



December 16, 2009

California Building Standards Commission
2525 Natomas Park Dr., Suite 130
Sacramento, CA 95833
ATT: Dave Walls, Executive Director

RE: BSC 15 Day Comment

Dear Commissioners:

I am writing on behalf of the California Building Officials (CALBO) Green Building Committee.

CALBO is a nonprofit professional association of city and county building departments. It is dedicated to promoting public health and safety in building construction through responsible legislation, education and building code development. Our members are responsible for the technical plan review and inspection of over 95% of all structures built within the State of California.

CALBO's members have a strong commitment to protecting our environment, while building a sustainable California. We also believe that when it comes to building standards, "green" or otherwise, that California is best served when building standards are written in code language that is clear, unambiguous and clearly enforceable.

We have previously provided comment which is attached for your review. Included in this correspondence is a commentary and suggested revisions to Chapter 5.

In our previous comment, we suggested that the chapter be held over for further study, giving time for agencies and stakeholders to address the nine point criteria and resolve issues related to the incorporation of these provisions into the state building code.

Much of the language is derived from national or regional programs developed for new commercial office buildings and intended for a building owner's use or represents an organization's best practices.

When these provisions are incorporated into a building code, they become mandatory provisions that must be enforced by the local building department. Before a structure is approved for occupancy or issued a certificate of occupancy, all of the code requirements must be satisfied.

A violation of the code is a violation of law and subject to penalties, revocation of the building's certificate of occupancy, and depending on the jurisdiction, not complying with the code is typically a misdemeanor or an infraction. In some instances, a leasee may withhold rent or terminate their lease for violations of the building code.

With the above in mind, we offered suggestions on the 45-day language and to the December 1, 2009 15-day language. We believe that the suggested amendments will make the code enforceable, not unnecessarily ambiguous or vague and that the cost to the public is reasonable based on the overall benefit to be derived from the proposed building standards.

Thank you for your time and consideration on this matter. The CALBO Green Building Committee and the membership believes this to be a great step forward to a more sustainable California and we look forward to working together to achieve that goal.

Sincerely,

William R. Schock LEED AP, CGBP
Chair, CALBO Green Building Committee

PRESIDENT

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CITY OF LIVERMORE

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CITY OF VACAVILLE

504.4 5.410.2 Commissioning. ~~For new office, retail and institutional buildings greater than buildings 10,000 50,000 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 project requirements. Commissioning shall be performed in accordance with this section by personnel trained and certified in commissioning by a nationally recognized organization. Commissioning requirements shall include as a minimum:~~

1. Owner's Project Requirements.
2. Basis of Design.
3. Commissioning measures shown in the construction documents.
4. Commissioning Plan.
5. Functional Performance Testing.
6. Post Construction Documentation & Training.
7. Commissioning Report.

All building systems and components covered by Title 24, Part 6, as well as process equipment and controls, and renewable energy systems shall be included in the scope of the Commissioning Requirements.

504.4.1 5.410.2.1 Owner's Project Requirements (OPR). ~~The expectations and requirements of the building shall be documented before the design phase of the project begins. At a minimum, t 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.

504.4.2 5.410.2.2 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. At a minimum, t 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.
5. Landscape Irrigation Systems.
6. Water Reuse Systems.

504.4.3 5.410.2.3 Commissioning plan. ~~Prior to permit issuance, a 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. 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, a. Functions to be tested, d. Conditions under which the test shall be performed, a. Measurable criteria for acceptable performance, 4. Commissioning Team Information.
5. Commissioning Process Activities, Schedules & Responsibilities - plans for the completion of Commissioning Requirements listed in A5.410.4.4 through A5.410.4.6 shall be included.

504.4.4 5.410.2.4 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.~~

504.4.5 5.410.2.5 Post construction documentation and training. ~~A Systems Manual and Systems Operations Training are is required.~~

~~**504.4.5.1 5.410.2.5.1 Systems manual.** Documentation of the operational aspects of the building shall be completed within the Systems Manual and delivered to the building owner or representative and facilities operator. At a minimum, t The Systems Manual shall include the following:~~

1. Site Information, including facility description, history and current requirements.
2. Site Contact Information.

Comment [w1]: The lack of scoping language results in a broad application with unintended consequence. As currently written these requirements would apply to a wide range of structures that were never intended to be included.

For example: parking garages, strip malls, lumber yards, warehouses, distribution facilities, factories and industrial uses, and agricultural buildings to name just a few.

"LEED for New Construction was designed primarily for new commercial office buildings. Examples of commercial occupancies include: offices, institutional buildings (libraries, museums, churches, etc.), hotels, and residential buildings of 4 or more habitable stories."

1. Suggest adding the following scoping language "offices and institutional buildings".

LEED requires "The individual serving as the CxA must be independent of the project design and construction management, though the CxA may be an employee of any firm providing those services. For projects smaller than 50,000 gross square feet, the CxA may be a qualified person on the design or construction team who has the required experience."

The building code states that "the owner...shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code." They "shall be independent entities with no financial interest in the materials or the project."

In order to reduce ambiguity within the project team and lessen the financial impact to the owner, the threshold should be adjusted to reflect the industry standard.

At 50,000 square feet, the commissioning agent is required to be independent of the project design and construction management team.

This mirrors the building code requirement for an "independent entity with no financial interest in the materials or the project".

2. Suggest revising the 10,000 square foot threshold to 50,000 square feet.

3. Basic Operations & 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 all special inspection verifications required by the enforcing agency or this code.
7. ~~Other Resources & Documentation.~~

~~504.4.5.2 5.410.2.5.2 Systems operations training. The training of the appropriate maintenance staff for each equipment type and/or system shall include, as a minimum, the following:~~

- 4- ~~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.~~
- ~~This section could be moved to the voluntary chapter.~~

~~504.4.6 5.410.2.6 Commissioning report. A complete report of commissioning process activities undertaken through the design, construction and post-construction phases of the building project shall be completed and provided to the owner or representative.~~

~~5.410.3 Testing, adjusting and balancing. Testing, adjusting and balancing of systems shall be required for buildings less than 10,000 square feet.~~

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

1. HVAC systems and controls
2. Indoor and outdoor lighting and controls
3. Water heating systems
4. Renewable energy systems
5. Landscape Irrigation Systems
6. Water Reuse Systems.

5.410.3.3 Procedures. Perform testing, adjusting and balancing procedures in accordance with industry best practices and applicable national standards on each system.

5.410.3.3.1 HVAC balancing. Before a new space-conditioning system serving a building or space is operated for normal use, balance the system should be balanced in accordance with the procedures defined by the Testing Adjusting and Balancing Bureau National Standards (2003); the National Environmental Balancing Bureau Procedural Standards (1983); or Associated Air Balance Council National Standards (1989) or as approved by the building official. (Provide standards and date in the standards chapter)

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

5.410.3.5 Operation and maintenance manual. Provide the building owner or representative with detailed operating and maintenance instructions and copies of warranties/warranties for each system prior to final inspection.

5.410.3.5.1 Special inspections and reports. Include a copy of all special inspection verifications required by the enforcing agency or this code.

Notation:

Authority - Health and Safety Code Sections 18930.5, 18934.5 and 18938 (b).

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

Comment [w2]: 3. Change the 10,000 square foot to 50,000 square feet to match the new threshold.



November 13, 2009

California Building Standards Commission
2525 Natomas Park Dr., Suite 130
Sacramento, CA 95833
ATT: Dave Walls, Executive Director

RE: BSC 45 Day Comment

Dear Commissioners:

I am writing on behalf of the California Building Officials (CALBO).

CALBO's members have a strong commitment to protecting our environment, while building a sustainable California which will benefit future generations. We also believe that when it comes to building standards, "green" or otherwise, that California is best served when the traditional rule making and building standards process is used.

The CALBO Green Building Committee has reviewed the proposed green building standards dated 10/01/09, excluding the reference standards, application checklist, worksheet and Appendix A. CALBO's suggested amendments are provided on the accompanying marked up text. The following is a summary of CALBO's recommendations and comments on the proposed building standards:

- Many of the suggested changes can be characterized as editorial in nature, alignment with statutory provisions or clarification of the proposed language. They should be identified as failure to meet reasons (1.), (2.), (4.), (6.) and (7.) of the nine point criteria by the agencies.
- The suggested revisions are shown in red with either a strikeout or underline text.
- The more substantive changes are found in section 5.410.1 BUILDING MAINTAINANCE AND OPERATION and section 5.504.2 IAQ POST-CONSTRUCTION.
- When California transitions to a mandatory "Green" building code these sections become operative and are enforced by the local building department along with all of the other requirements of a building permit. Not the least of which Include the requirement for verification of compliance and approval prior to occupancy of a building or issuance of a final certificate of occupancy.
- While commissioning and indoor air quality are integral part of "Green" building practices these particular provisions were never developed with the idea that they would one day become part of a mandatory building code.
- In fact the Code Advisory Committee (CAC) found that the provisions as written were not ready for adoption and recommended that they be further studied.
- It is our opinion that the agency has not demonstrated that these proposed building standards meet the nine point criteria required by section 18930 (a) of the California health and Safety Code.
- Therefore we request that these items be held over for further study. Giving time for the agencies and stakeholders to address the nine point criteria and resolve issues related to the incorporation of these provisions into the state building code.

