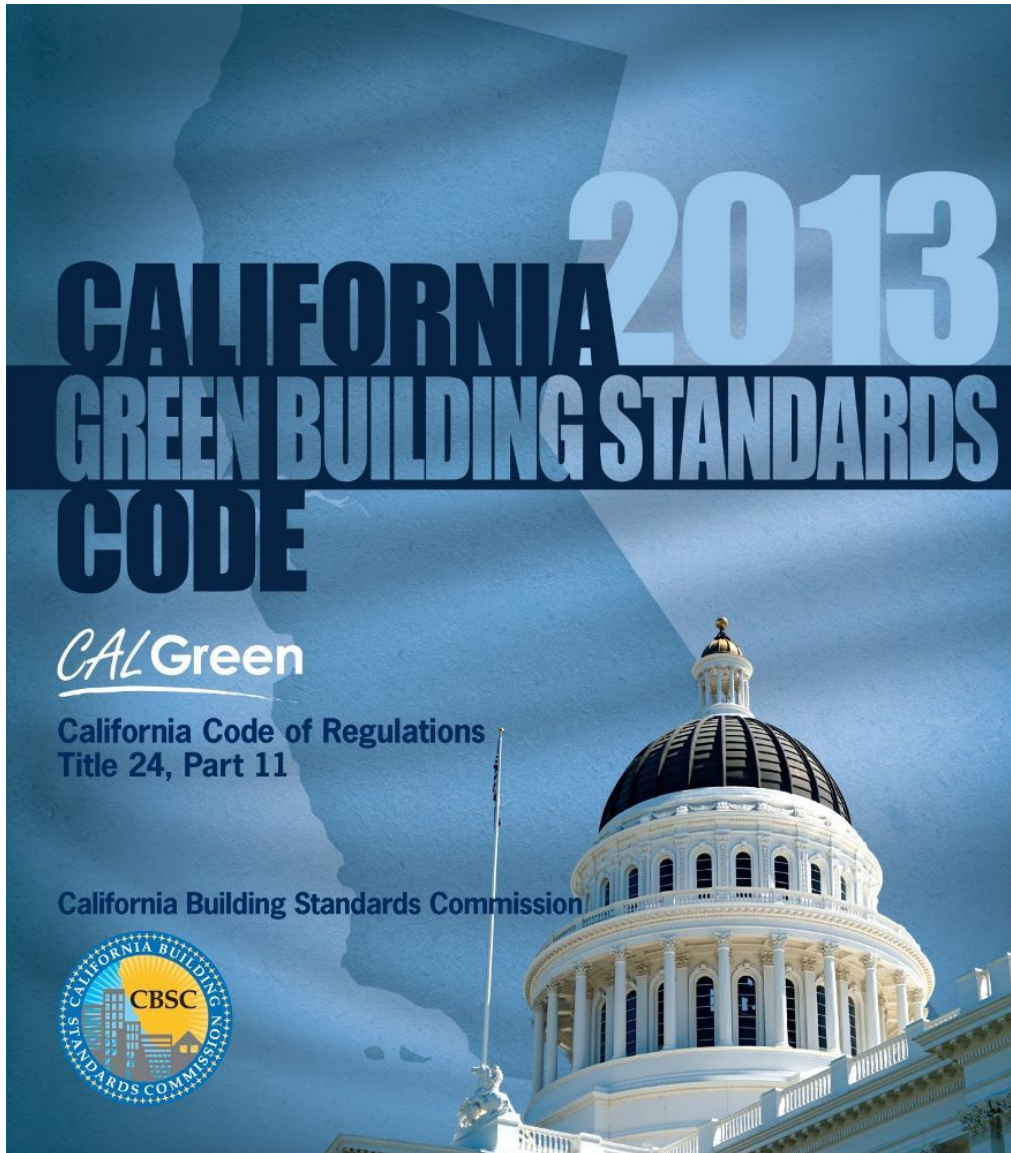


Residential CAL Green An Overview



Presented by:

Gary Wollin



Wollin Group, Inc.

Energy, Efficiency, Education, Earth

Notes and Questions

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

 2013 BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS	 CALIFORNIA 2010 GREEN BUILDING STANDARDS CODE CALGreen California Code of Regulations Title 24, Part 11 California Building Standards Commission	 CALIFORNIA 2013 GREEN BUILDING STANDARDS CODE CALGreen California Code of Regulations Title 24, Part 11 California Building Standards Commission
1	2013 Residential Cal Green Introduction	
 Energy, Efficiency, Education, Earth	2013 California Residential Cal Green	

Disclaimer		 	
2	The Advanced Rater Training Program is funded by California utility customers and administered by Southern California Gas Company (The Gas Company SM) under the auspices of the California Public Utilities Commission, through a contract awarded to Conservation Services Group, California customers who choose to participate in this program are not obligated to purchase any additional services offered by the contractor. The trademarks used herein are the property of their respective owners.		
2013 California Residential Cal Green			

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4



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Training

5

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Residential Cal GREEN

Welcome

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2013 CalGreen



7

The current 2013 edition contains both mandatory and voluntary standards applying to the design and construction of buildings and construction site management.

The California Air Resources Board estimates that the mandatory provisions in this code will reduce greenhouse gases by 3 million metric tons by the year 2020, and this number should increase with the code's new application to nonresidential additions and alterations.

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January 1, 2014



8

The **2013 California Building Standards Code**, including the *California Green Building Standards Code (CALGreen Code)* in Part 11, **became effective on January 1, 2014.**

Supplementary changes adopted and approved in the 2013 Intervening Code Adoption Cycle will become effective on July 1, 2015.

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Code Changes



9

The mandatory provisions of the CALGreen Code set the minimum standard throughout California beginning January 1, 2014.

Local jurisdictions may establish more restrictive green standards due to local climatic, geological, topographical or environmental conditions.

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Low Rise Residential Within the Code



10

“Low-rise residential buildings” used in Section 101.3.1(3) is defined in Section 202 as being three stories or less.

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Non Residential Construction Groups A, B and E



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Assembly Group A

Motion picture theaters, concert halls, banquet halls, nightclubs, restaurants, bowling allies, community halls, courtrooms, libraries, museums, arenas, amusement parks and stadiums.

Business Group B

Banks, barber and beauty shops, civic administration, motor vehicle showrooms, post offices, print shops, professional services offices, radio and television stations.

Educational Group E

Privately funded educational purpose buildings for more than six students at one time through the 12th grade and day care for more than six children 2 years and older.

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Non Residential Construction Groups F, H and I



12

Factory Group F

Building or structure used for factory industrial uses, moderate-hazard occupancy, such as food processing and dry cleaning; and low-hazard manufacturing, such as of brick and ice.

High-Hazard Group H

Building or structure used for manufacturing and storing high-hazard materials.

Institutional Group I

Building or structure used for certain medical care, the care of children and the physically disabled, assisted living facilities, child care facilities and adult care facilities.

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Non Residential Construction Groups

L and M



13

Laboratory Group L

Laboratories with limited storage of hazardous materials as defined in the *California Building Code (CBC)*.

Mercantile Group M

Department stores, drug stores, markets, motor fuel-dispensing stations, retail and wholesale stores and sales rooms.

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Non Residential Construction Groups

S and U



14

Storage Group S

Storage of moderate-hazard materials like furnishings and building materials and storage of low-hazard noncombustible materials such as food, bottles and cans and cement.

Utility and Miscellaneous Group U

Accessory or miscellaneous buildings, as applicable.

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2013 California Building Standards Code



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Title 24, California Code of Regulations

- Part 1 California Administrative Code
- Part 2 California Building Code
- Part 2.5 California Residential Code
- Part 3 California Electrical Code
- Part 4 California Mechanical Code
- Part 5 California Plumbing Code
- **Part 6 California Energy Code**
- Part 7 *Vacant*
- Part 8 California Historical Building Code
- Part 9 California Fire Code
- Part 10 California Existing Building Code
- **Part 11 California Green Building Standards Code**
- Part 12 California Referenced Standards Code

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Code Format

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- **Chapter 1 Administration**
- **Chapter 2 Definitions**
- **Chapter 3 Green Building**
- **Chapter 4 Residential Mandatory Measures**
- **Chapter 5 Nonresidential Mandatory Measures**
- Chapter 6 Referenced Organizations and Standards
- **Chapter 7 Installer and Special Inspector Qualifications**
- **Chapter 8 Compliance Forms and Worksheets**
- **Appendix A4 Voluntary Tiers (Residential)**
- **Appendix A5 Voluntary Tiers (Nonresidential)**

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Table of Contents

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Section 1 Welcome and Overview

Section 2 Mandatory Measures

Section 3 Tier 1 and 2 Overview

Section 4 CalGREEN Residential Sections

Section 5 CF-1R Set Minimum Compliance

Example

At Least 15% Better Tier 1

Example

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Agenda

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This training is designed to assist the Raters in California have a clear view of the Residential CalGREEN code.

While there are many pathways through the code we will demonstrate opportunities for the builders to maximize their construction investment by working with HERS Raters.

We will also demonstrate the possibility of expanding Rater services to Mechanical Contractors by cooperating together to meet several of the new CalGREEN Mandatory requirements.

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Objectives



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What is Green Building?

20

Many organizations have pathways for multiple shades of GREEN.

Green needs to be defined and there are many that will provide definitions.

There are several concepts that are important to consider:

**Sustainable,
Durable,
Healthy,
Comfortable,
Aesthetic,
Conservation,
Management,
Pollution.**

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What are the priorities?

21

Each of the organizations providing 'Green' services have a slightly different way of prioritizing the list of environmental issues, leading to different shades.

Instead of wondering if there will be consensus? Why not examine priorities and habits? What can be done, what options exist to reduce impact on the earth?

That leads us to mandated change CAL Green!

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Purpose of the Code

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Minimize impact of building construction on the environment

- Improve construction practices
- Reduce greenhouse gases and air pollution
- Improve indoor air quality

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23

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

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

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How?

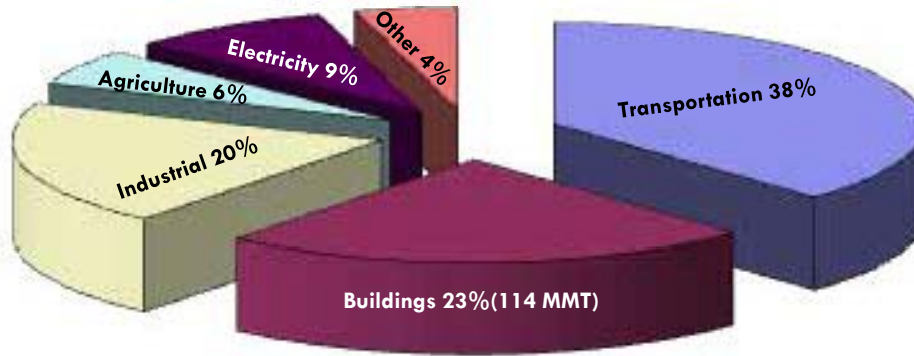
24

By enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact and encourage sustainable construction practices.

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CA GHG Emissions 484 MMT CO₂e (2004)

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Using the Code Book



2013 California Residential Cal Green

Code Format

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- **Chapter 1** **Administration**
- **Chapter 2** **Definitions**
- **Chapter 3** **Green Building**
- **Chapter 4** **Residential Mandatory Measures**
- **Chapter 5** **Nonresidential Mandatory Measures**
- **Chapter 6** **Referenced Organizations and Standards**
- **Chapter 7** **Installer and Special Inspector Qualifications**
- **Chapter 8** **Compliance Forms and Worksheets**
- **Appendix A4** **Voluntary Tiers (Residential)**
- **Appendix A5** **Voluntary Tiers (Nonresidential)**

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Using the Code

28

- ☐ **Is the project “New Construction?”**
- ☐ **Does the project come under the California Residential Code?**
- ☐ **Is the Building three stories or less?**

If the answer to the above questions are all **YES**, then **Chapter 4 and Appendix A4** apply to the project.

