material (lbs) ÷ Weight  
of assembly (lbs)] × 100 (Equation A5.4-11)

RC<sub>M</sub> (percent) = Postconsumer  
content percentage + (1/2) Preconsumer  
content percentage (See Equation A5.4-7)

**Method 2:** Recycled content (Postconsumer and Preconsumer) provided in pounds

PRC<sub>M</sub> (percent) = [RC<sub>M</sub> (lbs)  
Weight of material (lbs)] × 100 (Equation A5.4-12)

RC<sub>M</sub> (lbs) = Postconsumer content (lbs) +  
(1/2) Preconsumer content (lbs) (Equation A5.4-13)

**Note:** If the manufacturer does not separately identify the pre-consumer and post-consumer recycled content of a material but reports it as a total single percentage, the total amount shall be considered preconsumer recycled material.

**A5.405.4.5 Alternate method for concrete.** When Supplementary Cementitious Materials (SCMs), such as fly ash or ground blast furnace slag cement, are used in concrete, an alternate method of calculating and reporting recycled content in concrete products shall be permitted. When determining the recycled content value, the percent recycled content shall be multiplied by the cost of the cementitious materials only, not the total cost of the concrete.

**TABLE A5.405.4  
MINIMUM RECYCLED CONTENT LEVELS**

MATERIAL/ PRODUCT TYPE	MINIMUM TOTAL RECYCLED CONTENT	MINIMUM POST-CONSUMER RECYCLED CONTENT
Insulation, fiberglass	30%	30%
Insulation, cellulose	75%	75%
Exterior Paint, latex	50%	50%
Carpet, nylon	10%	10%
Compost	80%	80%
Mulch	80%	80%
Acoustical ceiling panels	60%	—
Drywall, gypsum	4%	4%
Aggregate base	80%	80%

**A5.405.5 Cement and concrete.** Use cement and concrete made with recycled products and complying with the following sections.

**A5.405.5.1 Cement.** Cement shall comply with one of the following standards:

1. Portland cement shall meet ASTM C150, *Standard Specification for Portland Cement*.
2. Blended cement shall meet ASTM C595, *Standard Specification for Blended Hydraulic Cement* or ASTM C1157, *Standard Performance Specification for Hydraulic Cement*.
3. Other Hydraulic Cements shall meet ASTM C1157, *Standard Performance Specification for Hydraulic Cement*.



## NONRESIDENTIAL VOLUNTARY MEASURES

**A5.405.5.2 Concrete.** Unless otherwise directed by the Engineer of Record, use concrete manufactured with cementitious materials in accordance with Sections A5.405.5.2.1 and A5.405.5.2.1.1, as approved by the enforcing agency.

**A5.405.5.2.1 Supplementary cementitious materials (SCM).** Use concrete made with one or more supplementary cementitious materials (SCM) conforming to the following standards:

1. Fly ash conforming to ASTM C618, *Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete*.
2. Slag cement (GGBFS) conforming to ASTM C989, *Specification for Use in Concrete and Mortars*.
3. Silica fume conforming to ASTM C1240, *Specification for Silica Fume Used in Cementitious Mixtures*.
4. Natural pozzolan conforming to ASTM C618, *Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete*.
5. Blended supplementary cementitious materials conforming to ASTM C1697, *Standard Specification for Blended Supplementary Cementitious Materials*. The amount of each SCM in the blend will be used separately in calculating Equation A5.4-1. If Class C fly ash is used in the blend, it will be considered to be "SL" for the purposes of satisfying the equation.
6. Ultra-fine fly ash (UFFA) conforming to ASTM C618, *Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete* and the following chemical and physical requirements:

Chemical Requirements	Percent
Sulfur Trioxide (SO <sub>3</sub> )	1.5 max.
Loss on ignition	1.2 max.
Available Alkalies (as Na <sub>2</sub> O) equivalent	1.5 max.
Physical Requirements	Percent
Particle size distribution Less than 3.5 microns	50
Less than 9.0 microns	90
Strength Activity Index with portland cement 7 days	95 (minimum % of control)
28 days	110 (minimum % of control)
Expansion at 16 days when testing job materials in conformance with ASTM C1567*	0.10 max.

\* In the test mix, cement shall be replaced with at least 12% UFFA by weight.

7. Metakaolin conforming to ASTM C618, *Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete*, the following chemical and physical requirements:

Chemical Requirements	Percent
Silicon Dioxide (SiO <sub>2</sub> ) + Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> )	92.0 min.
Calcium Oxide (CaO)	1.0 max.
Sulfur Trioxide (SO <sub>3</sub> )	1.0 max.
Loss on ignition	1.2 max.
Available Alkalies (as Na <sub>2</sub> O) equivalent	1.0 max.
Physical Requirements	Percent
Particle size distribution Less than 45 microns	95
Strength Activity Index with portland cement 7 days	100 (minimum % of control)
28 days	100 (minimum % of control)

8. Other materials with comparable or superior environmental benefits, as approved by the Engineer of Record and enforcing authority.

**A5.405.5.2.1.1 Mix design equation.** Use any combination of one or more SCM, satisfying Equation A5.4-14. When ASTM C595 or ASTM C1157 cement is used, the amount of SCM in these cements shall be used in calculating Equation A5.4-14.

**Exception:** Minimums in mix designs approved by the Engineer of Record may be lower where high early strength is needed for concrete products or to meet an accelerated project schedule.

$$F/25 + SL/50 + UF/12 \geq 1 \quad (\text{Equation A5.4-14})$$

where:

$F$  = Fly ash, natural pozzolan or other approved SCM as a percent of total cementitious material for concrete on the project.

$SL$  = GGBFS, as a percent of total cementitious material for concrete on the project.

$UF$  = Silica fume, metakaolin or UFFA, as a percent of total cementitious material for concrete on the project.

**A5.405.5.3 Additional means of compliance.** Any of the following measures shall be permitted to be employed for the production of cement or concrete, depending on their availability and suitability, in conjunction with Section A5.405.5.2.

**A5.405.5.3.1 Cement.** The following measures shall be permitted to be used in the manufacture of cement.

**A5.405.5.3.1.1 Alternative fuels.** The use of alternative fuels where permitted by state or local air quality standards.

## NONRESIDENTIAL VOLUNTARY MEASURES

**A5.405.5.3.1.2 Alternative power.** Alternate electric power generated at the cement plant and/or green power purchased from the utility meeting the requirements of Section A5.211.

**A5.405.5.3.2 Concrete.** The following measures shall be permitted to be used in the manufacture of concrete.

**A5.405.5.3.2.1 Alternative energy.** Renewable or alternative energy meeting the requirements of Section A5.211.

**A5.405.5.3.2.2 Recycled aggregates.** Concrete made with one or more of the following materials:

1. Blast furnace slag as a lightweight aggregate in unreinforced concrete.
2. Recycled concrete that meets grading requirements of ASTM C33, *Standard Specification for Concrete Aggregates*.
3. Other materials with comparable or superior environmental benefits, as approved by the engineer and enforcing authority.

**A5.405.5.3.2.3 Mixing water.** Water recycled by the local water purveyor or water reclaimed from manufacturing processes and conforming to ASTM C1602, *Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete*.

**A5.405.5.3.2.4 High strength concrete.** Concrete elements designed to reduce their total size compared to standard 3,000 psi concrete, thereby reducing the total volume of cement, aggregate and water used on the project, as approved by the Engineer of Record.

## SECTION A5.406 ENHANCED DURABILITY AND REDUCED MAINTENANCE

**A5.406.1 Choice of materials.** Compared to other products in a given product category, choose materials proven to be characterized by one or more of the following.

**A5.406.1.1 Service life.** Select materials for longevity and minimal deterioration under conditions of use.

**A5.406.1.2 Reduced maintenance.** Select materials that require little, if any, finishing. For those with surface protection, choose materials that do not require frequent applications of toxic or malodorous finishes.

**A5.406.1.3 Recyclability.** Select materials that can be reused or recycled at the end of their service life in the project.

## SECTION A5.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

**A5.408.3.1 Enhanced construction waste reduction – Tier 1.** Divert to recycle or salvage at least 65 percent of nonhazardous construction and demolition waste gener-

ated at the site. Any mixed recyclables that are sent to mixed-waste recycling facilities shall include a qualified third party verified facility average diversion rate. Verification of diversion rates shall meet minimum certification eligibility guidelines, acceptable to the local enforcing agency.

**A5.408.3.1.1 Enhanced construction waste reduction – Tier 2.** Divert to recycle or salvage at least 80 percent of nonhazardous construction and demolition waste generated at the site.

**A5.408.3.1.2 Verification of compliance.** A copy of the completed waste management report or documentation of certification of the waste management company utilized shall be provided.

### Exceptions:

1. Excavated soil and land-clearing debris.
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets.

## SECTION A5.409 LIFE CYCLE ASSESSMENT

**A5.409.1 General.** Life cycle assessment shall be ISO 14044 compliant. The service life of the building and materials assemblies shall not be less than 60 years unless designated in the construction documents as having a shorter service life as approved by the enforcing agency.

**A5.409.2 Whole building life cycle assessment.** Conduct a whole building life assessment, including operating energy, showing that the building project achieves at least a 10 percent improvement for at least three of the impacts listed in Section A5.409.2.2, one of which shall be climate change, compared to a reference building of similar size, function, complexity and operating energy performance, and meeting the 2016 *California Energy Code* at a minimum.

**A5.409.2.1 Building components.** The building envelope, structural elements, including footings and foundations, interior ceilings, walls, and floors; and exterior finishes shall be considered in the assessment.

### Exceptions:

1. Plumbing, mechanical and electrical systems and controls; fire and smoke detection and alarm systems and controls; and conveying systems.
2. Interior finishes are not required to be included.

### Notes:

1. Software for calculating whole building life cycle assessments includes those found at the Athena Institute website (Impact Estimator software), the PE International website (GaBi software), and the PRe Consultants website (SimaPro software).

## NONRESIDENTIAL VOLUNTARY MEASURES

2. Interior finishes, if included, may be assessed using the NIST BEES tool.

**A5.409.2.2 Impacts to be considered.** Select from the following impacts in the assessment:

1. Climate change (greenhouse gases).
2. Fossil fuel depletion.
3. Stratospheric ozone depletion.
4. Acidification of land and water sources.
5. Eutrophication.
6. Photochemical oxidants (smog).

**A5.409.3 Materials and system assemblies.** If whole building analysis of the project is not elected, select a minimum of 50 percent of materials or assemblies based on life cycle assessment of at least three of the impacts listed in Section A5.409.2.2, one of which shall be climate change.

**Note:** Software for calculating life cycle assessments for assemblies and materials may be found at the Athena Institute web site and the NIST BEES web site.

**A5.409.4 Substitution for prescriptive standards.** Performance of a life cycle assessment completed in accordance with Section A5.409.2 may be substituted for other prescriptive Material Conservation and Resource Efficiency provisions of Division A5.4, including those made mandatory through local adoption of Tier 1 or Tier 2 in Division A5.6.

**A5.409.5 Verification of compliance.** Documentation of compliance shall be provided as follows:

1. The assessment is performed in accordance with ISO 14044.
2. The project meets the requirements of other parts of Title 24.
3. A copy of the analysis shall be made available to the enforcement authority.
4. A copy of the analysis and any maintenance or training recommendations shall be included in the operation and maintenance manual.

# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## APPENDIX A5 – NONRESIDENTIAL VOLUNTARY MEASURES

### DIVISION A5.5 – ENVIRONMENTAL QUALITY

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHPD						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter																						
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below		X						X														
Chapter/Section																						
A5.501.1		X																				
A5.502.1 Definitions		X																				
A5.504.1		X																				
A5.504.1.1, Items 1 & 2		X																				
A5.504.1.2		X																				
A5.504.2		X																				
A5.504.2.1 and subsections		X																				
A5.504.4.5.1		X																				
A5.504.4.7		X																				
A5.504.4.7.1		X																				
A5.504.4.7.2		X																				
A5.504.4.8		X																				
A5.504.4.8.1		X																				
A5.504.4.8.2		X																				
A5.504.4.9		X																				
A5.504.4.9.1		X																				
A5.504.5		X																				
A5.504.5.1		X																				
A5.504.5.2		X																				
A5.504.5.3.1		X																				
A5.504.5.3.1.1		X																				
Table A5.504.8.5		X																				
A5.507.1 and subsections		X																				
A5.507.2		X																				
A5.507.3 and subsections		X																				
A5.507.5								X														
A5.508		X																				

## APPENDIX A5

# NONRESIDENTIAL VOLUNTARY MEASURES

### Division A5.5 – ENVIRONMENTAL QUALITY

#### SECTION A5.501 GENERAL

**A5.501.1 Scope.** The provisions of this chapter shall outline means of reducing the quantity of air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of a building's installers, occupants and neighbors.

#### SECTION A5.502 DEFINITIONS

**A5.502.1 Definitions.** The following terms are defined in Chapter 2.

**INTERIOR, BUILDING.**

**MERV. [BSC]**

**MULTI-OCCUPANT SPACES.**

**NO ADDED FORMALDEHYDE (NAF) BASED RESINS.**

**SINGLE OCCUPANT SPACES.**

**ULTRA-LOW EMITTING FORMALDEHYDE (ULEF) RESINS.**

#### SECTION A5.504 POLLUTANT CONTROL

**A5.504.1 Indoor air quality (IAQ) during construction.** Maintain IAQ as provided in Sections A5.504.1.1 and A5.504.1.2.

**A5.504.1.1 Temporary ventilation.** Provide temporary ventilation during construction in accordance with Section 120.1 (Requirements for Ventilation) of the *California Energy Code*, CCR, Title 24, Part 6 and Chapter 4 of CCR, Title 8 and as follows:

1. Ventilation during construction shall be achieved through openings in the building shell using fans to produce a minimum of three air changes per hour.
2. If the building is occupied during demolition or construction, meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3.

**A5.504.1.2 Additional IAQ measures.** Employ additional measures as follows:

1. When using generators to generate temporary power, use generators meeting the requirements of CCR, Title 13, Chapter 9 or local ordinance, whichever is more stringent.

2. Protect on-site absorbent materials from moisture. Remove and replace any materials with evidence of mold, mildew or moisture infiltration.
3. Store odorous and high VOC-emitting materials off-site, without packaging, for a sufficient period to allow odors and VOCs to disperse.
4. When possible, once materials are on the jobsite, install odorous and high VOC-emitting materials prior to those that are porous or fibrous.
5. Clean oil and dust from ducts prior to use.

**A5.504.2 IAQ postconstruction.** After all interior finishes have been installed, flush out the building by supplying continuous ventilation with all air handling units at their maximum outdoor air rate and all supply fans at their maximum position and rate for at least 14 days.

1. During this time, maintain an internal temperature of at least 60°F and relative humidity no higher than 60 percent. If extenuating circumstances make these temperature and humidity limits unachievable, the flush-out may be conducted under conditions as close as possible to these limits, provided that documentation of the extenuating circumstances is provided in writing.
2. Occupancy may start after 4 days, provided flush-out continues for the full 14 days. During occupied times, the thermal comfort conditions of Title 24 must be met.
3. For buildings that rely on natural ventilation, exhaust fans and floor fans must be used to improve air mixing and removal during the 14-day flush-out and windows should remain open.
4. Do not "bake out" the building by increasing the temperature of the space.
5. If continuous ventilation is not possible, flush-out air must total the equivalent of 14 days of maximum outdoor air. The equivalent of 14 days of maximum outdoor air (the target air volume) shall be calculated by multiplying the maximum feasible air flow rate (in ft<sup>3</sup>/m) by 14 days (20,160 minutes). The air volumes for each period of ventilation are then calculated and summed and the flush-out continues until the total equals the target air volume.

**A5.504.2.1 IAQ testing.** If the engineer determines that building flush-out pursuant to Section A5.504.2 is not feasible, a testing alternative may be employed after all interior finishes have been installed, using testing protocols recognized by the United States Environmental Protection Agency (U.S. EPA).



## NONRESIDENTIAL VOLUNTARY MEASURES

**A5.504.2.1.1 Maximum levels of contaminants.** Allowable levels of contaminant concentrations measured by testing shall not exceed the following:

1. Carbon Monoxide (CO): 9 parts per million, not to exceed outdoor levels by 2 parts per million;
2. Formaldehyde: 27 parts per billion;
3. Particulates (PM10): 50 micrograms per cubic meter;
4. 4-Phenylcyclohexene (4-PCH), if fabrics and carpets with styrene butadiene rubber (SBR) latex backing, are installed: 6.5 micrograms per cubic meter; and
5. Total Volatile Organic Compounds (TVOC): 300 micrograms per cubic meter.

**A5.504.2.1.2 Test protocols.** Testing of indoor air quality should include the following elements:

1. The contaminant sampling and averaging times and the measurement methods should be sufficient to achieve a Limit of Detection that is below the maximum allowable concentrations.
2. Testing should be conducted with the HVAC system operated at the minimum design outdoor air ventilation rate.
3. Air samplers and monitors should be located near likely sources of formaldehyde and other volatile organic compounds, at a height of 3 to 6 feet from the floor and well away from walls and air diffusers.
4. The test protocols should be justified with documentation to show that appropriate sampling methods and times were used.

**A5.504.2.1.3 Noncomplying building areas.** For each sampling area of the building exceeding the maximum concentrations specified in Section A5.504.2.1.1, flush out with outside air and retest samples taken from the same area. Repeat the procedures until testing demonstrates compliance.

**Note:** U.S. EPA-recognized testing protocols may be found on the Air Resources Board web site.

**A5.504.4.5.1 No added formaldehyde Tier 1.** Use composite wood products approved by the California Air Resources Board (ARB) as no-added formaldehyde (NAF) based resins or ultra-low emitting formaldehyde (ULEF) resins.

**Notes:**

1. See Title 17, Section 93120.3(c) and (d), respectively.
2. Documentation must be provided verifying that materials are certified to meet the pollutant emission limits. A list of manufacturers and their NAF and ULEF certified materials is provided at: [http://www.arb.ca.gov/toxics/compwood/naf\\_ulef/listofnaf\\_ulef.htm](http://www.arb.ca.gov/toxics/compwood/naf_ulef/listofnaf_ulef.htm).

**A5.504.4.7 Resilient flooring systems, Tier 1.** For 90 percent of floor area receiving resilient flooring, install resilient flooring that is:

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Compliant with the Collaborative for High Performance Schools California (2014 CA-CHPS) Criteria and listed in the CHPS High Performance Product Database; or
4. Products certified under UL GREENGUARD Gold (formerly the Greenguard Children's & Schools Program).

**A5.504.4.7.1 Resilient flooring systems, Tier 2.** For 100 percent of floor area receiving resilient flooring, install resilient flooring that is:

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Compliant with the Collaborative for High Performance Schools California (2014 CA-CHPS) Criteria and listed in the CHPS High Performance Product Database; or
4. Products certified under UL GREENGUARD Gold (formerly the Greenguard Children's & Schools Program).

**Exception:** Allowance may be permitted in Tier 2 for up to 5-percent specialty purpose flooring.

**A5.504.4.7.2 Verification of compliance.** Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

**A5.504.4.8 Thermal insulation, Tier 1.** Comply with the following standards:

1. Chapters 12-13 (Standards for Insulating Material) in Title 24, Part 12, the *California Referenced Standards Code*,
2. The VOC-emission limits defined in 2014 CA-CHPS criteria and listed on its High Performance Products Database.
3. California Department of Public Health 2010 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as Specification 01350.)

**A5.504.4.8.1 Thermal insulation, Tier 2.** Thermal insulation, No-added Formaldehyde. Install thermal



## NONRESIDENTIAL VOLUNTARY MEASURES

insulation which complies with Tier 1 plus does not contain any added formaldehyde.

**A5.504.4.8.2 Verification of compliance.** Documentation shall be provided verifying that thermal insulation materials meet the pollutant emission limits.

**A5.504.4.9 Acoustical ceilings and wall panels.** Comply with Chapter 8 in Title 24, Part 2, the *California Building Code* and with the VOC-emission limits defined in the 2009 CHPS criteria and listed on its High Performance Products Database.

**A5.504.4.9.1 Verification of compliance.** Documentation shall be provided verifying that acoustical finish materials meet the pollutant emission limits.

**Note:** Products compliant with CHPS criteria certified under the Greenguard Children & Schools program may also be used.

**A5.504.5 Hazardous particulates and chemical pollutants.** Minimize and control pollutant entry into buildings and cross-contamination of regularly occupied areas.

**A5.504.5.1 Entryway systems.** Install permanent entryway systems measuring at least six feet in the primary direction of travel to capture dirt and particulates at entryways directly connected to the outdoors.

1. Qualifying entryways are those that serve as regular entry points for building users.
2. Acceptable entryway systems include, but are not limited to, permanently installed grates, grilles or slotted systems that allow cleaning underneath.
3. Roll-out mats are acceptable only when maintained regularly by janitorial contractors as documented in service contract or by in-house staff as documented by written policies and procedures.

**A5.504.5.2 Isolation of pollutant sources.** In rooms where activities produce hazardous fumes or chemicals, such as garages, janitorial or laundry rooms and copy or printing rooms, exhaust them and isolate them from their adjacent rooms.

1. Exhaust each space with no air recirculation in accordance with ASHRAE 62.1, Table 6-4 to create negative pressure with respect to adjacent spaces with the doors to the room closed.
2. For each space, provide self-closing doors and deck to deck partitions or a hard ceiling.
3. Install low-noise, vented range hoods for all cooking appliances and in laboratory or other chemical mixing areas.

## SECTION A5.507 ENVIRONMENTAL COMFORT

**A5.507.1 Lighting and thermal comfort controls.** Provide controls in the workplace as described in Sections A5.507.1.1 and A5.507.1.2.

**A5.507.1.1 Single-occupant spaces.** Provide individual controls that meet energy use requirements in the *Califor-*

*nia Energy Code* in accordance with Sections A5.507.1.1.1 and A5.507.1.1.2.

**A5.507.1.1.1 Lighting.** Provide individual task lighting and/or daylighting controls for at least 90 percent of the building occupants.

**A5.507.1.1.2 Thermal comfort.** Provide individual thermal comfort controls for at least 50 percent of the building occupants.

1. Occupants shall have control over at least one of the factors of air temperature, radiant temperature, air speed and humidity as described in ASHRAE 55-2004.
2. Occupants inside 20 feet of the plane of and within 10 feet either side of operable windows can substitute windows to control thermal comfort. The areas of operable window must meet the requirements of Section 120.1 (Requirement for Ventilation) of the *California Energy Code*.

**A5.507.1.2 Multi-occupant spaces.** Provide lighting and thermal comfort system controls for all shared multi-occupant spaces, such as classrooms and conference rooms.

**A5.507.2 Daylight.** Provide daylight spaces as required for top-lighting and sidelighting in the *California Energy Code*. In constructing a design, consider the following:

1. Use of light shelves and reflective room surfaces to maximize daylight penetrating the rooms
2. Means to eliminate glare and direct sun light, including through skylights
3. Use of photosensors to turn off electric lighting when daylight is sufficient
4. Not using diffuse daylighting glazing where views are desired

**A5.507.3 Views.** Achieve direct line of sight to the outdoor environment via vision glazing between 2 feet 6 inches and 7 feet 6 inches above finish floor for building occupants in 90 percent of all regularly occupied areas as demonstrated by plan view and section cut diagrams.

**A5.507.3.1 Interior office spaces.** Entire areas of interior office spaces may be included in the calculation if at least 75 percent of each area has direct line of sight to perimeter vision glazing.

**A5.507.3.2 Multi-occupant spaces.** Include in the calculation the square footage with direct line of sight to perimeter vision glazing.

**Exceptions to Sections A5.507.2 and A5.507.3.** Copy/printing rooms, storage areas, mechanical spaces, restrooms, auditoria and other intermittently or infrequently occupied spaces or spaces where daylight would interfere with use of the space.

**A5.507.5 Acoustical control [DSA-SS].** Public Schools and Community Colleges: Unoccupied, furnished classrooms must have a maximum background noise level of no more than 45 dBA LAeq and a maximum (unoccupied, furnished) reverberation of 0.6-second time for classrooms with less than 10,000 cubic feet and a maximum (unoccupied, fur-

nished) reverberation of 0.7-second time for classroom volumes with between 10,000 cubic feet and 20,000 cubic feet.

### **SECTION A5.508 OUTDOOR AIR QUALITY**

**A5.508.1.3 Hydrochlorofluorocarbons (HCFCs).** Install HVAC and refrigeration equipment that do not contain HCFCs.

**A5.508.1.4 Hydrofluorocarbons (HFCs).** Install HVAC complying with either of the following:

1. Install HVAC, refrigeration and fire suppression equipment that do not contain HFCs or that do not contain HFCs with a global warming potential greater than 150.
2. Install HVAC and refrigeration equipment that limit the use of HFC refrigerant through the use of a secondary heat transfer fluid with a global warming potential no greater than 1.



# CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

## APPENDIX A5 – NONRESIDENTIAL VOLUNTARY MEASURES

### DIVISION A5.6 – VOLUNTARY TIERS

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.

See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHDP						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X																				
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below																						
Chapter/Section																						

## APPENDIX A5

# NONRESIDENTIAL VOLUNTARY MEASURES

## Division A5.6 – VOLUNTARY TIERS

### SECTION A5.601 CALGreen TIER 1 AND TIER 2

**A5.601.1 Scope.** The measures contained in this appendix are not mandatory unless adopted by local government as specified in Section 101.7. The provisions of this section outline means of achieving enhanced construction or reach levels by incorporating additional green building measures for newly constructed nonresidential buildings as well as additions and alterations. In order to meet one of the tier levels designers, builders or property owners are required to incorporate additional green building measures necessary to meet the threshold of each level. Refer to the provisions in Section 301.3 for nonresidential additions and alterations scope and application.