Thank you for your time and consideration on this matter. The CALBO Green Building Committee believes this to be a great step forward to a more sustainable California and we look forward to working together to achieve that goal.

Sincerely,

William R. Schock
Chair, CALBO Green Building Committee

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**EXPRESS TERMS
FOR
PROPOSED BUILDING STANDARDS OF
THE
CALIFORNIA BUILDING STANDARDS COMMISSION (CBSC)**

**REGARDING ADOPTION OF AMENDMENTS TO THE 2010 CALIFORNIA BUILDING STANDARDS CODE, TITLE
24, CALIFORNIA CODE OF REGULATIONS (CCR), PARTS 2, 3, 4, 5 and 6 in TITLE 24, CCR, PART 11,
CALIFORNIA GREEN BUILDING STANDARDS CODE**

LEGEND FOR EXPRESS TERMS

1. New California language and modified language is underlined.
 2. Repealed text: All such language appears in ~~strikeout~~.
-

The California Building Standards Commission (CBSC) proposes to adopt the 2010 edition of the California Green Building Standards Code (CGBSC) as shown on the following pages. Adopt new text as follows:

EXPRESS TERMS

PREFACE

This document is ~~Part 11~~ the 11th of 12 parts of the official compilation and publication of the adoptions, amendments and repeal of 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.

The California Building Standards Code is published in its entirety every three years by order of the California Legislature. 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 all occupancies in the State of California as annotated.

A city, county or city and county may ~~make necessary changes to the provisions contained in this code which are~~ establish more restrictive standards reasonably necessary because of local climatic, geological, or topographical conditions. For the purpose of this code these conditions include ~~specific local~~ environmental conditions as established by a city, county, or city and county. Findings of the local condition(s) and the adopted local building standard(s) must be filed with the California Building Standards Commission 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 by local ordinance 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 95833-2935 Phone: (916)
263-0916 Fax: (916) 263-0959

Website: www.bsc.ca.gov

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 Application Matrix Adoption Tables located at the beginning of each chapter for each state agency contained in Chapter 11. The following outline ~~may be helpful~~ 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 application matrix for that agency in Chapter 11~~ the chapter which covers the established occupancy.

4. ~~The application Matrix Adoption Tables at the beginning of Chapters 4 and 5 will list identify the required green building measures necessary to meet the minimum requirements of this code adopted, provide the effective date and other information regarding each green building measure applicable to for the established occupancy.~~
5. ~~Voluntary tier measures are contained in Appendix Chapters A4 and A5. A Checklist containing each Each green building measure, both required and voluntary is provided at the end of each appendix chapter. Each measure listed in the application matrix checklist has a section number which correlates with a section number in Chapters 4 through 8 to a section where more information about the specific measure is available.~~
6. ~~More information is available for each green building measure listed in the application matrix in the correlated sections contained in Chapters 4 through 8. 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.~~

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ADMINISTRATION

**SECTION 101
GENERAL**

101.1 Title. These regulations shall be known as the California Green Building Standards Code and may be cited as such and will be referred to herein as "this code". The California Green Building Standards Code is Part 11 of twelve 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 air quality.

101.3 Scope. The provisions of this code shall apply to the planning, design, operation, construction, ~~replacement,~~ use and occupancy, ~~location, maintenance, removal and demolition~~ of every newly constructed building or structure,, unless other wise indicated in this code, or any appurtenances connected or attached to such building structures throughout the State of California.

It is not the intent of ~~the California Building Standards Commission~~ that this code substitute or be identified as meeting the certification requirements of any green building program ~~that is not established and adopted by the California Building Standards Commission.~~

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 referenced in the Matrix Adoption Tables and 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 ~~the State Legislature statute.~~

1. State-owned buildings, including buildings constructed by the Trustees of the California State University, and to the extent permitted by California laws, buildings designed and constructed by the Regents of the University of California and regulated

CHAPTER 1

- by the Building Standards Commission. See Section 103 for additional scoping provisions.
2. Energy efficiency standards regulated by the California Energy Commission
 3. Low-rise residential buildings constructed throughout the State of California, including but not limited to, hotels, motels, lodging houses, apartment houses, 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. 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 scope 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.

101.4 Appendices. Provisions contained in the appendices of this code ~~shall not apply~~ are not mandatory unless specifically adopted by a State agency or adopted by a ~~local enforcing agency~~ city, county, or city and county in compliance with Health and Safety Code Section 18938 (b) 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 and California Residential 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.

101.6 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. . . .

101.6.4. Explanatory notes. Explanatory material, such as references to web sites 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. ~~It is the intent of the California Building Standards Commission, by adopting this~~ This code is intended to set mandatory minimum Green Building Standards and include optional tiers that may, at the discretion of any local government entity city, county or city and county, be applied. ~~It is the further intent of the California Building Standards Commission that all entities subject to this code view these standards as minimal Green Building Standards and that local government entities retain their discretion to exceed the standards established by this code. It is the further intent of the California Building Standards Commission to encourage state and local government entities, private entities and interested members of the public to provide the Commission with input regarding the efficacy of this code, in order to assist the Commission in preparing mandatory Green Building Standards during the next code cycle.~~

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 ~~of for cities, counties, or city and counties filed pursuant to Section 401.8.4~~ 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 geological conditions. For the purpose of this section, climatic 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 1800 3rd Street, Room 260, Sacramento, CA 95811.

4. The city, county, or city and county shall obtain California Energy Commission approval for any energy related ordinances consistent with PRC Public Resources Code 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, resource efficiency and conservation, 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 404.11, ~~Appendix Chapter 1, 2007 1.2.2 in the California Building Code (CBC) for the California Building Standards Commission and the Division of the State Architect.~~
2. Section ~~408.7.2 1.8.7, Chapter 1, Administration, Division 1, of the 2010 California Building Code~~ CBC for the Department of Housing and Community Development.
3. Section 7-104, 2007 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 ~~matrix checklist and the History Note page~~ matrix checklist and the History Note page of this code ~~of this code and the History Note page of this code.~~

101.10 Mandatory requirements. This code contains both mandatory and voluntary and ~~mandatory~~ green building measures. Mandatory and voluntary measures are identified in the appropriate application ~~matrix checklist~~ matrix checklist contained in ~~Chapter 11~~ Chapter 11 of 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 application matrix for that agency in Chapter 11~~ the chapter which covers the established occupancy.
4. ~~The application Matrix Adoption Tables at the beginning of Chapters 4 and 5 wW-fet identify the required green building measures necessary to meet the minimum requirements of this code adopted, provide the effective date and other information regarding each green building measure applicable to for the established occupancy.~~
5. Voluntary tier measures are contained in Appendix Chapters A4 and A5. A Checklist containing each Each green building measure, both required and voluntary is provided at the end of each appendix chapter. Each measure listed in the application matrix checklist has a section number which correlates with a section number in Chapters 4 through 8 to a section where more information about the specific measure is available.
6. ~~More information is available for each green building measure listed in the application matrix in the correlated sections contained in Chapters 4 through 8. 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.

SECTION 103 BUILDING STANDARDS COMMISSION

103.1 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.

CHAPTER 1

1. All occupancies.

Application - New construction, unless otherwise indicated in this code, of State buildings (all occupancies), including buildings constructed by the Trustees of the California State University and the Regents of the University of California and all occupancies where no state agency has the authority to adopt building standards applicable to such buildings.

Enforcing Agency - State or local agency specified by the applicable provisions of law. **Authority Cited** - Health and Safety Code Sections 18930.5, 18934.5 and 18938 (b). **Reference** - Health and Safety Code, Division 13, Part 2.5, commencing with Section 18901.

2. University of California, California State Universities, and California Community Colleges.

Application - Standards for lighting for parking lots and primary campus walkways at the University of California, California State Universities, and California Community Colleges.

Enforcing Agency - State or local agency specified by the applicable provisions of law. **Authority Cited** - Government Code Section 14617.

Reference - Government Code Section 14617.

3. Existing State-Owned Buildings, including those owned by the University of California and by the California State University.

Application - Building seismic retrofit standards including abating falling hazards of structural and nonstructural components and strengthening of building structures. See also Division of the State Architect. **Enforcing Agency** - State or local agency specified by the applicable provisions of law. **Authority Cited** - Government Code Section 16600. **Reference** - Government Code Sections 16600 through 16604.

4. Unreinforced Masonry Bearing Wall Buildings.

Application - Minimum seismic strengthening standards for buildings specified in Appendix Chapter 1 of the California Code for Building Conservation, except for buildings subject to building standards adopted pursuant to Part 1.5 (commencing with Section 17910).

Enforcing Agency - State or local agency specified by the applicable provisions of law. **Authority Cited** - Health and Safety Code Section 18934.6. **Reference** - Health and Safety Code Sections 18901 through 18949.

Notation:

Authority - Health and Safety Code Sections 18930.5, 18934.5 and 18938 (b).

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

DEFINITIONS

SECTION 201 GENERAL

SECTION 202 DEFINITIONS

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

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

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. is an enclosed space that is provided with wood heating, is provided with mechanical heating that has a capacity exceeding 10 Btu/hr-ft², or is provided with mechanical cooling that has a

capacity exceeding 5 Btu/hr-ft², unless the space-conditioning system is designed for a process space. (See "PROCESS SPACE")

CONDITIONED SPACE, INDIRECTLY. is 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.