Appropriate sections of Chapters 1-3, and 6-8 are also applied.

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☐ **Does the building have any additional occupancies?**

(For example primarily a residential project with non residential secondary occupancies.)

Then CAL Green Chapter 5 and Appendix A5 may also have applicable sections that need to be applied.

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CAL Green Q and A

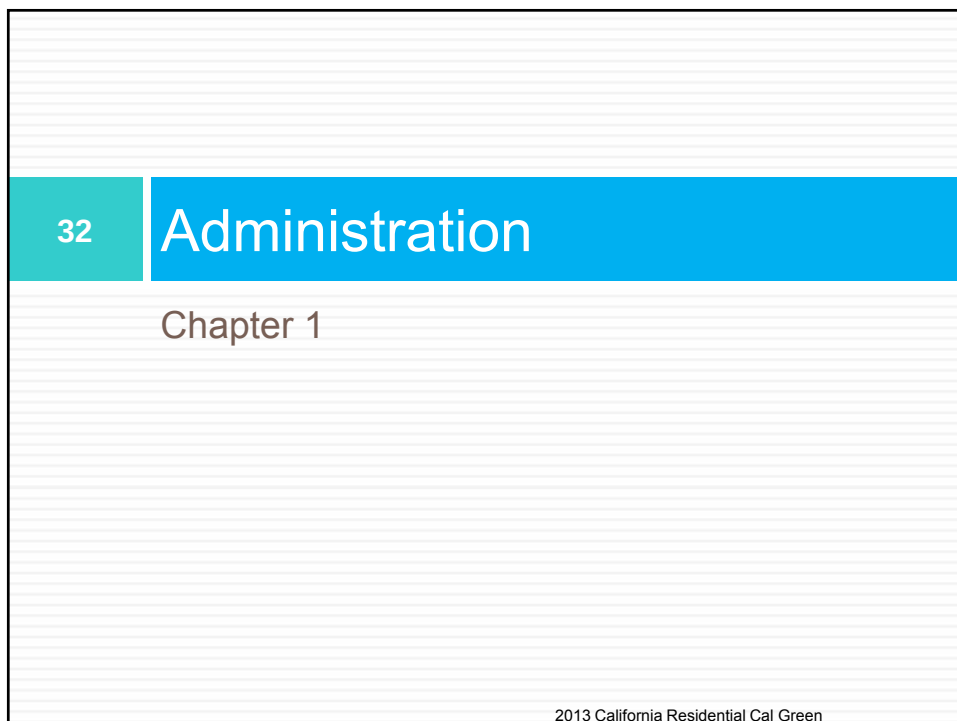


30

☐ **Does CAL Green Apply to detached garages?**

Private garages, unless exceeding size or other specified limits, are exempted U occupancies.

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Cal Green 101.3.1-3 Residential

33

3. All 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 dwelling containing sleeping accommodations with or without common toilets or cooking facilities.

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101.3.1-3 In English

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“Low-rise residential”

“A building that is of Occupancy Group R and is three stories or less, or that is a one- or two- family dwelling or townhouse.”

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101.7 City, County Amendments

35

The 2013 Cal Green is intended to set mandatory minimum standards and voluntary Tiered measures.

Local jurisdictions may increase requirements for their jurisdictions based upon local:

- Climate

- Topographical or geographical conditions

- Environmental conditions

The jurisdictions will file their amendments with the California Building Standards Commission or with the California Energy Commission for any energy related ordinances.

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Definitions

Chapter 2

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Code Layout Adjustments

37

Chapter 2 contains definitions that are used consistently throughout the CAL Green Code.

Additional definitions maybe placed at the beginning of a chapter when terms specific to that section or the provisions within that section need specificity or the terms do not appear in other sections of the CAL Green Regulations.

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General

Chapter 3

2013 California Residential Cal Green

301.1.1

Additions and Alterations

39

Mandatory Measures in Chapter 4 apply to additions and alterations of residential buildings and specifies that the applicable regulations only apply to the specific area of the addition or alteration.

Applicable when the addition or alteration increases a building Conditioned Area, volume, or size.

ALSO, residential buildings undergoing alterations, additions or improvements shall replace noncompliant plumbing fixtures with water conserving plumbing fixtures. See Civil CODE SECTION 1101.1, for the definition of a noncompliant plumbing fixture.

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302.1

Mixed Occupancy

40

Each portion of a mixed occupancy building comply with the specific green building measures applicable to that occupancy.

Example: Live Work loft.



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303.1

Phased Projects

41

The mandatory measures applicable to each phase of construction must be met.

During the initial construction phase (shell), only certain mandatory measures may be applicable.

The remainder of the CAL Green mandatory measures are required for compliance from either the initial tenant or as occupancy improvements are completed in order to achieve compliance with the CAL Green regulations.



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Voluntary Tiers

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Appendix A4 provides a list of Voluntary measures and Checklists for those who wish to go beyond the mandatory measures.

There are two tiers provided for in the Appendix.

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Residential Mandatory Measures

Chapter 4

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Code Covers

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Planning and Design	4.1
Energy Efficiency	4.2
Water Efficiency and Conservation	4.3
Material Conservation and Resource Efficiency	4.4
Environmental Quality	4.5

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Planning and Design



Chapter 4.1

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No Change From CAL GREEN 2010

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SECTION 4.106
Storm Water Drainage and Retention During Construction

Projects which disturbs less than 1 acre of soil and are not part of a larger common plan of development shall manage storm water drainage during construction.

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4.106.2**Storm water drainage and retention during construction**

47

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

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

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4.106.3**Grading and Paving.**

48

Construction plans shall indicate how the site grading or drainage system will manage all surface water flows to keep water from entering buildings.

Examples of methods to manage surface water include, but are not limited to, the following:

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

EXCEPTION: ADDITIONS and ALTERATIONS not altering the drainage path.

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Energy Efficiency



Chapter 4.2

2013 California Residential Cal Green

4.201

Energy Efficiency

52

For the purposes of energy efficiency standards, **a green building should achieve at least a 15 % reduction in energy usage** when compared to the State's mandatory energy efficiency standards.

Mandatory to MEET 2013 T-24

Part 6 Energy Efficiency Compliance

Standards for residential buildings **do not require compliance with levels of minimum energy efficiency beyond those required by the 2013 California Energy Code.**

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Water Efficiency and Conservation



Chapter 4.3

2013 California Residential Cal Green

Plan Check and Inspection

54

Plan Check:
The reviewer and/or plan checker should review the plans and specifications to confirm that the listed fixture types are used
For additions or alterations, confirm that the new fixture flow rates comply with the code.

On-site enforcement:
The inspector should review the permit set of plans to verify that the specified plumbing fixture types are installed.

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Compliance Method

55

Specify plumbing fixtures: water closets and urinals that:

- ☐ Do not exceed the maximum flow rates specified above.

Specify plumbing fittings: showerheads that:

- ☐ Do not exceed the maximum flow rate of not more than 2.0 gallons per minute at 80 pounds per square inch. If specifying multiple showerheads serving one shower, verify that the combined flow rates and controls meet the requirements listed above.

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4.303

Indoor Water Use, .1 - .3

56

- .1 Water Closets** **≤ 1.28 (GPF)**
Tank type water closets shall be certified to meet the performance criteria of the **EPA WaterSense** Specification.
- .2 Urinals** **≤ 0.5 (GPF)**
- .3.1 Single Showerheads** **≤ 2.0 (GPM)**
@ 80 psi and certified to meet the performance criteria of the **EPA WaterSense** Specification.
- .3.2 Multiple Showerheads** **≤ 2.0 (GPM)**
@ 80 psi. The combined flow rate of all showerheads and/or other shower outlets are controlled by a single valve and not exceed the above flow rate. OR only one shower outlet may be used at a time. A hand held shower is considered a showerhead.

GPF-Gallons per Flush, GPM-Gallons per Minute

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4.303

Indoor Water Use, .4

57

- .4.1 Residential Lavatory Faucets** **≤ 1.5 (GPM)**
@ 60 psi.
The minimum flow shall not be < 0.8 GPM @ 20 psi.
- .4.2 Lavatory Faucets in common and public use areas** **≤ 0.5 (GPM)**
@ 60 psi.
- .4.3 Metering Faucets** **≤ 0.25 (GPC)**
- .4.4 Kitchen Faucets** **≤ 1.8 (GPM)**
@ 60 psi. Kitchen faucets may temporarily increase the flow rate above the maximum rate, but not to exceed 2.2 GPM @ 60 psi and must default to maximum rate. If complying faucets are not available aerators or other means may be used to achieve the maximum rate.

GPC-Gallons per Cycle

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WaterSense Savings



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By replacing old, inefficient toilets with WaterSense labeled models, the average family **can reduce water used for toilets by 20 to 60 percent**—that's **nearly 13,000 gallons of water savings for your home every year!** They could also save more than \$110 per year in water costs, and \$2,200 over the lifetime of the toilets.

Nationally, if all old, inefficient toilets in the United States were replaced with WaterSense labeled models, we could save **520 billion gallons of water per year, or the amount of water that flows over Niagara Falls in about 12 days.**

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HET (High Efficiency Toilet) 1.28 Gallons Per Flush

59

American Standard
Style That Works Better!

CADET® 3 FloWise® RIGHT HEIGHT™
ROUND FRONT 10" ROUGH-IN TOILET
WITHOUT CHINA

CADET® 3 FloWise® RIGHT HEIGHT™

- 2845 128
 - Vitreous china
 - Meets definition for HET (High Efficiency Toilet)
 - High efficiency (1.28 gpf)
 - Meets EPA WaterSense® criteria
 - Flushes 100% of toilet waste the first time

and makes on the surface

- Includes the **CADET® 3 Flushing System**
 - 16 1/2" rim height for accessible applications
 - Single levers mounted from right side
 - Fully glazed 2 1/2" trapway
 - Detachable 3" x 8" water surface area
 - Chrome-plated tank with full tank cover for superior storage
 - Overlapping 3" flush valve with chemical resistant flapper
 - Chrome top bowl
 - Rugged Comfort® tank-to-bowl flushing system
 - Sanitary demount seat with four point back stabilization
 - 2 color-matched seat caps
 - 100% factory flush tested
 - 8 year warranty

Normal Dimensions:
66" x 33" x 29" (26 1/4" x 13 1/4" x 30 1/4")
Fixture only, seat and supply by others

Alternative Tank Configurations Available:
• **4015 128** Tank

Compliance Certifications:
Meets or Exceeds the Following Specifications:
• ASME A112.19.2/CSA B45.1-08 for Vitreous China Products
• 100% EPA WaterSense® Specification for HETs

To Be Specified:
1. Color: 2 White, 3 Blue, 4 Green, 5 Black
2. Seat: #1020 1/2" Round Front Comfort® Blue-Close seat (seat and cover with ease 19" of travel)
3. Seat: #1020 1/2" Round Front EverClean® seat (seat and cover)
4. Seat: #1020 1/2" Round Front EverClean® Round Front Seat with Blue-Close Snap-On hinges
5. Supply with stop

CADET® 3 FloWise®

KOHLER

WELLWORTH®
CLASS FIVE® TOILET
K-3577

Features

- Vitreous china
- Round bowl
- Clean Flow® Flushing system
- Polished chrome top bowl
- Easy access

1.28 gpf (4.8 gfl)

Optional tank cover locks

- 10 1/2" (267 mm) x 7 1/2" (191 mm) water area
- 27 1/2" (699 mm) x 19 1/2" (493 mm) x 20 1/4" (514 mm)

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.19.2/CSA B45.1
- EPA WaterSense®

Colors/Finishes

- G White
- Other: Refer to Price Book for additional colors/finishes

Accessories

- G White
- CP Polished Chrome
- PG Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Specified Model

Model	Description	Top Lever	Colors/Finishes
K-3577	Class Five Toilet	Left Hand	G White
K-3577-0A	Class Five Toilet	Right Hand	G White
K-3577-0B	Class Five Toilet with tank cover locks	Left Hand	G White
K-3577-0C	Class Five Toilet with tank cover locks	Right Hand	G White

Product Specification

The maximum bowl height shall be made of vitreous china. Toilet shall be 27 1/2" (699 mm) in length, 19 1/2" (493 mm) in width and 20 1/4" (514 mm) in height with a 10 1/2" (267 mm) by 7 1/2" (191 mm) water area. Toilet shall be 1.28 gpf (4.8 gfl) with Clean Flow® Flushing system. Toilet shall have a 10 1/2" (267 mm) trapway. Toilet shall include optional chrome top bowl. Toilet shall be 12" (305 mm) rough-in and have supply. Toilet shall feature optional tank cover locks. Round front bowl toilet shall be Kohler Model K-3577 or K-3577-0A.