#### A5.601.2 CALGreen Tier 1

**A5.601.2.1 Prerequisites.** To achieve *CALGreen* tier status, a project must meet all of the mandatory measures in Chapter 5 and, in addition, meet the provisions of this section.

**A5.601.2.2 Energy performance.** For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards.

**A5.601.2.3 Tier 1.** Comply with the energy efficiency requirements in Section A5.203.1.1.1 and Section A5.203.1.2.1.

**A5.601.2.4 Voluntary measures for Tier 1.** In addition to the provisions of Sections A5.601.2.1 and A5.601.2.3 above, compliance with the following voluntary measures from Appendix A5 is required for Tier 1:

1. From Division A5.1,
  - a. Comply with the designated parking requirements for fuel efficient vehicles for a minimum of 10 percent of parking capacity per Section A5.106.5.1 and Table A5.106.5.1.1.
  - b. Comply with thermal emittance, solar reflectance or SRI values for cool roofs in Section A5.106.11.2 and Table A5.106.11.2.1.<sup>1</sup>
  - c. Comply with one elective measure selected from this division.
2. From Division A5.2 comply with TWO of the following:
  1. Outdoor lighting as described in A5.203.1.1.1.
  2. Service water heating in restaurants as described in A5.203.1.1.2.
  3. Warehouse Dock Seal Doors A5.203.1.1.3.
  4. Daylight Design Power Adjustments A5.203.1.1.4.
  5. Exhaust Air Heat Recovery A5.203.1.1.5.
3. From Division A5.3,
  - a. Comply with the 12-percent reduction for indoor potable water use in Section A5.303.2.3.1.
  - b. Comply with one elective measure selected from this division.
4. From Division A5.4,<sup>2</sup>
  - a. Comply with recycled content of 10 percent of materials based on estimated total cost, or use two products from Table A5.405.4 for at least 75 percent by cost in Section A5.405.4.
  - b. Comply with the 65-percent reduction in construction and demolition waste in Section A5.408.3.1.

## NONRESIDENTIAL VOLUNTARY MEASURES

- c. Comply with one elective measure selected from this division.

### 5. From Division A5.5,

- a. Comply with resilient flooring systems for 90 percent of resilient flooring in Section A5.504.4.7.
- b. Comply with thermal insulation meeting 2009 CHPS low-emitting materials list in Section A5.504.4.8.
- c. Comply with one elective measure selected from this division.

### 6. Comply with one additional elective measure selected from any division.

<sup>1</sup> Cool roof is required for compliance with Tiers 1 and 2 and may be used to meet energy standards in Part 6, exceed energy standards and to mitigate heat island effect.

<sup>2</sup> Life cycle assessment compliant with Section A5.409.4 in this code may be substituted for prescriptive measures from Division A5.4.

### A5.601.3 CALGreen Tier 2.

**A5.601.3.2 Energy performance.** For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards.

**A5.601.3.3 Tier 2.** Comply with the energy efficiency requirements in Section A5.203.1.1 and Section A5.203.1.2.2.

**A5.601.3.4 Voluntary measures for Tier 2.** In addition to the provisions of Sections A5.601.3.1 and A5.601.3.3 above, compliance with the following voluntary measures from Appendix A5 and additional elective measures shown in Table A5.601.3.4 is required for Tier 2:

#### 1. From Division A5.1,

- a. Comply with the designated parking requirements for fuel efficient vehicles for a minimum of 12 percent of parking capacity per Section A5.106.5.1 and Table A5.106.5.1.2.
- b. Comply with thermal emittance, solar reflectance or SRI values for cool roofs in Section A5.106.11.2 and Table A5.106.11.2.2.<sup>1</sup>
- c. Comply with three elective measures selected from this division.

#### 2. From Division A5.2 comply with ONE of the following:

1. Outdoor lighting as described in A5.203.1.1.1.
2. Service water heating in restaurants as described in A5.203.1.1.2.
3. Warehouse Dock Seal Doors A5.203.1.1.3.
4. Daylight Design Power Adjustments A5.203.1.1.4.
5. Exhaust Air Heat Recovery A5.203.1.1.5.

#### 3. From Division A5.3,

- a. Comply with the 20-percent reduction for indoor potable water use in Section A5.303.2.3.2.

- b. Comply with three elective measures selected from this division.

### 4. From Division A5.4,<sup>2</sup>

- a. Comply with recycled content of 15 percent of materials based on estimated total cost, or use two products from Table A5.405.4 for at least 75 percent by cost in Section A5.405.4.1.
- b. Comply with the 80-percent reduction in construction and demolition waste in Section A5.408.3.1.
- c. Comply with three elective measures selected from this division.

### 5. From Division A5.5,

- a. Comply with resilient flooring systems for 100 percent of resilient flooring in Section A5.504.4.7.1.

**Exception:** Allowance may be permitted in Tier 2 for up to 5-percent specialty purpose flooring.

- b. Comply with thermal insulation meeting 2009 CHPS low-emitting materials list and no added formaldehyde in Section A5.504.4.8.1.

- c. Comply with three elective measures selected from this division.

### 6. Comply with three additional elective measures selected from any division.

<sup>1</sup> Cool roof is required for compliance with Tiers 1 and 2 and may be used to meet energy standards in Part 6, exceed energy standards and to mitigate heat island effect.

<sup>2</sup> Life cycle assessment compliant with Section A5.409.4 in this code may be substituted for prescriptive measures from Division A5.4.

**A5.601.4 Compliance verification.** Compliance with Section A5.601.2 or A5.601.3 shall be as required in Chapter 7 of this code. Compliance documentation shall be made part of the project record as required in Section 5.410.2 or 5.410.3.

## NONRESIDENTIAL VOLUNTARY MEASURES

**TABLE A5.601 NONRESIDENTIAL BUILDINGS:  
Green Building Standards Code Proposed Performance Approach**

*Note: This table is intended only as an aid in illustrating the nonresidential tier structure  
(Refer to Checklists A5.602, A5.602.1, and A5.602.2 for CALGreen verification  
guidelines for Mandatory Checklist, Tier 1 Checklist, and Tier 2 Checklist.)*

CATEGORY	ENVIRONMENTAL PERFORMANCE GOAL	TIER 1	TIER 2
<b>All</b>	Minimum Mandatory (See Mandatory Checklist)	Meet all of the provisions of Chapter 5 (See Tier 1 Checklist)	Meet all of the provisions of Chapter 5 (See Tier 2 Checklist)
<b>DIVISION 5.1 Planning and Design</b>	Designated Parking for Fuel Efficient Vehicles	Approx. 10% of total spaces	Approx. 12% of total spaces
	Electric Vehicle Charging	Approx. 8% of total spaces	Approx. 10% of total spaces
	Cool Roof to Reduce Heat Island Effect	Roof Slope < 2:12 SRI 75 Roof Slope > 2:12 SRI 16	Roof Slope < 2:12 SRI 82 Roof Slope > 2:12 SRI 27
		1 additional Elective from Division A5.1	3 additional Electives from Division A5.1
<b>DIVISION 5.2 Energy Efficiency</b>	Energy Performance <sup>2a, 2b</sup>	Outdoor lighting power 90% of Part 6 allowance	Outdoor lighting power 90% of Part 6 allowance
		If applicable, solar water-heating system with minimum solar savings fraction of 0.15	If applicable, solar water-heating system with minimum solar savings fraction of 0.15
		Warehouse door seals	Warehouse door seals
		Comply with day lighting requirements	Comply with day lighting requirements
		Exhaust heat recovery	Exhaust heat recovery
		Energy Budget 95% or 90% of Part 6 calculated value of allowance	Energy Budget 90% or 85% of Part 6 calculated value of allowance
<b>DIVISION 5.3 Water Efficiency and Conservation</b>	Indoor Water Use	12% Savings	20% Savings
		1 additional Elective from Division A5.3	3 additional Electives from Division A5.3
<b>DIVISION 5.4 Material Conservation and Resource Efficiency<sup>3</sup></b>	Construction Waste Reduction	At least 65% reduction	At least 80% reduction
	Recycled Content	Utilize recycled content materials for 10% of total material cost	Utilize recycled content materials for 15% of total material cost
		1 additional Elective from Division A5.4	3 additional Electives from Division A5.4
<b>DIVISION 5.5 Environmental Quality</b>	Low-VOC Resilient Flooring	90% of flooring meets VOC limits	100% of flooring meets VOC limits <sup>1</sup>
	Low-VOC Thermal Insulation	Comply with VOC limits	Install no-added formaldehyde insulation and comply with VOC limits
		1 additional Elective from Division A5.5	3 additional Electives from Division A5.5
<b>Additional Measures</b>		1 additional Elective from any division	3 additional Electives from any division
<b>Approximate Total Measures</b>		15	25

1. Exception: Allowance may be permitted in Tier 2 for up to 5-percent specialty purpose flooring.

2. Solar water-heating system requirement for newly constructed restaurants as per A5.203.1.1.2.

**Exceptions:**

a. Buildings with a natural gas service water heater with a minimum of 95-percent thermal efficiency.

b. Buildings where greater than 75 percent of the total roof area has annual solar access that is less than 70 percent. Solar access is the ratio of solar insolation including shade to the solar insolation without shade. Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access.

3. Life cycle assessment compliant with Section A5.409.4 in this code may be substituted for prescriptive measures from Division A5.4.



## NONRESIDENTIAL VOLUNTARY MEASURES

**A5.602**  
**CALGreen VERIFICATION GUIDELINES**  
**MANDATORY MEASURES CHECKLIST**

**Application:** This checklist shall be used for nonresidential projects that meet one of the following: new construction, building additions of 1,000 square feet or greater, or building alterations with a permit valuation of \$200,000 or more pursuant to Section 301.3 AND do not trigger a Tier 1 or Tier 2 requirement:

**Y** = Yes (section has been selected and/or included)

**N/A** = Not Applicable (code section does not apply to the project—mainly used for additions and alterations)

**O** = Other (provide explanation)

**[N]** = New construction pursuant to Section 301.3

**[A]** = Additions and/or Alterations pursuant to Section 301.3

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
<b>DIVISION 5.1</b> <b>Planning and</b> <b>Design</b>	Mandatory	Storm water pollution prevention for projects that disturb less than 1 acre of land	5.106.1 through 5.106.2				
	Mandatory	Short-term bicycle parking (with exception)	5.106.4.1.1				
	Mandatory	Long-term bicycle parking	5.106.4.1.2 through 5.106.4.1.5				
	Mandatory	Designated parking for clean air vehicles	5.106.5.2				
	Mandatory	Parking stall marking	5.106.5.2.1				
	Mandatory	Single charging space requirements	5.106.5.3.1				
	Mandatory	Multiple charging space requirements [N]	5.106.5.3.2				
	Mandatory	EV charging space calculation [N] (with exceptions)	5.106.5.3.3				
	Mandatory	[N] Identification	5.106.5.3.4				
	Mandatory	[N] Future charging spaces	5.106.5.3.5				
	Mandatory	Light pollution reduction [N] (with exceptions and notes)	5.106.8				
	Mandatory	Grading and paving (exception for additions and alterations not altering the drainage path)	5.106.10				
<b>DIVISION 5.2</b> <b>Energy</b> <b>Efficiency</b>	Mandatory	Meet the minimum energy efficiency standard	5.201.1				
<b>DIVISION 5.3</b> <b>Water</b> <b>Efficiency and</b> <b>Conservation</b> (continued)	Mandatory	Separate meters (new buildings or additions > 50,000 sf that consume more than 100 gal/day)	5.303.1.1				
	Mandatory	Separate meters (for tenants in new buildings or additions that consume more than 1,000 gal/day)	5.303.1.2				
	Mandatory	Water closets shall not exceed 1.28 gallons per flush (gpf)	5.303.3.1				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
(continued) <b>DIVISION 5.3 Water Efficiency and Conservation</b>	Mandatory	Wall-mounted urinals shall not exceed 0.125 gpf	5.303.3.2.1				
	Mandatory	Floor-mounted urinals shall not exceed 0.5 gpf	5.303.3.2.2				
	Mandatory	Single showerhead shall have maximum flow rate of 1.8 gpm (gallons per minute) at 80 psi	5.303.3.3.1				
	Mandatory	Multiple showerheads serving one shower shall have a combined flow rate of 1.8 gpm at 80 psi	5.303.3.3.2				
	Mandatory	Nonresidential lavatory faucets	5.303.3.4.1				
	Mandatory	Kitchen faucets	5.303.3.4.2				
	Mandatory	Wash fountains	5.303.3.4.3				
	Mandatory	Metering faucets	5.303.3.4.4				
	Mandatory	Metering faucets for wash fountains	5.303.3.4.5				
	Mandatory	Food waste disposers	5.303.4.1				
	Mandatory	Areas of additions or alterations	5.303.5				
	Mandatory	Standards for plumbing fixtures and fittings	5.303.6				
	Mandatory	Outdoor potable water use in landscape areas (with notes)	5.304.1				
	Mandatory	Outdoor water supply systems (with Exceptions 1-4)	5.305.1.1				
	Mandatory	Technical requirements for outdoor recycled water supply systems	5.305.1.2				
<b>DIVISION 5.4 Material Conservation and Resource Efficiency (continued)</b>	Mandatory	Weather protection	5.407.1				
	Mandatory	Moisture control: sprinklers	5.407.2.1				
	Mandatory	Moisture control: exterior door protection	5.407.2.2.1				
	Mandatory	Moisture control: flashing	5.407.2.2.2				
	Mandatory	Construction waste management—comply with either: Sections 5.408.1.1, 5.408.1.2, 5.408.1.3 or more stringent local ordinance	5.408.1.1, 5.408.1.2, 5.408.1.3				
	Mandatory	Construction waste management: documentation	5.408.1.4				
	Mandatory	Universal waste [A]	5.408.2				
	Mandatory	Excavated soil and land clearing debris (100% reuse or recycle)	5.408.3				
	Mandatory	Recycling by occupants (with exception)	5.410.1				
	Mandatory	Recycling by occupants: additions (with exception)	5.410.1.1				
	Mandatory	Recycling by occupants: sample ordinance	5.410.1.2				
	Mandatory	Commissioning new buildings (≥ 10,000 sf) [N]	5.410.2				
	Mandatory	Owner's or owner representative's Project Requirements (OPR) [N]	5.410.2.1				
	Mandatory	Basis of Design (BOD) [N]	5.410.2.2				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
(continued) <b>DIVISION 5.4 Material Conservation and Resource Efficiency</b>	Mandatory	Commissioning plan [N]	5.410.2.3				
	Mandatory	Functional performance testing [N]	5.410.2.4				
	Mandatory	Documentation and training [N]	5.410.2.5				
	Mandatory	Systems manual [N]	5.410.2.5.1				
	Mandatory	Systems operation training [N]	5.410.2.5.2				
	Mandatory	Commissioning report [N]	5.410.2.6				
	Mandatory	Testing and adjusting for new buildings < 10,000 sf or new systems that serve additions or alterations [A]	5.410.4				
	Mandatory	System testing plan for renewable energy, landscape irrigation and water reuse [A]	5.410.4.2				
	Mandatory	Procedures for testing and adjusting	5.410.4.3				
	Mandatory	Procedures for HVAC balancing	5.410.4.3.1				
	Mandatory	Reporting for testing and adjusting	5.410.4.4				
	Mandatory	Operation and maintenance (O&M) manual	5.410.4.5				
	Mandatory	Inspection and reports	5.410.4.5.1				
	Mandatory	Fireplaces	5.503.1				
<b>DIVISION 5.5 Environmental Quality</b> (continued)	Mandatory	Woodstoves	5.503.1.1				
	Mandatory	Temporary ventilation	5.504.1				
	Mandatory	Covering of ducts openings and protection of mechan- ical equipment during construction	5.504.3				
	Mandatory	Adhesives, sealants, and caulks	5.504.4.1				
	Mandatory	Paints and coatings	5.504.4.3				
	Mandatory	Aerosol paints and coatings	5.504.4.3.1				
	Mandatory	Aerosol paints and coatings: verification	5.504.4.3.2				
	Mandatory	Carpet systems	5.504.4.4				
	Mandatory	Carpet cushion	5.504.4.4.1				
	Mandatory	Carpet adhesives per Table 5.504.4.1	5.504.4.4.2				
	Mandatory	Composite wood products	5.504.4.5				
	Mandatory	Composite wood products: documentation	5.504.4.5.3				
	Mandatory	Resilient flooring systems	5.504.4.6				
	Mandatory	Resilient flooring: verification of compliance	5.504.4.6.1				
	Mandatory	Filters (with exceptions)	5.504.5.3				
	Mandatory	Filters: labeling	5.504.5.3.1				
	Mandatory	Environmental tobacco smoke (ETS) control	5.504.7				
	Mandatory	Indoor moisture control	5.505.1				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
(continued) <b>DIVISION 5.5 Environmental Quality</b>	Mandatory	Outside air delivery	5.506.1				
	Mandatory	Carbon dioxide (CO <sub>2</sub> ) monitoring	5.506.2				
	Mandatory	Acoustical control (with exception)	5.507.4				
	Mandatory	Exterior noise transmission, prescriptive method (with exceptions)	5.507.4.1				
	Mandatory	Noise exposure where noise contours are not readily available	5.507.4.1.1				
	Mandatory	Performance method	5.507.4.2				
	Mandatory	Site features	5.507.4.2.1				
	Mandatory	Documentation of compliance	5.507.4.2.2				
	Mandatory	Interior sound transmission (with note)	5.507.4.3				
	Mandatory	Ozone depletion and greenhouse gas reductions	5.508.1				
	Mandatory	Chlorofluorocarbons (CFCs)	5.508.1.1				
	Mandatory	Halons	5.508.1.2				
	Mandatory	Supermarket refrigerant leak reduction for retail food stores 8,000 square feet or more Sections 5.508.2 through 5.508.2.6.3	5.508.2 through 5.508.2.6.3				
		END OF MANDATORY PROVISIONS					

<b>Documentation Author's / Responsible Designer's Declaration Statement</b>	
<input type="checkbox"/> <b>Mandatory:</b> I attest that this mandatory provisions checklist is accurate and complete.	
Signature:	
Company:	Date:
Address:	License:
City/State/Zip:	Phone:

## NONRESIDENTIAL VOLUNTARY MEASURES

**A5.602.1**  
**CALGreen VERIFICATION GUIDELINES**  
**TIER 1 CHECKLIST**

**Application:** This checklist shall be used for nonresidential projects that meet the following: new construction, or building additions of 1,000 square feet or greater, or building alterations with a permit valuation of \$200,000 or more pursuant to Section 301.3, AND are adopting Tier 1 voluntary measures.

*Note: All applicable mandatory requirements in Chapter 5 shall be met prior to applying Tier 1 voluntary measures.*

**Instructions:**

Comply with all Tier 1 prerequisite measures from the various categories shown on the table below.

Add a “Y” to all mandatory and Tier 1 prerequisite measures in the appropriate columns.

Select the required number of additional electives from those categories shown on the table below and add a “Y” on the selected elective and add an “N” on the rest.

Count the total number of Tier 1 prerequisite measures plus the additional electives and write down the total number at the end of the checklist. Determine if the required number of Tier 1 measures have been selected to achieve Tier 1 compliance.

**Y** = Yes (section has been selected and/or included)

**N** = No (section has not been selected and/or included)

**O** = Other (provide explanation)

**[N]** = New construction pursuant to Section 301.3

**[A]** = Additions and/or Alterations pursuant to Section 301.3

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
<b>DIVISION 5.1 Planning and Design</b> (continued)	Mandatory	Storm water pollution prevention for projects that disturb less than 1 acre of land	5.106.1 through 5.106.2				
	Mandatory	Short-term bicycle parking	5.106.4.1.1				
	Mandatory	Long-term bicycle parking	5.106.4.1.2 through 5.106.4.1.5				
	Mandatory	Designated parking for clean air vehicles	5.106.5.2				
	<i>Tier 1 Prerequisite</i>	<i>Designated parking—10% of parking capacity w/ parking stall markings and stall identification</i>	<i>A5.106.5.1, A5.106.5.1.1, A5.106.5.1.3, A5.106.5.1.4</i>				
	Mandatory	Parking stall marking	5.106.5.2.1				
	Mandatory	Single charging space requirements	5.106.5.3.1				
	Mandatory	Multiple charging space requirements [N]	5.106.5.3.2				
	<i>Tier 1 Prerequisite</i>	<i>Electric vehicle (EV) charging [N] w/ associated electrical panel identification and designated parking allowance</i>	<i>A5.106.5.3, A5.106.5.3.1, A5.106.5.3.3, A5.106.5.3.4</i>				
	Mandatory	EV charging space calculation [N] (with exceptions)	5.106.5.3.3				
	Mandatory	[N] Identification	5.106.5.3.4				
	Mandatory	[N] Future charging spaces	5.106.5.3.5				
	Mandatory	Light pollution reduction [N] (with exceptions and notes)	5.106.8				
	Mandatory	Grading and paving (exception for additions and alterations not altering the drainage path)	5.106.10				
	<i>Tier 1 Prerequisite</i>	<i>Cool roof (A5.106.11.2.2): SRI 75 when ≤ 2:12, SRI 16 when &gt; 2:12</i>	<i>A5.106.11.2</i>				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS			SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
(continued) <b>DIVISION 5.1 Planning and Design</b>	<b>Select One Elective</b>	<i>Elective</i>	<i>Community connectivity</i>	<i>A5.103.1</i>				
		<i>Elective</i>	<i>Brownfield or greyfield site redevelopment or infill area development</i>	<i>A5.103.2</i> <i>A5.103.2.1</i>				
		<i>Elective</i>	<i>Reduce development footprint and optimize open space</i>	<i>A5.104.1,</i> <i>A5.104.1.1,</i> <i>A5.104.1.2,</i> <i>A5.104.1.3</i>				
		<i>Elective</i>	<i>Disassemble and reuse existing building structure (75%) with exceptions</i>	<i>A5.105.1.1</i>				
		<i>Elective</i>	<i>Disassemble and reuse existing nonstructural elements (50%) with exceptions</i>	<i>A5.105.1.2</i>				
		<i>Elective</i>	<i>Salvage</i>	<i>A5.105.1.3</i>				
		<i>Elective</i>	<i>Storm water design</i>	<i>A5.106.2,</i> <i>A5.106.2.1,</i> <i>A5.106.2.2</i>				
		<i>Elective</i>	<i>Low Impact Development (LID)</i>	<i>A5.106.3,</i> <i>A5.106.3.1,</i> <i>A5.106.3.2</i>				
		<i>Elective</i>	<i>Changing rooms w/ note</i>	<i>A5.106.4.3</i>				
		<i>Elective</i>	<i>Parking capacity w/ reduced parking capacity option</i>	<i>A5.106.6,</i> <i>A5.106.6.1</i>				
		<i>Elective</i>	<i>Exterior wall shading w/ fenestration and/or opaque wall area option</i>	<i>A5.106.7,</i> <i>A5.106.7.1,</i> <i>A5.106.7.2</i>				
		<i>Elective</i>	<i>Heat island effect</i>	<i>A5.106.11</i>				
<b>DIVISION 5.2 Energy Efficiency</b>	Mandatory	Meet the minimum energy efficiency standard	5.201.1					
	<i>Tier 1 Prerequisite</i>	<i>Energy performance—outdoor lighting power 90% of Part 6</i>	<i>A5.203.1.1.1</i>					
	<i>Tier 1 Prerequisite</i>	<i>If applicable, service for water heating in restaurants of 8,000 sf or greater</i>	<i>A5.203.1.1.2</i>					
	<i>Tier 1 Prerequisite</i>	<i>Energy budget 95% or 90% of Part 6 calculated value of allowance</i>	<i>A5.203.1.2.1</i>					
	<i>Elective</i>	<i>On-site renewable energy (with documentation)</i>	<i>A5.211.1,</i> <i>A5.211.1.1</i>					
	<i>Elective</i>	<i>Green power</i>	<i>A5.211.3</i>					
	<i>Elective</i>	<i>Elevators with car lights and fan</i>	<i>A5.212.1.1,</i> <i>A5.212.1.1.1</i>					
	<i>Elective</i>	<i>Escalators</i>	<i>A5.212.1.2</i>					
	<i>Elective</i>	<i>Controls that reduce energy</i>	<i>A5.212.1.4</i>					
	<i>Elective</i>	<i>Steel framing</i>	<i>A5.213.1</i>					
<b>DIVISION 5.3 Water Efficiency and Conservation (continued)</b>	Mandatory	Separate meters (new buildings or additions > 50,000 sf that consume more than 100 gal/day)	5.303.1.1					
	Mandatory	Separate meters (for tenants in new buildings or additions that consume more than 1,000 gal/day)	5.303.1.2					
	<i>Tier 1 Prerequisite</i>	<i>Water reduction Tier 1—12% savings over the “water use baseline” in Table A5.303.2.2 or meet Table A5.303.2.3.1</i>	<i>A5.303.2.3.1</i>					
	Mandatory	Water closets shall not exceed 1.28 gallons per flush (gpf)	5.303.3.1					
	Mandatory	Wall-mounted urinals shall not exceed 0.125 gpf	5.303.3.2.1					
	Mandatory	Floor-mounted urinals shall not exceed 0.5 gpf	5.303.3.2.2					
	Mandatory	Single showerhead shall have maximum flow rate of 1.8 gpm (gallons per minute) at 80 psi	5.303.3.3.1					
	Mandatory	Multiple showerheads serving one shower shall have a combined flow rate of 1.8 gpm at 80 psi	5.303.3.3.2					

(continued)



## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
(continued) <b>DIVISION 5.3 Water</b>	Mandatory	Nonresidential lavatory faucets	5.303.3.4.1				
	Mandatory	Kitchen faucets	5.303.3.4.2				
	Mandatory	Wash fountains	5.303.3.4.3				
	Mandatory	Metering faucets	5.303.3.4.4				
	Mandatory	Metering faucets for wash fountains	5.303.3.4.5				
	Mandatory	Food waste disposers	5.303.4.1				
	Mandatory	Areas of additions or alterations	5.303.5				
	Mandatory	Standards for plumbing fixtures and fittings	5.303.6				
	Mandatory	Outdoor potable water use in landscape areas (with notes)	5.304.1				
	Mandatory	Outdoor water supply systems (with Exceptions 1-4)	5.305.1.1				
	Mandatory	Technical requirements for outdoor recycled water supply systems	5.305.1.2				
	<b>Select One Elective</b>	<i>Elective</i> Nonpotable water systems for indoor use	A5.303.2.3.4				
		<i>Elective</i> Appliances and fixtures for commercial application	A5.303.3				
		<i>Elective</i> Nonwater supplied urinals	A5.303.4.1				
		<i>Elective</i> Dual plumbing	A5.303.5				
		<i>Elective</i> Outdoor potable water use	A5.304.2				
		<i>Elective</i> Restoration of areas disturbed by construction	A5.304.6				
		<i>Elective</i> Previously developed sites (with exception)	A5.304.7				
		<i>Elective</i> Graywater irrigation system	A5.304.8				
		<i>Elective</i> Nonpotable water systems	A5.305.1				
		<i>Elective</i> Irrigation systems	A5.305.2				
<b>DIVISION 5.4 Material Conservation and Resource Efficiency (continued)</b>	<i>Tier 1 Prerequisite</i>	Recycled content for 10% of total material cost	A5.405.4, A5.405.4.1 through A5.405.4.5				
	Mandatory	Weather protection	5.407.1				
	Mandatory	Moisture control: sprinklers	5.407.2.1				
	Mandatory	Moisture control: exterior door protection	5.407.2.2.1				
	Mandatory	Moisture control: flashing	5.407.2.2.2				
	Mandatory	Construction waste management—comply with either: Sections 5.408.1.1, 5.408.1.2, 5.408.1.3 or more stringent local ordinance	5.408.1.1, 5.408.1.2, 5.408.1.3				
	Mandatory	Construction waste management: documentation	5.408.1.4				
	Mandatory	Universal waste [A]	5.408.2				
	Mandatory	Excavated soil and land clearing debris (100% reuse or recycle)	5.408.3				
	<i>Tier 1 Prerequisite</i>	Enhanced construction waste reduction (65%—Tier 1 with verification)	A5.408.3.1, A5.408.3.1.2				
	Mandatory	Recycling by occupants (with exception)	5.410.1				
	Mandatory	Recycling by occupants: additions (with exception)	5.410.1.1				
	Mandatory	Recycling by occupants: sample ordinance	5.410.1.2				
	Mandatory	Commissioning new buildings (≥ 10,000 sf) [N]	5.410.2				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
(continued) <b>DIVISION 5.4 Material Conservation and Resource Efficiency</b>	Mandatory	Owner's or Owner representative's Project Requirements (OPR) [N]	5.410.2.1				
	Mandatory	Basis of Design (BOD) [N]	5.410.2.2				
	Mandatory	Commissioning plan [N]	5.410.2.3				
	Mandatory	Functional performance testing [N]	5.410.2.4				
	Mandatory	Documentation and training [N]	5.410.2.5				
	Mandatory	Systems manual [N]	5.410.2.5.1				
	Mandatory	Systems operation training [N]	5.410.2.5.2				
	Mandatory	Commissioning report [N]	5.410.2.6				
	Mandatory	Testing and adjusting for new buildings < 10,000 sf or new systems that serve additions or alterations [A]	5.410.4				
	Mandatory	System Testing Plan for renewable energy, landscape irrigation and water reuse [A]	5.410.4.2				
	Mandatory	Procedures for testing and adjusting	5.410.4.3				
	Mandatory	Procedures for HVAC balancing	5.410.4.3.1				
	Mandatory	Reporting for testing and adjusting	5.410.4.4				
	Mandatory	Operation and maintenance (O&M) manual	5.410.4.5				
	Mandatory	Inspection and reports	5.410.4.5.1				
	<b>Select One Elective</b>	<i>Elective</i> Wood framing or OVE w/ note	A5.404.1, A5.404.1.1, A5.404.1.2				
		<i>Elective</i> Regional materials	A5.405.1				
		<i>Elective</i> Bio-based materials	A5.405.2				
		<i>Elective</i> Rapidly renewable materials	A5.405.2.2				
		<i>Elective</i> Reused materials w/ note	A5.405.3				
		<i>Elective</i> Cement and concrete: cement	A5.405.5.1				
		<i>Elective</i> Cement and concrete: concrete with SCM & Mix design equation	A5.405.5.2, A5.405.5.2.1, A5.405.5.2.1.1				
		<i>Elective</i> Cement and concrete: additional means of compliance	A5.405.5.3, A5.405.5.3.1, A5.405.5.3.1.1, A5.405.5.3.1.2, A5.405.5.3.2, A5.405.5.3.2.1, A5.405.5.3.2.2, A5.405.5.3.2.3, A5.405.5.3.2.4				
		<i>Elective</i> Choice of materials	A5.406.1, A5.406.1.1, A5.406.1.2, A5.406.1.3				
		<i>Elective</i> Life cycle assessment: general	A5.409.1				
		<i>Elective</i> Whole building life cycle assessment	A5.409.2, A5.409.2.1, A5.409.2.2				
		<i>Elective</i> Materials and system assemblies	A5.409.3				
		<i>Elective</i> Substitution for prescriptive standards	A5.409.4				
		<i>Elective</i> Verification of compliance	A5.409.5				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
<b>DIVISION 5.5 Environmental Quality (continued)</b>	Mandatory	Fireplaces	5.503.1				
	Mandatory	Woodstoves	5.503.1.1				
	Mandatory	Temporary ventilation	5.504.1				
	Mandatory	Covering of ducts openings and protection of mechanical equipment during construction	5.504.3				
	Mandatory	Adhesives, sealants, and caulks	5.504.4.1				
	Mandatory	Paints and coatings	5.504.4.3				
	Mandatory	Aerosol paints and coatings	5.504.4.3.1				
	Mandatory	Aerosol paints and coatings: verification	5.504.4.3.2				
	Mandatory	Carpet systems	5.504.4.4				
	Mandatory	Carpet cushion	5.504.4.4.1				
	Mandatory	Carpet adhesives per Table 5.504.4.1	5.504.4.4.2				
	Mandatory	Composite wood products	5.504.4.5				
	Mandatory	Composite wood products: documentation	5.504.4.5.3				
	Mandatory	Resilient flooring systems	5.504.4.6				
	Mandatory	Resilient flooring: verification of compliance	5.504.4.6.1				
	<i>Tier 1 Prerequisite</i>	<i>Resilient flooring systems, Tier 1 (with verification of compliance)</i>	<i>A5.504.4.7, A5.504.4.7.2</i>				
	<i>Tier 1 Prerequisite</i>	<i>Thermal insulation, Tier 1 (with verification of compliance)</i>	<i>A5.504.4.8, A5.504.4.8.2</i>				
	Mandatory	Filters (with exceptions)	5.504.5.3				
	Mandatory	Filters: labeling	5.504.5.3.1				
	Mandatory	Environmental tobacco smoke (ETS) control	5.504.7				
	Mandatory	Indoor moisture control	5.505.1				
	Mandatory	Outside air delivery	5.506.1				
	Mandatory	Carbon dioxide (CO <sub>2</sub> ) monitoring	5.506.2				
	Mandatory	Acoustical control (with exception)	5.507.4				
	Mandatory	Exterior noise transmission, prescriptive method (with exceptions)	5.507.4.1				
	Mandatory	Noise exposure where noise contours are not readily available	5.507.4.1.1				
	Mandatory	Performance method	5.507.4.2				
	Mandatory	Site features	5.507.4.2.1				
	Mandatory	Documentation of compliance	5.507.4.2.2				
	Mandatory	Interior sound transmission (with note)	5.507.4.3				
	Mandatory	Ozone depletion and greenhouse gas reductions	5.508.1				
	Mandatory	Chlorofluorocarbons (CFCs)	5.508.1.1				
	Mandatory	Halons	5.508.1.2				
	Mandatory	Supermarket refrigerant leak reduction for retail food stores 8,000 square feet or more Sections 5.508.2 through 5.508.2.6.3	5.508.2 through 5.508.2.6.3				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS			SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
(continued) <b>DIVISION 5.5 Environmental Quality</b>	<b>Select One Elective</b>	<i>Elective</i>	<i>Indoor air quality (IAQ) during construction</i>	<i>A5.504.1, A5.504.1.1, A5.504.1.2</i>				
		<i>Elective</i>	<i>IAQ postconstruction</i>	<i>A5.504.2</i>				
		<i>Elective</i>	<i>IAQ testing</i>	<i>A5.504.2.1, A5.504.2.1.1, A5.504.2.1.2, A5.504.2.1.3</i>				
		<i>Elective</i>	<i>No added formaldehyde Tier 1 (with notes)</i>	<i>A5.504.4.5.1</i>				
		<i>Elective</i>	<i>Acoustical ceilings and wall panels (with verification of compliance)</i>	<i>A5.504.4.9, A5.504.4.9.1</i>				
		<i>Elective</i>	<i>Hazardous particulates and chemical pollutants</i>	<i>A5.504.5</i>				
		<i>Elective</i>	<i>Entryway systems</i>	<i>A5.504.5.1</i>				
		<i>Elective</i>	<i>Isolation of pollutant sources</i>	<i>A5.504.5.2</i>				
		<i>Elective</i>	<i>Lighting and thermal comfort controls</i>	<i>A5.507.1, A5.507.1.1 through A5.507.1.2</i>				
		<i>Elective</i>	<i>Daylight</i>	<i>A5.507.2</i>				
		<i>Elective</i>	<i>Views</i>	<i>A5.507.3</i>				
		<i>Elective</i>	<i>Interior office spaces</i>	<i>A5.507.3.1</i>				
		<i>Elective</i>	<i>Multi-occupant spaces (with exceptions)</i>	<i>A5.507.3.2</i>				
		<i>Elective</i>	<i>Hydrochlorofluorocarbons (HCFCs)</i>	<i>A5.508.1.3</i>				
		<i>Elective</i>	<i>Hydrofluorocarbons (HFCs)</i>	<i>A5.508.1.4</i>				
Additional Measures		<i>Select 1 additional measure from any division</i>	Add section #					
Total number of Measures required				15				
Total number of Measures selected								

&lt;

<b>Documentation Author's / Responsible Designer's Declaration Statement</b> <b>Check the appropriate box(es) for the list below.</b>	
<input type="checkbox"/> <b>Mandatory:</b> I attest that the mandatory provisions checklist is accurate and complete.	
<input type="checkbox"/> <b>Tier 1 compliant:</b> I attest that the total number of voluntary measures selected meet or exceed the total number required to achieve Tier 1 compliance.	
<input type="checkbox"/> <b>Partial Tier 1 compliant:</b> I attest that the total number of voluntary measures selected do not meet the total number required to achieve Tier 1 compliance: however, partial Tier 1 compliance has been achieved.	
Signature:	
Company:	Date:
Address:	License:
City/State/Zip:	Phone:

## NONRESIDENTIAL VOLUNTARY MEASURES

**A5.602.2**  
**CALGreen VERIFICATION GUIDELINES**  
**TIER 2 CHECKLIST**

**Application:** This checklist shall be used for nonresidential projects that meet the following: new construction, or building additions of 1,000 square feet or greater, or building alterations with a permit valuation of \$200,000 or more pursuant to Section 301.3, AND are adopting Tier 2 voluntary measures.

*Note: All applicable mandatory requirements in Chapter 5 shall be met prior to applying Tier 2 voluntary measures.*

**Instructions:**

Comply with all Tier 2 prerequisite measures from the various categories shown on the table below.

Add a “Y” to all mandatory and Tier 2 prerequisite measures in the appropriate columns.

Select the required number of additional electives from those categories shown on the table below and add a “Y” on the selected elective and add an “N” on the rest.

Count the total number of Tier 2 prerequisite measures plus the additional electives and write down the total number at the end of the checklist. Determine if the required number of Tier 2 measures have been selected to achieve Tier 2 compliance.

**Y** = Yes (section has been selected and/or included)

**N** = No (section has not been selected and/or included)

**O** = Other (provide explanation)

**[N]** = New construction pursuant to Section 301.3

**[A]** = Additions and/or Alterations pursuant to Section 301.3

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
<b>DIVISION 5.1</b> <b>Planning and Design</b> (continued)	Mandatory	Storm water pollution prevention for projects that disturb less than 1 acre of land	5.106.1 through 5.106.2				
	Mandatory	Short-term bicycle parking	5.106.4.1.1				
	Mandatory	Long-term bicycle parking	5.106.4.1.2 through 5.106.4.1.5				
	Mandatory	Designated parking for clean air vehicles	5.106.5.2				
	<i>Tier 2 Prerequisite</i>	<i>Designated parking—10% of parking capacity w/ parking stall markings and stall identification</i>	<i>A5.106.5.1, A5.106.5.1.2, A5.106.5.1.3, A5.106.5.1.4</i>				
	Mandatory	Parking stall marking	5.106.5.2.1				
	Mandatory	Single charging space requirements	5.106.5.3.1				
	Mandatory	Multiple charging space requirements [N]	5.106.5.3.2				
	<i>Tier 2 Prerequisite</i>	<i>Electric vehicle (EV) charging [N] w/ associated electrical panel identification and designated parking allowance</i>	<i>A5.106.5.3, A5.106.5.3.1, A5.106.5.3.3, A5.106.5.3.4</i>				
	Mandatory	EV charging space calculation [N] (with exceptions)	5.106.5.3.3				
	Mandatory	[N] Identification	5.106.5.3.4				
	Mandatory	[N] Future charging spaces	5.106.5.3.5				
	Mandatory	Light pollution reduction [N] (with exceptions and notes)	5.106.8				
	Mandatory	Grading and paving (exception for additions and alterations not altering the drainage path)	5.106.10				
	<i>Tier 2 Prerequisite</i>	<i>Cool roof (A5.106.11.2.2): SRI 82 when ≤ 2:12, SRI 27 when &gt; 2:12</i>	<i>A5.106.11.2</i>				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS			SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC OR ATTACH REFERENCE
(continued) <b>DIVISION 5.1 Planning and Design</b>	<b>Select Three Electives</b>	<i>Elective</i>	<i>Community connectivity</i>	A5.103.1				
		<i>Elective</i>	<i>Brownfield or greyfield site redevelopment or infill area development</i>	A5.103.2, A5.103.2.1				
		<i>Elective</i>	<i>Reduce development footprint and optimize open space</i>	A5.104.1, A5.104.1.1, A5.104.1.2, A5.104.1.3				
		<i>Elective</i>	<i>Disassemble and reuse existing building structure (75%) with exceptions</i>	A5.105.1.1				
		<i>Elective</i>	<i>Disassemble and reuse existing nonstructural elements (50%) with exceptions</i>	A5.105.1.2				
		<i>Elective</i>	<i>Salvage</i>	A5.105.1.3				
		<i>Elective</i>	<i>Storm water design</i>	A5.106.2, A5.106.2.1, A5.106.2.2,				
		<i>Elective</i>	<i>Low Impact Development (LID)</i>	A5.106.3, A5.106.3.1, A5.106.3.2				
		<i>Elective</i>	<i>Changing rooms w/ note</i>	A5.106.4.3				
		<i>Elective</i>	<i>Parking capacity w/ reduced parking capacity option</i>	A5.106.6, A5.106.6.1				
		<i>Elective</i>	<i>Exterior wall shading w/ fenestration and/or opaque wall area option</i>	A5.106.7, A5.106.7.1, A5.106.7.2				
		<i>Elective</i>	<i>Heat island effect</i>	A5.106.11				
<b>DIVISION 5.2 Energy Efficiency</b>	Mandatory		Meet the minimum energy efficiency standard	5.201.1				
	<i>Tier 2 Prerequisite</i>		<i>Energy Performance—outdoor lighting power 90% of Part 6</i>	A5.203.1.1.1				
	<i>Tier 2 Prerequisite</i>		<i>If applicable, service for water heating in restaurants of 8,000 sf or greater</i>	A5.203.1.1.2				
	<i>Tier 2 Prerequisite</i>		<i>Energy budget 90% or 85% of Part 6 calculated value of allowance</i>	A5.203.1.2.2				
	<i>Elective</i>		<i>On-site renewable energy (with documentation)</i>	A5.211.1, A5.211.1.1				
	<i>Elective</i>		<i>Green power</i>	A5.211.3				
	<i>Elective</i>		<i>Elevators with car lights and fan</i>	A5.212.1.1, A5.212.1.1.1				
	<i>Elective</i>		<i>Escalators</i>	A5.212.1.2				
	<i>Elective</i>		<i>Controls that reduce energy</i>	A5.212.1.4				
	<i>Elective</i>		<i>Steel framing</i>	A5.213.1				
<b>DIVISION 5.3 Water Efficiency and Conservation (continued)</b>	Mandatory		Separate meters (new buildings or additions > 50,000 sf that consume more than 100 gal/day)	5.303.1.1				
	Mandatory		Separate meters (for tenants in new buildings or additions that consume more than 1,000 gal/day)	5.303.1.2				
	<i>Tier 2 Prerequisite</i>		<i>Water reduction Tier 2—20% or 25% savings over the "water use baseline" in Table A5.303.2.2</i>	A5.303.2.3.2 or A5.303.2.3.3				
	Mandatory		Water closets shall not exceed 1.28 gallons per flush (gpf)	5.303.3.1				
	Mandatory		Wall-mounted urinals shall not exceed 0.125 gpf	5.303.3.2.1				
	Mandatory		Floor-mounted urinals shall not exceed 0.5 gpf	5.303.3.2.2				
	Mandatory		Single showerhead shall have maximum flow rate of 1.8 gpm (gallons per minute) at 80 psi	5.303.3.3.1				
	Mandatory		Multiple showerheads serving one shower shall have a combined flow rate of 1.8 gpm at 80 psi	5.303.3.3.2				

(continued)



## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
(continued) <b>DIVISION 5.3</b> <b>Water</b> <b>Efficiency and</b> <b>Conservation</b>	Mandatory	Nonresidential lavatory faucets	5.303.3.4.1				
	Mandatory	Kitchen faucets	5.303.3.4.2				
	Mandatory	Wash fountains	5.303.3.4.3				
	Mandatory	Metering faucets	5.303.3.4.4				
	Mandatory	Metering faucets for wash fountains	5.303.3.4.5				
	Mandatory	Food waste disposers	5.303.4.1				
	Mandatory	Areas of additions or alterations	5.303.5				
	Mandatory	Standards for plumbing fixtures and fittings	5.303.6				
	Mandatory	Outdoor potable water use in landscape areas (with notes)	5.304.1				
	Mandatory	Outdoor water supply systems (with Exceptions 1-4)	5.305.1.1				
	Mandatory	Technical requirements for outdoor recycled water supply systems	5.305.1.2				
	<b>Select Three Electives</b>	<i>Elective</i> Nonpotable water systems for indoor use	A5.303.2.3.4				
		<i>Elective</i> Appliances and fixtures for commercial application	A5.303.3				
		<i>Elective</i> Nonwater supplied urinals	A5.303.4.1				
		<i>Elective</i> Dual plumbing	A5.303.5				
		<i>Elective</i> Outdoor potable water use	A5.304.2				
		<i>Elective</i> Restoration of areas disturbed by construction	A5.304.6				
		<i>Elective</i> Previously developed sites (with exception)	A5.304.7				
		<i>Elective</i> Graywater irrigation system	A5.304.8				
		<i>Elective</i> Nonpotable water systems	A5.305.1				
		<i>Elective</i> Irrigation systems	A5.305.2				
	<b>DIVISION 5.4</b> <b>Material</b> <b>Conservation</b> <b>and Resource</b> <b>Efficiency</b> (continued)	<i>Tier 2 Prerequisite</i> Recycled content for 15% of total material cost	A5.405.4, A5.405.4.1 through A5.405.4.5				
		Mandatory Weather protection	5.407.1				
		Mandatory Moisture control: sprinklers	5.407.2.1				
		Mandatory Moisture control: exterior door protection	5.407.2.2.1				
		Mandatory Moisture control: flashing	5.407.2.2.2				
		Mandatory Construction waste management—comply with either: Sections 5.408.1.1, 5.408.1.2, 5.408.1.3 or more stringent local ordinance	5.408.1.1, 5.408.1.2, 5.408.1.3				
		Mandatory Construction waste management: documentation	5.408.1.4				
		Mandatory Universal waste [A]	5.408.2				
	Mandatory	Excavated soil and land clearing debris (100% reuse or recycle)	5.408.3				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
(continued) <b>DIVISION 5.4</b> <b>Material</b> <b>Conservation</b> <b>and Resource</b> <b>Efficiency</b>	<i>Tier 2 Prerequisite</i>	<i>Enhanced construction waste reduction (80%—Tier 2 with verification)</i>	A5.408.3.1.1, A5.408.3.1.2				
	Mandatory	Recycling by occupants (with exception)	5.410.1				
	Mandatory	Recycling by occupants: additions (with exception)	5.410.1.1				
	Mandatory	Recycling by occupants: sample ordinance	5.410.1.2				
	Mandatory	Commissioning new buildings (≥ 10,000 sf) [N]	5.410.2				
	Mandatory	Owner's or Owner representative's Project Require- ments (OPR) [N]	5.410.2.1				
	Mandatory	Basis of Design (BOD) [N]	5.410.2.2				
	Mandatory	Commissioning plan [N]	5.410.2.3				
	Mandatory	Functional performance testing [N]	5.410.2.4				
	Mandatory	Documentation and training [N]	5.410.2.5				
	Mandatory	Systems manual [N]	5.410.2.5.1				
	Mandatory	Systems operation training [N]	5.410.2.5.2				
	Mandatory	Commissioning report [N]	5.410.2.6				
	Mandatory	Testing and adjusting for new buildings < 10,000 sf or new systems that serve additions or alterations [A]	5.410.4				
	Mandatory	System Testing Plan for renewable energy, landscape irrigation and water reuse [A]	5.410.4.2				
	Mandatory	Procedures for testing and adjusting	5.410.4.3				
	Mandatory	Procedures for HVAC balancing	5.410.4.3.1				
	Mandatory	Reporting for testing and adjusting	5.410.4.4				
	Mandatory	Operation and maintenance (O&M) manual	5.410.4.5				
	Mandatory	Inspection and reports	5.410.4.5.1				
Select Three Electives	<i>Elective</i>	<i>Wood framing or OVE (with note)</i>	A5.404.1, A5.404.1.1, A5.404.1.2				
	<i>Elective</i>	<i>Regional materials</i>	A5.405.1				
	<i>Elective</i>	<i>Bio-based materials</i>	A5.405.2				
	<i>Elective</i>	<i>Rapidly renewable materials</i>	A5.405.2.2				
	<i>Elective</i>	<i>Reused materials (with note)</i>	A5.405.3				
	<i>Elective</i>	<i>Cement and concrete: cement</i>	A5.405.5.1				
	<i>Elective</i>	<i>Cement and concrete: concrete with SCM &amp; Mix design equation</i>	A5.405.5.2, A5.405.5.2.1, A5.405.5.2.1.1				
	<i>Elective</i>	<i>Cement and concrete: additional means of compliance</i>	A5.405.5.3, A5.405.5.3.1, A5.405.5.3.1.1, A5.405.5.3.1.2, A5.405.5.3.2, A5.405.5.3.2.1, A5.405.5.3.2.2, A5.405.5.3.2.3, A5.405.5.3.2.4				
(cont'd)	<i>Elective</i>	<i>Choice of materials</i>	A5.406.1, A5.406.1.1, A5.406.1.2, A5.406.1.3				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS			SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC. OR ATTACH REFERENCE
(continued) <b>DIVISION 5.4</b> <b>Material Conservation and Resource Efficiency</b>	<b>Select Three Electives</b> (cont'd)	Elective	Life cycle assessment: general	A5.409.1				
		Elective	Whole building life cycle assessment	A5.409.2, A5.409.2.1, A5.409.2.2				
		Elective	Materials and system assemblies	A5.409.3				
		Elective	Substitution for prescriptive standards	A5.409.4				
		Elective	Verification of compliance	A5.409.5				
<b>DIVISION 5.5</b> <b>Environmental Quality</b> (continue)		Mandatory	Fireplaces	5.503.1				
		Mandatory	Woodstoves	5.503.1.1				
		Mandatory	Temporary ventilation	5.504.1				
		Mandatory	Covering of ducts openings and protection of mechanical equipment during construction	5.504.3				
		Mandatory	Adhesives, sealants, and caulks	5.504.4.1				
		Mandatory	Paints and coatings	5.504.4.3				
		Mandatory	Aerosol paints and coatings	5.504.4.3.1				
		Mandatory	Aerosol paints and coatings: verification	5.504.4.3.2				
		Mandatory	Carpet systems	5.504.4.4				
		Mandatory	Carpet cushion	5.504.4.4.1				
		Mandatory	Carpet adhesives per Table 5.504.4.1	5.504.4.4.2				
		Mandatory	Composite wood products	5.504.4.5				
		Mandatory	Composite wood products: documentation	5.504.4.5.3				
		Mandatory	Resilient flooring systems	5.504.4.6				
		Mandatory	Resilient flooring: verification of compliance	5.504.4.6.1				
		<i>Tier 2 Prerequisite</i>	<i>Resilient flooring systems, Tier 2 (with verification of compliance)</i>	<i>A5.504.4.7.1, A5.504.4.7.2</i>				
		<i>Tier 2 Prerequisite</i>	<i>Thermal insulation, Tier 2 (with verification of compliance)</i>	<i>A5.504.4.8.1, A5.504.4.8.2</i>				
		Mandatory	Filters (with exceptions)	5.504.5.3				
		Mandatory	Filters: labeling	5.504.5.3.1				
		Mandatory	Environmental tobacco smoke (ETS) control	5.504.7				
		Mandatory	Indoor moisture control	5.505.1				
		Mandatory	Outside air delivery	5.506.1				
		Mandatory	Carbon dioxide (CO <sub>2</sub> ) monitoring	5.506.2				
		Mandatory	Acoustical control (with exception)	5.507.4				
		Mandatory	Exterior noise transmission, prescriptive method (with exceptions)	5.507.4.1				
		Mandatory	Noise exposure where noise contours are not readily available	5.507.4.1.1				
		Mandatory	Performance method	5.507.4.2				