DISPOSAL. Means the management of solid waste through landfilling or transformation at permitted solid waste facilities.

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

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.

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, parking lots, or were graded or altered by direct human activities.

HAZARDOUS WASTE. (a) Means 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.

INERT SOLIDS OR INERT WASTE. Inert solids or inert waste means 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 section 13000) of the California Water Code and does not contain significant quantities of decomposable solid waste.

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.

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

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 non-indigenous 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.

PROCESS SPACE is 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.

RECYCLE or RECYCLING. Means 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.

RESILIENT FLOORING. Refers to non-textile 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

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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. Means the use, in the same form as it was produced, of a material which might otherwise be discarded.

SOLID WASTE. (a) Solid waste means 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.

Notation:

Authority - Health and Safety Code Sections 18930.5, 18934.5 and 18938 (b).

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

GREEN BUILDING

SECTION 301

GENERAL

301.1 Scope. Buildings shall be designed to include the green building measures specified as mandatory in the application ~~matrices contained in Chapter 11~~ of 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.

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.

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 Tenant improvements. The provisions of this code shall apply only to the initial tenant or occupant improvements to a project.

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, promote a more sustainable design.

304.1.1 Tiers. The provisions of Appendices A4 and A5 outline means of achieving enhanced construction levels by incorporating additional measures. Buildings complying with tiers specified for each occupancy contain additional prerequisite and elective green building measures necessary to meet the threshold of each tier.

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.

Notation:

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Authority - Health and Safety Code Sections 18930.5, 18934.5 and 18938 (b).

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

CHAPTER 4 (Reserved for HCD)

~~PLANNING AND DESIGN~~

~~SECTION 401- GENERAL~~

CHAPTER 5

NONRESIDENTIAL MANDATORY MEASURES

DIVISION 5.1 PLANNING AND DESIGN

SECTION 5.101 GENERAL

401.4 5.101 Purpose. 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 402 5.102 DEFINITIONS

402.4 5.102 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.

CUTOFF LUMINAIRES. Luminaires whose light distribution is such that the candela per 100 lamp lumens does not numerically exceed 25 (2.5%) at an angle of 90° above nadir, and 100 (10%) at a vertical angle of 80° above nadir. This applies to all lateral angles around the luminaire.

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 US EPA, bearing Single-Occupant Vehicle (SOV) car pool lane stickers issued by the Department of Motor Vehicles.

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 CFR571.500 (as it existed on July 1, 2000), and is certified to zero-emission vehicle standards.

PZEV. Any vehicle certified by the California Air Resources Board as a Partial Credit Zero Emission Vehicle.

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.

VANPOOL VEHICLE. Eligible vehicles are limited 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

ZEV. Any vehicle certified to zero-emission standards.

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.

SECTION 403 5.103 SITE SELECTION (Reserved)

SECTION 404 5.104 SITE PRESERVATION (Reserved)

SECTION 405 5.105 DECONSTRUCTION AND REUSE OF EXISTING

CHAPTER 3

STRUCTURES
(Reserved)

SECTION 406 5.106
SITE DEVELOPMENT

~~406.2 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 develop a plan to manage storm water drainage during construction. A plan to manage storm water drainage during construction shall be implemented to prevent flooding of adjacent property, prevent erosion and retain soil runoff on the site. One or more of the following methods shall be utilized to manage storm water drainage:-

- ~~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, wattles, or other method approved by the enforcing agency.~~
- ~~3. Compliance with a lawfully enacted storm water management ordinance.~~

5.106.1 Storm water pollution prevention plan. For projects of less than one acre, develop a Storm Water Pollution Prevention Plan (SWPPP) that has been designed, specific to its site, conforming to the State Storm water NPDES Construction Permit or local ordinance, whichever is stricter, as is required for projects one acre or more. The plan should cover prevention of soil loss by storm water run-off and/or wind erosion, of sedimentation, and/or of dust/particulate matter air pollution.

Note: Assistance with the permit may be obtained from the California State Water Resources Control Board (SWRCB) at: <http://www.swrcb.ca.gov/stormwtr/>, from a Regional Water Quality Control Board, and at local public works departments.

~~406.1.4~~ **5.106.4 Bicycle storage parking and changing rooms.** Provide secure racks or storage for bicycles for a minimum of 40% of parking capacity, with 3% or more being long term storage. Comply with Sections 5.106.4.1 through 5.106.4.3; or meet local ordinance ~~or the University of California Policy on Sustainable Practices~~, whichever is stricter.

5.106.4.1 Short-term bicycle parking. If the project is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 100 feet of the visitors' entrance, readily visible to passers-by, for 5% of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack.

5.106.4.2 Long-term bicycle parking. For buildings with over 10 tenant-occupants, provide secure bicycle parking for 5% of motorized vehicle parking capacity, with a minimum of one space. Acceptable parking facilities shall be convenient from the street and may include:

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

5.106.4.3 Changing rooms. For buildings with over 10 tenant-occupants, provide changing/shower facilities for tenant-occupants only in accordance with Table 5.106.4.3, or document arrangements with nearby changing/shower facilities.

Table 5.106.4.3

Number of tenant-occupants	Shower/changing facilities required ²	2-tier (12" x 15" x 72") personal effects lockers ' required ^{1 2}
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	1 2-tier locker for each 50 additional tenant-occupants

One 2-tier locker serves two people. Lockers shall be lockable with either padlock or combination lock.

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 1 unisex shower and two 2-tier lockers.

Note: Additional information on recommended bicycle accommodations may be found at http://www.sacbike.org/advocacy/state_bicycle_facilities/

5.106.5.2 Designated parking. Provide designated parking for any combination of low-emitting, fuel-efficient, and carpool/van pool vehicles as follows:

Table 5.106.5.2

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Total Number of Parking Spaces	Number of Required Spaces
1-20	0
21-50	1
51-75	6
76-100	8
101-150	11
151-200	16
201 and over	At least 8% 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
VEHICLE"**

5.106.8 Light pollution reduction. Comply with lighting power requirements in the California Energy Code, CCR, Part 6, and design interior and exterior lighting such that zero direct-beam illumination leaves the building site. Meet or exceed exterior light levels and uniformity ratios for lighting zones 1-4 as defined in Chapter 10 of the California Administrative Code, CCR, Part 1, using the following strategies:

1. Shield all exterior luminaires or provide cutoff luminaires per Section 132 (b) of the California Energy Code.
2. Contain interior lighting within each source.
3. Contain all exterior lighting within property boundaries.
4. Automatically control exterior lighting dusk to dawn to turn off or lower light levels during inactive periods. **Exceptions:**
 1. Part 2, Chapter 12, Section 1205.6 for campus lighting requirements for parking facilities and walkways.
 2. Emergency lighting and lighting required for nighttime security.

5.106.10 Grading and Paving. The site shall be planned and developed to keep surface water from entering buildings. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows.

Notation:

Authority - Health and Safety Code Sections 18930.5, 18934.5 and 18938 (b).

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

DIVISION 5.2 ENERGY EFFICIENCY

SECTION 501 5.201 **GENERAL**

~~**501.4 5.201.1 Scope.** The provisions of this chapter shall outline means of achieving enhanced building energy efficiency [OSHPD 1, 2, 3, & 4] using either a performance approach or a prescriptive approach. For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory building standards.~~

Note: It is the intent of this code to encourage buildings to achieve exemplary performance in the area of energy efficiency. For the purposes of energy efficiency standards, the California Energy Commission believes specifically, a green building should achieve at least a 15% reduction in energy usage when compared to the State's mandatory energy efficiency standards.

SECTION 502 5.202 **DEFINITIONS**

~~**502.1 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.~~

~~**BUILDING COMMISSIONING.** A systematic quality assurance process that spans the entire design and construction process. Building commissioning helps ensure that a new building's performance meets owner expectations by verifying and documenting that building systems and components are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements.~~

~~**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.~~

~~**DEMAND RESPONSE AUTOMATION INTERNET SOFTWARE CLIENT.** Software that resides in a building Energy Management Control System that can receive a demand response signal and automatically reduce HVAC and lighting system loads. Demand Response programs developed by Utilities and ISO's depend upon timely and reliable communications of events and information to the buildings that are participating in the programs.~~

~~**GEOHERMAL.** Renewable energy generated by deep earth water or steam.~~

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OVERCURRENT PROTECTION DEVICE RATING. The highest current at rated voltage that an overcurrent protection device is intended to interrupt under standard test conditions.

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.

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 cost 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.

SECTION 503 PERFORMANCE APPROACH

503.1 Energy performance. For the purposes of energy efficiency standards in this code the California Energy Commission will continue to adopt mandatory building standards. It is the intent of this code to encourage green buildings to achieve exemplary performance in the area of energy efficiency. Specifically, a green building should achieve more than a 15% reduction in energy usage when compared to the State's mandatory energy efficiency standards.

Using an Alternative Calculation Method approved by the California Energy Commission, calculate each nonresidential building's TDV energy and CO₂ emissions, and compare it to the standard or "budget" building.

503.1.1 Tier 1. Exceed 2007 California Energy Code requirements by 15%.

503.1.2 Tier 2. Exceed 2007 California Energy Code requirements by 30%.

Field verify and document the measures and calculations used to reach the desired level of efficiency following the requirements specified in the Title 24 Nonresidential Alternative Calculation Method Manual.