Page 1 of 2
10/17/12 JLS-LMS

USA/Canada: 1-800-451-KOHLER
(1-800-451-4637)
www.kohler.com

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WaterSense Savings

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The average family could save **2,900 gallons per year** by installing WaterSense labeled showerheads.

Since these water savings will reduce demands on water heaters, they will also save energy.

In fact, the average family could save more than 370 kilowatt hours of electricity annually, enough to power a house for 13 days.

On a national scale, if every home in the United States installed WaterSense labeled showerheads, we could save more than \$2.2 billion in water utility bills and more than **260 billion gallons of water annually**. In addition, we could avoid about \$2.6 billion in energy costs for heating water.

Another 6 days of water over Niagara Falls

Example Manufacturers Cut Sheet

1.75 Gallons Per Minute

61



DESCRIPTION

- Available finishes identified by suffix
- Nonmetallic spray face and shell
- Brass swivel ball assembly

OPERATION

- 3 functions: massage, full and combined

• Rotate outer ring to select

FLOW

- Designed to deliver 1.75 gpm (6.65 L/min) max at 80 psi

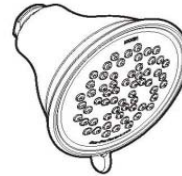
STANDARDS

- Third party certified to WaterSense, ASME A112.18.1/CSA B125.1 and all requirements referenced therein

WARRANTY

- Lifetime limited warranty against leaks, drips and finish defects to the original consumer purchaser
- 5 year warranty if used in commercial installations

Specifications



**Envi™ Eco-Performance
3-Function Showerhead**

Models: 3233 series



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WaterSense Savings



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Replacing old, inefficient faucets and aerators with WaterSense labeled models **can save the average family 700 gallons of water per year**, equal to the amount of water needed to take 40 showers.

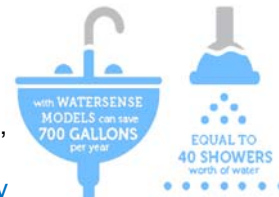
Also, since these water savings reduce demands on water heaters, households will also **save enough energy to run a hairdryer 10 minutes a day for a year**.

Achieving these savings can be as easy as twisting on a WaterSense labeled aerator, which can cost as little as a few dollars.

If every home in the United States replaced existing faucets and aerators with WaterSense labeled models, we could save nearly \$1.2 billion in water and energy costs and **64 billion gallons of water across the country annually** - **equivalent to the annual household water needs of more than 680,000 American homes**.

Nearly another 1 1/2 days of water over Niagara Falls

REPLACING FAUCETS AND AERATORS



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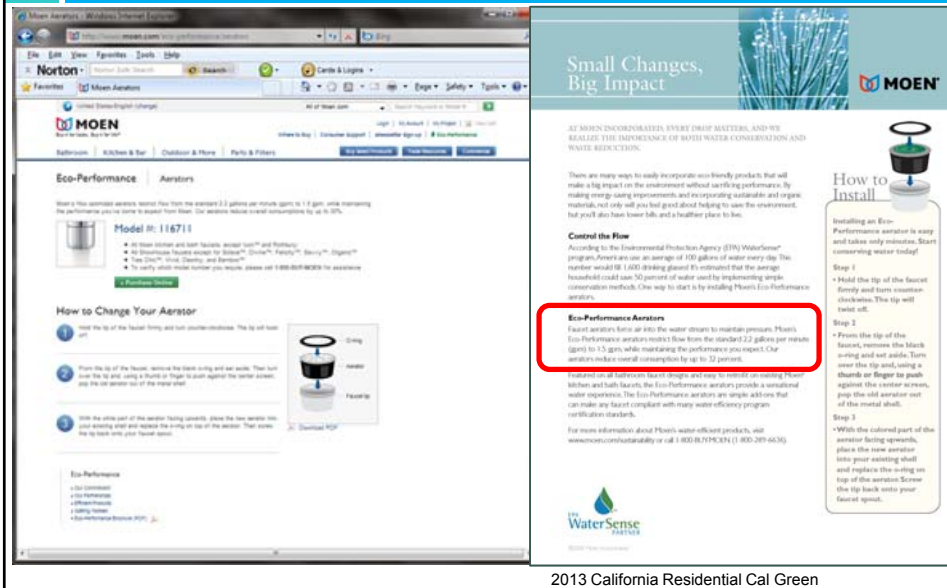
2013 California Residential Cal Green

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Replacement Aerators

65



Small Changes, Big Impact

AT MOEN INCORPORATED, EVERY DROOP MATTERS, AND WE REALIZE THE IMPORTANCE OF BOTH WATER CONSERVATION AND WATER EFFICIENCY.

There are many ways to easily incorporate eco-friendly products that will make a big impact on the environment without sacrificing performance. By making energy-saving improvements, and by repairing, maintaining and upgrading materials, not only will you feel good about helping to save the environment, but you'll also have lower bills and a healthier place to live.

Control the Flow

According to the Environmental Protection Agency (EPA) WaterSense program, aerators are one of the easiest ways to save water. The average household could save 30 percent of water used by implementing simple conservation methods. One way to start is by installing Moen's Eco-Performance aerators.

Eco-Performance Aerators

Faucet aerators force air into the water stream to maintain pressure. Moen's Eco-Performance aerators reduce flow from the standard 2.2 gallons per minute (gpm) to 1.5 gpm while maintaining the performance you expect. Our aerators reduce overall consumption by up to 33 percent.

For more information about Moen's water-efficient products, visit moen.com/conservation or call 1-800-877-6329 (1-800-267-6036).

How to Install

Installing an Eco-Performance aerator is easy and takes only minutes. Start conserving water today!

Step 1

- Hold the tip of the faucet firmly and turn clockwise. The tip will twist off.

Step 2

- From the tip of the faucet, remove the black cap and set aside. Turn over the tip and, using a thumb or finger to push against the center screen, pop the old aerator out of the metal shell.

Step 3

- With the colored part of the aerator facing upwards, place the new aerator into your existing shell and replace the cap on top of the aerator. Screw the tip back onto your faucet spout.

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4.303.1.3.2

Multiple showerheads serving one shower.

66

The combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 2.0 gpm @ 80 psi or only one shower outlet may be operational at a time.



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**“When the wells dry, we know the worth of water.”
— Benjamin Franklin**

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Outdoor Water Use

Chapter 4.3

2013 California Residential Cal Green

4.304.1 Irrigation Controllers.

69

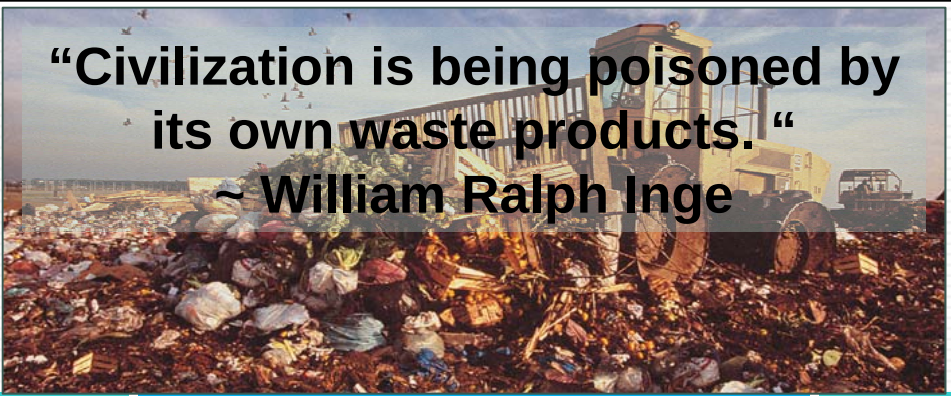
Automatic irrigation system controllers for landscaping provided by the builder and installed at the time of final inspection shall comply with the following:

Controllers shall be weather- or soil moisture-based controllers that automatically adjust irrigation in response to changes in plants' needs as weather conditions change.

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.

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**“Civilization is being poisoned by
its own waste products.”
~ William Ralph Inge**

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**Material Conservation and Resource
Efficiency**



Chapter 4.4

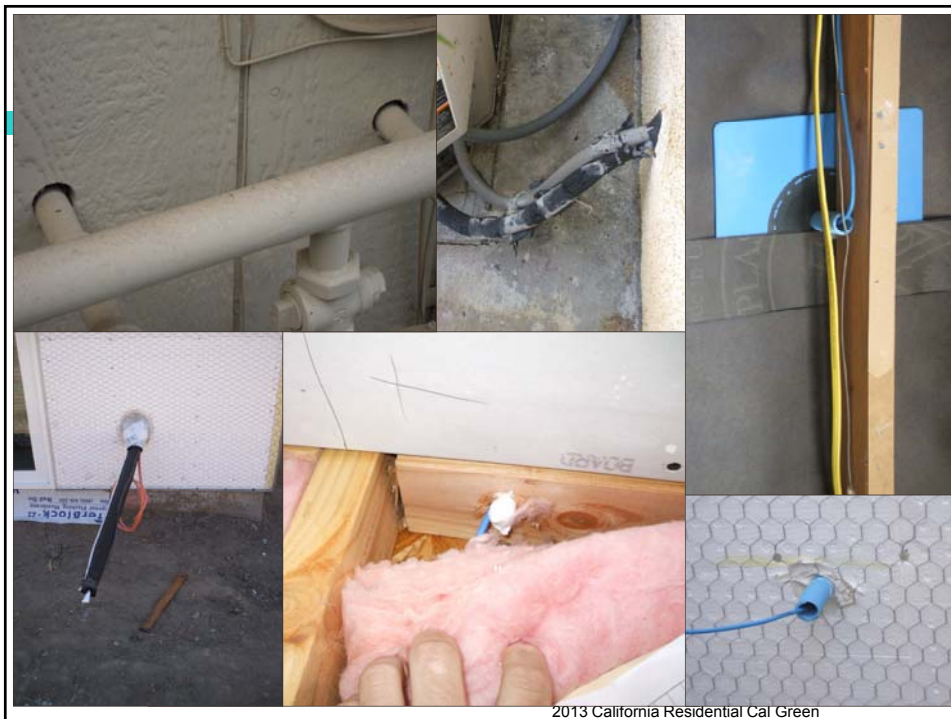
2013 California Residential Cal Green

4.406.1**Joints and Openings.**

71

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

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4.408.1

Construction waste reduction of at least 50%.

73

Recycle and/or salvage for reuse a minimum of 50 percent of the nonhazardous construction and demolition debris, or meet a local construction and demolition waste management ordinance, whichever is more stringent.

Exceptions:

Excavated soil and land-clearing debris.

Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist or are not located reasonably close to the jobsite.

The enforcing agency may make exceptions to the requirements of this section when isolated jobsites are located in areas beyond the haul boundaries of the diversion facility.

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4.408.2**Construction waste management plan.**

75

Submit a construction waste management plan, the plan shall be updated as necessary and available during construction.

Identifies the construction and demolition waste materials to be diverted from disposal by recycling, reuse on the project or salvage for future use or sale.