(continued)

## NONRESIDENTIAL VOLUNTARY MEASURES

CHAPTER 5 DIVISIONS		SECTION TITLE	CODE SECTION	Y	N	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
(continued) <b>DIVISION 5.5 Environmental Quality</b>	Mandatory	Site features	5.507.4.2.1				
	Mandatory	Documentation of compliance	5.507.4.2.2				
	Mandatory	Interior sound transmission (with note)	5.507.4.3				
	Mandatory	Ozone depletion and greenhouse gas reductions	5.508.1				
	Mandatory	Chlorofluorocarbons (CFCs)	5.508.1.1				
	Mandatory	Halons	5.508.1.2				
	Mandatory	Supermarket refrigerant leak reduction for retail food stores 8,000 square feet or more Sections 5.508.2 through 5.508.2.6.3	5.508.2 through 5.508.2.6.3				
	Select Three Electives	Elective	Indoor air quality (IAQ) during construction	A5.504.1, A5.504.1.1, A5.504.1.2			
		Elective	IAQ postconstruction	A5.504.2			
		Elective	IAQ testing	A5.504.2.1, A5.504.2.1.1, A5.504.2.1.2, A5.504.2.1.3			
		Elective	No added formaldehyde Tier 1 (with notes)	A5.504.4.5.1			
		Elective	Acoustical ceilings and wall panels (with verification of compliance)	A5.504.4.9, A5.504.4.9.1			
		Elective	Hazardous particulates and chemical pollutants	A5.504.5			
		Elective	Entryway systems	A5.504.5.1			
		Elective	Isolation of pollutant sources	A5.504.5.2			
		Elective	Lighting and thermal comfort controls	A5.507.1, A5.507.1.1 through A5.507.1.2			
		Elective	Daylight	A5.507.2			
		Elective	Views	A5.507.3			
		Elective	Interior office spaces	A5.507.3.1			
		Elective	Multi-occupant spaces (with exceptions)	A5.507.3.2			
		Elective	Hydrochlorofluorocarbons (HCFCs)	A5.508.1.3			
		Elective	Hydrofluorocarbons (HFCs)	A5.508.1.4			
Additional Measures		Select three additional measures from any division	Additional measures: 1. 2. 3.				
Total number of Measures required for Tier 2			25				
Total number of Measures selected							

## NONRESIDENTIAL VOLUNTARY MEASURES

<b>Documentation Author's / Responsible Designer's Declaration Statement</b> <b><i>Check the appropriate box(es) for the list below.</i></b>	
<input type="checkbox"/> <b>Mandatory:</b> I attest that the mandatory provisions checklist is accurate and complete.	
<input type="checkbox"/> <b>Tier 2 compliant:</b> I attest that the total number of voluntary measures selected meet or exceed the total number required to achieve Tier 2 compliance.	
<input type="checkbox"/> <b>Partial Tier 2 compliant:</b> I attest that the total number of voluntary measures selected do not meet the total number required to achieve Tier 2 compliance; however, partial Tier 2 compliance has been achieved.	
Signature:	
Company:	Date:
Address:	License:
City/State/Zip:	Phone:

## CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE

### APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHDP 1, 2 & 4]

The following sections are relocated from the voluntary appendices into one appendix to assist code users in the planning, design and construction of environmentally sustainable medical facilities under the authority of the Office of Statewide Health Planning and Development specified in Chapter 1 of this code.

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHDP						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter																						
Adopt entire chapter as amended (amended sections listed below)									X		X		X									
Adopt only those sections that are listed below																						
Chapter/Section																						
A5.106.9									X		X		X									
A5.203									X													
A5.505.4.5.1									X		X		X									

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHDP 1, 2 & 4]

### Division A5.1 – SITE PLANNING AND DESIGN

#### SECTION A5.106 SITE DEVELOPMENT

**A5.106.9 Building orientation.** Locate and orient the building as follows:

1. When site and location permit, orient the building with the long sides facing north and south.
2. Protect the building from thermal loss, drafts, and degradation of the building envelope caused by wind and wind-driven materials such as dust, sand, snow and leaves, with building orientation and landscape features.

**Note:** For information on sun angles and shading, visit: <http://www2.aud.ucla.edu/energy-design-tools/>.

Calculations may be made using the Solar-2 tool.

### Division A5.2 – ENERGY EFFICIENCY

#### SECTION A5.202 DEFINITIONS

**A5.202.1 Definitions.** The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

**ENERGY STAR.** A joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy. ENERGY STAR is a voluntary program designed to identify and promote energy-efficient products and practices.

#### SECTION A5.203 PERFORMANCE APPROACH

**A5.203.2 Energy performance.** It is the intent of this code to encourage green buildings to achieve exemplary performance in the area of energy efficiency.

**A5.203.2.1 CALGreen Tier 1. [OSHDP 1]** To achieve CALGreen Tier 1, buildings must comply with the latest edition of “Savings By Design, Healthcare Modeling Procedures” found online at <http://www.energysoft.com/ep/2007SBDHPProcedures.pdf>.

**A5.203.2.2 CALGreen Tier 2. [OSHDP 1]** To achieve CALGreen Tier 2, buildings must exceed the latest edition of “Savings By Design, Healthcare Modeling Procedures” by a minimum of 15 percent.

#### SECTION A5.204 PRESCRIPTIVE APPROACH

**A5.204.1 ENERGY STAR equipment and appliances.** All equipment and appliances provided by the builder shall be ENERGY STAR labeled if ENERGY STAR is applicable to that equipment or appliance.

**A5.204.4 Commissioning. [OSHDP 1 & 4]** Building commissioning shall be included in the design and construction processes of the building project to verify that the building’s energy related systems are installed, calibrated and perform according to the owner’s project requirements, basis of design and construction documents.

The owner and designer shall designate an individual as the Commissioning Authority (CxA) to lead, review and oversee the completion of the commissioning process activities. The owner shall document the Owner’s Project Requirements (OPR). The design team shall develop the Basis of



## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 & 4]

Design (BOD). The CxA shall review these documents for clarity and completeness. The owner and design team shall be responsible for updates to their respective documents, develop and incorporate commissioning requirements into the construction documents and develop and implement a commissioning plan. The CxA shall verify the installation and performance of the systems to be commissioned, verify that training and operation and maintenance documentation have been provided to the owner's operations staff and complete a commissioning report.

Commissioning process activities shall be completed for the following energy-related systems, at a minimum:

1. Heating, ventilating, air conditioning and refrigeration (HVAC&R) systems (mechanical and passive) and associated controls.
2. Lighting and daylighting controls.
3. Domestic hot water systems.
4. Renewable energy systems (wind, solar, etc.).
5. Building envelope systems.

**A5.204.4.1 Owner's Project Requirements (OPR).** The expectations and requirements of the building shall be documented by the owner and the designer before the design phase of the project begins. This shall be reviewed by the CxA. At a minimum, this documentation shall include the following:

1. Environmental and sustainability goals.
2. Energy efficiency goals.
3. Indoor environmental quality requirements.
4. Equipment and systems expectations.
5. Building occupant and O&M personnel expectations.

**A5.204.4.2 Basis of Design (BOD).** A written explanation of how the design of the building systems meets the Owner's Project Requirements shall be completed at the design phase of the building project and updated as necessary during the design and construction phases. This shall be reviewed by the CxA. At a minimum, the Basis of Design document shall cover the following systems:

1. Heating, ventilation, air conditioning (hvac) systems and controls.
2. Indoor lighting system and controls.
3. Water heating system.
4. Renewable energy systems.

**A5.204.4.3 Commissioning plan.** A commissioning plan shall be completed to document the approach to how the project will be commissioned and shall be started during the design phase of the building project. This shall be reviewed by the CxA. The Commissioning Plan shall include the following at a minimum:

1. General project information.
2. Commissioning goals.
3. Systems to be commissioned. Plans to test systems and components shall include at a minimum:

- a. A detailed explanation of the original design intent;
  - b. Equipment and systems to be tested, including the extent of tests;
  - c. Functions to be tested;
  - d. Conditions under which the test shall be performed; and
  - e. Measurable criteria for acceptable performance.
4. Commissioning team information.
  5. Commissioning process activities, schedules and responsibilities – plans for the completion of commissioning requirements listed in Sections A5.204.4.4 through A5.204.4.6 shall be included.

**A5.204.4.4 Functional performance testing.** Functional performance tests shall demonstrate the correct installation and operation of each component, system and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized and include any readings and adjustments made. This shall be reviewed and verified by the CxA.

**A5.204.4.5 Postconstruction documentation and training.** A systems manual and systems operations training are required.

**A5.204.4.5.1 Systems manual.** Documentation of the operational aspects of the building shall be completed within the systems manual and delivered to the building owner and facilities operator. This shall be reviewed by the CxA. At a minimum, the systems manual shall include the following:

1. Site information, including facility description, history and current requirements.
2. Site contact information.
3. Basic operations and maintenance, including general site operating procedures, basic troubleshooting, recommended maintenance requirements, site events log.
4. Major systems.
5. Site equipment inventory and maintenance notes.
6. Other resources and documentation.

**A5.204.4.5.2 Systems operations training.** The CxA shall oversee the training of the appropriate maintenance staff for each equipment type and/or system. The training shall include, as a minimum, the following:

1. System/equipment overview (what it is, what it does and what other systems and/or equipment it interfaces with).
2. Review of the information in the systems manual.
3. Review of the record drawings on the system/equipment.

**A5.204.4.6 Commissioning report.** The CxA shall create a complete report of commissioning process activities under-

taken through the design, construction and postconstruction phases of the building project and provided to the owner.

**A5.204.6 Building orientation and shading.** Locate orient and shade the building as required in Section A5.106.9.

## SECTION A5.205 [OSHPD 1 & 4] BUILDING ENVELOPE

### A5.205.1 Fenestration products and exterior doors.

**A5.205.1.1 Certification of fenestration products and exterior doors other than field-fabricated.** Any fenestration product and exterior door, other than field-fabricated fenestration products and field-fabricated exterior doors, may be installed only if the manufacturer has certified to the California Energy Commission or if an independent certifying organization approved by the Commission has certified that the product complies with all of the applicable requirements of this subsection.

**A5.205.1.1.1 Air leakage.** Manufactured fenestration products and exterior doors shall have air infiltration rates not exceeding 0.3 cfm/ft<sup>2</sup> of window area, 0.3 cfm/ft<sup>2</sup> of door area for residential doors, 0.3 cfm/ft<sup>2</sup> of door area for nonresidential single doors (swinging and sliding) and 1.0 cfm/ft<sup>2</sup> for nonresidential double doors (swinging), when tested according to NFRC-400 or ASTM E283 at a pressure differential of 75 pascals (or 1.57 pounds/ft<sup>2</sup>), incorporated herein by reference.

**A5.205.1.1.2 U-factor.** A fenestration product's U-factor shall be rated in accordance with NFRC 100 or the applicable default U-factor set forth in Table A.5.205.1-A.

**Exception:** If the fenestration product is a skylight or is site-built fenestration in a building covered by the nonresidential standards with less than 10,000 square feet of site-built fenestration, the default U-factor may be calculated as set forth in Reference Nonresidential Appendix NA6 of the California Energy Commission 2008 *Building Energy Efficiency Standards for Residential and Nonresidential Buildings*.

**A5.205.1.1.3 SHGC.** A fenestration product's SHGC shall be rated in accordance with NFRC 200 for site-built fenestration or use the applicable default SHGC set forth in Table A5.205.1-B.

**Exception:** If the fenestration product is a skylight or is site-built fenestration in a building covered by the nonresidential standards with less than 10,000 square feet of site-built fenestration, the default SHGC may be calculated as set forth in Reference Nonresidential Appendix NA6 of the California Energy Commission 2008 *Building Energy Efficiency Standards for Residential and Nonresidential Buildings*.

**A5.205.1.1.4 Labeling.** Fenestration products shall:

1. Have a temporary label (or label certificate for site-built fenestration) meeting the requirements of Section 10-111(a)1 of Title 24, Part 1 not to be removed before inspection by the enforcement

agency, listing the certified U-factor and SHGC and certifying that the air leakage requirements of Section A5.205.1.1.1 are met for each product line; and

2. Have a permanent label (or label certificate for site-built fenestration) meeting the requirements of Section 10-111(a)2 of Title 24, Part 1 if the product is rated using NFRC procedures.

### A5.205.1.1.5 Fenestration acceptance requirements.

Before an occupancy permit is granted, site-built fenestration products in other than low-rise residential buildings shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified by the Reference Nonresidential Appendix NA7 of the California Energy Commission 2008 *Building Energy Efficiency Standards for Residential and Nonresidential Buildings* to ensure that site-built fenestration meet Standards requirements, including a matching label certificate for each product installed and be readily accessible at the project location. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the fenestration product meets the acceptance requirements.

**Exception:** Fenestration products removed and reinstalled as part of a building alteration or addition.

**A5.205.1.2 Installation of field-fabricated fenestration and exterior doors.** Field-fabricated fenestration and field-fabricated exterior doors may be installed only if the compliance documentation has demonstrated compliance for the installation using U-factors from Table A5.205.1-A and SHGC values from Table A5.205.1-B. Field-fabricated fenestration and field-fabricated exterior doors shall be caulked between the fenestration products or exterior door and the building and shall be weatherstripped.

**Exception:** Unframed glass doors and fire doors need not be weatherstripped or caulked.

**A5.205.2 Joints and other openings.** Joints and other openings in the building envelope that are potential sources of air leakage shall be caulked, gasketed, weatherstripped or otherwise sealed to limit infiltration and exfiltration.

### A5.205.3 Insulation and roofing products.

**A5.205.3.1 Certification by manufacturers.** Any insulation shall be certified by Department of Consumer Affairs, Bureau of Home Furnishing and Thermal Insulation that the insulation conductive thermal performance is approved pursuant to the *California Code of Regulations*, Title 24, Part 12, Chapters 12-13, Article 3, "Standards for Insulating Material."

**A5.205.3.2 Installation of urea formaldehyde foam insulation.** Urea formaldehyde foam insulation may be applied or installed only if:

1. It is installed in exterior side walls; and
2. A four-mil-thick plastic polyethylene vapor barrier or equivalent plastic sheathing vapor barrier is installed between the urea formaldehyde foam insulation and the interior space in all applications.

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A.5.205.1-A**  
**DEFAULT FENESTRATION PRODUCT U-FACTORS**

FRAME	PRODUCT TYPE	SINGLE PANE U-FACTOR	DOUBLE PANE <sup>1</sup> U-FACTOR	GLASS BLOCK <sup>2</sup> U-FACTOR
Metal	Operable	1.28	0.79	0.87
	Fixed	1.19	0.71	0.72
	Greenhouse/garden window	2.26	1.40	N.A.
	Doors	1.25	0.77	N.A.
	Skylight	1.98	1.30	N.A.
Metal, thermal break	Operable	N.A.	0.66	N.A.
	Fixed	N.A.	0.55	N.A.
	Greenhouse/garden window	N.A.	1.12	N.A.
	Doors	N.A.	0.59	N.A.
	Skylight	N.A.	1.11	N.A.
Nonmetal	Operable	0.99	0.58	0.60
	Fixed	1.04	0.55	0.57
	Greenhouse/garden window	0.99	0.53	N.A.
	Doors	1.94	1.06	N.A.
	Skylight	1.47	0.84	N.A.

N.A. = Not applicable.

1. For all dual-glazed fenestration products, adjust the listed *U*-factors as follows:
  - a. Add 0.05 for products with dividers between panes if spacer is less than  $\frac{7}{16}$  inch wide.
  - b. Add 0.05 to any product with true divided lite (dividers through the panes).
2. Translucent or transparent panels shall use glass blocks.

**TABLE A.5.205.1-B**  
**DEFAULT SOLAR HEAT GAIN COEFFICIENT (SHGC)**

FRAME	PRODUCT TYPE	GLAZING	TOTAL WINDOW SHGC		
			Single Pane	Double Pane	Glass Block <sup>1</sup>
Metal	Operable	Clear	0.80	0.70	0.70
	Fixed	Clear	0.83	0.73	0.73
	Operable	Tinted	0.67	0.59	N.A.
	Fixed	Tinted	0.68	0.60	N.A.
Metal, thermal break	Operable	Clear	N.A.	0.63	N.A.
	Fixed	Clear	N.A.	0.69	N.A.
	Operable	Tinted	N.A.	0.53	N.A.
	Fixed	Tinted	N.A.	0.57	N.A.
Nonmetal	Operable	Clear	0.74	0.65	0.70
	Fixed	Clear	0.76	0.67	0.67
	Operable	Tinted	0.60	0.53	N.A.
	Fixed	Tinted	0.63	0.55	N.A.

N.A. = Not applicable.

1. Translucent or transparent panels shall use glass block values.

**A5.205.3.3 Flame spread rating.** All insulating material shall be installed in compliance with the flame spread rating and smoke density requirements of the Title 24, Part 2, *California Building Code*.

**A5.205.3.4 Installation of insulation in existing buildings.** Insulation installed in an existing attic or on an existing duct or water heater, shall comply with the applicable requirements of Subsections A5.205.3.4.1, A5.205.3.4.2 and A5.205.3.4.3 below. If a contractor installs the insulation, the contractor shall certify to the customer, in writing, that the insulation meets the applicable requirements of Subsections A5.205.3.4.1, A5.205.3.4.2 and A5.205.3.4.3 below.

**A5.205.3.4.1 Attics.** If insulation is installed in the existing attic of a low-rise residential building, the R-value of the total amount of insulation (after addition of insulation to the amount, if any, already in the attic) shall be at least R-38 in climate zones 1 and 16; and R-30 in all other climate zones.

**Exception:** Where the accessible space in the attic is not large enough to accommodate the required R-value, the entire accessible space shall be filled with insulation provided such installation does not violate Section 1203.2 of Title 24, Part 2, *California Building Code*.

**A5.205.3.4.2 Water heaters.** If external insulation is installed on an existing unfired water storage tank or on an existing back-up tank for a solar water-heating system, it shall have an R-value of at least R-12 or the heat loss of the tank surface based on an 80°F water-air temperature difference shall be less than 6.5 Btu per hour per square foot.

**A5.205.3.4.3 Ducts.** If insulation is installed on an existing space-conditioning duct, it shall comply with Section 605 of the *California Mechanical Code* (CMC).

**A5.205.3.5 Placement of roof/ceiling insulation.** Insulation installed to limit heat loss and gain through the top of conditioned spaces shall comply with the following:

**A5.205.3.5.1** Insulation shall be installed in direct contact with a continuous roof or ceiling which is sealed to limit infiltration and exfiltration as specified in Section A5.205.2, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling; and

**A5.205.3.5.2** When insulation is installed at the roof in nonresidential buildings, fixed vents or openings to the outdoors or to unconditioned spaces shall not be installed and the space between the ceiling and the roof is either directly or indirectly conditioned space and shall not be considered an attic for the purposes of complying with CBC attic ventilation requirements; and

**A5.205.3.5.3** Insulation placed on top of a suspended ceiling with removable ceiling panels shall be deemed to have no affect on envelope heat loss; and

**Exception:** When there are conditioned spaces with a combined floor area no greater than 2,000 square feet in an otherwise unconditioned building and when the average height of the space between the ceiling and the roof over these spaces is greater than 12 feet, insulation placed in direct contact with a suspended ceiling with removable ceiling panels shall be an acceptable method of reducing heat loss from a conditioned space and shall be accounted for in heat loss calculations.

**A5.205.3.5.4** Insulation shall be installed below the roofing membrane or layer used to seal the roof from water penetration unless the insulation has a maximum water absorption of 0.3 percent by volume when tested according to ASTM C272.

**Note:** Vents, which do not penetrate the roof deck, that are designed for wind resistance for roof membranes are not within the scope of Section A5.205.3.5.2.

**A5.205.3.6 Demising walls in nonresidential buildings.** The opaque portions of framed demising walls in nonresidential buildings shall be insulated with an installed R-value of no less than R-13 between framing members.

**A5.205.3.7 Insulation requirements for heated slab floors.** Heated slab-on-grade floors shall be insulated according to the requirements in Table A5.205.3-A.

**A5.205.3.7.1** Insulation materials in ground contact must:

**A5.205.3.7.1.1** Comply with the certification requirements of Section A5.205.3.1 and

**A5.205.3.7.1.2** Have a water absorption rate for the insulation material alone without facings that is no greater than 0.3 percent when tested in accordance with Test Method A – 24 Hour-Immersion of ASTM C272.

**A5.205.3.7.2** Insulation installation must:

**A5.205.3.7.2.1** Cover the insulation with a solid guard that protects against damage from ultraviolet radiation, moisture, landscaping operation, equipment maintenance and wind; and

**A5.205.3.7.2.2** Include a rigid plate, which penetrates the slab and blocks the insulation from acting as a conduit for insects from the ground to the structure above the foundation.

**A5.205.3.8 Wet insulation systems.** When insulation is installed on roofs above the roofing membrane or layer used to seal the roof from water penetration, the effective R-value of the insulation shall be as specified in Reference Joint Appendix JA4 of the California Energy Commission 2008 *Building Energy Efficiency Standards for Residential and Nonresidential Buildings*.

**A5.205.3.9 Roofing products solar reflectance and thermal emittance.**

**A5.205.3.9.1** In order to meet the requirements of Sections 141, 142, 143(a)1, 149(b)1B, 151(f)12, 152(b)1H or 152(b)2 of Title 24, Part 6, a roofing product's ther-



## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 & 4]

mal emittance and 3-year aged solar reflectance shall be certified and labeled according to the requirements of Section 10-113 of Title 24, Part 1.

**Exception:** Roofing products that are not certified according to Section 10-113 of Title 24, Part 1 shall assume the following default aged reflectance/emittance values:

**A5.205.3.9.1.1** For asphalt shingles, 0.08/0.75

**A5.205.3.9.1.2** For all other roofing products, 0.10/0.75

**A5.205.3.9.2** If CRRC testing for 3-year aged reflectance is not available for any roofing products, the 3-year aged value shall be derived from the CRRC initial value using the equation  $R_{aged} = [0.2 + 0.7(p_{initial} - 0.2)]$ , where  $p_{initial}$  = the initial Solar Reflectance.

**A5.205.3.9.3** Solar Reflectance Index (SRI), calculated as specified by ASTM E1980-01, may be used as an alternative to thermal emittance and 3-year aged solar reflectance when complying with the requirements of Sections 141, 142, 143(a)1, 149(b)1B, 151(f)12, 152(b)1H or 152(b)2 of Title 24, Part 6. SRI calculations

shall be based on moderate wind velocity of 2-6 meters per second. The SRI shall be calculated based on the 3-year aged reflectance value of the roofing products.

**A5.205.3.9.4** Liquid applied roof coatings applied to low-sloped roofs in the field as the top surface of a roof covering shall:

**A5.205.3.9.4.1** Be applied across the entire roof surface to meet the dry mil thickness or coverage recommended by the coating manufacturer, taking into consideration the substrate on which the coating is applied, and

**A5.205.3.9.4.2** Meet the minimum performance requirements listed in Table A5.205.3-B or the minimum performance requirements of ASTM C836, D3468, D6083 or D6694, whichever are appropriate to the coating material.

### Exceptions:

1. Aluminum-pigmented asphalt roof coatings shall meet the requirements of ASTM D2824 or ASTM D6848 and be installed as specified by ASTM D3805.

**TABLE A5.205.3-A**  
**SLAB INSULATION REQUIREMENTS FOR HEATED SLAB-ON-GRADE**

INSULATION LOCATION	INSULATION ORIENTATION	INSTALLATION REQUIREMENTS	CLIMATE ZONE	INSULATION R-FACTOR
Outside edge of heated slab, either inside or outside the foundation wall	Vertical	From the level of the top of the slab, down 16 inches or to the frost line, whichever is greater. Insulation may stop at the top of the footing where this is less than the required depth. For below grade slabs, vertical insulation shall be extended from the top of the foundation wall to the bottom of the foundation (or the top of the footing) or to the frost line, whichever is greater.	1 – 15	5
			16	10
Between heated slab and outside foundation wall	Vertical and Horizontal	Vertical insulation from top of slab at inside edge of outside wall down to the top of the horizontal insulation. Horizontal insulation from the outside edge of the vertical insulation extending 4 feet toward the center of the slab in a direction normal to the outside of the building in plan view.	1 – 15	5
			16	10 vertical and 7 horizontal

**TABLE A5.205.3-B**  
**MINIMUM PERFORMANCE REQUIREMENTS FOR LIQUID APPLIED ROOF COATINGS**

PHYSICAL PROPERTY	ASTM TEST PROCEDURE	REQUIREMENT
Initial percent elongation (break)	D2370	Minimum 200 percent 73°F (23°C)
Initial percent elongation (break) OR Initial flexibility	D2370 D522, Test B	Minimum 60 percent 0°F (-18°C) Minimum pass 1" mandrel 0°F (-18°C)
Initial tensile strength (maximum stress)	D2370	Minimum 100 psi (1.38 Mpa) 73°F (23°C)
Initial tensile strength (maximum stress) OR Initial flexibility	D2370 D522, Test B	Minimum 200 psi (2.76 Mpa) 0°F (-18°C) Minimum pass 1" mandrel 0°F (-18°C)
Final percent elongation (break) after accelerated weathering 1000 h	D2370	Minimum 100 percent 73°F (23°C)
Final percent elongation (break) after accelerated weathering 1000 h OR Flexibility after accelerated weathering 1000 h	D2370	Minimum 40 percent 0°F (-18°C) Minimum pass 1" mandrel 0°F (-18°C)
Permeance	D1653	Maximum 50 perms
Accelerated weathering 1000 h	D4798	No cracking or checking <sup>1</sup>

1. Any cracking or checking visible to the eye fails the test procedure.

2. Cement-based roof coatings shall contain a minimum of 20 percent cement and shall meet the requirements of ASTM C1583, ASTM D822 and ASTM D5870.