SECTION 504 PRESCRIPTIVE APPROACH

504.1 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.

504.2 Energy monitoring. Provide sub metering or equivalent combinations of sensor measurements and thermodynamic calculations, if appropriate, to record energy use data for each major energy system in the building, including chillers, heat pumps, packaged AC systems, fans, pumps, cooling towers, boilers and other heating systems, lighting systems, and process loads. This energy use data, once collected, shall be stored within a data management system.

504.2.1 Data storage. The data management system must be capable of electronically storing energy data and creating user reports showing hourly, daily, monthly and annual energy consumption for each major energy system. Hourly data shall be retained a minimum of 30 days, daily data shall be retained a minimum of 6 months and monthly data shall be retained a minimum of 2 years.

504.2.2 Data access. Hourly energy use data shall be accessible through a central data management system and must be available daily.

504.3 Demand response. HVAC systems with Direct-Digital Control Systems and centralized lighting systems shall include pre-programmed demand response strategies that are automated with either a Demand Response Automation Internet Software Client or dry contact relays.

504.3.1 HVAC. The pre-programmed demand response strategies shall be capable of reducing the peak HVAC demand by cooling temperature set-point adjustment.

504.3.2 Lighting. The pre-programmed demand response strategies shall be capable of reducing the total lighting load by a minimum 30% through dimming control or bi level switching.

504.3.3 Software clients. The software clients shall be capable of communicating with a DR Automation Server.

504.4 Commissioning. 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 project requirements.

Commissioning shall be performed in accordance with this section by personnel trained and certified in commissioning by a nationally recognized organization. Commissioning requirements shall include as a minimum:

41—Owner's Project Requirements-2—

Basis of Design.

31—Commissioning measures shown in the construction documents.

4—Commissioning Plan

5—Functional Performance Testing.

61—Post-Construction Documentation & Training.

7—Commissioning Report.

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All building systems and components covered by Title 24, Part 6, as well as process equipment and controls, and renewable energy systems shall be included in the scope of the Commissioning Requirements.

504.4.1 Owner's Project Requirements (OPR). The expectations and requirements of the building shall be documented before the design phase of the project begins. 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.

504.4.2 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. 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.

504.4.3 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. 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,
 - e—Measurable criteria for acceptable performance.
- 4—Commissioning Team Information.
- 5—Commissioning Process Activities, Schedules & Responsibilities—plans for the completion of Commissioning Requirements listed in 504.4.4 through 504.4.6 shall be included.

504.4.4 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.

504.4.5 Post construction documentation and training. A Systems Manual and Systems Operations Training are required.

504.4.5.1 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. 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 & 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 & Documentation.

504.4.5.2 Systems operations training. The training of the appropriate maintenance staff for each equipment type and/or system shall include, as a minimum, 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.

504.4.6 Commissioning report. A complete report of commissioning process activities undertaken through the design, construction and post construction phases of the building project shall be completed and provided to the owner.

504.5 Building orientation and shading. Locate, orient and shade the building as follows:

- 1—Provide exterior shade for south facing windows during the peak cooling season.
- 2—Provide vertical shading against direct solar gain and glare due to low altitude sun angles for east and west facing windows.
- 3—When site and location permit, orient the building with the long sides facing north and south.
- 4—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.

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~~504.5.1 Shading with vegetation.~~ As applicable, comply with local ordinance, Chapter 7A of the 2007 California Building Code and Chapter 47 of the California Fire Code for locations designated by the enforcing agency as having a significant risk for wildfires.

~~504.5.2 Sun angle calculations.~~ 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.

~~SECTION 511 RENEWABLE ENERGY~~

~~511.1 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% 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 4kW, (whichever is greater), in addition to the electrical demand required to meet 1% of the natural gas and propane use. The building project's electrical service overcurrent protection device rating shall be calculated in accordance with the 2007 California Electrical Code. Natural gas or propane use is calculated in accordance with the 2007 California Plumbing Code.

~~511.1.1 Documentation.~~ Using a Calculation Method approved by the California Energy Commission, calculate the renewable on site energy system to meet the requirements of Section 511.1, expressed in kW. Factor in net metering, if offered by local utility, on an annual basis.

~~511.2 Green Power.~~ If offered by local utility provider, participate in a renewable energy portfolio program that provides a minimum of 50% electrical power from renewable sources. Maintain documentation through utility billings.

~~SECTION 512 ELEVATORS, ESCALATORS AND OTHER EQUIPMENT~~

~~512.1 Elevators and escalators.~~ In buildings with more than one elevator or two escalators, provide controls to reduce the energy demand of elevators for part of the day and escalators to reduce speed when no traffic is detected. Document the controls in the project specifications and commissioning plan.

~~512.1.1 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 513 ENERGY EFFICIENT STEEL FRAMING~~

~~513.1 Steel framing.~~ Design steel framing for maximum energy efficiency. Techniques for avoiding thermal bridging in the envelope include:

- ~~1. Punching large holes in the stud web without affecting its structural integrity,~~
- ~~2. Spacing the studs as far as possible while maintaining the structural integrity of the structure,~~
- ~~3. Exterior rigid insulation, and~~
- ~~4. Detailed design of intersections of wall openings and building intersections of floors, walls, and roofs.~~

Notation:

Authority - Health and Safety Code Sections 18930.5, 18934.5 and 18938 (b).

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

DIVISION 5.3 WATER EFFICIENCY AND CONSERVATION

SECTION 601 5.301 GENERAL

~~601.4 5.301.1 Scope.~~ The provisions of this chapter shall establish the means of conserving water used indoors, outdoors, and in wastewater conveyance.

SECTION 602 5.302 DEFINITIONS

~~602.4 5.302.1 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.

DENSITY FACTOR [Kd](dimensionless). The Coefficient used to modify Ks to reflect the water needs of a particular plant or group of plants with reference to the density of the plant material. Kd ranges from 0.5 for a sparse planting to 1.3 for very dense plantings and averages 1.0. (Landscape, 2000).

EVAPOTRANSPIRATION [ET]. The combination of water transpired from plant tissues and evaporated from the soil and plant surfaces measured in inches per unit of time.

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GRAYWATER. Untreated household waste which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines and laundry tubs. It shall not include waste water from kitchen sinks, dishwashers, or laundry water from soiled diapers.

HISTORICAL EVAPOTRANSPIRATION [Historical E_{To}]. A multiple year average of recorded historical reference E_{To} data from a weather station or evaporative pan in a given geographic location. This value is typically a monthly average of the specific month in a given multi year time frame. This value, when corrected for plant species characteristics, can be used as a baseline to evaluate the expected water needs of a landscape planting in that geographic area. (FAO 1998; ASCE, 1990)

LANDSCAPE (PLANT) COEFFICIENT [Kl]. The product of the species factor multiplied by the density factor and the microclimate factor. $(Kl = K_s \times K_d \times K_{mc})$ The landscape coefficient is used in the landscape water budget calculation. (UCCE, 2000)

MICROCLIMATE FACTOR [Kmc]. The coefficient used to modify K_s to reflect water needs of a particular plant or group of plants with reference to the microclimate of the planting area. Microclimate factors include sun exposure, proximity to reflective surfaces, and windy locations. K_{mc} ranges from 0.5 for low microclimate factors to 1.4 for high microclimate factors. (UCCE, 2000)

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE. The California ordinance regulating landscape design, installation and maintenance practices that will ensure commercial, multifamily and other developer installed landscapes greater than 2500 square feet meet an irrigation water budget developed based on landscaped area, and climatological parameters.

PLANT SPECIES FACTOR, [K_s] (dimensionless). A factor or coefficient used to adjust reference evapotranspiration to reflect water use by a particular plant species. K_s ranges from <0.1 for very low water using plants, 0.1-0.3 for low water using, 0.4-0.6 moderate water using to 0.7-0.9 for high water using plants. The K_s for cool season turfgrass is 0.8 and warm season turfgrass is 0.6.

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.

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.

REFERENCE EVAPOTRANSPIRATION [E_{To}]. The estimated rate of evapotranspiration from a standardized surface of well watered, actively growing cool season turfgrass clipped to 12 cm with sufficient density to fully shade the soil. The water needs of a landscape planting can be calculated by multiplying the Landscape Coefficient [Kl] and Reference Evapotranspiration (E_{To})

SUBMETER. A meter installed subordinate to a site meter. Usually used to measure water intended for one purpose, such as landscape irrigation, also known as a Dedicated Meter. For the purposes of this section, a Dedicated Meter may be considered a submeter.

WATER BUDGET. Estimated total landscape irrigation water use shall not exceed the maximum applied water allowance calculated in accordance with the Department of Water Resources Model Efficient Landscape Ordinance (MLO).

SECTION 603 5.303 INDOOR WATER USE

603.4 5.303.1 Meters. Separate meters or metering device shall be installed for the uses described in Sections 503.1.1 and 503.1.2.

5.303.1.1 Buildings 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.
2. For spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop projected to consume more than 100 gal/day.

5.303.1.2 Excess consumption. Any building within a project or space within a building that is projected to consume more than 1,000 gal/day.

603.2 5.303.2 20% Savings. A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 20% shall be provided. The reduction shall be based on the maximum allowable water use per plumbing fixture and fittings as required by the California Building Standards Code. The 20% reduction in potable water use shall be demonstrated by one of the following methods.