Specify if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).

Identify diversion facilities where the construction and demolition waste material will be taken.

Identify construction methods employed to reduce the amount of construction and demolition waste generated.

Specify that the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.

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4.408.4**Construction waste management plan.**

76

Waste stream reduction alternative **[LR]**. Projects that generate a total combined weight of construction and demolition waste disposed of in landfills, which do not exceed **4 lbs/ ft²** of the building area shall meet the minimum 50% construction waste reduction requirement in Section 4.408.1

Waste stream reduction alternative **[HR+]**. Projects that generate a total combined weight of construction and demolition waste disposed of in landfills, which do not exceed **2 lbs/ ft²** of the building area shall meet the minimum 50% construction waste reduction requirement in Section 4.408.1

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4.408.5

Documentation

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Sample Forms found in “A Guide to the California Green Building Standards Code (Residential)” located at:

www.hcd.ca.gov/CALGreen.html

Mixed construction and demolition debris (C&D) processors can be located as the California Department of Resources Recycling and Recovery (CalRecycle)

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4.410.1

Operation and Maintenance Manual

78

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

1. Directions to the owner or occupant that the manual shall remain with the building throughout the life cycle of the structure.

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4.410.1**Operation and Maintenance Manual**

79

2. Operation and maintenance instructions for the following:

- a. Equipment and appliances, including water-saving devices and systems, HVAC systems, water-heating systems and other major appliances and equipment.
- b. Roof and yard drainage, including gutters and downspouts.
- c. Space conditioning systems, including condensers and air filters.
- d. Landscape irrigation systems.
- e. Water reuse systems.

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4.410.1**Operation and Maintenance Manual**

80

- 3. Information from local utility, water and waste recovery providers on methods to further reduce resource consumption, including recycle programs and locations.
- 4. Public transportation and/or carpool options available in the area.

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4.410.1

Operation and Maintenance Manual

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5. Educational material on the positive impacts of an interior relative humidity between 30–60 percent and what methods an occupant may use to maintain the relative humidity level in that range.
6. Information about water-conserving landscape and irrigation design and controllers which conserve water.

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4.410.1

Operation and Maintenance Manual

82

7. Instructions for maintaining gutters and downspouts and the importance of diverting water at least 5' away from the foundation.
8. Information on required routine maintenance measures, including, but not limited to, caulking, painting, grading around the building, etc.

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4.410.1**Operation and Maintenance Manual**

83

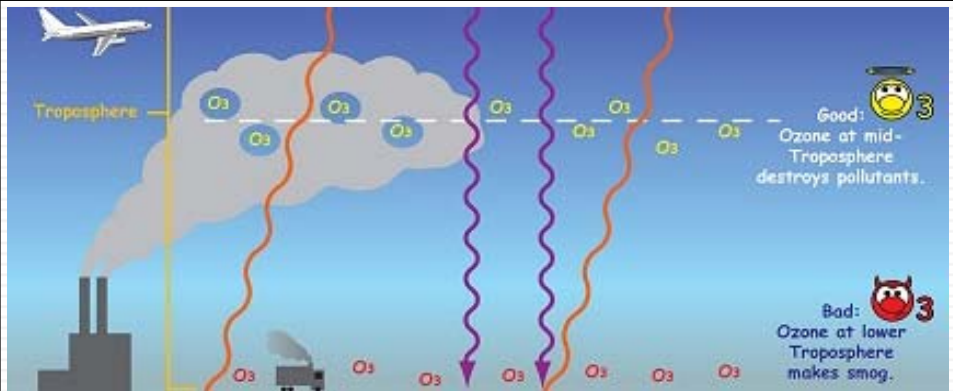
9. Information about state solar energy and incentive programs available.
10. A copy of all special inspection verifications required by the enforcing agency or this code.

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Environmental Quality

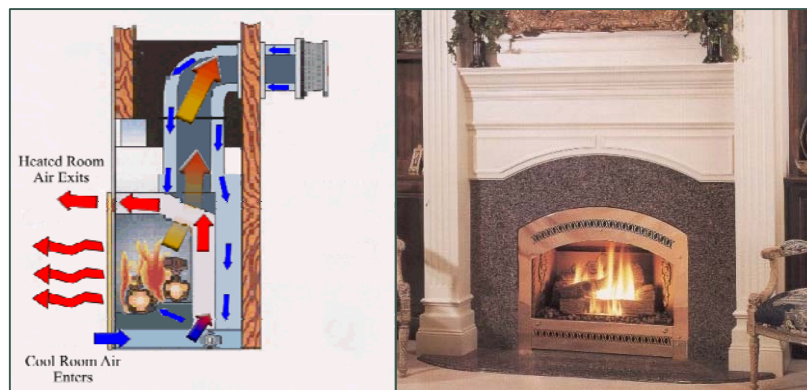
Chapter 4.5

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4.503.1 FIREPLACES

86

Any installed gas fireplace shall be a direct-vent sealed-combustion type.



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4.503.1**FIREPLACES**

87

Any installed woodstove or pellet stove shall comply with U.S. EPA Phase II emission limits where applicable. Woodstoves, pellet stoves and fireplaces shall also comply with applicable local ordinances.

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4.504.1

Covering of duct openings and protection of mechanical equipment during construction

88

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.

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4.504.2.1

Adhesives, sealants and caulks.

90

Adhesives, sealants and caulks used on the project shall meet the requirements of the following standards unless more stringent local or regional air pollution or air quality management district rules apply:

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits, as shown in [Table 4.504.1](#) or [4.504.2](#), as applicable.
2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than 1 pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

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4.504.2.2 Paints and Coatings.

91

Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Suggested Control Measure, as shown in **Table 4.504.3**, unless more stringent local limits apply.

The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in **Table 4.504.3** shall be determined by classifying the coating as a Flat, Non-flat or Non-flat-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, Non-flat or Non-flat-High Gloss VOC limit in Table 4.504.3 shall apply.

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TABLE 4.504.1
ADHESIVE VOC LIMIT^{1,2}
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
Driveway and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250
Other adhesives not specifically listed	50
SPECIALTY APPLICATIONS	
PVC welding	510
CPVC welding	490
ABS welding	375
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special purpose contact adhesive	250
Structural wood member adhesive	140
Top and trim adhesive	250
SUBSTRATE SPECIFIC APPLICATIONS	
Metal to metal	30
Plastic foams	50
Porous material (except wood)	50
Wood	30
Fiberglass	80

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

TABLE 4.504.2
SEALANT VOC LIMIT
Less Water and Less Exempt Compounds in Grams per Liter

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

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TABLE 4.504.3 VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS ^{2,3} Grams of VOC per Liter of Coating, Less Water and Less Exempt Compounds		
COATING CATEGORY	EFFECTIVE 1/1/2010	EFFECTIVE 1/1/2012
Flat coatings	50	
Nonflat coatings	100	
Nonflat-high gloss coatings	150	
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	
Flux finishing coatings	350	
Flux resistive coatings	350	
Floor coatings	100	
Form-release compounds	250	
Graphic arts coatings (sign paints)	500	
High temperature coatings	420	
Industrial maintenance coatings	250	
Low solids coatings ¹	120	
Magnetite cement coatings	450	
Mastic texture coatings	100	
Metallic pigmented coatings	500	
Multicolor coatings	250	
Pre-treatment wash primers	420	
Primers, sealers, and undercoats	100	
Reactive penetrating sealers	350	

TABLE 4.504.3 VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS ^{2,3} Grams of VOC per Liter of Coating, Less Water and Less Exempt Compounds		
COATING CATEGORY	EFFECTIVE 1/1/2010	EFFECTIVE 1/1/2012
Recycled coatings	250	
Roof coatings	50	
Rust preventative coatings	400	250
Shellacs		
Clear	730	
Opaque	550	
Specialty primers, sealers and undercoats	350	100
Stains	250	
Semic conductive	450	
Swimming pool coatings	340	
Traffic marking coatings	100	
Tie and tile refinish coatings	420	
Waterproofing membranes	250	
Wood coatings	275	
Wood preservatives	350	
Zinc-rich primers	340	

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

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SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

Physical State Appearance:	Liquid.
Color:	White
Boiling Point:	No Data
Melting Point:	No Data
Density:	1.0 - 1.2 Lbs./gal.
Vapor Density:	Greater than 1 (Air = 1).
pH:	8.5 to 9.5
Molecular Formula:	Mixture
Molecular Weight:	Mixture
Flash Point:	No Data
VOC Content:	Material VOC: 20 gnl (Includes Water) Coating VOC: 46 gnl (Excludes Water)
	Note - The addition of colorant may add VOCs.

Certification:

VOC compliant in all regulated areas

Based on independent, third-party testing, the Green Promise® designation certifies that this product meets or exceeds each standard shown in the following chart.

LEED®	CHPS (Collaborative for High Performance Schools)	Greenguard Children & Schools®	Greenguard®	VOC (any color)
YES	YES	YES	YES	14 g/l or less

**SHERWIN
WILLIAMS.**

As of 09/22/09, Complies with:	
VOC:	Yes LEED® C02.0 Yes
C02.0 MD:	Yes LEED® C02.0 Yes
C02.0:	Yes LEED® C02.0 Yes
MPI Spec #	147 LEED® H: Yes
NAB:	Yes LEED® S: No Yes

CHARACTERISTICS

Harmony® Interior Latex Semi-Gloss provides a durable, low-odor, anti-microbial*, interior paint formulated without silica. You can use this product, without typical odor complaints, in occupied areas because of the very low odor during application and drying.

Color: Most Colors
To optimize hide and color development, always use the recommended P-Shade primer.
Coverage: 350-400 sq ft/gal @ 4 mils wet, 1.8 mils dry
Drying Time, @ 77°F, 50% RH:
Touch: 1 hour
Recoat: 4 hours
Drying and recoat times are temperature, humidity, and film thickness dependent.

Flash Point: N/A
Finish: 35 - 45 units @ 60°
Tinting with Blend-A-Color:
Base oz/gal **Strength**
Extra White 0-5 100%
Deep Base 4-12 100%
Addition of Blend-A-Color Tinting Color may increase the VOC.

Vehicle Type: Styrenated Acrylic/EVA
B10W08951
VOC (EPA Method 24): 0 g/L; 0.0 lbs/gal

Volume Solids: 39 ± 2%
Water Vapor Permeance: ASTM E 96 A 2.3 perm s
Weight Solids: 47 ± 2%
Weight per Gallon: 9.9 lb

SPECIFICATIONS

Block
1 ct. Loxon Bl
2 cts. Harmony Gloss

Drywall
1 ct. Harmony
2 cts. Harmony Gloss

Masonry
1 ct. Loxon Primer* or Harmony
2 cts. Harmony Gloss

Plaster
1 ct. Premium or Harmony
2 cts. Harmony Gloss

Wood, Composite
1 ct. Premium or Harmony
2 cts. Harmony Gloss

* These primer amounts of VOC minor, noticeable

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4.504.2.3

Aerosol paints and coatings.

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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.

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4.504.3

Carpet systems.

97

All carpet installed in the building interior shall meet the testing and product requirements of one of the following:

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

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4.504.3.1 Carpet cushion.