## SECTION A5.207 [OSHPD 1, 2 & 4] HVAC DESIGN, EQUIPMENT AND INSTALLATION

**A5.207.1 Space-conditioning equipment certification by manufacturers.** Any space-conditioning equipment listed in this section may be installed only if the manufacturer has certified that the equipment complies with all the applicable requirements of this section.

**A5.207.1.1 Efficiency.** Equipment shall meet the applicable requirements in Tables A5.207.1-A through A5.207.1-M, subject to the following:

1. If more than one standard is listed for any equipment in Tables A5.207.1-A through A5.207.1-M, the equipment shall meet all the applicable standards that are listed; and
2. If more than one test method is listed in Tables A5.207.1-A through A5.207.1-M, the equipment shall comply with the applicable standard when tested with each test method; and
3. Where equipment can serve more than one function, such as both heating and cooling or both space heating and water heating, it shall comply with all the requirements applicable to each function; and
4. Where a requirement is for equipment rated at its “maximum rated capacity” or “minimum rated capacity,” the capacity shall be as provided for and allowed by the controls, during steady-state operation.

**Exception:** Water-cooled centrifugal water-chilling packages that are not designed for operation at ARI Standard 550 test conditions of 44°F leaving chilled water temperature and 85°F entering condenser water temperature shall have a minimum full load COP rating as shown in Tables A5.207.1-H, A5.207.1-I and A5.207.1-J and a minimum NPLV rating as shown in Tables A5.207.1-K, A5.207.1-L and A5.207.1-M. The table values are only applicable over the following full load design ranges:

Leaving Chiller Water Temperature	40 to 48°F
Entering Condenser Water Temperature	75 to 85°F
Condensing Water Temperature Rise	5 to 15°F

**A5.207.1.2 Controls for heat pumps with supplementary electric resistance heaters.** Heat pumps with supplementary electric resistance heaters shall have controls:

**A5.207.1.2.1** That prevent supplementary heater operation when the heating load can be met by the heat pump alone; and

**A5.207.1.2.2** In which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating and the cut-off temperature for compression heating is higher than the cut-off temperature for supplementary heating.

**Exceptions:** The controls may allow supplementary heater operation during:

1. Defrost; and
2. Transient periods such as start-ups and following room thermostat setpoint advance, if the controls provide preferential rate control, intelligent recovery, staging, ramping or another control mechanism designed to preclude the unnecessary operation of supplementary heating.

**A5.207.1.3 Thermostats.** All unitary heating and/or cooling systems including heat pumps that are not controlled by a central energy management control system (EMCS) shall have a setback thermostat.

1. **Setback capabilities.** All thermostats shall have a clock mechanism that allows the building occupant to program the temperature set points for at least four periods within 24 hours. Thermostats for heat pumps shall meet the requirements of Section A5.207.1.2.

**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 need not comply with this requirement. Additionally, room air-conditioner heat pumps need not comply with Section A5.207.1.2 Under performance method of compliance, the resulting increase in energy use due to elimination of the setback thermostat shall be factored into the compliance analysis in accordance with a method prescribed by the Executive Director.

**A5.207.1.4 Gas- and oil-fired furnace standby loss controls.** Gas-fired and oil-fired forced air furnaces with input ratings  $\geq 225,000$  Btu/h shall also have an intermittent ignition or interrupted device (IID) and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for furnaces where combustion air is drawn from the conditioned space. All furnaces with input ratings  $\geq 225,000$  Btu/h, including electric furnaces, that are not located within the conditioned space shall have jacket losses not exceeding 0.75 percent of the input rating.



**APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 & 4]**

**TABLE A5.207.1-A**  
**ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS—MINIMUM EFFICIENCY REQUIREMENTS**

EQUIPMENT TYPE	SIZE CATEGORY	EFFICIENCY <sup>1</sup>		TEST PROCEDURE
		Before 1/1/2010	After 1/1/2010	
Air conditioners, Air cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	10.3 EER <sup>2</sup>	11.2 EER <sup>2</sup>	ARI 340/360
	≥ 135,000 Btu/h and < 240,000 Btu/h	9.7 EER <sup>2</sup>	11.0 EER <sup>2</sup>	ARI 340/360
	≥ 240,000 Btu/h and < 760,000 Btu/h	9.5 EER <sup>2</sup> and 9.7 IPLV <sup>2</sup>	10.0 EER <sup>2</sup> and 9.7 IPLV <sup>2</sup>	
	≥ 760,000 Btu/h	9.2 EER <sup>2</sup> and 9.4 IPLV <sup>2</sup>	9.7 EER <sup>2</sup> and 9.4 IPLV <sup>2</sup>	
Air conditioners, water and evaporatively cooled				ARI 210/240
	> 240,000 Btu/h	11.0 EER <sup>2</sup> and 10.3 IPLV <sup>2</sup>		ARI 340/360
Condensing units, air cooled	≥ 135,000 Btu/h	10.1 EER and 11.2 IPLV		ARI 365
Condensing units, water or evaporatively cooled	≥ 135,000 Btu/h	13.1 EER and 13.1 IPLV		

1. IPLVs are only applicable to equipment with capacity modulation.

2. Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.

**TABLE A5.207.1-B**  
**UNITARY AND APPLIED HEAT PUMPS—MINIMUM EFFICIENCY REQUIREMENTS**

EQUIPMENT TYPE	SIZE CATEGORY	SUBCATEGORY OR RATING CONDITION	EFFICIENCY <sup>1</sup>		TEST PROCEDURE
			Before 1/1/2010	After 1/1/2010	
Air cooled (cooling mode)	≥ 65,000 Btu/h and < 135,000 Btu/h	Split system and single package	10.1 EER <sup>2</sup>	11.0	ARI 340/360
	≥ 135,000 Btu/h and < 240,000 Btu/h		9.3 EER <sup>2</sup>	10.6	
	≥ 240,000 Btu/h		9.0 EER <sup>2</sup> and 9.2 IPLV <sup>2</sup>	9.5 EER <sup>2</sup> and 9.2 IPLV <sup>2</sup>	
Air cooled (heating mode)	≥ 65,000 Btu/h and < 135,000 Btu/h (Cooling capacity)	47°F db/43°F wb outdoor air	3.2 COP	3.3 COP	ARI 210/240
	≥ 135,000 Btu/h (Cooling capacity)	47°F db/43°F wb outdoor air	3.1 COP	3.2 COP	ARI 340/360

1. IPLVs and Part load rating conditions are applicable only to equipment with capacity modulation.

2. Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.

**TABLE A5.207.1-C**  
**AIR-COOLED GAS-ENGINE HEAT PUMPS**

EQUIPMENT TYPE	SIZE CATEGORY	SUBCATEGORY OR RATING CONDITION	EFFICIENCY <sup>1</sup>	TEST PROCEDURE
Air-cooled gas engine heat pump (cooling mode)	All capacities	95°F db Outdoor air	0.60 COP	ANSI Z21.40.4
Air-cooled gas engine heat pump (heating mode)	All capacities	47°F db/43°F wb Outdoor air	0.72 COP	ANSI Z21.40.4

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A5.207.1-D**  
**WATER CHILLING PACKAGES—MINIMUM EFFICIENCY REQUIREMENTS**

EQUIPMENT TYPE	SIZE CATEGORY	EFFICIENCY	TEST PROCEDURE
Air cooled, with condenser	< 150 Tons	2.80 COP	ARI 550/590
Electrically operated	≥ 150 Tons	3.05 IPLV	
Air cooled, without condenser	All Capacities	3.10 COP	
Electrically operated		3.45 IPLV	
Water cooled, electrically operated, positive displacement	All Capacities	4.20 COP	ARI 550/590
(Reciprocating)		5.05 IPLV	
Water cooled,	< 150 Tons	4.45 COP	ARI 550/590
		5.20 IPLV	
Electrically operated,	≥ 150 Tons and	4.90 COP	
Positive displacement	< 300 Tons	5.60 IPLV	
	≥ 300 Tons	5.50 COP	
(Rotary screw and scroll)		6.15 IPLV	
Water cooled, electrically operated, centrifugal	< 150 Tons	5.00 COP	ARI 550/590
		5.25 IPLV	
	≥ 150 Tons and < 300 Tons	5.55 COP	
		5.90 IPLV	
	≥ 300 Tons	6.10 COP	
		6.40 IPLV	
Air cooled absorption, single effect	All Capacities	0.60 COP	ARI 560
Water cooled absorption, single effect	All Capacities	0.70 COP	
Absorption double effect, indirect-fired	All Capacities	1.00 COP	
		1.05 IPLV	
Absorption double effect, direct-fired	All Capacities	1.00 COP	
		1.00 IPLV	
Water cooled gas engine driven chiller	All Capacities	1.2 COP	ANSI Z21.40.4
		2.0 IPLV	

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A5.207.1-E**  
**PACKAGED TERMINAL AIR CONDITIONERS AND PACKAGED TERMINAL HEAT PUMPS – MINIMUM EFFICIENCY REQUIREMENTS**

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	EFFICIENCY <sup>1</sup>	TEST PROCEDURE
PTAC (cooling mode) new construction	All Capacities	95°F db outdoor air	$12.5 - (0.213 \times \text{Cap}/1000)^1$ EER	ARI 310/380
PTAC (cooling mode) replacements <sup>2</sup>			$10.9 - (0.213 \times \text{Cap}/1000)^1$ EER	
PTHP (cooling mode) new construction			$12.3 - (0.213 \times \text{Cap}/1000)^1$ EER	
PTHP (cooling mode) replacements <sup>2</sup>			$10.8 - (0.213 \times \text{Cap}/1000)^1$ EER	
PTHP (heating mode) new construction			$3.2 - (0.026 \times \text{Cap}/1000)^1$ COP	
PTHP (heating mode) replacements <sup>2</sup>			$2.9 - (0.026 \times \text{Cap}/1000)^1$ COP	
SPVAC (cooling mode)	< 65,000 Btu/h	95°F db/75°F wb outdoor air	9.0 EER	ARI 390
	$\geq 65,000$ Btu/h and < 135,000 Btu/h		8.9 EER	
	$\geq 135,000$ Btu/h and < 240,000 Btu/h		8.6 EER	
SPVHP (cooling mode)	< 65,000 Btu/h		9.0 EER	
	$\geq 65,000$ Btu/h and < 135,000 Btu/h		8.9 EER	
	$\geq 135,000$ Btu/h and < 240,000 Btu/h		8.6 EER	
SPVHP (heating mode)	< 65,000 Btu/h	47°F db/43°F wb outdoor air	3.0 COP	
	$\geq 65,000$ Btu/h and < 135,000 Btu/h		3.0 COP	
	$\geq 135,000$ Btu/h and < 240,000 Btu/h		2.9 COP	

1. Cap means the rated cooling capacity of the product in Btu/h. If the unit's capacity is less than 7,000 Btu/h, use 7,000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculation.

2. Replacement units must be factory labeled as follows: MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS. Replacement efficiencies apply only to units with existing sleeves less than 16 inches high and less than 42 inches wide.

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A5.207.1-G  
PERFORMANCE REQUIREMENTS FOR HEAT REJECTION EQUIPMENT<sup>4</sup>**

EQUIPMENT TYPE	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED <sup>1,2</sup>	TEST PROCEDURE <sup>3</sup>
Propeller or axial fan open cooling towers	All	95°F entering water	≥ 38.2 gpm/hp	CTI ATC-105
		85°F leaving water		and
		75°F wb outdoor air		CTI STD-201
Centrifugal fan open cooling towers	All	95°F entering water	≥ 20.0 gpm/hp	CTI ATC-105
		85°F leaving water		and
		75°F wb outdoor air		CTI STD-201
Air cooled condensers	All	125°F condensing temperature	≥ 176,000 Btu/h·hp	ARI 460
		R22 test fluid		
		190°F entering gas temperature		
		15°F subcooling		
		95°F entering drybulb		

1. For purposes of this table, open cooling tower performance is defined as the maximum flow rating of the tower divided by the fan nameplate rated motor power.
2. For purposes of this table air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate rated motor power.
3. Open cooling towers shall be tested using the test procedures in CTI ATC-105. Performance of factory assembled open cooling towers shall be either certified as base models as specified in CTI STD-201 or verified by testing in the field by a CTI approved testing agency. Open factory assembled cooling towers with custom options added to a CTI certified base model for the purpose of safe maintenance or to reduce environmental or noise impact shall be rated at 90 percent of the CTI certified performance of the associated base model or at the manufacturer's stated performance, whichever is less. Base models of open factory assembled cooling towers are open cooling towers configured in exact accordance with the Data of Record submitted to CTI as specified by CTI STD-201. There are no certification requirements for field erected cooling towers.
4. The efficiencies for open cooling towers listed in Table A5.207.1-G are not applicable for closed-circuit cooling towers.

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A5.207.1-H**  
**COPS FOR NONSTANDARD CENTRIFUGAL CHILLERS < 150 TONS**

CENTRIFUGAL CHILLERS < 150 Tons COP <sub>std</sub> = 5.0								
			CONDENSER FLOW RATE					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT <sup>1</sup> (°F)	Required COP					
46	75	29	5.58	5.83	6.03	6.32	6.54	6.70
45	75	30	5.50	5.74	5.92	6.19	6.38	6.53
44	75	31	5.42	5.65	5.82	6.07	6.24	6.37
43	75	32	5.35	5.57	5.72	5.95	6.11	6.23
42	75	33	5.27	5.49	5.64	5.85	6.00	6.11
41	75	34	5.19	5.41	5.56	5.75	5.89	5.99
46	80	34	5.19	5.41	5.56	5.75	5.89	5.99
40	75	35	5.11	5.33	5.48	5.67	5.79	5.88
45	80	35	5.11	5.33	5.48	5.67	5.79	5.88
44	80	36	5.03	5.26	5.40	5.58	5.70	5.79
43	80	37	4.94	5.18	5.32	5.50	5.62	5.70
42	80	38	4.84	5.10	5.25	5.43	5.53	5.61
41	80	39	4.73	5.01	5.17	5.35	5.46	5.53
46	85	39	4.73	5.01	5.17	5.35	5.46	5.53
40	80	40	4.62	4.92	5.09	5.27	5.38	5.45
45	85	40	4.62	4.92	5.09	5.27	5.38	5.45
44	85	41	4.49	4.82	5.00	5.20	5.30	5.38
43	85	42	4.35	4.71	4.91	5.12	5.23	5.30
42	85	43	4.19	4.59	4.81	5.03	5.15	5.22
41	85	44	4.02	4.46	4.70	4.94	5.06	5.14
40	85	45	3.84	4.32	4.58	4.84	4.98	5.06
<b>Condenser DT<sup>2</sup></b>			14.04	11.23	9.36	7.02	5.62	4.68

1. LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)

2. Condenser DT = Leaving Condenser Water Temperature (°F) – Entering Condenser Water Temperature (°F)

$$K_{adj} = 6.1507 - 0.30244(\times) + 0.0062692(\times)^2 - 0.000045595(\times)^3$$

where  $\times$  = Condenser DT + LIFT

$$COP_{adj} = K_{adj} * COP_{std}$$

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A5.207.1-I**  
**COPS FOR NONSTANDARD CENTRIFUGAL CHILLERS > 150 TONS, ≤ 300 TONS**

CENTRIFUGAL CHILLERS > 150 TONS, ≤ 300 TON COP <sub>std</sub> = 5.55								
			CONDENSER FLOW RATE					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT <sup>1</sup> (°F)	Required COP					
46	75	29	6.17	6.44	6.66	6.99	7.23	7.40
45	75	30	6.08	6.34	6.54	6.84	7.06	7.22
44	75	31	6.00	6.24	6.43	6.71	6.90	7.05
43	75	32	5.91	6.15	6.33	6.58	6.76	6.89
42	75	33	5.83	6.07	6.23	6.47	6.63	6.75
41	75	34	5.74	5.98	6.14	6.36	6.51	6.62
46	80	34	5.74	5.98	6.14	6.36	6.51	6.62
40	75	35	5.65	5.90	6.05	6.26	6.40	6.51
45	80	35	5.65	5.90	6.05	6.26	6.40	6.51
44	80	36	5.56	5.81	5.97	6.17	6.30	6.40
43	80	37	5.46	5.73	5.89	6.08	6.21	6.30
42	80	38	5.35	5.64	5.80	6.00	6.12	6.20
41	80	39	5.23	5.54	5.71	5.91	6.03	6.11
46	85	39	5.23	5.54	5.71	5.91	6.03	6.11
40	80	40	5.10	5.44	5.62	5.83	5.95	6.03
45	85	40	5.10	5.44	5.62	5.83	5.95	6.03
44	85	41	4.96	5.33	5.55	5.74	5.86	5.94
43	85	42	4.81	5.21	5.42	5.66	5.78	5.86
42	85	43	4.63	5.08	5.31	5.56	5.69	5.77
41	85	44	4.45	4.93	5.19	5.46	5.60	5.69
40	85	45	4.24	4.77	5.06	5.35	5.50	5.59
<b>Condenser DT<sup>2</sup></b>			14.04	11.23	9.36	7.02	5.62	4.68

1. LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)
2. Condenser DT = Leaving Condenser Water Temperature (°F) – Entering Condenser Water Temperature (°F)
- $$K_{adj} = 6.1507 - 0.30244(\times) + 0.0062692(\times)^2 - 0.000045595(\times)^3$$
- where  $\times$  = Condenser DT + LIFT
- $$COP_{adj} = K_{adj} * COP_{std}$$



## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A5.207.1-J**  
**COPS FOR NONSTANDARD CENTRIFUGAL CHILLERS > 300 TONS**

CENTRIFUGAL CHILLERS > 300 TONS COP <sub>std</sub> = 6.1								
			CONDENSER FLOW RATE					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT <sup>1</sup> (°F)	Required COP					
46	75	29	6.80	7.11	7.35	7.71	7.97	8.16
45	75	30	6.71	6.99	7.21	7.55	7.78	7.96
44	75	31	6.61	6.89	7.09	7.40	7.61	7.77
43	75	32	6.52	6.79	6.98	7.26	7.45	7.60
42	75	33	6.43	6.69	6.87	7.13	7.31	7.44
41	75	34	6.33	6.60	6.77	7.02	7.18	7.30
46	80	34	6.33	6.60	6.77	7.02	7.18	7.30
40	75	35	6.23	6.50	6.68	6.91	7.06	7.17
45	80	35	6.23	6.50	6.68	6.91	7.06	7.17
44	80	36	6.13	6.41	6.58	6.81	6.95	7.05
43	80	37	6.02	6.31	6.49	6.71	6.85	6.94
42	80	38	5.90	6.21	6.40	6.61	6.75	6.84
41	80	39	5.77	6.11	6.30	6.52	6.65	6.74
46	85	39	5.77	6.11	6.30	6.52	6.65	6.74
40	80	40	5.63	6.00	6.20	6.43	6.56	6.65
45	85	40	5.63	6.00	6.20	6.43	6.56	6.65
44	85	41	5.47	5.87	6.10	6.33	6.47	6.55
43	85	42	5.30	5.74	5.98	6.24	6.37	6.46
42	85	43	5.11	5.60	5.86	6.13	6.28	6.37
41	85	44	4.90	5.44	5.72	6.02	6.17	6.27
40	85	45	4.68	5.26	5.58	5.90	6.07	6.17
<b>Condenser DT<sup>2</sup></b>			14.04	11.23	9.36	7.02	5.62	4.68

1. LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)

2. Condenser DT = Leaving Condenser Water Temperature (°F) – Entering Condenser Water Temperature (°F)

$$K_{adj} = 6.1507 - 0.30244(\times) + 0.0062692(\times)^2 - 0.000045595(\times)^3$$

where  $\times$  = Condenser DT + LIFT

$$COP_{adj} = K_{adj} * COP_{std}$$

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHDP 1, 2 &amp; 4]

**TABLE A5.207.1-K  
COPS FOR NONSTANDARD CENTRIFUGAL CHILLERS < 150 TONS**

CENTRIFUGAL CHILLERS < 150 TONS COP <sub>std</sub> = 5.25								
			CONDENSER FLOW RATE					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT <sup>1</sup> (°F)	Required COP					
46	75	29	5.84	6.10	6.30	6.61	6.84	7.00
45	75	30	5.75	6.00	6.19	6.47	6.68	6.83
44	75	31	5.67	5.91	6.08	6.34	6.53	6.67
43	75	32	5.59	5.82	5.99	6.23	6.39	6.52
42	75	33	5.51	5.74	5.90	6.12	6.27	6.39
41	75	34	5.43	5.66	5.81	6.02	6.16	6.26
46	80	34	5.43	5.66	5.81	6.02	6.16	6.26
40	75	35	5.35	5.58	5.73	5.93	6.06	6.15
45	80	35	5.35	5.58	5.73	5.93	6.06	6.15
44	80	36	5.26	5.50	5.65	5.84	5.96	6.05
43	80	37	5.16	5.42	5.57	5.76	5.87	5.96
42	80	38	5.06	5.33	5.49	5.67	5.79	5.87
41	80	39	4.95	5.24	5.41	5.60	5.71	5.78
46	85	39	4.95	5.24	5.41	5.60	5.71	5.78
40	80	40	4.83	5.14	5.32	5.52	5.63	5.70
45	85	40	4.83	5.14	5.32	5.52	5.63	5.70
44	85	41	4.69	5.04	5.25 <sup>3</sup>	5.43	5.55	5.62
43	85	42	4.55	4.93	5.13	5.35	5.47	5.54
42	85	43	4.38	4.80	5.03	5.26	5.38	5.46
41	85	44	4.21	4.67	4.91	5.17	5.30	5.38
40	85	45	4.01	4.52	4.79	5.06	5.20	5.29
<b>Condenser DT<sup>2</sup></b>			14.04	11.23	9.36	7.02	5.62	4.68

- LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)
- Condenser DT = Leaving Condenser Water Temperature (°F) – Entering Condenser Water Temperature (°F)  

$$K_{adj} = 6.1507 - 0.30244(\times) + 0.0062692(\times)^2 - 0.000045595(\times)^3$$
 where  $\times$  = Condenser DT + LIFT  

$$COP_{adj} = K_{adj} * COP_{std}$$

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A5.207.1-L**  
**IPLV/NPLV FOR NONSTANDARD CENTRIFUGAL CHILLERS > 150 TONS, < 300 TONS**

CENTRIFUGAL CHILLERS > 150 TONS, < 300 TONS IPLV <sub>std</sub> = 5.9								
			CONDENSER FLOW RATE					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT <sup>1</sup> (°F)	Required COP					
46	75	29	6.58	6.87	7.11	7.46	7.71	7.90
45	75	30	6.49	6.76	6.98	7.30	7.53	7.70
44	75	31	6.40	6.66	6.98	7.15	7.36	7.52
43	75	32	6.31	6.56	6.75	7.02	7.21	7.35
42	75	33	6.22	6.47	6.65	6.90	7.07	7.20
41	75	34	6.13	6.38	6.55	6.79	6.95	7.06
46	80	34	6.13	6.38	6.55	6.79	6.95	7.06
40	75	35	6.03	6.29	6.46	6.68	6.83	6.94
45	80	35	6.03	6.29	6.46	6.68	6.83	6.94
44	80	36	5.93	6.20	6.37	6.58	6.72	6.82
43	80	37	5.82	6.11	6.28	6.49	6.62	6.72
42	80	38	5.71	6.01	6.19	6.40	6.53	6.62
41	80	39	5.58	5.91	6.10	6.31	6.44	6.52
46	85	39	5.58	5.91	6.10	6.31	6.44	6.52
40	80	40	5.44	5.80	6.00	6.22	6.35	6.43
45	85	40	5.44	5.80	6.00	6.22	6.35	6.43
44	85	41	5.29	5.68	5.90 <sup>3</sup>	6.13	6.26	6.34
43	85	42	5.13	5.55	5.79	6.03	6.16	6.25
42	85	43	4.94	5.41	5.67	5.93	6.07	6.16
41	85	44	4.74	5.26	5.54	5.82	5.97	6.07
40	85	45	4.52	5.09	5.40	5.71	5.87	5.97
<b>Condenser DT<sup>2</sup></b>			14.04	11.23	9.36	7.02	5.62	4.68

1. LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)

2. Condenser DT = Leaving Condenser Water Temperature (°F) – Entering Condenser Water Temperature (°F)

$$K_{adj} = 6.1507 - 0.30244(\times) + 0.0062692(\times)^2 - 0.000045595(\times)^3$$

where  $\times$  = Condenser DT + LIFT

$$COP_{adj} = K_{adj} * COP_{std}$$

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A5.207.1-M**  
**COPS FOR NONSTANDARD CENTRIFUGAL CHILLERS > 300 TONS**

CENTRIFUGAL CHILLERS > 300 TONS								
IPLV <sub>std</sub> = 6.4								
			CONDENSER FLOW RATE					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT <sup>1</sup> (°F)	Required COP					
46	75	29	7.15	7.47	7.72	8.10	8.37	8.58
45	75	30	7.05	7.35	7.58	7.93	8.18	8.36
44	75	31	6.95	7.23	7.45	7.77	8.00	8.16
43	75	32	6.85	7.13	7.33	7.63	7.83	7.98
42	75	33	6.75	7.03	7.22	7.49	7.68	7.82
41	75	34	6.65	6.93	7.12	7.37	7.55	7.67
46	80	34	6.65	6.93	7.12	7.37	7.55	7.67
40	75	35	6.55	6.83	7.01	7.26	7.42	7.54
45	80	35	6.55	6.83	7.01	7.26	7.42	7.54
44	80	36	6.44	6.73	6.92	7.15	7.30	7.41
43	80	37	6.32	6.63	6.82	7.05	7.19	7.30
42	80	38	6.20	6.53	6.72	6.95	7.09	7.19
41	80	39	6.06	6.42	6.62	6.85	6.99	7.08
46	85	39	6.06	6.42	6.62	6.85	6.99	7.08
40	80	40	5.91	6.30	6.52	6.76	6.89	6.98
45	85	40	5.91	6.30	6.52	6.76	6.89	6.98
44	85	41	5.75	6.17	6.40 <sup>3</sup>	6.66	6.79	6.89
43	85	42	5.57	6.03	6.28	6.55	6.70	6.79
42	85	43	5.37	5.88	6.16	6.44	6.59	6.69
41	85	44	5.15	5.71	6.01	6.33	6.49	6.59
40	85	45	4.91	5.53	5.86	6.20	6.37	6.48
<b>Condenser DT<sup>2</sup></b>			14.04	11.23	9.36	7.02	5.62	4.68

1. LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)
2. Condenser DT = Leaving Condenser Water Temperature (°F) – Entering Condenser Water Temperature (°F)  

$$K_{adj} = 6.1507 - 0.30244(\times) + 0.0062692(\times)^2 - 0.000045595(\times)^3$$
 where  $\times$  = Condenser DT + LIFT  

$$COP_{adj} = K_{adj} * COP_{std}$$

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 & 4]

**A5.207.2 Space conditioning systems.** A building complies with this section by being designed with and having constructed and installed a space-conditioning system that meets the requirements of Subsections A5.207.2.1 through A5.207.2.6.