1. Each plumbing fixture and fitting shall meet the 20% reduced flow rate specified in Table 603.2 5.303.2.3, or
2. A calculation demonstrating a 20% reduction in the building "water use baseline" as established in Table 603.4 5.303.2.2 shall be provided.

603.2.4 5.303.2.1 Multiple showerheads serving one shower. When single shower fixtures are served by more than one showerhead, the combined flow rate of all the showerheads shall not exceed the maximum flow rates specified in the 20% reduction column contained in Table 5.303.2.2 or the shower shall be designed to only allow one showerhead to be in operation at a time.

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Exception: The maximum flow rate for shower heads when using the calculation method specified in Section 5.303.2.1, Item 2 is 2.5 gpm @ 80 psi.

**TABLE 6034 5.303.2.2 INDOOR WATER
USE BASELINE^{5 4}**

Fixture Type	Flow-rate ²	Duration	Daily uses	Occupants ^{3 4}
Showerheads	2.5 gpm @ 80 psi	8 min.	1	X
Showerheads Residential	2.5 gpm @ 80 psi	8 min.	4	X
Lavatory Faucets NonResidential	2.05 gpm @ 60 psi	.25 min.	3	X
Kitchen Faucets	2.2 gpm @ 60 psi	4 min.	1	X
Replacement Aerators	2.2 gpm @ 60 psi			X
Wash Fountains	2.2 [rim space (in.) / 20 gpm @ 60 psi]			X
Metering Faucets	0.25 gallons/cycle	.25 min.	3	X
Metering Faucets for Wash Fountains	.25 [rim space (in.) / 20 gpm @ 60 psi]	.25 min.		X
Gravity tank type Water Closets	1.6 gallons/flush	1 flush	1 male ¹ 3 female	X
Flushometer Tank Water Closets	1.6 gallons/flush	1 flush	1 male ¹ 3 female	X
Flushometer Valve Water Closets	1.6 gallons/flush	1 flush	1 male ¹ 3 female	X
Electromechanical Hydraulic Water Closets	1.6 gallons/flush	1 flush	1 male ¹ 3 female	X
Urinals	1.0 gallons/flush	1 flush	2 male	X

Fixture "Water Use" = Flow rate x Duration x Occupants x Daily uses

¹ Except for low-rise residential occupancies, † The daily use number shall be increased to three if urinals are not installed in the room.

² The Flow-rate is from the CEC Appliance Efficiency Standards, Title 20 California Code of Regulations; where a conflict occurs, the CEC standards shall apply.

³ For low-rise residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.

^{4 3}

- For non-residential occupancies, † Refer to Table A, Chapter 4, 2007 California Plumbing Code, for occupant load factors.

Use Worksheet WS-1 to calculate base line water use.

**TABLE 6032 5.303.2.3
FIXTURE FLOW RATES**

Fixture Type	Flow-rate	Maximum flow rate at 20% Reduction
Showerheads	2.5 gpm @ 80 psi	2 gpm @ 80 psi
Lavatory Faucets NonResidential	2.05 gpm @ 60 psi	1.64 gpm @ 60 psi
Kitchen Faucets	2.2 gpm @ 60 psi	1.8 gpm @ 60 psi
Wash Fountains	2.2 [rim space (in.) / 20 gpm @ 60 psi]	1.8 [rim space (in.) / 20 gpm @ 60 psi]
Metering Faucets	0.25 gallons/cycle	0.2 gallons/cycle
Metering Faucets for Wash Fountains	.25 [rim space (in.) / 20 gpm @ 60 psi]	.20 [rim space (in.) / 20 gpm @ 60 psi]
Gravity tank type Water Closets	1.6 gallons/flush	1.28 gallons/flush ¹
Flushometer Tank Water Closets	1.6 gallons/flush	1.28 gallons/flush ¹
Flushometer Valve Water Closets	1.6 gallons/flush	1.28 gallons/flush ¹
Electromechanical Hydraulic Water Closets	1.6 gallons/flush	1.28 gallons/flush ¹
Urinals	1.0 gallons/flush	0.8 gallons/flush ¹

Includes single and dual flush water closets with an effective flush of 1.28 gallons or less when tested ASME A112.19.2 and ASME A112.19.14.

Single Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the

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average flush volume when tested in accordance with ASME A112.19.233.2.

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.

603.3 Appliances.

1. ~~Clothes washer shall have a maximum Water Factor (WF) that will reduce the use of water by 10% 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—5.8 gallons per cycle~~
 - b. ~~Commercial—refer to Table 603.3~~

TABLE 603.3 5.303.3 COMMERCIAL DISHWASHER WATER USE

Type	High Temperature— maximum gallons per rack	Chemical—maximum gallons per rack
Conveyer	0 70	0 62
Door	0 95	4.46
Undercounter	0 90	0 98

3. ~~Ice makers shall be air-cooled.~~
4. ~~Food steamers shall be connection less or boiler less.~~
5. ~~The use and installation of water softeners that discharge to the community sewer system shall be limited or prohibited by local agencies if certain conditions are met.~~

5.303.4 Wastewater reduction. Each building shall reduce by 20% wastewater by one of the following methods:

1. The installation of water-conserving fixtures (water closets, urinals) meeting the criteria established in sections 5.303.2 or 5.303.3 or
2. Utilizing non-potable water systems (captured rainwater, graywater, and municipally treated wastewater [recycled water] complying with the current edition of the California Plumbing Code or other methods described in Section A5.304).

5.303.6 Plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall meet the standards referenced in Table 5.503.6.

TABLE 5.303.6

REQUIRED STANDARDS	
Water closets (toilets) - flushometer valve type single flush, maximum flush volume	ASME A112.19.2/CSA B45.1 - 1.28 gal (4.8 L)
Water closets (toilets) - flushometer valve type dual flush, maximum flush volume	ASME A112.19.14 and USEPA WaterSense Tank-Type High Efficiency Toilet Specification - 1.28 gal (4.8 L).
Water closets (toilets) - tank-type	U.S. EPA WaterSense Tank-Type High-Efficiency Toilet Specification
Urinals, maximum flush volume	ASME A112.19.2/CSA B45.1 - 0.5 gal (1.9 L)
Urinals, non-water urinals	ASME A112.19.19 (vitreous china) ANSI Z124.9-2004 or IAPMO Z124.9 (plastic)
Public lavatory faucets: Maximum flow rate -0.5 gpm (1.9 L/min)	ASME A112.18.1/CSA B125.1
Public metering self-closing faucets: Maximum water use - 0.25 gal (1.0 L) per metering cycle	ASME A112.18.1/CSA B125.1
Residential bathroom lavatory sink faucets: 1 Maximum flow rate - 1.5 gpm (5.7 L/min)	ASME A112.18.1/CSA B125.1

**SECTION 604 5.304
OUTDOOR WATER USE**

604.4 5.304.1 Water budget. A water budget shall be developed for landscape irrigation use that conforms to the local water efficient landscape ordinance or to the California Department of Water Resources Model Water Efficient Landscape Ordinance where no local ordinance is applicable.

Note: Prescriptive measures to assist in compliance with the water budget are listed in Sections 492.5 through 492.8, 492.10

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and 492.11 of the ordinance, which may be found at: <http://www.owue.water.ca.gov/landscape/ord/ord.cfm>

5.304.2 Outdoor potable water use. For new water service for landscaped areas between 1000 square feet and 5000 square feet (the level at which Water Code §535 applies), separate meters or submeters shall be installed for indoor and outdoor potable water use.

5.304.3 Irrigation design. In new nonresidential construction with between 1000 and 2500 square feet of landscaped area (the level at which the MLO applies), install irrigation controllers and sensors which include the following criteria, and meet manufacturer's recommendations.

5.304.3.1 Irrigation controllers. Automatic irrigation system controllers installed at the time of final inspection shall comply with the following:

1. Controllers shall be weather- or soil moisture-based controllers that automatically adjust irrigation in response to changes in plants' needs as weather conditions change.
2. Weather-based controllers without integral rain sensors or communication systems that account for local rainfall shall have a separate wired or wireless rain sensor which connects or communicates with the controller(s). Soil moisture-based controllers are not required to have rain sensor input.

Note: More information regarding irrigation controller function and specifications is available from the Irrigation Association at <http://www.irrigation.org/SWAT/Industry/ia-tested.asp>.

~~**604.2 Potable water reduction.** Provide water efficient landscape irrigation design that reduces by 50% the use of potable water beyond the initial requirements for plant installation and establishment. Calculations for the reduction shall be based on the water budget developed pursuant to section 604.1.~~

~~Methods used to accomplish the requirements of this section must be designed to the requirements of the California Building Standards Code and shall include, but not be limited to, the following:~~

- ~~1. Plant coefficient.~~
- ~~2. Irrigation efficiency and Distribution Uniformity.~~
- ~~3. Use of captured rainwater.~~
- ~~4. Use of recycled water.~~
- ~~5. Water treated for irrigation purposes and conveyed by a water district or public entity.~~
- ~~6. Use of graywater.~~

~~**604.3 Potable water elimination.** Provide a water efficient landscape irrigation design that eliminates the use of potable water beyond the initial requirements for plant installation and establishment. Methods used to accomplish the requirements of this section must be designed to the requirements of the California Building Standards Code and shall include, but not be limited to, the following:~~

- ~~1. Plant coefficient.~~
- ~~2. Irrigation efficiency and Distribution Uniformity.~~
- ~~3. Use of captured rainwater.~~
- ~~4. Use of recycled water.~~
- ~~5. Water treated for irrigation purposes and conveyed by a water district or public entity.~~
- ~~6. Use of graywater.~~

~~**604.4 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 Appendix G, 2007 California Plumbing Code.~~

~~**604.5 Rainwater or stormwater collection systems.** Either as a site design feature (vegetated swales, etc.), or as a constructed system (rain cistern, etc.), rain cisterns and other constructed water collection devices may store water for landscape irrigation.~~

SECTION 605 5.305 RECYCLED (RECLAIMED) AND GRAYWATER SYSTEMS WATER REUSE SYSTEMS (Reserved)

Notation:

Authority - Health and Safety Code Sections 18930.5, 18934.5 and 18938 (b).