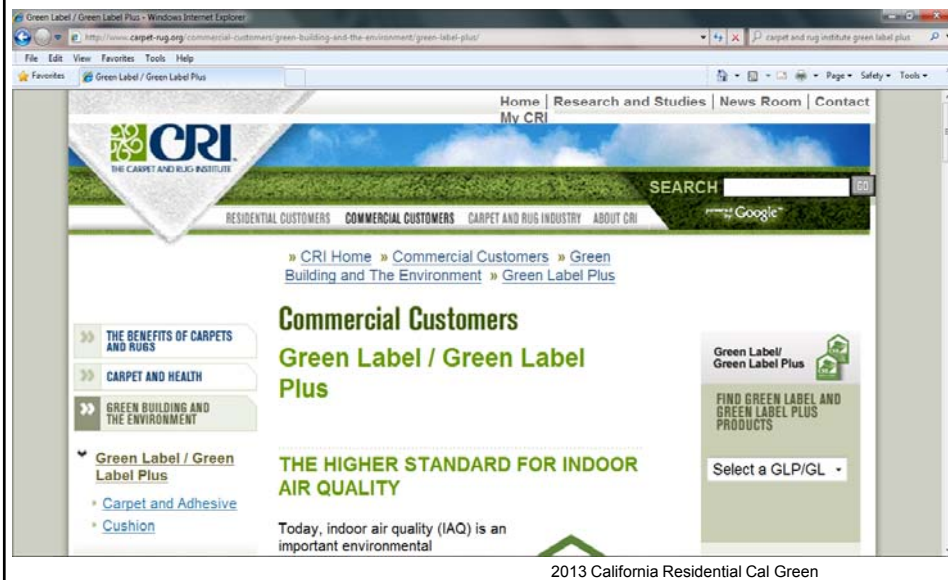
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All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.

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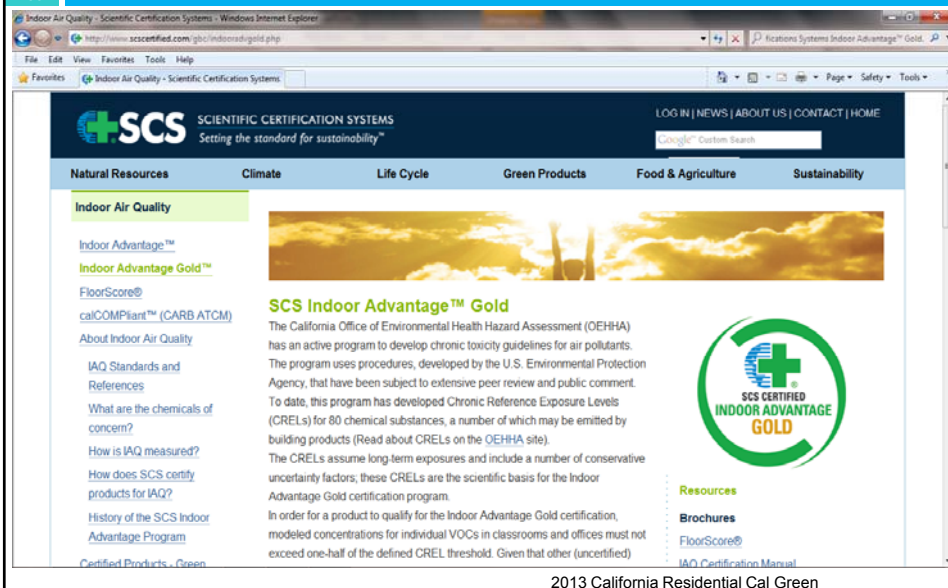
www.carpet-rug.org/commercial-customers/green-building-and-the-environment/green-label-plus/

99



<http://www.scs-certified.com/gbc/indooradvgold.php>

100



4.504.3.2 Carpet adhesive.

All carpet adhesive shall meet the requirements of Table 4.504.1.

Table 4.504.1
ADHESIVE VOC LIMIT^{1,2}
Less Water and Less Exempt Compounds in Grams per Liter

Architectural Applications	Current VOC Limit	Specialty Applications	Current VOC Limit
Indoor carpet adhesives	50	PVC welding	510
Carpet pad adhesives	50	CPVC welding	490
Outdoor carpet adhesives	150	ABS welding	325
Wood flooring adhesive	100	Plastic cement welding	250
Rubber floor adhesives	60	Adhesive primer for plastic	550
Subfloor adhesives	50	Contact adhesive	90
Ceramic tile adhesives	65	Special purpose contact adhesive	250
VCT and asphalt tile adhesives	50	Structural wood member adhesive	140
Drywall and panel adhesives	50	Top and trim adhesive	250
Cove base adhesives	50	SUBSTRATE SPECIFIC APPLICATIONS	
Multipurpose adhesives	70	Metal to metal	30
Structural glazing adhesives	100	Plastic foams	50
Single-ply roof membranes adhesives	250	Porous material (except wood)	50
Other adhesives not specifically listed	50	Wood	30
		Fiberglass	80

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

2. For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1168.

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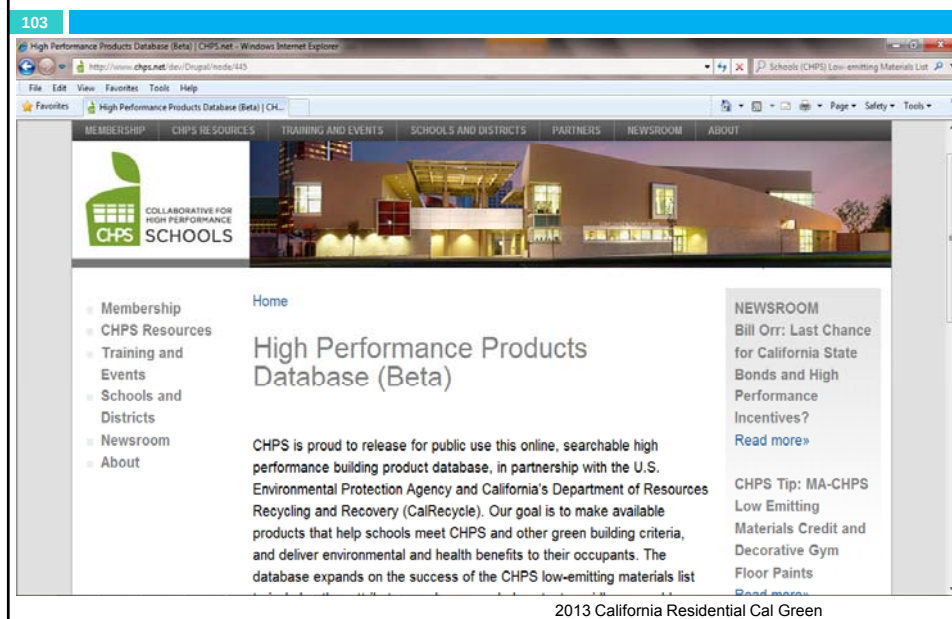
4.504.4 Resilient flooring systems.

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

1. VOC emission limits per Collaborative for High Performance Schools (CHIPS) High Performance Products Database.
2. Products compliant with CHIPS criteria certified under the Greenguard Children & Schools program.
3. Certification under the Resilient Floor Covering Institute (RCFI) FloorScore program.
4. California Department of Public Health, Specification 01350

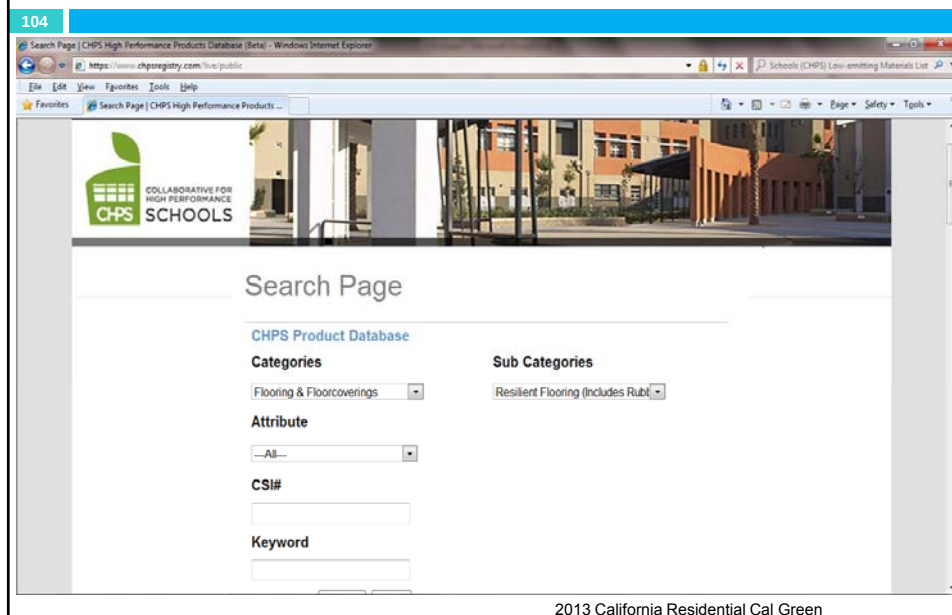
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www.chps.net/dev/Drupal/node/445



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www.chps.net/dev/Drupal/node/445



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www.chps.net/dev/Drupal/node/445

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Search Page | CHPS High Performance Products Database (Beta) - Windows Internet Explorer

https://www.chpsregistry.com/dev/public

Search Page | CHPS High Performance Products ...

Search Results-4 Products found

Page 1 Results per Page: 10 Go

No Image

Marmoleum Decibel
Forbo Flooring Systems
CSI#:
Manufactured in:
 • Hazleton, Pa, UNITED STATES

Attributes:	Verification:	Expiration Date:
CHPS - Low Emitting Material	Download Certificate	01-27-2012

[Product details](#)

Advisories:

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berkeley analytical chemistry • testing • compliance

Certificate of Compliance – VOC Emissions

Marmoleum Decibel Resilient Sheet Flooring #Color - 270735
 Forbo Flooring

Forbo Flooring selected a sample representative of its Marmoleum Decibel Resilient Sheet Flooring #Color - 270735 product manufactured in Forbo - Krommenie and submitted it for testing on December 15, 2009. Berkeley Analytical measured and evaluated the emissions of volatile organic compounds (VOCs) from this sample according to California Department of Health Services (CDHS) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers (CA/DHS/EHLB/R-174, 2004; also known as: chamber testing portion of CA Section 01350) and ASTM Standard Guide D 5116-06. Chemical sampling and analysis were performed following U.S. EPA Compendium Methods TO-1 and TO-17 and ASTM Standard Method D 5191-03.

Calculations were performed with the following standard classroom and office exposure parameters to project the concentrations of VOCs of concern resulting from the use of this product. The results of the test and the calculated concentrations for the classroom and office are presented in Berkeley Analytical laboratory report, 135-031-01A-Jan2710.

Exposure Scenarios

Standardized Environment	Room Volume (m ³)	Area Specific Air Flow Rate (m ³ /h)	Flooring Area (m ²)
Classroom	231	2.10	89.2
Office	30.6	1.85	11.1

Summary of test results according to the CA DHS Standard Practice guidelines:

- Predicted concentrations of all VOCs of concern including formaldehyde were below the guideline concentrations.

Based on these results, the tested product sample meets the VOC emission requirements for use in classroom and office environments as defined in the CA DHS Standard Practice. Thus, the testing requirements are met to qualify the product as a low-emitting material in the Collaborative for High Performance Schools rating system (CHPS Designed & CHPS Verified). Also, the testing requirements are met for USGBC LEED v3 for Commercial Interiors, EQ Credit 4.3 Low-Emitting Flooring Systems under the optional pathway.