**A5.207.2.1 Supply-air temperature reset controls.** Mechanical space-conditioning systems supplying heated or cooled air to multiple zones shall include controls that automatically reset supply-air temperatures:

1. In response to representative building loads or to outdoor air temperature; and
2. By at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

Air distribution systems serving zones that are likely to have constant loads, such as interior zones, shall be designed for the air flows resulting from the fully reset supply-air temperature.

**Exceptions:**

1. Systems that meet the requirements of Section 144(d) of Title 24, Part 6, without using Exception 1 or 2 to that section.
2. Where supply-air temperature reset would increase overall building energy use.
3. Zones in which specific humidity levels are required to satisfy process needs.

**A5.207.2.2 Electric resistance heating.** Electric resistance heating systems shall not be used for space heating.

**Exceptions:**

1. Where an electric-resistance heating system supplements a heating system in which at least 60 percent of the annual energy requirement is supplied by site-solar or recovered energy.
2. Where the total capacity of all electric-resistance heating systems serving the entire building is less than 10 percent of the total design output capacity of all heating equipment serving the entire building.
3. Where an electric resistance heating system serves an entire building that is not a high-rise residential or hotel/motel building; and has a conditioned floor area no greater than 5,000 square feet; and has no mechanical cooling; and is in an area where natural gas is not currently available and an extension of a natural gas system is impractical, as determined by the natural gas utility.

**A5.207.2.3 Heat rejection systems.**

**A5.207.2.3.1 General.** Subsection A5.207.2.3 applies to heat rejection equipment used in comfort cooling systems such as air-cooled condensers, open cooling towers, closed-circuit cooling towers and evaporative condensers.

**A5.207.2.3.2 Fan speed control.** Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at  $\frac{2}{3}$  of full speed or less

and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

**Exceptions:**

1. Heat rejection devices included as an integral part of the equipment listed in Tables A5.207.1-A through A5.207.1-E.
2. Condenser fans serving multiple refrigerant circuits.
3. Condenser fans serving flooded condensers.
4. Up to  $\frac{1}{3}$  of the fans on a condenser or tower with multiple fans where the lead fans comply with the speed control requirement.

**A5.207.2.3.3 Tower flow turndown.** Open cooling towers configured with multiple condenser water pumps shall be designed so that all cells can be run in parallel with the larger of:

1. The flow that's produced by the smallest pump or
2. 33 percent of the design flow for the cell.

**A5.207.2.3.4 Limitation on centrifugal fan cooling towers.** Open cooling towers with a combined rated capacity of 900 gpm and greater at 95°F condenser water return, 85°F condenser water supply and 75°F outdoor wet-bulb temperature shall use propeller fans and shall not use centrifugal fans.

**Exceptions:**

1. Cooling towers that are ducted (inlet or discharge) or have an external sound trap that requires external static pressure capability.
2. Cooling towers that meet the energy efficiency requirement for propeller fan towers in Section A5.207.1, Table A5.207.1-G.

**A5.207.2.4 Hydronic system measures.**

**A5.207.2.4.1 Hydronic variable flow systems.** HVAC chilled and hot water pumping shall be designed for variable fluid flow and shall be capable of reducing pump flow rates to no more than the larger of: a) 50 percent or less of the design flow rate; or b) the minimum flow required by the equipment manufacturer for the proper operation of equipment served by the system.

**Exceptions:**

1. Systems that include no more than three control valves.
2. Systems having a total pump system power less than or equal to  $1\frac{1}{2}$  HP.

**A5.207.2.4.2 Chiller isolation.** When a chilled water plant includes more than one chiller, provisions shall be made so that flow through any chiller is automatically shut off when that chiller is shut off while still maintaining flow through other operating chiller(s). Chillers that are piped in series for the purpose of increased temperature differential shall be considered as one chiller.

**A5.207.2.4.3 Boiler isolation.** When a hot water plant includes more than one boiler, provisions shall be made so that flow through any boiler is automatically shut off when that boiler is shut off while still maintaining flow through other operating boiler(s).

**A5.207.2.4.4 Chilled and hot water temperature reset controls.** Chilled and hot water systems with a design capacity exceeding 500,000 Btu/hr supplying chilled or heated water (or both) shall include controls that automatically reset supply water temperatures as a function of representative building loads or outside air temperature.

**Exception:** Hydronic systems that use variable flow to reduce pumping energy in accordance with Section A5.207.2.4.1.

**A5.207.2.4.5 Water-cooled air conditioner and hydronic heat pump systems.** Water circulation systems serving water-cooled air conditioners, hydronic heat pumps or both that have total pump system power exceeding 5 hp shall have flow controls that meet the requirements of Section A5.207.2.4.6. Each air conditioner or heat pump shall have a two-position automatic valve interlocked to shut off water flow when the compressor is off.

**A5.207.2.4.6 Variable flow controls.**

**A5.207.2.4.6.1 Variable speed drives.** Individual pumps serving variable flow systems and having a motor horsepower exceeding 5 hp shall have controls and/or devices (such as variable speed control) that will result in pump motor demand of no more than 30 percent of design wattage at 50 percent of design water flow. The pumps shall be controlled as a function of required differential pressure.

**A5.207.2.4.6.2 Pressure sensor location and set-point.**

1. For systems without direct digital control of individual coils reporting to the central control panel, differential pressure shall be measured at or near the most remote heat exchanger or the heat exchanger requiring the greatest differential pressure.
2. For systems with direct digital control of individual coils with central control panel, the static pressure set point shall be reset based on the valve requiring the most pressure and the set-point shall be no less than 80 percent open. The pressure sensor(s) may be mounted anywhere.

**Exceptions:**

1. Heating hot water systems.
2. Condenser water systems serving only water-cooled chillers.

**A5.207.2.4.7 Hydronic heat pump (WLHP) controls.** Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are capable of

providing a heat pump water supply temperature dead band of at least 20°F between initiation of heat rejection and heat addition by the central devices.

**Exception:** Where a system loop temperature optimization controller is used to determine the most efficient operating temperature based on real-time conditions of demand and capacity, dead bands of less than 20°F shall be allowed.

**A5.207.2.5 Air distribution system duct leakage sealing.** All duct systems shall be sealed to a leakage rate not to exceed 6 percent of the fan flow if the duct system:

**A5.207.2.5.1** Is connected to a constant volume, single zone, air conditioners, heat pumps or furnaces; and

**A5.207.2.5.2** Serves less than 5,000 square feet of floor area; and

**A5.207.2.5.3** Has more than 25 percent duct surface area located in one or more of the following spaces:

1. Outdoors; or
2. In a space directly under a roof where the *U*-factor of the roof is greater than the *U*-factor of the ceiling; or

**Exception:** Where the roof meets the requirements of Section 143(a)1C of Title 24, Part 6.

3. In a space directly under a roof with fixed vents or openings to the outside or unconditioned spaces; or

4. In an unconditioned crawlspace; or

5. In other unconditioned spaces.

The leakage rate shall be confirmed through field verification and diagnostic testing, in accordance with procedures set forth in the Reference Nonresidential Appendix NA1 of the California Energy Commission 2008 *Building Energy Efficiency Standards for Residential and Nonresidential Buildings*.

**A5.207.2.6 Variable air volume control for single zone systems.** Effective January 1, 2012, all unitary air conditioning equipment and air-handling units with mechanical cooling capacity at ARI conditions greater than or equal to 110,000 Btu/hr that serve single zones shall be designed for variable supply air volume with their supply fans controlled by two-speed motors, variable speed drives or equipment that has been demonstrated to the Executive Director to use no more energy. The supply fan controls shall modulate down to a minimum of  $\frac{2}{3}$  of the full fan speed or lower at low cooling demand.

**A5.207.3 Service water-heating systems and equipment.**

**A5.207.3.1 Certification by manufacturers.** Any service water-heating system or equipment may be installed only if the manufacturer has certified that the system or equipment complies with all of the requirements of this subsection for that system or equipment.

**A5.207.3.1.1 Temperature controls for service water-heating systems.** Service water-heating systems shall be equipped with automatic temperature controls capable of adjustment from the lowest to the highest



## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 & 4]

acceptable temperature settings for the intended use as listed in Table 2, Chapter 9 of the ASHRAE Handbook, HVAC Applications Volume.

**A5.207.3.2 Efficiency.** Equipment shall meet the applicable requirements of the Appliance Efficiency Regulations as required by Section A5.210.1, subject to the following:

1. If more than one standard is listed in the Appliance Efficiency Regulations, the equipment shall meet all the standards listed; and
2. If more than one test method is listed in the Appliance Efficiency Regulations, the equipment shall comply with the applicable standard when tested with each test method; and
3. Where equipment can serve more than one function, such as both heating and cooling or both space heating and water heating, it shall comply with all the requirements applicable to each function; and
4. Where a requirement is for equipment rated at its “maximum rated capacity” or “minimum rated capacity,” the capacity shall be as provided for and allowed by the controls, during steady-state operation.

**A5.207.3.3 Installation.** Any service water-heating system or equipment may be installed only if the system or equipment complies with all of the applicable requirements of this subsection for the system or equipment.

**A5.207.3.3.1 Outlet temperature controls.** On systems that have a total capacity greater than 167,000 Btu/hr, outlets that require higher than service water temperatures as listed in the ASHRAE Handbook, Applications Volume, shall have separate remote heaters, heat exchangers or boosters to supply the outlet with the higher temperature.

**A5.207.3.3.2 Temperature controls for public lavatories.** The controls shall limit the outlet temperature to 110°F.

**A5.207.3.3.3 Insulation.** Unfired service water heater storage tanks and backup tanks for solar water-heating systems shall have:

1. External insulation with an installed *R*-value of at least *R*-12; or
2. Internal and external insulation with a combined *R*-value of at least *R*-16; or
3. The heat loss of the tank surface based on an 80°F water-air temperature difference shall be less than 6.5 Btu per hour per square foot.

**A5.207.3.3.4 Service water heaters in state buildings.** Any newly constructed building constructed by the State shall derive its service water heating from a system that provides at least 60 percent of the energy needed for service water heating from site solar energy or recovered energy.

**Exception:** Buildings for which the state architect determines that service water heating from site solar energy or recovered energy is economically or physically infeasible.

### **A5.207.4 Natural gas central furnaces, cooking equipment and pool and spa heaters: Pilot lights prohibited.**

Any natural gas system or equipment listed below may be installed only if it does not have a continuously burning pilot light:

1. Fan-type central furnaces.
2. Household cooking appliances.

**Exception:** Household cooking appliances without an electrical supply voltage connection and in which each pilot consumes less than 150 Btu/hr.

3. Pool heaters.
4. Spa heaters.

**A5.207.5 Controls for space-conditioning systems.** Space-conditioning systems shall be installed with controls that comply with the applicable requirements of Subsections A5.207.5.1 through A5.207.5.5.

**A5.207.5.1 Thermostatic controls for each zone.** The supply of heating and cooling energy to each space-conditioning zone or dwelling unit shall be controlled by an individual thermostatic control that responds to temperature within the zone and that meets the applicable requirements of Section A5.207.5.2.

**Exception:** An independent perimeter heating or cooling system may serve more than one zone without individual thermostatic controls if:

1. All zones are also served by an interior cooling system;
2. The perimeter system is designed solely to offset envelope heat losses or gains;
3. The perimeter system has at least one thermostatic control for each building orientation of 50 feet or more; and
4. The perimeter system is controlled by at least one thermostat located in one of the zones served by the system.

**A5.207.5.2 Criteria for zonal thermostatic controls.** The individual thermostatic controls required by Section A5.207.5.1 shall meet the following requirements as applicable:

1. Where used to control comfort heating, the thermostatic controls shall be capable of being set, locally or remotely, down to 55°F or lower.
2. Where used to control comfort cooling, the thermostatic controls shall be capable of being set, locally or remotely, up to 85°F or higher.
3. Where used to control both comfort heating and comfort cooling, the thermostatic controls shall meet Items 1 and 2 and shall be capable of providing a temperature range or dead band of at least 5°F within which the supply of heating and cooling energy to the zone is shut off or reduced to a minimum.

**Exception:** Systems with thermostats that require manual changeover between heating and cooling modes.

- Thermostatic controls for all unitary single zone, air conditioners, heat pumps and furnaces, shall comply with the setback thermostat requirements of Section A5.207.1.3 or, if equipped with DDC to the Zone level, with the Automatic Demand Shed Controls of Section A5.207.5.5.

**Exception:** Systems serving zones that must have constant temperatures to prevent degradation of materials, a process, plants or animals.

**A5.207.5.3 Heat pump controls.** All heat pumps with supplementary electric resistance heaters shall be installed with controls that comply with Section A5.207.1.2.

**A5.207.5.4 Dampers for air supply and exhaust equipment.** Outdoor air supply and exhaust equipment shall be installed with dampers that automatically close upon fan shutdown.

**Exceptions:**

- Where it can be demonstrated to the satisfaction of the enforcing agency that the equipment serves an area that must operate continuously.
- Gravity and other nonelectrical equipment that has readily accessible manual damper controls.
- At combustion air intakes and shaft vents.
- Where prohibited by other provisions of law.

**A5.207.5.5 Automatic demand shed controls.** HVAC systems with DDC to the Zone level shall be programmed to allow centralized demand shed for noncritical zones as follows:

- The controls shall have a capability to remotely setup the operating cooling temperature set points by 4 degrees or more in all noncritical zones on signal from a centralized contact or software point within an Energy Management Control System (EMCS).
- The controls shall remotely set down the operating heating temperature set points by 4 degrees or more in all noncritical zones on signal from a centralized contact or software point within an EMCS.
- 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.
- The controls shall be programmed to provide an adjustable rate of change for the temperature setup and reset.

**A5.207.6 Pipe insulation.** The piping for all space-conditioning and service water-heating systems with fluid temperatures listed in Table A5.207.6-A shall have the amount of insulation specified in Subsection A5.207.6.1 or A5.207.6.2. Insulation conductivity shall be determined in accordance with ASTM C335 at the mean temperature listed in Table A5.207.6-A and shall be rounded to the nearest  $\frac{1}{100}$  Btu-inch per hour per square foot per °F.

Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance and wind, including but not limited to, the following:

Insulation exposed to weather shall be suitable for outdoor service, e.g., protected by aluminum, sheet metal, painted canvas or plastic cover. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation that can cause degradation of the material.

Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall include a vapor retardant located outside the insulation (unless the insulation is inherently vapor retardant), all penetrations and joints of which shall be sealed.

**Exceptions:**

- Factory-installed piping within space-conditioning equipment certified under Section A5.210.1 or A5.207.1.
- Piping that conveys fluids with a design operating temperature range between 60°F and 105°F.
- Piping that serves process loads, gas piping, cold domestic water piping, condensate drains, roof drains, vents or waste piping.
- Where the heat gain or heat loss to or from piping without insulation will not increase building source energy use.
- Piping that penetrates framing members shall not be required to have pipe insulation for the distance of the framing penetration. Metal piping that penetrates metal framing shall use grommets, plugs, wrapping or other insulating material to assure that no contact is made with the metal framing.

**A5.207.6.1** For insulation with a conductivity in the range shown in Table A5.207.6-A for the applicable fluid temperature range, the insulation shall have the applicable thickness shown in Table A5.207.6-A.

**A5.207.6.2** For insulation with a conductivity outside the range shown in Table A5.207.6-A for the applicable fluid temperature range, the insulation shall have a minimum thickness as calculated with Equation A5.207.6-A below.

**EQUATION A5.207.6-A  
INSULATION THICKNESS EQUATION**

$$T = PR \left[ \left( 1 + \frac{t}{PR} \right)^{\frac{K}{k}} - 1 \right]$$

where:

$T$  = Minimum insulation thickness for material with conductivity  $K$ , inches.

$PR$  = Pipe actual outside radius, inches.

$t$  = Insulation thickness from Table A5.207.6-A, inches.

$K$  = Conductivity of alternate material at the mean rating temperature indicated in Table A5.207.6-A, for the applicable fluid temperature range, in Btu-inch per hour per square foot per °F.

$k$  = The lower value of the conductivity range listed in Table A5.207.6-A, for the applicable fluid temperature range, Btu-inch per hour per square foot per °F.

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TABLE A5.207.6-A  
PIPE INSULATION THICKNESS

FLUID TEMPERATURE RANGE (°F)	CONDUCTIVITY RANGE (in Btu-inch per hour per square foot per °F)	INSULATION MEAN RATING TEMPERATURE (°F)	NOMINAL PIPE DIAMETER (in inches)					
			Runouts up to 2	1 and less	1.25-2	2.50-4	5-6	8 and larger
			INSULATION THICKNESS REQUIRED (in inches)					
Space heating systems (steam, steam condensate and hot water)								
Above 350	0.32-0.34	250	1.5	2.5	2.5	3.0	3.5	3.5
251-350	0.29-0.31	200	1.5	2.0	2.5	2.5	3.5	3.5
201-250	0.27-0.30	150	1.0	1.5	1.5	2.0	2.0	3.5
141-200	0.25-0.29	125	0.5	1.5	1.5	1.5	1.5	1.5
105-140	0.24-0.28	100	0.5	1.0	1.0	1.0	1.5	1.5
Service water-heating systems (recirculating sections, all piping in electric trace tape systems and the first 8 feet of piping from the storage tank for nonrecirculating systems)								
Above 105	0.24-0.28	100	0.5	1.0	1.0	1.5	1.5	1.5
Space cooling systems (chilled water, refrigerant and brine)								
40-60	0.23-0.27	75	0.5	0.5	0.5	1.0	1.0	1.0
Below 40	0.23-0.27	75	1.0	1.0	1.5	1.5	1.5	1.5

**A5.208**  
**Not used****A5.209 [OSHPD 1, 2 & 4]**  
**LIGHTING**

**A5.209.1 Lighting control devices,** ballasts and luminaires. Any lighting control device, ballast or luminaire subject to the requirements of Section A5.209 shall be installed only if the manufacturer has certified to the Commission that the device complies with all of the applicable requirements of Section A5.209.

Lighting control devices may be individual devices or systems consisting of two or more components. For control systems consisting of two or more components, such as an Energy Management Control System (EMCS), the manufacturer of the control system shall certify each of the components required for the system to comply with Section A5.209.

**A5.209.1.1 All devices:** Instructions for installation and calibration. The manufacturer shall provide step-by-step instructions for installation and start-up calibration of the device.

**A5.209.1.2 Indicator lights.** Indicator lights integral to lighting control devices shall consume no more than one watt of power per indicator light.

**A5.209.1.3 Automatic time switch control devices.** Automatic time switch control devices or system shall:

1. Be capable of programming different schedules for weekdays and weekends; and
2. Have program backup capabilities that prevent the loss of the device's schedules for at least 7 days and the device's time and date setting for at least 72 hours if power is interrupted.

**A5.209.1.4 Occupant sensors, motion sensors and vacancy sensors.** Occupant sensors, motion sensors and vacancy sensors shall be capable of automatically turning

off all the lights in an area no more than 30 minutes after the area has been vacated and shall have a visible status signal that indicates that the device is operating properly or that it has failed or malfunctioned. The visible status signal may have an override switch that turns the signal off. In addition, ultrasonic and microwave devices shall have a built-in mechanism that allows calibration of the sensitivity of the device to room movement in order to reduce the false sensing of occupants and shall comply with either Subsection A5.209.1.4.1 or A5.209.1.4.2 below, as applicable:

**A5.209.1.4.1** If the device emits ultrasonic radiation as a signal for sensing occupants within an area, the device shall:

1. Have had a Radiation Safety Abbreviated Report submitted to the Center for Devices and Radiological Health, Federal Food and Drug Administration, under 21 Code of Federal Regulations, Section 1002.12 (1996) and a copy of the report shall have been submitted to the California Energy Commission; and
2. Emit no audible sound; and
3. Not emit ultrasound in excess of the decibel (dB) values shown in Table A5.209.1-A, measured no more than 5 feet from the source, on axis.

**A5.209.1.4.2** If the device emits microwave radiation as a signal for sensing occupants within the area, the device shall:

1. Comply with all applicable provisions in 47 *Code of Federal Regulations*, Parts 2 and 15 (1996) and have an approved Federal Communications Commission Identifier that appears on all units of the device and that has been submitted to the California Energy Commission; and
2. Not emit radiation in excess of 1 milliwatt per square centimeter measured at no more than 5

centimeters from the emission surface of the device; and

3. Have permanently affixed to it installation instructions recommending that it be installed at least 12 inches from any area normally used by room occupants.

**A5.209.1.5 Multilevel occupant sensor.** Multilevel occupant sensors shall have an automatic OFF function that turns off all the lights and either an automatic or a manually controlled ON function capable of meeting all the multilevel and uniformity requirements of Section A5.209.2.2 for the controlled lighting. The first stage shall be capable of activating between 30–70 percent of the lighting power in a room either through an automatic or manual action and may be a switching or dimming system. After that event occurs the device shall be capable of all of the following actions when manually called to do so by the occupant:

1. Activating the alternate set of lights.
2. Activating 100 percent of the lighting power.
3. Deactivating all lights.

**A5.209.1.6 Automatic daylighting control devices.** Automatic daylighting control devices used to control lights in daylight zones shall:

1. Be capable of reducing the power consumption of the general lighting in the controlled area by at least two thirds in response to the availability of daylight; and
2. If the device is a dimmer controlling incandescent or fluorescent lamps, provide electrical outputs to lamps for reduced flicker operation through the dimming range, so that the light output has an amplitude modulation of less than 30 percent for frequencies less than 200 Hz and without causing premature lamp failure; and
3. If the devices reduce lighting in control steps, incorporate time-delay circuits to prevent cycling of light level changes of less than 3 minutes and have a manual or automatic means of adjusting the deadband to provide separation of on and off points for each control step; and
4. If the device is placed in calibration mode, automatically restore its time delay settings to normal operation programmed time delays after no more than 60 minutes; and
5. Have a setpoint control that easily distinguishes settings to within 10 percent of full scale adjustment; and
6. Have a light sensor that has a linear response with 5 percent accuracy over the range of illuminance measured by the light sensor; and
7. Have a light sensor that is physically separated from where calibration adjustments are made or is capable of being calibrated in a manner that the person initiating calibration is remote from the sensor

during calibration to avoid influencing calibration accuracy.

**A5.209.1.7 Interior photosensors.** Interior photosensor shall not have a mechanical slide cover or other device that permits easy unauthorized disabling of the control and shall not be incorporated into a wall-mounted occupant-sensor.

**A5.209.1.8 Multilevel astronomical time-switch controls.** Multilevel astronomical time-switch controls used to control lighting in daylight zones shall:

1. Contain at least two separately programmable steps per zone that reduces illuminance in a relatively uniform manner as specified in Section A5.209.2.2; and
2. Have a separate offset control for each step of 1 to 240 minutes; and
3. Have sunrise and sunset prediction accuracy within +/- 15 minutes and timekeeping accuracy within 5 minutes per year; and
4. Store astronomical time parameters (used to develop longitude, latitude, time zone) for at least 7 days if power is interrupted; and
5. Display date/time, sunrise and sunset and switching times for each step; and
6. Have an automatic daylight savings time adjustment; and
7. Have automatic time switch capabilities specified in Section A5.209.1.3.