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

NONRESIDENTIAL MANDATORY MEASURES

CHAPTER 7

DIVISION 5.4 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

SECTION 701 5.401 GENERAL

~~704.1 5.401.1 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; 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, and reduction of building pollutants prior to occupancy.

SECTION 702 5.402 DEFINITIONS

~~702.4 5.402.1 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.

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

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

~~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.

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

~~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.

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

~~OVE.~~ Optimal Value Engineering, another term for advanced wood framing techniques.

~~POST CONSUMER CONTENT.~~ Waste material generated by consumers after it is used and which would otherwise be discarded.

~~PRE CONSUMER (or POST INDUSTRIAL) CONTENT.~~ Material diverted from the waste stream during one manufacturing process, including scraps, damaged goods, and excess production, that is used in another manufacturing process.

~~RECYCLED CONTENT.~~ Refer to International Organization of Standards ISO 14021 Environmental labels and declarations—Self-declared environmental claims (Type II environmental labeling).

~~RECYCLED CONTENT VALUE (RCV).~~ Material cost multiplied by post-consumer content plus V the pre-consumer content, or $RCV = \$ X (\text{post-consumer content} + V \text{ pre-consumer content})$.

SECTION 703 5.403 FOUNDATION SYSTEMS (Reserved)

SECTION 704 5.404 EFFICIENT FRAMING TECHNIQUES (Reserved)

~~704.1 Wood framing.~~ Employ advanced wood framing techniques, or OVE, as recommended by the US Department of Energy's Office of Building Technology, State and Community Programs and as permitted by the enforcing agency.

~~704.1.1 Structural integrity.~~ The OVE selected shall not conflict with structural framing methods required by the 2007 California Building Code.

~~704.1.2 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.~~

~~Additional information can be obtained at the following web site:~~

~~<http://www.eere.energy.gov/buildings/info/publications.html#technology%20fact%20sheets>~~

SECTION 705 5.405 MATERIAL SOURCES (Reserved)

~~705.4 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

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500 miles of the project site.

4. 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%, 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.

705.2 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% bio-based content.

705.2.1 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.

705.2.2 Rapidly renewable materials. Use materials made from plants harvested within a ten year cycle for at least 2.5% of total materials value, based on estimated cost.

705.3 Reused materials. Use salvaged, refurbished, refinished, or reused materials for a minimum of 5% of the total value, based on estimated cost of materials on the project. Provide documentation as to the respective values.

705.3.1 Sources of reused materials. Sources of some reused materials can be found at <http://www.ciwmb.ca.gov/RCP/Product.asp?VW-CAT&CATID=257>

See also Appendix A, Sections A405.1 and A405.2 for on-site materials reuse.

705.4 Recycled content. Use materials, equivalent in performance to virgin materials, with post-consumer or pre-consumer recycled content value (RCV) for a minimum of 10% of the total value, based on estimated cost of materials on the project. Provide documentation as to the respective values.

705.4.1 Determination of recycled content value (RCV). The recycled content of a material assembly shall be determined by weight, and the fractional value of the weight is then multiplied by the total estimated cost of the material assembly.

705.4.2 Sources of recycled materials. Sources and recycled content of some recycled materials can be found at <http://www.ciwmb.ca.gov/RCP/Product.asp?VW-CAT&CATID=257>.

705.5 Cement and concrete. Use cement and concrete made with recycled products complying with Sections 705.6.1 through 705.6.3.

705.5.1 Alternative fuels. Where permitted by state or local air quality standards, use alternative fuels in the manufacture of cement.

705.5.2 Cement. Meet the following standards for cement:

1. Portland Cement shall meet ASTM C 150 Specifications.
2. Blended Cement shall meet ASTM C 595 or ASTM C 1157.

705.5.3 Concrete. Use concrete manufactured in accordance with Sections 706.6.3.1 and 706.6.3.2, as approved by the enforcing agency.

705.5.3.1 Industrial byproducts. Use concrete made with the following materials:

1. Fly ash meeting ASTM C 618, Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
2. Slag cement meeting ASTM C 989, Specification for Ground Granulated Blast Furnace Slag for Use in Concrete and Mortars, up to 70%.
3. Silica fume meeting ASTM C 1240, Specification for Silica Fume Used in Cementitious Mixtures, up to 7%.

705.5.3.2 Recycled aggregates. Depending on their availability and suitability, use concrete made with one or more of the following materials:

1. Blast furnace slag as a lightweight.
2. Recycled concrete that meets grading requirements of ASTM C 33, Standard Specification for Concrete Aggregates.

SECTION 706 5.406 ENHANCED DURABILITY AND REDUCED MAINTENANCE (Reserved)

706.1 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.

706.1.1 Service life. Select materials for longevity and minimal deterioration under conditions of use.

706.1.2 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.

706.1.3 Recyclability. Select materials that can be re-used or recycled at the end of their service life in the project.

SECTION 707 5.407 WATER RESISTANCE AND MOISTURE MANAGEMENT

707.1 5.407.1 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.

707.2 5.407.2 Moisture control. Employ moisture control measures by ~~one of the following methods.~~

707.2 5.407.2.1 Sprinklers. Design and maintain landscape irrigation systems to prevent spray on structures.

707.2 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.

Notes:

1. ~~Use using features such as overhangs and recesses, and flashings integrated with a drainage plane.~~ and
2. ~~Use non pervious absorbent interior floor and wall finishes within the vicinity at least two feet around and perpendicular to such openings.~~

SECTION 708 5.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

708.1 5.408.1 Construction waste diversion. Establish a construction waste management plan for the diverted materials, or meet local construction and demolition waste management ordinance, whichever is more stringent.

708.2 5.408.2 Construction waste management plan. Where a local jurisdictions does not have a construction and demolition waste management ordinance, submit a construction waste management plan for approval by the enforcement authority agency that:

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

5.408.2.1 Documentation. Documentation shall be provided to the enforcing agency which demonstrates compliance with Section 5.408.2 items 1 thru 4. The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

5.408.2.2 Isolated jobsites. 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.

Notes:

1. Sample forms found in Chapter 8 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 <http://www.ciwmb.ca.gov/ConDemo/>.

708.3 5.408.3 Construction waste reduction of at least 50%. Recycle and/or salvage for reuse a minimum of 50% of the non-hazardous 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.

708.4 5.408.4 Excavated soil and land clearing debris. 100% 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 709 5.409 LIFE CYCLE ASSESSMENT (Reserved)

~~**709.1 Materials and system assemblies.** Select materials assemblies based on life cycle assessment of their embodied energy and/or green house gas emission potentials.~~

~~**709.1.1 Materials and system assemblies.** Software for calculating life cycle costs for materials and assemblies may be found at:~~

1. ~~the Athena Institute web site at: <http://www.athenasmi.ca/tools/impactEstimator/>~~
2. ~~the NIST-BEES web site at: <http://www.brl.nist.gov/oac/software/bees/>~~
3. ~~Life Cycle assessment may also be done in accordance with ISO Standard 14044, www.iso.ch.~~

~~**709.1.2 Additional resources.** More information on life cycle assessment may be found at the Sustainable Products Purchasers Coalition: www.sppcoalition.org; at the American Center for Life Cycle Assessment:~~

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~~www.leacenter.org; at U.S. EPA Life Cycle Assessment Research: www.epa.gov/nrmrl/leaccess/index.html; and at U.S. EPA Environmentally-Preferable Products, www.epa.gov/epp/~~

SECTION 710 **5.410 BUILDING MAINTENANCE AND OPERATION**

710.4 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 and metals.