Certificate No.: 100127-02
 Dated: January 27, 2010

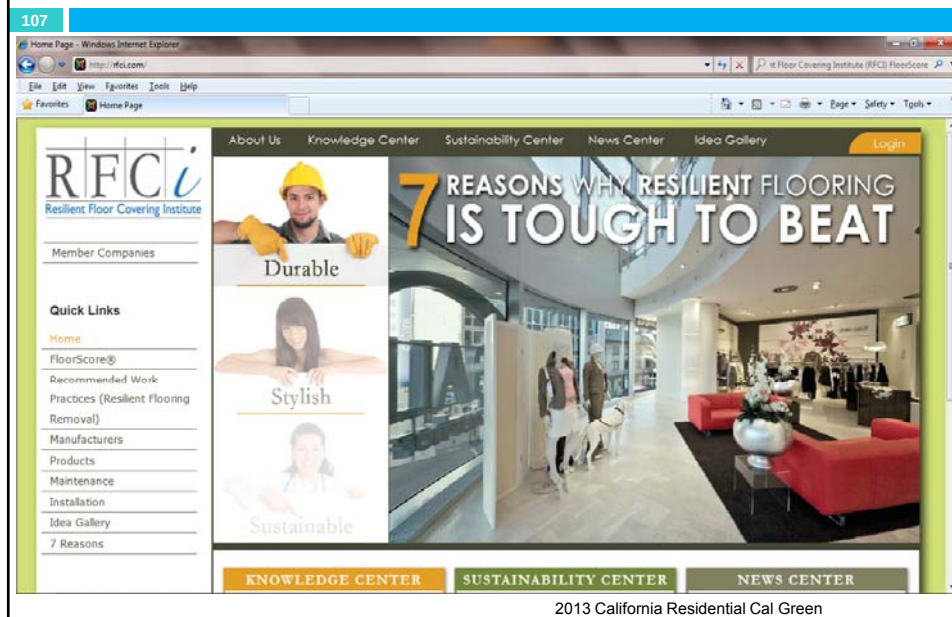
[Signature]
 Raja S. Tannous
 Laboratory Director

[Signature]
 Khalil Campbell
 Quality Manager

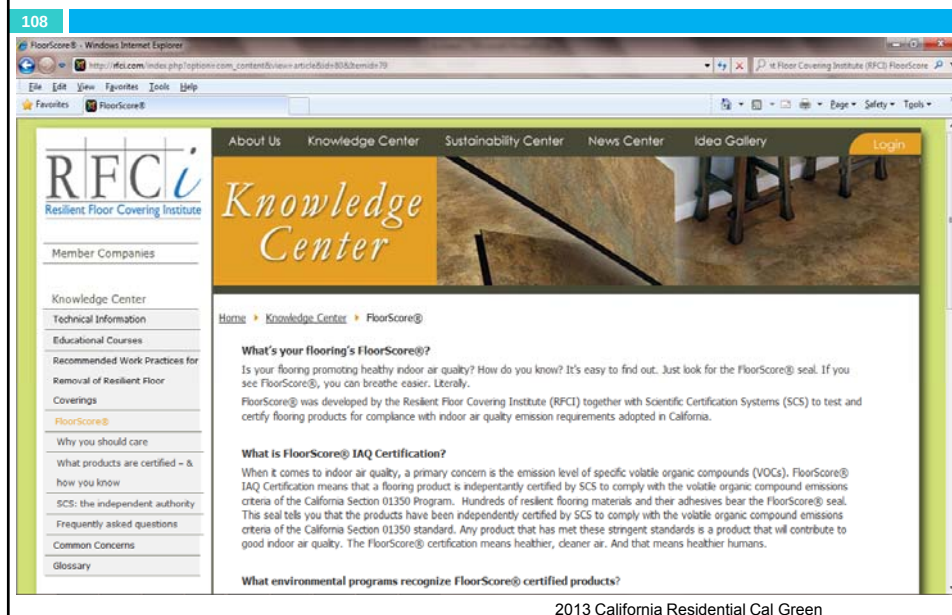
870 Harbour Way South, Suite 6 • Richmond, CA 94804-3012 • Tel: 510-236-2325 • Fax: 510-236-2326
 www.berkeleyanalytical.com

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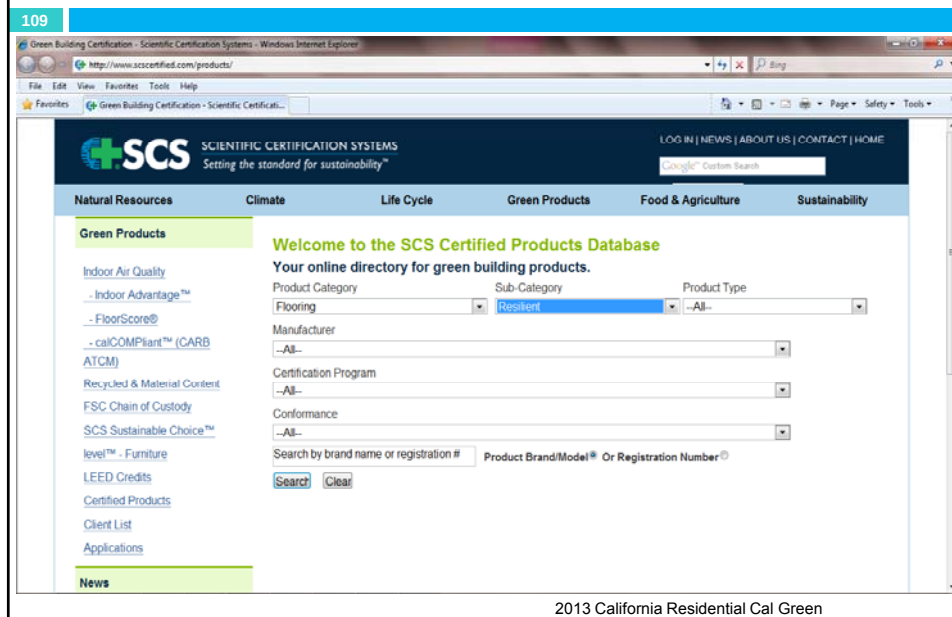
www.rfci.com/



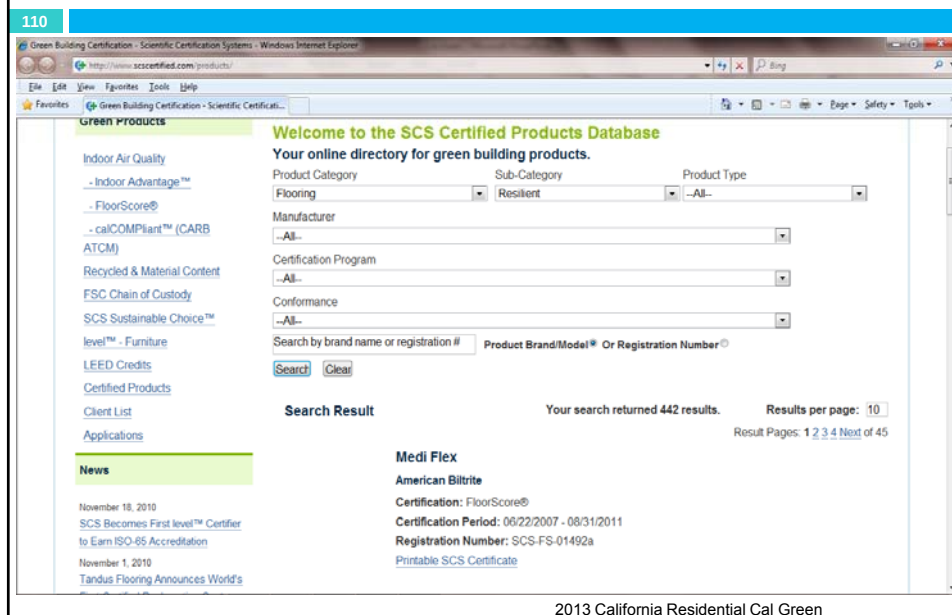
www.rfci.com/



www.scs-certified.com/products/



www.scs-certified.com/products/



4.504.5

Composite wood products.

111

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

TABLE 4.504.5
FORMALDEHYDE LIMITS¹
Maximum Formaldehyde Emissions in Parts per Million

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

1. Values in this table are derived from those specified by the California Air Resources Board, Air Toxics Control Measure for Composite Wood as tested in accordance with ASTM E 1333. For additional information, see *California Code of Regulations*, Title 17, Sections 93120 through 93120.12.
2. Thin medium density fiberboard has a maximum thickness of $\frac{5}{16}$ inch (8 mm).

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4.504.5.1

Documentation

112

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

1. Product certifications and specifications.
2. Chain of custody certifications.
3. Product labeled and invoiced as meeting the Composite Wood Products regulation.
4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, Australian AS/NZS 2269 or European 636 3S standards.
5. Other methods acceptable to the enforcing agency.

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INTERIOR MOISTURE CONTROL



SECTION 4.505

2013 California Residential Cal Green

4.505.2**Concrete slab foundations**

115

If a concrete slab foundation is required to have a vapor retarder by the CBC, Chapter 19 or if concrete slab on grade floors are required to have a vapor retarder by the CRC, Chapter 5 then the project shall comply with the following:

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SECTION 1910**MINIMUM SLAB PROVISIONS**

116

1910.1 General. The thickness of concrete floor slabs supported directly on the ground shall not be less than 3 1/2 inches (89 mm). A 6-mil (0.006 inch; 0.15 mm) polyethylene vapor retarder with joints lapped not less than 6 inches (152 mm) shall be placed between the base course or subgrade and the concrete floor slab, or other approved equivalent methods or materials shall be used to retard vapor transmission through the floor slab.

Exception: A vapor retarder is not required:

1. For detached structures accessory to occupancies in Group R-3, such as garages, utility buildings or other unheated facilities.
2. For unheated storage rooms having an area of less than 70 square feet (6.5 m2) and carports attached to occupancies in Group R-3.
3. For buildings of other occupancies where migration of moisture through the slab from below will not be detrimental to the intended occupancy of the building.
4. For driveways, walks, patios and other flatwork which will not be enclosed at a later date.
5. Where approved based on local site conditions.

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Detached unheated garage **No Vapor retarder**

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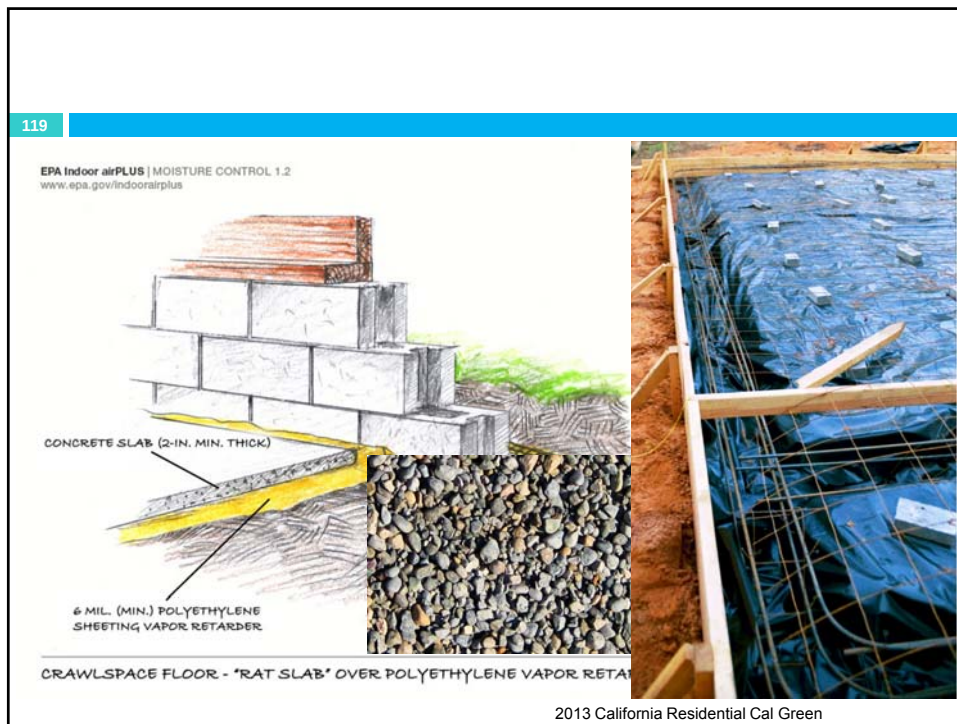
4.505.2.1 Capillary break.

118

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

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

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4.505.3

Moisture content of building materials

120

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

1. Moisture content shall be determined with either a probe-type or contact-type moisture meter.
2. Moisture readings shall be taken at a point 2 feet to 4 feet from the grade stamped end of each piece to be verified.
3. At least three random moisture readings shall be performed on wall and floor framing with documentation acceptable to the enforcing agency provided at the time of approval to enclose the wall and floor framing.