**A5.209.1.9 Outdoor astronomical time-switch controls.** Outdoor astronomical time-switch controls used to control outdoor lighting as specified in Section A5.209.3.3 shall:

1. Contain at least two separately programmable steps per function area; and
2. Have the ability to independently offset the on and off times for each channel by 0 to 99 minutes before or after sunrise or sunset; and
3. Have sunrise and sunset prediction accuracy within +/- 15 minutes and timekeeping accuracy within 5 minutes per year; and
4. Store astronomical time parameters (used to develop longitude, latitude, time zone) for at least 7 days if power is interrupted; and
5. Display date/time, sunrise and sunset; and
6. Have an automatic daylight savings time adjustment; and
7. Have automatic time switch capabilities specified in Section A5.209.1.3.

**A5.209.1.10 Dimmers.** Dimmers used to control lighting shall:

1. Be capable of reducing power consumption by a minimum of 65 percent when the dimmer is at its lowest light level; and
2. If the device is a dimmer controlling incandescent or fluorescent lamps, provide electrical outputs to



## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 & 4]

lamps for reduced flicker operation through the dimming range, so that the light output has an amplitude modulation of less than 30 percent for frequencies less than 200 Hz and without causing premature lamp failure; and

3. Be listed by a rating lab recognized by the International Code Council (ICC) as being in compliance with Underwriters Laboratories Standards; and
4. If the device is a wall box dimmer designed to be used in a three- or more-way circuit with nondimmable switches, the level set by the dimmer, shall not be overridden by any of the switches in the circuit. The dimmer and all of the switches in the circuit shall have the capability of turning lighting OFF if it is ON and turning lighting ON to the level set by the dimmer if the lighting is OFF. Any wall box dimmer that is connected to a system with an emergency override function shall be controlled by the emergency override.
5. If the device is a stepped dimmer, it shall include an off position to turn lights completely off.

**TABLE A5.209.1-A**  
**ULTRASOUND MAXIMUM DECIBEL VALUES**

MIDFREQUENCY OF SOUND PRESSURE THIRD-OCTAVE BAND (in kHz)	MAXIMUM dB LEVEL WITHIN THIRD-OCTAVE BAND (in dB reference 20 micropascals)
Less than 20	80
20 or more to less than 25	105
25 or more to less than 31.5	110
31.5 or more	115

### A5.209.2 Indoor lighting controls

#### A5.209.2.1 Area controls.

**A5.209.2.1.1** Each area enclosed by ceiling-height partitions shall have an independent switching or control device. This switching or control device shall be:

1. Readily accessible; and
2. Located so that a person using the device can see the lights or area controlled by that switch or so that the area being lit is annunciated; and
3. Manually operated or automatically controlled by an occupant-sensor that meets the applicable requirements of Section A5.209.1.

**A5.209.2.1.2** Other devices may be installed in conjunction with the switching or control device provided that they:

1. Permit the switching or control device to manually turn the lights off in each area enclosed by ceiling-height partitions; and
2. Reset the mode of any automatic system to normal operation without further action.

**Exception 1 to Section A5.209.2.1:** Up to 0.3 watts per square foot of lighting in any area within a building that must be continuously illuminated for reasons of building security or emergency egress, if:

1. The area is designated a security or emergency egress area on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Title 24, Part 1; and
2. The security or egress lighting is controlled by switches accessible only to authorized personnel.

**Exception 2 to Section A5.209.2.1:** Public areas with switches that are accessible only to authorized personnel.

**A5.209.2.2 Multilevel lighting controls.** The general lighting of any enclosed space 100 square feet or larger and has a connected lighting load that exceeds 0.8 watts per square foot, shall have multilevel lighting controls. Multilevel controls shall have at least one control step that is between 30 percent and 70 percent of design lighting power and allow the power of all lights to be manually turned off. A reasonably uniform level of illuminance shall be achieved by any of the following:

1. Continuous or stepped dimming of all lamps or luminaires; or
2. Switching alternate lamps in luminaires, alternate luminaires and alternate rows of luminaires.

#### Exceptions:

1. Lights in corridors.
2. A space that has only one luminaire with no more than two lamps.

### A5.209.2.3 Daylight areas.

**A5.209.2.3.1 Daylight areas shall be defined as follows:**

**A5.209.2.3.1.1 Daylight area.** The total daylight area shall not double count overlapping areas with any primary sidelit daylight area, secondary sidelit daylight area or skylit daylight area.

**A5.209.2.3.1.2 Daylight area, primary sidelit** is the combined primary sidelit area without double counting overlapping areas. The floor area for each primary sidelit area is directly adjacent to vertical glazing below the ceiling with an area equal to the product of the sidelit width and the primary sidelit depth.

The primary sidelit width is the width of the window plus, on each side, the smallest of:

1. 2 feet; or
2. The distance to any 5 feet or higher permanent vertical obstruction.

The primary sidelit depth is the horizontal distance perpendicular to the glazing which is the smaller of:

1. One window head height; or
2. The distance to any 5 feet or higher permanent vertical obstruction.

**A5.209.2.3.1.3 Daylight area, secondary sidelit** is the combined secondary sidelit area without double counting overlapping areas. The floor area for each secondary sidelit area is directly adjacent to primary

sidelit area with an area equal to the product of the sidelit width and the secondary sidelit depth.

The secondary sidelit width is the width of the window plus, on each side, the smallest of:

1. 2 feet; or
2. The distance to any 5 feet or higher permanent vertical obstruction; or
3. The distance to any skylit daylight area.

The secondary sidelit depth is the horizontal distance perpendicular to the glazing which begins from one window head height and ends at the smaller of:

1. Two window head heights;
2. The distance to any 5 feet or higher permanent vertical obstruction; or
3. The distance to any skylit daylight area.

**A5.209.2.3.1.4 Daylight area, skylit** is the combined daylight area under each skylight without double counting overlapping areas. The daylight area under each skylight is bounded by the rough opening of the skylight, plus horizontally in each direction the smallest of:

1. 70 percent of the floor-to-ceiling height; or
2. The distance to any primary sidelit area or the daylight area under rooftop monitors; or
3. The distance to any permanent partition or permanent rack which is farther away than 70 percent of the distance between the top of the permanent partition or permanent rack and the ceiling.

**A5.209.2.3.2** Luminaires providing general lighting that are in or are partially in the skylit daylight area and/or the primary sidelit daylight area shall be controlled as follows:

**A5.209.2.3.2.1** Primary sidelit and skylit daylight areas shall have at least one lighting control that:

1. Controls at least 50 percent of the general lighting power in the primary sidelit and skylit daylight areas separately from other lighting in the enclosed space.
2. Controls luminaires in primary sidelit areas separately from skylit areas.

**Exception:** Primary sidelit and skylit daylight areas that have a combined area totaling less than or equal to 250 square feet within any enclosed space.

**A5.209.2.3.2.2** For all skylit daylight areas:

1. The skylit daylight area shall be shown on the plans.
2. All of the general lighting in the skylit area shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section A5.209.1.

3. The automatic daylighting control shall be installed in accordance with Section A5.209.2.3.2.4.

**Exceptions:**

1. Where the total skylit daylight area in any enclosed space is less than or equal to 2,500 square feet.
2. Skylit daylight areas where existing adjacent structures obstruct direct beam sunlight for at least 6 hours per day during the equinox as calculated using computer or graphical methods.
3. When the skylight effective aperture is greater than 4.0 percent and all general lighting in the skylit area is controlled by a multi-level astronomical time switch that meets the requirements of Section A5.209.1.8 and that has an override switch that meets the requirements of Section A5.209.2.4.2.
4. Skylit daylight areas where the effective aperture is less than 0.006. The effective aperture for skylit daylight areas is specified in Section 146(a)2E of Title 24, Part 6.

**A5.209.2.3.2.3** The primary sidelit area(s) shall be shown on the plans and the general lighting in the primary sidelit areas shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section A5.209.1 and is installed in accordance with Section A5.209.2.3.2.4.

**Exceptions:**

1. Where the total primary sidelit daylight area in any enclosed space has an area less than or equal to 2,500 square feet.
2. Primary sidelit daylight areas where the effective aperture is less than 0.1. The effective aperture for primary sidelit daylight areas is specified in Section 146(a)2E of Title 24, Part 6.
3. Primary sidelit daylight areas where existing adjacent structures are twice as tall as their distance away from the windows.
4. Parking garages.

**A5.209.2.3.2.4** Automatic daylighting control device installation and operation. Automatic daylighting control devices shall be installed and configured to operate according to all of the following requirements:

1. Automatic daylighting control devices shall have photosensors that are located so that they are not readily accessible in accordance with the designer's or manufacturer's instructions.
2. The location where calibration adjustments are made to the automatic daylighting control device shall be readily accessible to autho-



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rized personnel or located within 2 feet of a ceiling access panel that is no higher than 11 feet above floor level.

3. Automatic daylighting controls shall be multi-level, including continuous dimming and have at least one control step that is between 50 percent to 70 percent of rated power of the controlled lighting.

### Exceptions:

1. Controlled lighting having a lighting power density less than 0.3 W/ft<sup>2</sup>.
2. When skylights are replaced or added to on an existing building with an existing general lighting system.
4. Under all daylight conditions in all areas served by the controlled lighting, the combined illuminance from the controlled lighting and daylight is not less than the illuminance from controlled lighting when no daylight is available.
5. When all areas served by the controlled lighting are receiving daylight illuminance levels greater than 150 percent of the illuminance from controlled lighting when no daylight is available, the controlled lighting power consumption shall be no greater than 35 percent of the rated power of the controlled lighting.

### A5.209.2.4 Shut-off controls.

**A5.209.2.4.1** In addition to the manual controls installed to comply with Sections A5.209.2.1 and A5.209.2.2 for every floor, all indoor lighting systems shall be equipped with separate automatic controls to shut off the lighting. These automatic controls shall meet the requirements of Section A5.209.1 and may be an occupant sensor, automatic time switch or other device capable of automatically shutting off the lighting.

### Exceptions:

1. Where the lighting system is serving an area that must be continuously lit, 24 hours per day/365 days per year.
2. Lighting in corridors, guestrooms, dwelling units of high-rise residential buildings and hotel/motels and parking garages.
3. Up to 0.3 watts per square foot of lighting in any area within a building that must be continuously illuminated for reasons of building security or emergency egress, provided that the area is designated a security or emergency egress area on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Title 24, Part 1.

**A5.209.2.4.2** If an automatic control device is installed to comply with Section A5.209.2.4.1, it shall incorporate an override switching device that:

1. Is readily accessible; and

2. Is located so that a person using the device can see the lights or the area controlled by that switch or so that the area being lit is annunciated; and
3. Is manually operated; and
4. Allows the lighting to remain on for no more than 2 hours when an override is initiated; and

**Exception:** In malls, auditoriums, single tenant retail spaces, industrial facilities and arenas, where captive-key override is utilized, override time may exceed 2 hours.

5. Controls an area enclosed by ceiling height partitions not exceeding 5,000 square feet.

**Exception:** In malls, auditoriums, single tenant retail spaces, industrial facilities, convention centers and arenas, the area controlled may not exceed 20,000 square feet.

**A5.209.2.4.3** If an automatic time switch control device is installed to comply with Section A5.209.2.4.1, it shall incorporate an automatic holiday “shut-off” feature that turns off all loads for at least 24 hours and then resumes the normally scheduled operation.

**Exception:** Retail stores and associated malls, restaurants, grocery stores, churches and theaters.

**A5.209.2.4.4** Offices 250 square feet or smaller; multi-purpose rooms of less than 1,000 square feet and classrooms and conference rooms of any size, shall be equipped with occupant sensor(s) to shut off the lighting. In addition, controls shall be provided that allow the lights to be manually shut off in accordance with Section A5.209.2.1 regardless of the sensor status.

### A5.209.3 Outdoor lighting controls and equipment.

**A5.209.3.1 Outdoor lighting.** All permanently installed outdoor luminaires employing lamps rated over 100 watts shall either have a lamp efficacy of at least 60 lumens per watt or be controlled by a motion sensor.

### Exceptions:

1. Lighting required by a health or life safety statute ordinance or regulation, including but not limited to, emergency lighting.
2. Lighting used in or around swimming pools, water features or other locations subject to Article 680 of Title 24, Part 3, *California Electrical Code*.
3. Searchlights.
4. Theme lighting for use in theme parks.
5. Lighting for film or live performances.
6. Temporary outdoor lighting.
7. Light emitting diode, light emitting capacitors, neon and cold cathode lighting.
8. Sign lighting.

**A5.209.3.2 Luminaire cutoff requirements.** All outdoor luminaires that use lamps rated greater than 175 watts in hardscape areas including parking lots, building entrances,

sales and nonsales canopies and all outdoor sales areas shall be designated Cutoff for light distribution. To comply with this requirement, the luminaire shall be rated Cutoff in a photometric test report that includes any tilt or other nonlevel mounting condition of the installed luminaire. Cutoff is a luminaire light distribution classification where the candela per 1000 lamp lumens does not numerically exceed 25 at or above a vertical angle of 90 degrees above nadir and 100 at or above a vertical angle of 80 degrees above nadir. Nadir is in the direction of straight down, as would be indicated by a plumb line. 90 degrees above nadir is horizontal. 80 degrees above nadir is 10 degrees below horizontal.

**Exceptions:**

1. Signs.
2. Lighting for building facades, public monuments, statues and vertical surfaces of bridges.
3. Lighting required by a health or life safety statute ordinance or regulation, including but not limited to, emergency lighting.
4. Temporary outdoor lighting.
5. Lighting used in or around swimming pools, water features or other locations subject to Article 680 of the *California Electrical Code*.
6. Replacement of existing pole mounted luminaires in hardscape areas meeting all of the following conditions:
  1. Where the existing luminaire does not meet the luminaire cutoff requirements in A5.209.3.2; and
  2. Spacing between existing poles is greater than 6 times the mounting height of the existing luminaires; and
  3. Where no additional poles are being added to the site; and
  4. Where new wiring to the luminaires is not being installed; and
  5. Provided that the connected lighting power wattage is not increased.

**A5.209.3.3 Controls for outdoor lighting.**

**A5.209.3.3.1** All permanently installed outdoor lighting shall be controlled by a photocontrol or astronomical time switch that automatically turns off the outdoor lighting when daylight is available.

**Exception:** Lighting in tunnels and large covered areas that require illumination during daylight hours.

**A5.209.3.3.2** For lighting of building facades, parking lots, sales and nonsales canopies, all outdoor sales areas and student pick-up/drop-off zones where two or more luminaires are used, an automatic time switch shall be installed that is capable of (1) turning off the lighting when not needed and (2) reducing the lighting power (in watts) by at least 50 percent but not exceeding 80 percent or providing continuous dimming through a range that includes 50 percent through 80 percent

reduction. This control shall meet the requirements of Section A5.209.1.3.

**Exceptions:**

1. Lighting required by a health or life safety statute ordinance or regulation, including but not limited to, emergency lighting.
2. Lighting for steps or stairs that require illumination during daylight hours.
3. Lighting that is controlled by a motion sensor and photocontrol.
4. Lighting for facilities that have equal lighting requirements at all hours and are designed to operate continuously.
5. Temporary outdoor lighting.
6. Signs.

**A5.209.4 Outdoor lighting.** This section applies to all outdoor lighting, whether attached to buildings, poles, structures or self-supporting, including but not limited to, hardscape areas including parking lots, lighting for building entrances, sales and nonsales canopies; lighting for all outdoor sales areas; and lighting for building facades.

**Exceptions:** When more than 50 percent of the light from a luminaire falls on one or more of the following applications, the lighting power for that luminaire shall be exempt from Section A5.209.4.2.

1. Temporary outdoor lighting.
2. Lighting required and regulated by the Federal Aviation Administration and the Coast Guard.
3. Lighting for public streets, roadways, highways and traffic signage lighting, including lighting for driveway entrances occurring in the public right-of-way.
4. Lighting for sports and athletic fields and children's playground.
5. Lighting for industrial sites, including but not limited to, rail yards, maritime shipyards and docks, piers and marinas, chemical and petroleum processing plants and aviation facilities.
6. Lighting specifically for automated teller machines as required by *California Financial Code* Section 13040 or required by law through a local ordinance.
7. Lighting of public monuments.
8. Signs shall meet the requirements of Section A5.209.5.
9. Lighting used in or around swimming pools, water features or other locations subject to Article 680 of Title 24, Part 3, *California Electrical Code*.
10. Lighting of tunnels, bridges, stairs, wheelchair elevator lifts for American with Disabilities Act (ADA) compliance and ramps that are other than parking garage ramps.
11. Landscape lighting.

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12. In theme parks: outdoor lighting for themes and special effects.
13. Lighting for outdoor theatrical and other outdoor live performances, provided that these lighting systems are additions to area lighting systems and are controlled by a multiscene or theatrical cross-fade control station accessible only to authorized operators.
14. Outdoor lighting systems for qualified historic buildings, as defined in Title 24, Part 8, *California Historic Building Code*, if they consist solely of historic lighting components or replicas of historic lighting components. If lighting systems for qualified historic buildings contain some historic lighting components or replicas of historic components, combined with other lighting components, only those historic or historic replica components are exempt. All other outdoor lighting systems for qualified historic buildings shall comply with Section A5.209.4.

**A5.209.4.1 Outdoor lighting power trade-offs.** Outdoor lighting power trade-offs shall be determined as follows:

1. Allowed lighting power determined according to Section A5.209.4.4.1 for general hardscape lighting allowance may be traded to specific applications in Section A5.209.4.4.2, provided the hardscape area from which the lighting power is traded continues to be illuminated in accordance with Section A5.209.4.4.1.1.
2. Allowed lighting power determined according to Section A5.209.4.4.2 for additional lighting power allowances for specific applications shall not be traded between specific applications or to hardscape lighting in Section A5.209.4.4.1.
3. Allowed lighting power determined according to Section A5.209.4.4.3 for additional lighting power allowances for local ordinance shall not be traded to specific applications in Section A5.209.4.4.2 or to hardscape areas not covered by the local ordinance.
4. Trading off lighting power allowances between outdoor and indoor areas shall not be permitted.

**A5.209.4.2 Outdoor lighting power.** An outdoor lighting installation complies with this section if the actual outdoor lighting power installed is no greater than the allowed outdoor lighting power calculated under Section A5.209.4.4. The allowed outdoor lighting shall be calculated by Lighting Zone as defined in Section 10-114 of Title 24, Part 1. Local governments may amend lighting zones in compliance with Section 10-114 of Title 24, Part 1.

**A5.209.4.3 Calculation of actual lighting power.** The wattage of outdoor luminaires shall be determined in accordance with Section 130(d) of Title 24, Part 6.

**A5.209.4.4 Calculation of allowed lighting power.** The allowed lighting power shall be the combined total of the sum of the general hardscape lighting allowance determined in accordance with Section A5.209.4.4.1, the sum of the additional lighting power allowance for specific

applications determined in accordance with Section A5.209.4.4.2 and the sum of the additional lighting power allowances for local ordinance determined in accordance with Section A5.209.4.4.3.

**A5.209.4.4.1 General hardscape lighting allowance.** Determine the general hardscape lighting power allowances as follows:

**A5.209.4.4.1.1** The general hardscape area of a site shall include parking lot(s), roadway(s), driveway(s), sidewalk(s), walkway(s), bikeway(s), plaza(s) and other improved area(s) that are illuminated. In plan view of the site, determine the illuminated hardscape area, which is defined as any hardscape area that is within a square pattern around each luminaire or pole that is ten times the luminaire mounting height with the luminaire in the middle of the pattern, less any areas that are within a building, beyond the hardscape area, beyond property lines or obstructed by a structure. The illuminated hardscape area shall include portions of planters and landscaped areas that are within the lighting application and are less than or equal to 10 feet wide in the short dimensions and are enclosed by hardscape or other improvement on at least three sides. Multiply the illuminated hardscape area by the Area Wattage Allowance (AWA) from Table A5.209.4-A for the appropriate Lighting Zone.

**A5.209.4.4.1.2** Determine the perimeter length of the general hardscape area. The total perimeter shall not include portions of hardscape that is not illuminated according to Section A5.209.4.4.1.1. Multiply the hardscape perimeter by the Linear Wattage Allowance (LWA) for hardscape from Table A5.209.4-A for the appropriate lighting zone. The perimeter length for hardscape around landscaped areas and permanent planters shall be determined as follows:

1. Landscaped areas completely enclosed within the hardscape area and which have width or length less than 10 feet wide, shall not be added to the hardscape perimeter length.
2. Landscaped areas completely enclosed within the hardscape area and which width or length are a minimum of 10 feet wide, the perimeter of the landscaped areas or permanent planter shall be added to the hardscape perimeter length.
3. Landscaped edges that are not abutting the hardscape shall not be added to the hardscape perimeter length.

**A5.209.4.4.1.3** Determine the Initial Wattage Allowance (IWA) for general hardscape lighting from Table A.209.4-A for the appropriate lighting zone. The hardscape area shall be permitted one IWA per site.

**A5.209.4.4.1.4** The general hardscape lighting allowance shall be the sum of the allowed watts determined

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from Sections A5.209.4.4.1.1, A5.209.4.4.1.2 and A5.209.4.4.1.3 above.

**A5.209.4.4.2 Additional lighting power allowance for specific applications.** Additional lighting power for specific applications shall be the smaller of the additional lighting allowances for specific applications determined in accordance with Table A5.209.4-B for the appropriate lighting zone or the actual installed lighting power meeting the requirements for the allowance.

**A5.209.4.4.3 Additional lighting power allowance for local ordinance requirements.** For hardscape areas, including parking lots, site roadways, driveways, sidewalks, walkways or bikeways, when specific light levels are required by law through a local ordinance and provided the local ordinance meets Section 10-114 of Title 24, Part 1, additional lighting power for those hardscape areas covered by the local ordinance requirement shall be the smaller of the additional lighting allowances for local ordinance determined from Table A5.209.4-C for the appropriate lighting zone or the actual installed lighting power meeting the requirements for the allowance.

**A5.209.5 Signs.** This section applies to all internally illuminated and externally illuminated signs, unfiltered light emitting diodes (LEDs) and unfiltered neon, both indoor and outdoor. Each sign shall comply with either Subsection A5.209.5.1 or A5.209.5.2, as applicable.

**A5.209.5.1 Maximum allowed lighting power.**

**A5.209.5.1.1** For internally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 12 watts per square foot. For double-faced signs, only the area of a single face shall be used to determine the allowed lighting power.

**A5.209.5.1.2** For externally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 2.3 watts per square foot. Only areas of an externally lighted sign that are illuminated without obstruction or interference, by one or more luminaires, shall be used.

**TABLE A5.209.4-A  
GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE**

TYPE OF POWER ALLOWANCE	LIGHTING ZONE 1	LIGHTING ZONE 2	LIGHTING ZONE 3	LIGHTING ZONE 4
Area wattage allowance (AWA)	0.036 W/ft <sup>2</sup>	0.045 W/ft <sup>2</sup>	0.092 W/ft <sup>2</sup>	0.115 W/ft <sup>2</sup>
Linear wattage allowance (LWA)	0.36 W/lf	0.45 W/lf	0.92 W/lf	1.15 W/lf
Initial wattage allowance (IWA)	340 W	510 W	770 W	1030 W



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**TABLE A5.209.4-B**  
**ADDITIONAL LIGHTING POWER ALLOWANCE FOR SPECIFIC APPLICATIONS**  
 All area and distance measurements in plan view unless otherwise noted.