710.4.4 5.410.1.1 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^A - ~~sample ordinance for use by local agencies may be found in Appendix A of the document at the California Integrated Waste Management's web site at: <http://www.ciwmb.ca.gov/Publications/LocalAsst/31000012.doc>~~

Note: A sample ordinance for use by local agencies may be found in Appendix A of the document at the California Integrated Waste Management's web site at: <http://www.ciwmb.ca.gov/Publications/LocalAsst/31000012.doc>

See also ~~Section 504 for commissioning.~~

504.4 5.410.2 Commissioning. ~~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 project requirements. Commissioning shall be performed in accordance with this section by personnel trained and certified in commissioning by a nationally recognized organization. Commissioning requirements shall include as a minimum:~~

- ~~1. Owner's Project Requirements;~~
- ~~2. Basis of Design;~~
- ~~3. Commissioning measures shown in the construction documents;~~
- ~~4. Commissioning Plan;~~
- ~~5. Functional Performance Testing;~~
- ~~6. Post-Construction Documentation & Training;~~
- ~~7. Commissioning Report.~~

~~All building systems and components covered by Title 24, Part 6, as well as process equipment and controls, and renewable energy systems shall be included in the scope of the Commissioning Requirements.~~

~~**504.4.1 5.410.2.1 Owner's Project Requirements (OPR).** The expectations and requirements of the building shall be documented before the design phase of the project begins. 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.~~

~~**504.4.2 5.410.2.2 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. 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;~~
- ~~5. Landscape Irrigation Systems;~~
- ~~6. Water Reuse Systems.~~

~~**504.4.3 5.410.2.3 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. 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;~~
 - ~~a. Functions to be tested;~~
 - ~~d. Conditions under which the test shall be performed, a. Measurable criteria for acceptable performance.~~
- ~~4. Commissioning Team Information;~~
- ~~5. Commissioning Process Activities, Schedules & Responsibilities - plans for the completion of Commissioning Requirements listed in A5.410.4.4 through A5.410.4.6 shall be included.~~

~~**504.4.4 5.410.2.4 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.~~

~~**504.4.5 – 5.410.2.5 Post construction documentation and training.** A Systems Manual and Systems Operations Training are required.~~

~~**504.4.5.1 – 5.410.2.5.1 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. 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 & 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 all special inspection verifications required by the enforcing agency or this code.~~
- ~~7. Other Resources & Documentation.~~

~~**504.4.5.2 – 5.410.2.5.2 Systems operations training.** The training of the appropriate maintenance staff for each equipment type and/or system shall include, as a minimum, the following:~~

- ~~4. 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.~~

~~**504.4.6 5.410.2.6 Commissioning report.** A complete report of commissioning process activities undertaken through the design, construction and post-construction phases of the building project shall be completed and provided to the owner.~~

~~**5.410.3 Testing, adjusting and balancing.** Testing, adjusting and balancing of systems shall be required for buildings less than 10,000 square feet.~~

~~**5.410.3.2 – Systems.** Develop a written plan of procedures for testing, adjusting and balancing systems. Systems to be included for testing, adjusting and balancing shall include at a minimum, as applicable to the project:~~

- ~~1. HVAC systems and controls~~
- ~~2. Indoor and outdoor lighting and controls~~
- ~~3. Water heating systems~~
- ~~4. Renewable energy systems~~
- ~~5. Landscape Irrigation Systems~~
- ~~6. Water Reuse Systems.~~

~~**5.410.3.3 – Procedures.** Perform testing, adjusting and balancing procedures in accordance with industry best practices and applicable national standards on each system:~~

~~**5.410.3.3.1 HVAC balancing.** Before a new space-conditioning system serving a building or space is operated for normal use, the system should be balanced in accordance with the procedures defined by the Testing Adjusting and Balancing Bureau National Standards (2003); the National Environmental Balancing Bureau Procedural Standards (1983); or Associated Air Balance Council National Standards (1989).~~

~~**5.410.3.4 – Reporting.** After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.~~

~~**5.410.3.5 – Operation and maintenance manual.** Provide the building owner with detailed operating and maintenance instructions and copies of guaranties/warranties for each system prior to final inspection.~~

~~**5.410.3.5.1 Special inspections.** Include a copy of all special inspection verifications required by the enforcing agency or this code.~~

Notation:

Authority - Health and Safety Code Sections 18930.5, 18934.5 and 18938 (b).

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

CHAPTER 5

NONRESIDENTIAL MANDATORY MEASURES

CHAPTER 8

DIVISION 5.5 ENVIRONMENTAL QUALITY

SECTION 801 5.501 GENERAL

~~804.4 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 802 5.502 DEFINITIONS

~~802.4 5.502.1~~ **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.

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, ~~as specified in "Structural Glued Laminated Timber" (ANSI A190.1-2002) or prefabricated wood I-joists, or finger-jointed lumber.~~

Note: See CCR, Title 17, Section 93120.1.

~~**HVAC UNITS, SMALL.** Those containing less than 0.5 lbs of refrigerant.~~

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

MERV. Filter minimum efficiency reporting value, based on ASHRAE 52.2-1999.

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 (g O₃ /g ROG).

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

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

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).

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

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

VOC. A volatile organic compound 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 SCAQMD, ARB, etc, the VOC definition included in that specific regulation is the one that prevails for the specific measure in question.

SECTION 803 5.503 FIREPLACES

~~803.4 5.503.1~~ **General.** 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.** Woodstoves and pellet stoves shall comply with US EPA Phase II emission limits.

SECTION 804 5.504 POLLUTANT CONTROL

~~804.4~~ **Indoor air quality (IAQ) during construction.** Maintain IAQ as provided in Sections 804.1.2 and 804.1.3.

~~804.1.2~~ **Temporary ventilation.** Provide temporary ventilation during construction in accordance with Section 124 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. ~~During dust producing operations, protect supply and return HVAC system openings from dust.~~
3. ~~The permanent HVAC system shall only be used during construction if necessary to condition the building 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% based on ASHRAE 52.1 1992. Replace all filters with MERV 13 filters by Section 804.2.3 immediately prior to occupancy.~~
4. ~~If the building is occupied during demolition or construction, meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3.~~

804.1.3 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.~~

804.2 5.504.2 IAQ Post-construction. ~~After construction ends, with 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 while:~~

4. ~~During this time, maintaining an internal temperature of at least 60 °F, and relative humidity no higher than 60%. 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 must total the equivalent of 14 days of maximum outdoor air.)~~

5.504.3 Covering of duct openings and protection of mechanical equipment during construction. At the time of rough installation, or during storage on the construction site and until final startup of the heating and cooling 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 or debris which may collect in the system.

804.4 5.504.4 Finish material pollutant control. Finish materials shall comply with Sections 804.4.4 5.504.4.1 through 804.4.4 5.504.4.4.

804.4.4 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, and 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 804.4.4 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 shall meet the requirements, 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, <http://ccr.oal.ca.gov/>.

Note: Title 17 may be found at <http://ccr.oal.ca.gov/>

**TABLE 804.4.1 5.504.4.1 ADHESIVE AND
SEALANT VOC LIMIT¹**

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
Dry Wall 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
Specialty Applications	Current VOC Limit
PVC Welding	285
CPVC Welding	270
ABS Welding	325
Plastic Cement Welding	250
Adhesive Primer for Plastic	250
Contact Adhesive	80
Special Purpose Contact Adhesive	250
Structural Wood Member Adhesive	140
Top and Trim Adhesive	250
Substrate Specific Applications	Current VOC Limit
Metal to Metal	30
Plastic Foams	50
Porous Material (except wood)	50
Wood	30
Fiberglass	80

If an adhesive is used to bond dissimilar substrates together the adhesive with the highest VOC content shall be allowed.

**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	Current VOC Limit
Architectural	250
Non Porous Porous	775
Modified Bituminous	500
Marine Deck	760
Other	750

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Note: For additional information regarding methods to measure the VOC content specified in this table these tables, see South Coast Air Quality Management District Rule 1168: <http://www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF> .

804.4.2 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 804.4.2 5.504.4.3, unless local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 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 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.

Notes:

1. Title 17 may be found at <http://ccr.oal.ca.gov/>
2. See Bay Area Air Quality Management District Regulation 8 Rule 49 at <http://www.arb.ca.gov/DRDB/BA/CURHTML/R8-49.HTM>

TABLE 804.4.2 5.504.4.3

COATING VOC LIMITS^{41*2} Grams of VOC Per Liter of Coating, Less Water and Less-Exempt Compounds

COATING CATEGORY	CEILING LIMIT*	CURRENT LIMIT	EFFECTIVE DATE 7/1/08	EFFECTIVE DATE
Bond Breakers	350			1
Clear Wood Finishes	350 350 350	275 275 275		
Varnish	680	275		
Sanding Sealers Lacquer				
Clear Brushing Lacquer	680	275		
Concrete Curing Compounds	350	100		
Dry Fog Coatings	400	150		
Fire Proofing Exterior Coatings	450	350		
Flats	250	100	50	
Floor Coatings	420	50		
Graphic Arts (Sign) Coatings	500			
Industrial Maintenance (IM) Coatings High Temperature IM Coatings Zinc Rich IM Primers	420 420	100 420 100		
Japans/Faux Finishing Coatings	700	350		
Magnesite Cement Coatings	600	450		
Mastic Coatings	300			
Metallic Pigmented Coatings	500			
Multi Color Coatings	420	250		
Nonflat Coatings	250 250	50 50		
Nonflat High Gloss				
Pigmented Lacquer	680	275		
Pre Treatment Wash Primers	780	420		
Primers, Sealers, and Undercoaters	350	100		
Quick Dry Enamels	400	50		
Quick Dry Primers, Sealers, and Undercoaters	350	100		
Recycled Coatings	250			
Roof Coatings	300 500	50 100		
Roof Coatings, Aluminum				
Roof Primers, Bituminous	350			

Rust Preventative Coatings	420	100		
Shellac Clear Pigmented	730	550		
Specialty Primers	350	100		
Stains Interior	350 250	100		
Swimming Pool Coatings Repair Other	650 340	340		
Waterproofing Sealers	400	100		
Waterproofing Concrete/Masonry Sealers	400	100		
Wood Preservatives Below Ground Other	350 350			

The specified limits remain in effect unless revised limits are listed in subsequent columns in the Table.