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

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4.506

INDOOR AIR QUALITY AND EXHAUST

122

4.506.1 Bathroom exhaust fans. Mechanical exhaust fans which exhaust directly from bathrooms shall comply with the following:

1. Fans shall be ENERGY STAR compliant and be ducted to terminate outside the building.
2. Unless functioning as a component of a whole house ventilation system, fans must be controlled by a humidity control.

Humidity controls shall be capable of adjustment between a relative humidity range of ≤ 50 to a maximum of 80 %. The control may have a manual or automatic adjustment control.

Note: For the purposes of this section, a bathroom is a room which contains a bathtub, shower or tub/shower combination.

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Bathroom Exhaust Fans

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4.507.2

Heating and air-conditioning system design.

124

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

1. The heat loss and heat gain is established according to ANSI/ACCA **Manual J—2004**, ASHRAE handbooks or other equivalent design software or methods.
2. Duct systems are sized according to ANSI/ACCA **Manual D—2009**, ASHRAE handbooks or other equivalent design software or methods.
3. Select heating and cooling equipment according to ANSI/ACCA 3-S **Manual S—2004**, or other equivalent design software or methods.

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

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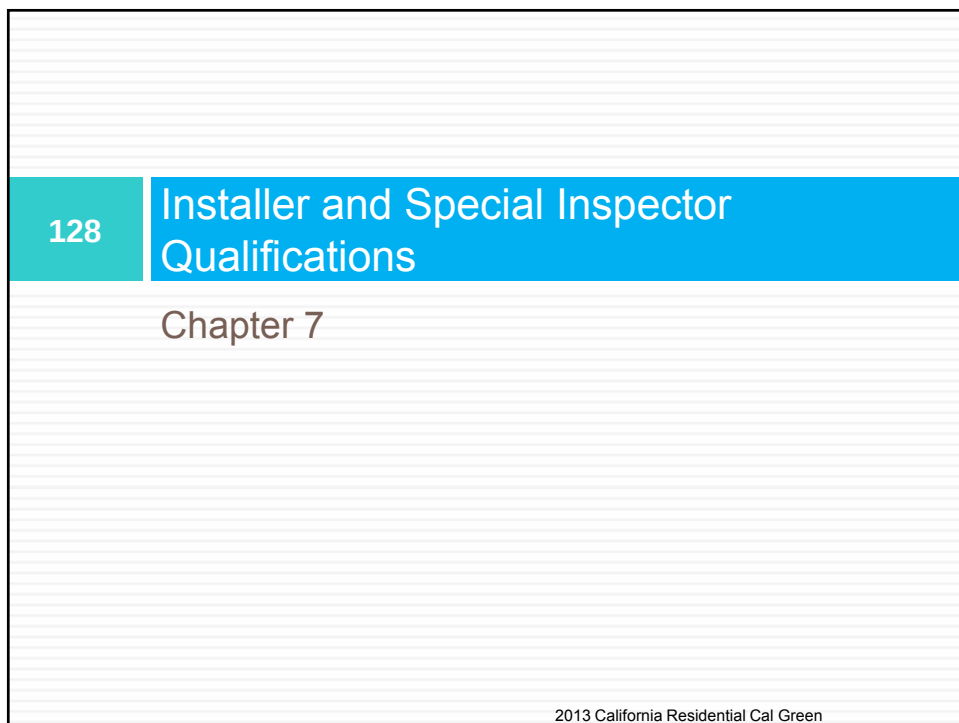
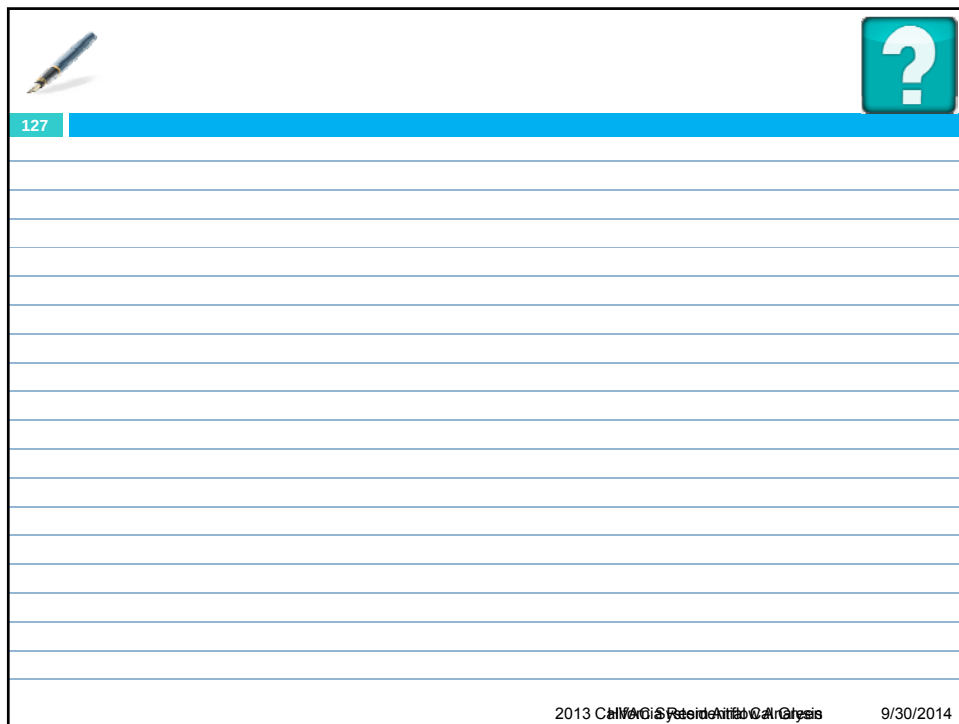
The image displays three book covers side-by-side. The first book on the left is titled 'Residential Load Calculation' and features a large yellow letter 'J' at the top. The middle book is titled 'Residential Equipment Selection' and shows a photograph of a two-story house. The third book on the right is titled 'Residential Duct Systems' and features a large green letter 'D' at the top. All three books are part of a series related to residential energy efficiency.

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The image shows a large, teal-colored square button with rounded corners and a white question mark in the center. The button has a slight 3D effect with a shadow underneath. It is centered on a white background.



702.1

Installer Training

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HVAC System Installers shall be trained and certified in the proper installation of HVAC systems including ducts and equipment by a nationally or regionally recognized training or certification program.

Uncertified persons may perform HVAC installations when under the direct supervision and responsibility of a person trained and certified to install HVAC systems or a contractor licensed to install HVAC systems.

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702.1

Installer Training

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

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702.2**Special Inspection**

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

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702.2**Special Inspection**

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NOTES:

1. Special Inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.

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Residential Voluntary Measures

Appendix A4

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Tier 1 and Tier 2 Requirements

134

Tier 1 and Tier 2 thresholds require compliance with the mandatory provisions of this code and incorporation of the required prerequisite measures listed in Section A4.601.4.2 for Tier 1 and A4.601.5.2 for Tier 2. Prerequisite measures are also identified in the Residential Occupancies Application Checklist in Section A4.602.

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Tier Groupings

13 Required Measures	Tier 1	Tier 2
4.1 Planning and Design	Top Soil Protection (stockpiled) A4.106.2.3	Top Soil Protection (Stockpiled and Construction Area Flagged) A4.106.2.3
	20% Permeable Paving A4.106.4	30% Permeable Paving A4.106.4
	Cool Roof A4.106.5	Cool Roof A4.106.5
	Comply with at least 2 additional elective measures selected from A4.1	Comply with at least 4 additional elective measures selected from A4.1
4.2 Energy and Efficiency	Exceed T-24 by 15% A4.203.1.1 and A4.203.1.2.1	Exceed T-24 by 30% A4.203.1.1 and A4.203.1.2.2
	Additions and Alterations A4.203.1.1 and A4.204.1.2.1	Additions and Alterations A4.204.1.1 and A4.204.1.2.2
4.3 Water Efficiency and Conservation	Comply with landscape irrigation water budget requirements. A4.304.3	Comply with landscape irrigation water budget requirements. A4.304.3
	Potable Water use reduction for Irrigation (65% ETo) A4.304.4	Potable Water use reduction for Irrigation (60% ETo) A4.304.4
	Comply with at least 1 additional elective measures selected from A4.3	Comply with at least 3 additional elective measures selected from A4.3

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Tier Groupings

136 Required Measures	Tier 1	Tier 2
4.4 Material Conservation and Resource Efficiency	20% Cement Reduction A4.403.2	25% Cement Reduction A4.403.2
	10% Recycled Content A4.405.3.1	15% Recycled Content A4.405.3.1
	65% Reduction in Construction Waste A4.408.1	75% Reduction in Construction Waste A4.408.1
	Comply with at least 2 additional elective measures selected from A4.4	Comply with at least 4 additional elective measures selected from A4.4
4.5 Environmental Quality	90% Resilient Flooring A4.504.2	100% Resilient Flooring A4.504.2
	Thermal insulation requirements (VOC Limits) A4.504.3	Thermal Insulation requirements (No formaldehyde) A4.504.3
	Comply with at least 2 additional elective measures selected from A4.5	Comply with at least 1 additional elective measures selected from A4.5

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A4.601.3**Elective measures.**

137

In addition to the required measures, Tier 1 and Tier 2 buildings must incorporate at least the number of elective measures specified in Sections A4.601.4.2 and A4.601.5.2.

Elective Measure	Tier 1	Tier 2
Planning and Design	2	4
Energy and Efficiency		
Water Efficiency and Conservation	1	3
Material Conservation and Resource Efficiency	2	4
Environmental Quality	1	1

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A4.101**General**

138

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

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DEFINITIONS

e

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

Note: See the full text at EPA's web site.

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Planning and Design

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Required Measures	Tier 1	Tier 2
Planning and Design	Top Soil Protection (stockpiled)	Top Soil Protection (Stockpiled and Construction Area Flagged)
	20% Permeable Paving	30% Permeable Paving
	Cool Roof	Cool Roof
	Comply with at least 2 additional elective measures	Comply with at least 4 additional elective measures

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A4.103.1

Optional Elective Measure

SITE SELECTION

142

A site which complies with at least one of the following characteristics is selected:

1. An infill site is selected.
2. A greyfield site is selected.
3. An EPA-recognized and remediated Brownfield site is selected.

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A4.103.2

Optional Elective Measure

Community Connectivity

143

1. Locate project within ¼ mile true walking distance of at least 4 basic services, readily accessible by pedestrians.
2. Locate project within a ½ mile true walking distance of at least 7 basic services, readily accessible by pedestrians.
3. Other methods increasing access to additional resources

List of services:

bank, place of worship, grocery, day care, cleaners, fire station, barber shop, beauty shop, hardware store, laundry, library, medical clinic, dental clinic, senior care facility, park, pharmacy, post office, restaurant, school, supermarket, theater, community center, fitness center, museum, or farmers market.

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A4.104.1

Optional Elective Measure

SITE PRESERVATION

144

Supervision and education. Individuals with oversight authority on the project who have been trained in areas related to environmentally friendly development can teach green concepts to other members of the development staff and ensure that training is provided to all parties associated with the development of the project.

Prior to beginning the construction activities, all parties involved with the development process shall receive a written guideline and instruction specifying the green goals of the project.

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A4.105

Optional Elective Measure

DECONSTRUCTION AND REUSE OF EXISTING MATERIALS

145

Existing buildings on the site are deconstructed and the salvaged materials are reused. Reused materials or products must comply with current building standards requirements or be an accepted alternate method or material.

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A4.105.2

Optional Elective Measure

Reuse of materials.

146

Materials which can be easily reused include but are not limited to the following:

1. Light fixtures
2. Plumbing fixtures
3. Doors and trim
4. Masonry
5. Electrical devices
6. Appliances
7. Foundations or portions of foundations

Note: Reused material must be in compliance with the appropriate Title 24 requirements.