	LIGHTING APPLICATION	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
<b>WATTAGE ALLOWANCE PER APPLICATION. Use all that apply as appropriate.</b>					
	<b>Building entrances or exits.</b> Allowance per door. Luminaires qualifying for this allowance shall be within 20 feet of the door.	30 watts	75 watts	100 watts	120 watts
	<b>Primary entrances to senior care facilities, police stations, hospitals, fire stations and emergency vehicle facilities.</b> Allowance per primary entrance(s) only. Primary entrances shall provide access for the general public and shall not be used exclusively for staff or service personnel. This allowance shall be in addition to the building entrance or exit allowance above. Luminaires qualifying for this allowance shall be within 100 feet of the primary entrance.	45 watts	80 watts	120 watts	130 watts
	<b>Drive up windows.</b> Allowance per customer service location. Luminaires qualifying for this allowance shall be within two mounting heights of the sill of the window.	40 watts	75 watts	125 watts	200 watts
	<b>Vehicle service station uncovered fuel dispenser.</b> Allowance per fueling dispenser. Luminaires qualifying for this allowance shall be within two mounting heights of the dispenser.	120 watts	175 watts	185 watts	330 watts
<b>WATTAGE ALLOWANCE PER UNIT LENGTH (w/linear ft). May be used for one or two frontage side(s) per site.</b>					
	<b>Outdoor sales frontage.</b> Allowance for frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. Luminaires qualifying for this allowance shall be located between the principal viewing location and the frontage outdoor sales area.	No allowance	22.5 w/linear ft	36 w/linear ft	45 w/linear ft
<b>WATTAGE ALLOWANCE PER HARDSCAPE AREA (W/ft²). May be used for any illuminated hardscape area on the site.</b>					
	<b>Hardscape ornamental lighting.</b> Allowance for the total site illuminated hardscape area. Luminaires qualifying for this allowance shall be rated for 100 watts or less as determined in accordance with Section 130(d) and shall be post-top luminaires, lanterns, pendant luminaires or chandeliers.	No allowance	0.02 w/ft²	0.04 w/ft²	0.06 w/ft²
<b>WATTAGE ALLOWANCE PER SPECIFIC AREA (W/ft²). Use as appropriate provided that none of the following specific applications shall be used for the same area.</b>					
	<b>Building facades.</b> Only areas of building façade that are illuminated shall qualify for this allowance. Luminaires qualifying for this allowance shall be aimed at the façade and shall be capable of illuminating it without obstruction or interference by permanent building features or other objects.	No allowance	0.18 w/ft²	0.35 w/ft²	0.50 w/ft²
	<b>Outdoor sales lots.</b> Allowance for uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale. Driveways, parking lots or other nonsales areas shall be considered hardscape areas even if these areas are completely surrounded by sales lot on all sides. Luminaires qualifying for this allowance shall be within five mounting heights of the sales lot area.	0.164 w/ft²	0.555 w/ft²	0.758 w/ft²	1.285 w/ft²
	<b>Vehicle service station hardscape.</b> Allowance for the total illuminated hardscape area less area of buildings, under canopies, off property or obstructed by signs or structures. Luminaires qualifying for this allowance shall be illuminating the hardscape area and shall not be within a building, below a canopy, beyond property lines or obstructed by a sign or other structure.	0.014 w/ft²	0.155 w/ft²	0.308 w/ft²	0.485 w/ft²
	<b>Vehicle service station canopies.</b> Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.514 w/ft²	1.005 w/ft²	1.358 w/ft²	2.285 w/ft²
	<b>Sales canopies allowance for the total area within the drip line of the canopy.</b> Luminaires qualifying for this allowance shall be located under the canopy.	No allowance	0.655 w/ft²	0.908 w/ft²	1.135 w/ft²
	<b>Nonsales canopies.</b> Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.084 w/ft²	0.205 w/ft²	0.408 w/ft²	0.585 w/ft²
	<b>Guard stations.</b> Allowance up to 1,000 square feet per vehicle lane. Guard stations provide access to secure areas controlled by security personnel who stop and may inspect vehicles and vehicle occupants, including identification, documentation, vehicle license plates and vehicle contents. Qualifying luminaires shall be within two mounting heights of a vehicle lane or the guardhouse.	0.154 w/ft²	0.355 w/ft²	0.708 w/ft²	0.985 w/ft²
	<b>Student pick-up/drop-off zone.</b> Allowance for the area of the student pick-up/drop-off zone, with or without canopy, for preschool through 12th grade school campuses. A student pick-up/drop off zone is a curbside, controlled traffic area on a school campus where students are picked up and dropped off from vehicles. The allowed area shall be the smaller of the actual width or 25 feet, times the smaller of the actual length or 250 feet. Qualifying luminaires shall be within two mounting heights of the student pick-up/drop-off zone.	No allowance	0.12 w/ft²	0.45 w/ft²	No allowance
	<b>Outdoor dining.</b> Allowance for the total illuminated hardscape of outdoor dining. Outdoor dining areas are hardscape areas used to serve and consume food and beverages. Qualifying luminaires shall be within 2 mounting heights of the hardscape area of outdoor dining.	0.014 w/ft²	0.135 w/ft²	0.258 w/ft²	0.435 w/ft²
	<b>Special security lighting for retail parking and pedestrian hardscape.</b> This additional allowance is for illuminated retail parking and pedestrian hardscape identified as having special security needs. This allowance shall be in addition to the building entrance or exit allowance.	0.007 w/ft²	0.009 w/ft²	0.019 w/ft²	No allowance

**TABLE A5.209.4-C  
ADDITIONAL LIGHTING POWER ALLOWANCE FOR ORDINANCE REQUIREMENTS**

ADDITIONAL LIGHTING POWER ALLOWANCE (W/ft <sup>2</sup> ) WHEN AVERAGE LIGHT LEVELS ARE REQUIRED BY LOCAL ORDINANCE.				
Required (horizontal foot-candles, AVERAGE)	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
0.5	0	0	0	0
1.0	0.004	0	0	0
1.5	0.024	0.015	0	0
2.0	0.044	0.035	0	0
3.0	0.084	0.075	0.028	0.005
4.0 or greater	0.124	0.115	0.068	0.045
ADDITIONAL LIGHTING POWER ALLOWANCE (W/ft <sup>2</sup> ) WHEN MINIMUM LIGHT LEVELS ARE REQUIRED BY LOCAL ORDINANCE.				
Required (horizontal foot-candles, MINIMUM)	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
0.5	0.044	0	0	0
1.0	0.124	0.035	0	0
1.5	0.164	0.115	0.068	0.045
2.0	0.164	0.155	0.108	0.085
3.0	0.164	0.155	0.108	0.085
4.0 or greater	0.164	0.155	0.108	0.085

**A5.209.5.2 Alternate lighting sources.** The sign shall comply if it is equipped only with one or more of the following light sources:

**A5.209.5.2.1** High pressure sodium lamps; or

**A5.209.5.2.2** Metal halide lamps that are:

1. Pulse start or ceramic served by a ballast that has a minimum efficiency of 88 percent or greater or
2. Pulse start that are 320 watts or smaller, are not 250 watt or 175 watt lamps and are served by a ballast that has a minimum efficiency of 80 percent.

Where ballast efficiency is the measured output wattage to the lamp divided by the measured operating input wattage when tested according to ANSI C82.6-2005; or

**A5.209.5.2.3** Neon or cold cathode lamps with transformer or power supply efficiency greater than or equal to the following:

1. A minimum efficiency of 75 percent when the transformer or power supply rated output current is less than 50 mA; or
2. A minimum efficiency of 68 percent when the transformer or power supply rated output current is 50 mA or greater.

Where the ratio of the output wattage to the input wattage is at 100-percent tubing load; or

**A5.209.5.2.4** Fluorescent lamps with a minimum color rendering index (CRI) of 80; or

**A5.209.5.2.5** Light emitting diodes (LEDs) with a power supply having an efficiency of 80 percent or greater; or

**Exception:** Single voltage external power supplies that are designed to convert 120 volt AC input into lower voltage DC or AC output and have a nameplate output power less than or equal to 250 watts, shall comply with the applicable requirements of the *Appliance Efficiency Regulations*, Title 20.

**A5.209.5.2.6** Compact fluorescent lamps that do not contain medium screw base sockets (E24/E26); or

**A5.209.5.2.7** Electronic ballasts with a fundamental output frequency not less than 20 kHz;

**Exception 1 to Section A5.209.5:** Unfiltered incandescent lamps that are not part of an electronic message center (EMC), an internally illuminated sign or an externally illuminated sign.

**Exception 2 to Section A5.209.5:** Exit signs. Exit signs shall meet the requirements of the *Appliance Efficiency Regulations*.

**Exception 3 to Section A5.209.5:** Traffic Signs. Traffic signs shall meet the requirements of the *Appliance Efficiency Regulations*.

**A5.209.6 Sign lighting controls.** All signs with permanently connected lighting shall meet the requirements below:

1. Automatic time switch control. All signs with permanently connected lighting shall be controlled with an automatic time switch control that complies with the applicable requirements of Section A5.209.1.
2. Photocontrol or outdoor astronomical time switch control. All outdoor signs shall be controlled with a photocontrol or outdoor astronomical time switch control.

**Exception:** Outdoor signs in tunnels and large covered areas that require illumination during daylight hours.



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3. Dimming. All outdoor signs shall be controlled with a dimmer that provides the ability to automatically reduce sign power by a minimum of 65 percent during nighttime hours.

### Exceptions:

1. Signs that are illuminated for less than 1 hour per day during daylight hours.
2. Outdoor signs in tunnels and large covered areas that require illumination during daylight hours.
3. Metal halide, high pressure sodium, cold cathode and neon lamps used to illuminate signs or parts of signs.
4. Demand Responsive Electronic Message Center Control. An Electronic Message Center (EMC) having a new connected lighting power load greater than 15 kW shall have a control installed that is capable of reducing the lighting power by a minimum of 30 percent when receiving a demand response signal that is sent out by the local utility.
5. EMCs required by a health or life safety statute ordinance or regulation, including but not limited to exit signs and traffic signs.

**A5.209.7 Nonresidential lighting control acceptance.** Before an occupancy permit is granted for a new building or space or a new lighting system serving a building, space or site is operated for normal use, all indoor and outdoor lighting controls serving the building, space or site shall be certified as meeting the Acceptance Requirements for Code Compliance. A Certificate of Acceptance shall be submitted to the enforcement agency under Section 10-103(a) of Title 24, Part 1, that:

1. Certifies that plans, specifications, installation certificates and operating and maintenance information meet the requirements of Title 24, Part 6.
2. Certifies that automatic daylighting controls meet the applicable requirements of Sections A5.209.1 and A5.209.2.3.2.4.
3. Certifies that when a multilevel astronomical time switch is used to meet Exception 3 to Section A5.209.2.3.2.2 all general lighting in the skylit area is controlled by a multilevel astronomical time switch that meets the applicable requirements of Section A5.209.1 and that has an override switch that meets the requirements of Section A209.2.4.2.
4. Certifies that lighting controls meet the requirements of Sections A5.209.2.1 through A5.209.2.3 and Title 24, Part 6, Sections 131(e) and (f) and 146(a)2, as applicable.
5. Certifies that automatic lighting controls meet the applicable requirements of Sections A5.209.1 and A5.209.2.4.
6. Certifies that occupant-sensors meet the applicable requirements of Sections A5.209.1 and A5.209.2.4.
7. Certified that outdoor lighting controls meet the applicable requirements of Sections A5.209.1 and A5.209.3.

## SECTION A5.210 [OSHPD 1, 2 & 4] APPLIANCES

**A5.210.1 Appliances regulated by the *Appliance Efficiency Regulations*.** Any appliance for which there is a California standard established in the *Appliance Efficiency Regulations* may be installed only if the manufacturer has certified to the Commission, as specified in those regulations, that the appliance complies with the applicable standard for that appliance.

**Note:** For certified appliances, go to [www.energy.ca.gov/appliances/database/](http://www.energy.ca.gov/appliances/database/).

## Division A5.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

### SECTION A5.401 GENERAL

**A5.401.1 Scope.** The provisions of this chapter shall outline means of achieving material conservation and resource efficiency through reuse of existing building stock and materials; use of recycled, regional, rapidly renewable and certified wood materials; and employment of techniques to reduce pollution through recycling of materials.

### SECTION A5.407 [OSHPD 1, 2 & 4] WATER RESISTANCE AND MOISTURE MANAGEMENT

**A5.407.3 Weather protection.** Provide a weather-resistant exterior wall and foundation envelope as required by *California Building Code* Section 1403.2 and *California Energy Code* Section 150, manufacturer's installation instructions or local ordinance, whichever is more stringent.

**A5.407.4 Moisture control.** Employ moisture control measures by the following methods.

**A5.407.4.1 Sprinklers.** Design and maintain landscape irrigation systems to prevent spray on structures.

**A5.407.4.2 Entries and openings.** Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings.

#### Notes:

1. Use features such as overhangs and recesses and flashings integrated with a drainage plane.
2. Use nonabsorbent floor and wall finishes within at least two feet around and perpendicular to such openings.

### SECTION A5.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

**A5.408.5 Construction waste diversion. [OSHPD 1, 2 & 4]** Establish a construction waste management plan for the diverted materials or meet local construction and demolition waste management ordinance, whichever is more stringent.

**A5.408.6 Construction waste reduction of at least 50 percent. [OSHPD 1, 2 & 4]** Recycle and/or salvage for reuse a

minimum of 50 percent of the nonhazardous construction and demolition debris or meet a local construction and demolition waste management ordinance, whichever is more stringent. Calculate the amount of materials diverted by weight or volume, but not by both.

**Exceptions:**

1. Excavated soil and land-clearing debris.
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.

**A5.408.7 Excavated soil and land clearing debris.** [OSHPD 1, 2 & 4] 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed.

## SECTION A5.410

### BUILDING MAINTENANCE AND OPERATION

**A5.410.6 Recycling by occupants.** [OSHPD 1, 2 & 4] Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of nonhazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals.

## Division A5.5 – ENVIRONMENTAL QUALITY

### SECTION A5.504 POLLUTANT CONTROL

**A5.504.4.5.1 No-added formaldehyde.** Use composite wood products approved by the California Air Resources Board (ARB) as no-added formaldehyde (NAF) based resins or ultra-low-emitting formaldehyde (ULEF) resins.

**Notes:**

1. See Title 17, Section 93120.3(c) and (d), respectively.
2. Documentation must be provided verifying that materials are certified to meet the pollutant emission limits. A list of manufacturers and their NAF and ULEF certified materials is provided at [http://www.arb.ca.gov/toxics/compwood/naf\\_ulef/listofnaf\\_ulef.htm](http://www.arb.ca.gov/toxics/compwood/naf_ulef/listofnaf_ulef.htm).

**A5.504.4.9 Acoustical ceilings and wall panels.** Comply with Chapter 8 in Title 24, Part 2, the *California Building Code* and with the VOC-emission limits defined in the 2009 CHPS criteria and listed on its High Performance Products Database.

**A5.504.4.9.1 Verification of compliance.** Documentation shall be provided verifying that acoustical finish materials meet the pollutant emission limits.

**Note:** Products compliant with CHPS criteria certified under the Greenguard Children & Schools program may also be used.

**Note:** [OSHPD 1, 2 & 4] Documentation shall be provided that verifies that finish materials are certified to meet the pollutant emission limits.

**A5.504.5 Hazardous particulates and chemical pollutants.** Minimize and control pollutant entry into buildings and cross-contamination of regularly occupied areas.

**A5.504.5.1 Entryway systems.** Install permanent entryway systems measuring at least six feet in the primary direction of travel to capture dirt and particulates at entryways directly connected to the outdoors.

1. Qualifying entryways are those that serve as regular entry points for building users.
2. Acceptable entryway systems include, but are not limited to, permanently installed grates, grilles or slotted systems that allow cleaning underneath.
3. Roll-out mats are acceptable only when maintained regularly by janitorial contractors as documented in service contract or by in-house staff as documented by written policies and procedures.

**A5.504.8 Finish material pollutant control.** [OSHPD 1, 2 & 4] Finish materials shall comply with Sections A5.504.4.1 through A5.504.4.5.

**A5.504.8.1 Adhesives, sealants and caulks.** Adhesives, sealants and caulks used on the project shall meet the requirements of the following standards:

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits, as shown in Tables A5.504.8.1 and A5.504.8.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in Subsection 2, below.
2. Aerosol adhesives and smaller unit sizes of adhesives and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

**Note:** Title 17 may be found at <http://ccr.oal.ca.gov/>.

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A5.504.8.1**  
**ADHESIVE VOC LIMIT<sup>1,2</sup>**

Less Water and Less Exempt Compounds in Grams per Liter

ARCHITECTURAL APPLICATIONS	CURRENT VOC LIMIT
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
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250
Other adhesive not specifically listed	50
<b>SPECIALTY APPLICATIONS</b>	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special purpose contact adhesive	250
Structural wood member adhesive	140
Top and trim adhesive	250
<b>SUBSTRATE SPECIFIC APPLICATIONS</b>	
Metal to metal	30
Plastic foams	50
Porous material (except wood)	50
Wood	30
Fiberglass	80

1. If an adhesive is used to bond dissimilar substrates together the adhesive with the highest VOC content shall be allowed.
2. For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1168, <http://www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF>.

**A5.504.8.3 Paints and coatings.** Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table A5.504.8.3, unless local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table A5.504.8.3, shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure and the corresponding Flat, Nonflat or Nonflat-High Gloss VOC limit in Table A5.504.8.3 shall apply.

**TABLE A5.504.8.2**  
**SEALANT VOC LIMIT**

Less Water and Less Exempt Compounds in Grams per Liter

SEALANTS	CURRENT VOC LIMIT
Architectural	250
Marine deck	760
Nonmembrane roof	300
Roadway	250
Single-ply roof membrane	450
Other	420
<b>SEALANT PRIMERS</b>	
Architectural Nonporous Porous	250 775
Modified bituminous	500
Marine deck	760
Other	750

**Note:** For additional information regarding methods to measure the VOC content specified in these tables, see South Coast Air Quality Management District Rule 1168: <http://www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF>.

**A5.504.8.3.1 Aerosol paints and coatings.** Aerosol paints and coatings shall meet the Product-Weighted MIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

**A5.504.8.3.2 Verification.** Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

1. Manufacturers product specification.
2. Field verification of on-site product containers.

**A5.504.8.4 Carpet systems.** All carpet installed in the building interior shall meet the testing and product requirements of one of the following:

1. Carpet and Rug Institute's Green Label Plus Program.
2. California Department of Public Health Standard Practice for the testing of VOCs (Specification 01350).
3. NSF/ANSI 140 at the Gold level.
4. Scientific Certifications Systems Sustainable Choice.

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**TABLE A5.504.8.3**  
**VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS<sup>2, 3</sup>**  
 Grams of VOC Per Liter of Coating,  
 Less Water and Less Exempt Compounds

COATING CATEGORY	EFFECTIVE 1/1/2010	EFFECTIVE 1/1/2012
Flat coatings	50	
Nonflat coatings	100	
Nonflat-high gloss coatings	150	
<b>Specialty coatings</b>		
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 <sup>1</sup>	120	
Magnesite cement coatings	450	
Mastic texture coatings	100	
Metallic pigmented coatings	500	
Multicolor 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	
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	

1. Grams of VOC Per liter of coating, including water and including exempt compounds.
2. The specified limits remain in effect unless revised limits are listed in subsequent columns in the table.
3. Values in this table are derived from those specified by the California Air Resources Board, Architectural Coatings Suggested Control Measure, February 1, 2008. More information is available at Air Resources Board.

**A5.504.8.4.1 Carpet cushion.** All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.

**A5.504.8.4.2 Carpet adhesive.** All carpet adhesive shall meet the requirements of Table A5.504.8.1.

**A5.504.8.5 Composite wood products.** Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure for Composite Wood (17 CCR 93120 et seq.), by or before the dates specified in those sections, as shown in Table A5.504.8.5

**TABLE A5.504.8.5**  
**FORMALDEHYDE LIMITS<sup>1</sup>**

Product	Current Limit	Jan 1, 2012	July 1, 2012
Hardwood plywood veneer core	0.05		
Hardwood plywood composite core	0.08		0.05
Particle board	0.09		
Medium density fiberboard	0.11		
Thin medium density fiberboard <sup>2</sup>	0.21	.13	

1. Values in this table are derived from those specified by the California Air Resources Board, Air Toxics Control Measure for Composite Wood as tested in accordance with ASTM E1333-96 (2002). For additional information, see *California Code of Regulations*, Title 17, Sections 93120 through 93120.12.
2. Thin medium density fiberboard has a maximum thickness of eight millimeters.

**A5.504.8.5.2 Documentation.** Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

1. Product certifications and specifications.
2. Chain of custody certifications.
3. Other methods acceptable to the enforcing agency.

**A5.504.9 Environmental tobacco smoke (ETS) control.** [OSHPD 1, 2 & 4] Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building, if not already prohibited by other laws or regulations, or as enforced by ordinances, regulations or policies of any city, county, city and county, California Community College, campus of the California State University or campus of the University of California, whichever are more stringent. When ordinances, regulations or policies are not in place, post signage to inform building occupants of the prohibitions.

## **SECTION A5.505 [OSHPD 1, 2 & 4]** **INDOOR MOISTURE CONTROL**

**A5.505.2 Indoor moisture control.** Buildings shall meet or exceed the provisions of *California Building Code*, CCR, Title 24, Part 2, Sections 1203 and Chapter 14.



## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**NONRESIDENTIAL OCCUPANCIES**  
**APPLICATION CHECKLIST [OSHPD 1, 2 and 4]**

FEATURE OR MEASURE	COMPLIANCE LEVELS			NOTES
	Mandatory CALGreen	VOLUNTARY CALGreen		
		Tier 1	Tier 2	
DIVISION A5.1 – PLANNING AND DESIGN				
SECTION Site Development				
A5.106.9 Building orientation. Locate and orient the building as follows: 1. When site and location permit, orient the building with the long sides facing north and south. 2. Protect the building from thermal loss, drafts and degradation of the building envelope caused by wind and wind-driven materials such as dust.		<input type="checkbox"/>	<input type="checkbox"/>	
DIVISION A5.2 – ENERGY EFFICIENCY				
SECTION A5.203 Performance Measures				
A5.203.1 Energy performance. [OSHPD 1] A5.203.1.1 CALGreen Tier 1. [OSHPD 1] Buildings must comply with the latest edition of “Savings By Design, Healthcare Modeling Procedures.” A5.203.1.2 CALGreen Tier 2. [OSHPD 1] Buildings must exceed the latest edition of “Savings By Design, Healthcare Modeling Procedures” by 15 percent.		<input type="checkbox"/>	<input type="checkbox"/>	
SECTION A5.204 Prescriptive Measures				
A5.204.1 ENERGY STAR equipment and appliances. All equipment and appliances provided by the builder shall be ENERGY STAR labeled if ENERGY STAR is applicable to that equipment or appliance.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.204.4 Commissioning. Building commissioning for all building systems covered by T24, Part 6, process systems and renewable energy systems shall be included in the design and construction processes of the building project. Commissioning requirements shall include as a minimum items listed in Section A5.204.4. A5.204.4.1 Owner’s Project Requirements (OPR). Documented before the design phase of the project begins the OPR shall include items listed in Section A5.204.4. A5.204.4.2 Basis of Design (BOD). A written explanation of how the design of the building systems meets the OPR shall be completed at the design phase of the building project and updated periodically to cover the systems listed in Section A5.204.4.2. A5.204.4.3 Commissioning plan. A commissioning plan describing how the project will be commissioned shall be started during the design phase of the building project and shall include as a minimum items listed in Section A5.204.4.3. A5.204.4.4 Functional performance testing shall demonstrate the correct installation and operation of each component, system and system-to-system interface in accordance with the approved plans and specifications. A5.204.4.5 Post construction documentation and training. A systems manual and systems operations training are required. A5.204.4.5.1 Systems manual. The systems manual shall be delivered to the building owner and facilities operator and shall include the items listed in Section A5.204.4.5.1. A5.204.4.5.2 Systems operations training. The training of the appropriate maintenance staff for each equipment type and/or system shall include as a minimum items listed in Section A5.204.4.5.2. A5.204.4.6 Commissioning report. A complete report of commissioning process activities undertaken through the design, construction and postconstruction phases of the building project shall be completed and provided to the owner.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.204.6 Building orientation and shading. Locate orient and shade the building as required in Section A5.106.11.		<input type="checkbox"/>	<input type="checkbox"/>	
SECTION A5.205 Building Envelope				
A5.205.1 Fenestration products and exterior doors. A5.205.1.1 Certification of fenestration products and exterior door other than field-fabricated.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.205.1.2 Installation of field-fabricated fenestration and exterior doors.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.205.2 Joints and other openings.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.205.3 Installation and roofing products.		<input type="checkbox"/>	<input type="checkbox"/>	

continued

## APPENDIX A6.1 – VOLUNTARY STANDARDS FOR HEALTH FACILITIES [OSHPD 1, 2 &amp; 4]

**NONRESIDENTIAL OCCUPANCIES**  
**APPLICATION CHECKLIST [OSHPD 1, 2 and 4]**

FEATURE OR MEASURE	COMPLIANCE LEVELS			NOTES
	Mandatory CALGreen	VOLUNTARY CALGreen		
		Tier 1	Tier 2	
SECTION A5.207 HVAC Design, Equipment and Installation				
A5.207.1 Space-conditioning equipment certification by manufacturers.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.1.1 Efficiency.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.1.2 Controls for heat pumps with supplementary electric resistance heaters.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.1.3 Thermostats.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.1.4 Gas-and oil-fired furnace standby loss controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2 Space conditioning systems.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.1 Supply air temperature reset controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.2 Electric resistance heating.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.3 Heat rejection systems.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.4 Hydronic system measures.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.5 Air distribution system duct leakage sealing.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.6 Variable air volume control for single zone systems.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.3 Service water-heating systems and equipment.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.3.1 Certification by manufacturers.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.3.2 Efficiency.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.3.3 Installation.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.4 Natural gas central furnaces, cooking equipment and pool and spa heaters. Pilot lights prohibited.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.5 Controls for space-conditioning systems.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.5.1 Thermostatic controls for each zone.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.5.2 Criteria for zonal thermostatic controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.5.3 Heat pump controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.5.4 Dampers for air supply and exhaust equipment.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.5.5 Automatic demand shed controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.6 Pipe insulation.		<input type="checkbox"/>	<input type="checkbox"/>	
SECTION A5.209 Lighting				
A5.209.1 Lighting control devices, ballasts and luminaires.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.1.1 All devices: Instructions and calibration.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.1.2 Indicator lights.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.1.3 Automatic time switch control devices.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.1.4 Occupant sensors, motion sensors and vacancy sensors.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.1.5 Multilevel occupant sensor.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.1.6 Automatic daylighting control devices.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.1.7 Interior Photosensors.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.1.8 Multilevel astronomical time-switch controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.1.9 Outdoor astromomical time-switch controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.1.10 Dimmers.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.2 Indoor lighting controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.2.1 Area controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.2.2 Multilevel lighting controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.2.3 Daylight areas.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.2.3.1 Daylight area.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.2.3.1.2 Daylight area, primary sidelit.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.2.3.1.3 Daylight area, secondary sidelit.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.2.3.1.4 Daylight area, skylit.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.2.3.2 Controls for luminaires providing general lighting that are in or are partially in the skylit daylight area and or the primary sidelit daylight area.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.2.4 Shut-off controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.3 Outdoor lighting controls and equipment.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.3.1 Outdoor lighting.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.3.2 Luminaire cutoff requirements.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.3.3 Controls for outdoor lighting.		<input type="checkbox"/>	<input type="checkbox"/>	

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## HISTORY NOTE APPENDIX

### California Green Building Standards Code Title 24, Part 11, California Code of Regulations (CCR)

For prior history, see the History Note Appendix to the *California Green Building Standards Code*, 2016 Edition, effective January 1, 2017.

1. (BSC 06/18, HCD 06/18, DSA-SS 07/18, CEC 01/18)  
Repeal, amend and add provisions in the 2019 *California Green Building Standards Code* for residential, nonresidential and public school buildings. Effective on January 1, 2020.





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