For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1113: <http://www.arb.ca.gov/DRDB/SG/CURHTML/R1113.PDF>

VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS^{2, 3} Grams of VOC Per Liter of

Coating Category	Effective 1/1/2010	Effective 1/1/2012
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	
¹ Low Solids Coatings	120	
Magnesite Cement Coatings	450	
Mastic Texture Coatings	100	
Metallic Pigmented Coatings	500	
Multi-Color Coatings	250	
Pre-Treatment Wash Primers	420	
Primers, Sealers, and Undercoaters	100	
Reactive Penetrating Sealers	350	
Recycled Coatings	250	
Roof Coatings	50	
Rust Preventative Coatings	400	250

Grams of VOC Per Liter of Coating, Including Water and Including Exempt Compounds

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Coating, Less Water and Less Exempt Compounds

Note: For additional information regarding methods to measure the VOC content specified in this table, see ARB, 2008, Suggested Control Measure for Architectural Coatings, February 1, 2008. http://www.arb.ca.gov/coatings/arch/Approved_2007_SCM.pdf.

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. Manufacturers product specification.
2. Field verification of on-site product containers.

5.504.4.4 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 <http://www.carpet-rug.com/>
2. California Department of Public Health Standard Practice for the testing of VOCs (Specification 01350)
3. Department of General Services, California Gold Sustainable Carpet Standard. <http://www.green.ca.gov/EPP/standards.htm>
4. Scientific Certifications Systems Sustainable Choice, <http://www.scs-certified.com/iaq/indooradvantage.htm>

Notes:

1. For Green Label Plus, see <http://www.carpet-rug.com/>.
2. For Department of General Services standards, see <http://www.green.ca.gov/EPP/standards.htm>
3. For Sustainable Choice, see <http://www.scs-certified.com/gbc/sustainablecarpet.php>

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 Green Label program.

5.504.4.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 804.4.4-5.504.4.1.

804.4.4 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 for Composite Wood (17 CCR 93120 et seq.), by or before the dates specified in those sections, as shown in Table 804.4.4 5.504.4.5

804.4.4.4 5.504.4.5.1 Early compliance. Reserved. Where complying product is readily available for non-residential occupancies, meet Phase 2 requirements before the compliance dates indicated in Table 804.4.

804.4.4.4 5.504.4.5.2 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.

TABLE 804-4-4 5.504.4.5 FORMALDEHYDE LIMITS¹
Maximum formaldehyde emissions in parts per million.

Product	Phase 1		Phase 2			
	Jan 1, 2009 Current Limit	Jul 1, 2009	Jan 1, 2010	Jan 1, 2011	Jan 1, 2012	Jul 1, 2012
Hardwood Plywood Veneer Core	0.08		0.05			
Hardwood Plywood Composite Core	0.08	0.08				0.05
Particle Board	0.18-0.09			0.09		
Medium Density Fiberboard	0.2-0.11			0.04		
Thin Medium Density Fiberboard ¹	0.21				0.13	

¹Values in this table are consistent with derived from those developed 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.

²Thin medium density fiberboard has a maximum thickness of eight millimeters.

5.504.4.6 Resilient flooring systems. For 50% of floor area receiving resilient flooring, install resilient flooring complying with the VOC-emission limits defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on its Low-emitting Materials List or certified under the Resilient Floor Covering Institute (RFCI) FloorScore program.

Note: See www.chps.net/manual/lem_table.htm.

804.4.6 Thermal Insulation. Comply with Chapter 12-13 in Title 24, Part 12, the California Referenced Standards Code, and with the VOC emission limits defined in CHPS Low-emitting Materials List, www.chps.net/manual/lem_table.htm.

~~**804.4.7 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 CHPS Low emitting Materials List, www.chps.net/manual/lem_table.htm.~~

~~**804.5 Hazardous particulates and chemical pollutants.** Minimize and control pollutant entry into buildings and cross-contamination of regularly occupied areas.~~

~~**804.5.1 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.~~

~~**804.5.2 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.~~

~~**804.5.3 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 prior to occupancy that provides at least a Minimum Efficiency Reporting Value (MERV) of 43 8.~~

~~**804.7 5.504.7 Environmental tobacco smoke (ETS) control.** Prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows where outdoor areas are provided for smoking, and in buildings; 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 805 5.505 INDOOR MOISTURE CONTROL

~~**805.4 5.505.1 Indoor moisture control.** Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24, Part 2, Sections 1203 and Chapter 14. For additional measures not applicable to low-rise residential occupancies, see Section 5.407.2 of [this code](#).~~

SECTION 806 5.506 INDOOR AIR QUALITY AND EXHAUST

~~**806.4 5.506.1 Outside air delivery.** For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 121 of the California Energy Code, CCR, Title 24, Part 6, [or the applicable local code, whichever is more stringent](#), and Chapter 4 of CCR, Title 8, [or the applicable local code, whichever is more stringent](#).~~

~~**806.2 5.506.2 Carbon dioxide (CO₂) monitoring.** Install permanent CO₂ monitoring equipment that permits adjustment of ventilation system controls and set points that can be adjusted based on human occupancy. [For buildings equipped with demand control ventilation](#), CO₂ sensors and ventilation controls shall be specified and installed in accordance with the requirements of the [latest current](#) edition of the California Energy Code, CCR, Title 24, Part 6, Section 121(c).~~

~~**Exception:** In buildings without energy management systems, monitoring equipment shall trigger alarms to alert facilities operators or occupants of ventilation deficiencies.~~

SECTION 807 5.507 ENVIRONMENTAL COMFORT (Reserved)

~~**807.1 Lighting and thermal comfort controls.** Provide controls in the workplace as described in Sections 807.1.1 and 807.1.2.~~

~~**807.1.1 Single occupant spaces.** Provide individual controls that meet energy use requirements in the 2007 California Energy Code in accordance with Sections 807.1.1.1 and 807.1.1.2.~~

~~**807.1.1.1 Lighting.** Provide individual task lighting and/or daylighting controls for at least 90% of the building occupants.~~

~~**807.1.1.2 Thermal comfort.** Provide individual thermal comfort controls for at least 50% 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 121 of the California Energy Code~~

~~**807.1.2 Multi occupant spaces.** Provide lighting and thermal comfort system controls for all shared multi occupant~~

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spaces, such as classrooms and conference rooms.

807.2 Verification of indoor environmental quality. Within a period of six to 18 months after occupancy, conduct an indoor environmental survey of building occupants.

1. Collect voluntary anonymous responses about indoor environmental quality, including thermal comfort, air quality, lighting, acoustics, daylighting, and operable windows.
2. Take corrective action if the survey results indicate that more than 20% of surveyed occupants are dissatisfied with thermal comfort, or if more than 5% complain of odor, irritation, fatigue, nausea, and respiratory problems arising from the workplace.
3. Samples of survey format and appropriate responses may be found at <http://www.cbe.berkeley.edu/RESEARCH/survey.htm>.

807.3 Daylight. Provide daylight spaces as required for toplighting and sidelighting in the 2007 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.

807.4 Views. Achieve direct line of sight to the outdoor environment via vision glazing between 2'6" and 7'6" above finish floor for building occupants in 90% of all regularly occupied areas as demonstrated by plan view and section cut diagrams.

807.4.1 Interior office spaces. Entire areas of interior office spaces may be included in the calculation if at least 75% of each area has direct line of sight to perimeter vision glazing.

807.4.2 Multi occupant spaces. Include in the calculation the square footage with direct line of sight to perimeter vision glazing.

Exceptions to Sections 807.3 and 807.4: 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.

807.5 5.507.4 Acoustical control. Employ building assemblies and components with Sound Transmission Coefficient (STC) values determined in accordance with ASTM E90 and ASTM E413.

807.5.1 5.507.4.1 Exterior noise transmission. Wall and roof-ceiling assemblies making up the building envelope shall have an STC of at least 50, and exterior windows shall have a minimum STC of 30 for any of the following building locations:

1. Within 1000 ft. (300 m.) of right of ways of freeways.
2. Within 5 mi. (8 km.) of airports serving more than 10,000 commercial jets per year.
3. Where sound levels at the property line regularly exceed 65 decibels, other than occasional sound due to church bells, train horns, emergency vehicles and public warning systems.

Exception: Buildings with few or no occupants and 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.

807.5.2 5.507.4.2 Interior sound. 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: http://www.toolbase.org/PDF/CaseStudies/stc_icc_ratings.pdf.

SECTION 808 5.508 OUTDOOR AIR QUALITY

804.6 5.508.1 Ozone depletion and global warming greenhouse gas reductions. Installations of HVAC, refrigeration, and fire suppression equipment shall comply with Sections 804.6.1, 5.508.1.1 and optionally Section 804.6.2 5.508.1.2.

804.6.1 5.508.1.1 Chlorofluorocarbons (CFCs.) Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.

804.6.2 5.508.1.2 Hydrochlorofluorocarbons (HCFCs) and Halons. Install HVAC, refrigeration and fire suppression equipment that do not contain HCFCs or Halons.

Exception: Small HVAC and other equipment such as standard refrigerators, small water coolers, and any other cooling equipment that contains less than 5 pounds of refrigerant.

Notation:

Authority - Health and Safety Code Sections 18930.5, 18934.5 and 18938 (b).

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