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A4.106**SITE DEVELOPMENT**

147

Building orientation. Orient buildings to optimize the use of solar energy with the long side of the house oriented within 30° of south.

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A4.106.2.2**Optional Elective Measure****Soil protection.**

e

The effect of development on building sites is evaluated and the soil is protected by one or more of the following:

1. Natural drainage patterns are evaluated and erosion controls are implemented to minimize erosion during construction and after occupancy.
2. Site access is accomplished by minimizing the amount of cut and fill needed to install access roads and driveways.
3. As allowed by other parts of the California Building Standards Code underground construction activities are coordinated to utilize the same trench, minimize the amount of time the disturbed soil is exposed and the soil is replaced using accepted compaction methods.

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A4.106.2.3

Topsoil protection.



149

Topsoil shall be protected or saved for reuse as specified in this section.

Tier 1

Displaced topsoil shall be stockpiled for reuse in a designated area and covered or protected from erosion.

Note: Protection from erosion includes covering with tarps, straw, mulch, chipped wood, vegetative cover, or other means acceptable to the enforcing agency to protect the topsoil for later use.

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A4.106.2.3

Topsoil protection.



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Tier 2

The construction area shall be identified and delineated by fencing or flagging to limit construction activity to the construction area. Heavy equipment or vehicle traffic and material storage outside the construction area shall be limited to areas that are planned to be paved.

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A4.106.3**Landscape design.**

151

Postconstruction landscape designs shall accomplish one or more of the following:

1. Areas disrupted during construction are restored to be consistent with native vegetation species and patterns.
2. Limit turf areas to the greatest extent possible.

Tier 1 not more than 50% of the total landscaped area.

Tier 2 not more than 25% of the total landscaped area.

3. Utilize at least 75% native California or drought tolerant plant and tree species appropriate for the climate zone region.
4. Hydrozoning irrigation techniques are incorporated into the landscape design.

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A4.106.4**Water permeable surfaces.**

152

Permeable paving is utilized for the parking, walking or patio surfaces in compliance with the following.

- Tier 1** Not less than 20% of the total parking, walking or patio surfaces shall be permeable.
- Tier 2** Not less than 30% of the total parking, walking or patio surfaces shall be permeable.

Exceptions:

1. The primary driveway, primary entry walkway and entry porch or landing shall not be included when calculating the area required to be a permeable surface.
2. Required accessible routes for persons with disabilities as required by California Code of Regulations, Title 24, Part 2, Chapter 11A and/or Chapter 11B as applicable.

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A4.106.5

Cool Roof for Reduction of Heat Island Effect



153

Roofing materials for Tier 1 and Tier 2 buildings shall comply with this section:

Exception:

1. Roof constructions that have a thermal mass over the roof membrane including areas of vegetated (green) roofs, weighing at least 25 lbs/ft².
2. Roof areas covered by building integrated solar photovoltaic panels and building integrated solar thermal panels.

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A4.106.5.1 and .5.2

Solar Reflectance and Thermal Emittance



154

Roofing materials shall have a minimum 3-year aged **solar reflectance** $\geq$ the values specified in:

Roofing materials shall have a CRRC initial or aged thermal emittance $\geq$ the values specified in:

Tier 1, Table A4.106.5.1(1) and A4.106.5.1(3)

Tier 2, Table A4.106.5.1(2) and A4.105.5.1(4)

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Tables A4.106.5.1

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Table A4.106.5.1
Values of Soiling Resistance (β) By Product Type

Product Type	CCRC Product Category	β
Field-applied coating	Field-applied coating	0.65
Other	Not a Field-applied coating	0.70

If CRRC testing for aged solar reflectance is not available for any roofing products use this calculation:

$$\rho_{\text{aged}} = (0.2 + \beta[\rho_{\text{initial}} - 0.2])$$

Where

ρ_{initial} = initial Solar Reflectance and soiling resistance

β = Table A4.106.5.1

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Tables A4.106.5 (1) and (3)



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Table A4.106.5.1(1)
Tier 1 – Low-Rise Residential

Roof Slope	Climate Zone	Minimum 3- Year Aged Solar Reflectance	Thermal Emittance	SRI
$\leq 2:12$	13 & 15	0.55	0.75	64
$> 2:12$	10 - 15	0.20	0.75	16

Table A4.106.5.1(3)
Tier 1 – High-Rise Residential Buildings, Hotels and Motels

Roof Slope	Climate Zone	Minimum 3- Year Aged Solar Reflectance	Thermal Emittance	SRI
$\leq 2:12$	10 & 11, 13 - 15	0.55	0.75	64
$> 2:12$	2 - 15	0.20	0.75	16

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Tables A4.106.5 (2) and (4)



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Table A4.106.5.1(2)
Tier 2 – Low-Rise Residential

Roof Slope	Climate Zone	Minimum 3- Year Aged Solar Reflectance	Thermal Emittance	SRI
≤ 2:12	2, 4, 6 - 15	0.65	0.85	78
> 2:12	2, 4, 6 - 15	0.23	0.85	20

Table A4.106.5.1(4)
Tier 2 – High-Rise Residential Buildings, Hotels and Motels

Roof Slope	Climate Zone	Minimum 3- Year Aged Solar Reflectance	Thermal Emittance	SRI
≤ 2:12	2 - 15	0.65	0.75	78
> 2:12	2 - 15	0.23	0.75	20

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A4.106.5.3

Solar Reflectance Index Alternative

158

Solar Reflectance Index (SRI) equal to or greater than the values specified in:

Tier 1, Table A4.106.5.1(1) and Table A4.106.5.1(3)

Tier 2, Table A4.106.5.1(2) and Table A4.106.5.1(4)

These tables may be used as an alternative to compliance with the 3-year aged solar reflectance values and thermal emittance.

SRI values used to comply with this section shall be calculated using the Solar Reflective Index (SRI) Calculation Worksheet (SRI-WS).

Solar reflectance values used in the SRI-WS shall be based on the aged reflectance values of the roofing product or the equation below if the CRRC certified aged solar reflectance are not available.

$$\rho_{\text{aged}} = (0.2 + \beta[\rho_{\text{initial}} - 0.2])$$

Where

ρ_{initial} = initial Solar Reflectance and soiling resistance

β = Table A4.106.5.1

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Solar Reflectance Index (SRI) Calculation Worksheet

SRI-WS

Computer Generated Form

Date: Climate Zone: Building Type: Residential
Nonresidential

Project Name:

Project Address:

Roofing Products (Cool Roof)
Roofing products with high solar reflectance and thermal emittance are referred to as "Cool Roof", which refers to an outer layer or exterior surface of a roof. As the term implies, the temperature of a cool roof is lower on hot sunny days than for a conventional roof, reducing cooling loads and energy required to provide air conditioning.

The benefit of a high reflectance surface is obvious: while dark surfaces absorb the sun's energy (visible light, invisible infrared, and ultraviolet radiation) and become hot, light-colored surfaces reflect solar energy and stay cooler. However, high emittance is also important. Emittance refers to the ability of heat to escape from the surface once it is absorbed. Surfaces with low emittance (usually shiny, metallic surfaces) contribute to the transmission of heat into the roof components under the roof surface. The heat can increase the building's air conditioning load, resulting in increased energy costs and detracting from the comfort level of the home. High-emittance roof surfaces give off absorbed heat relatively quickly through the path of least resistance, upward and out of the building.

Rating and Labeling
Roofing products that are used for compliance with the standards (prescriptive and performance approaches) are required to be tested and labeled by the Cool Roof Rating Council (CRRRC). Roofing product manufacturers must have their roofing product tested for solar reflectance and thermal emittance, and be labeled according to CRRRC procedures. See example of a CRRRC label at right.

CRRRC-1 Label Attached to Submittal
(Note: If no CRRRC-1 label is available, this compliance method cannot be used and another method is required to meet compliance.)

CRRRC Product ID Number	Manufacturer	Brand	Model	Product Type

Roof Slope	Product Weight	SRI Calculations						
<2:12	>2:12	< 5lb/sq ft	> 5lb/sq ft	Aged Reflectance Listed with CRRRC?	CRRRC listed Aged Solar Reflectance	Initial Solar Reflectance	Calculated Aged Solar Reflectance	Thermal Emittance

Solar Reflectance Index 0

2008 Residential and Nonresidential Roof Certificate December 2009

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CRRC—Cool Roof Rating Council

www.coolroofs.org/

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Cool Roof Rating Council - Windows Internet Explorer

http://www.coolroofs.org/

File Edit View Favorites Tools Help

Favorites Cool Roof Rating Council

CRRC
COOL ROOF RATING COUNCIL

COOL ROOF RATING COUNCIL
The Cool Roof Rating Council (CRRC) is an independent, non-profit organization that maintains a third-party rating system for radiative properties of roof surfacing materials.

Latest News

- **ENERGY STAR® Product Certification:** On March 21, 2011 the Board of Directors approved the implementation of the Evaluation Services CRRC Program (ES-CRRC) as the CRRC's ENERGY STAR Certification Body. Please reference the following links for important changes to the Certification Body Program.
 - [Learn about the ES-CRRC Program.](#)
 - [Learn how to use ES-CRRC to re-qualify and certify your ENERGY STAR products.](#)
- **Note:** In order to meet the March 31, 2011 deadline to re-qualify your products, you must provide ES-CRRC with all preliminary documentation, including a formal letter stating that you would like ES-CRRC to be your CB and a completed data submission form by March 31.
- **2011-2012 ANSI Consensus Review Process for the CRRC-1 Standard**
 - [View the current status of the review process.](#)
 - [View the CRRC-1 Standard document.](#)

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A4.106.5.4

Verification

161

Inspection shall be conducted to ensure roofing materials meet cool roof aged solar reflectance and thermal emittance or SRI values.

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A4.106.6

Optional Elective Measure

Vegetated Roof

162

Install a vegetated roof for at least 50% of the roof area.

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A4.106.7

Optional Elective Measure

Reduction of Heat Island Effect for Non-Roof Areas

163

1. Trees or other plantings to provide shade and that mature within 15 years of planting.
2. Use high albedo materials with an initial solar reflectance value of at least 0.30 as determined by ASTM E 198 or C 1549.
3. Use open grid pavement system or pervious or permeable pavement system.
4. Locate 50% of parking underground or use multilevel parking.
5. Other methods of reducing heat island effects acceptable to the enforcing agency.

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A4.106.8.1

Optional Elective Measure

Electric Vehicle (EV) Charging

164

Dwellings shall comply with the following requirements for the future installation of electric vehicle supply equipment (EVSE).

One and two family dwellings, Install a 1" (minimum) conduit to accommodate a dedicated branch circuit to support the placement of EVSE.

Place a label stating "EV Capable" in a conspicuous place at the service panel.

Multi family dwellings, At least 3% of the total parking spaces, but not less than 1 shall be capable of supporting future electrical vehicle supply equipment (EVSE).

Single Charging Space Required, When only a single charging space is required, install a 1" (minimum) conduit capable of accommodating a dedicated branch circuit to support the placement of EVSE.

2013 California Residential Cal Green

A4.106.8.2

Optional Elective Measure

Electric Vehicle (EV) Charging

165

Multi family dwellings, At least 3% of the total parking spaces, but not less than 1 shall be capable of supporting future electrical vehicle supply equipment (EVSE).

Single Charging Space Required, When only a single charging space is required, install a 1" (minimum) conduit capable of accommodating a dedicated branch circuit to support the placement of EVSE.

Multiple Charging Spaces Required, When multiple charging spaces are required, plans shall include the locations and type of EVSE, conduit, wiring schematics and electrical calculations to verify that the system has the capacity to simultaneously charge all of the electrical vehicles at their full rated amperage.

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A4.106.9.1 and .2

Optional Elective Measure

Bicycle Parking

166

Short Term Parking, Provide permanently anchored bicycle racks within 100' of the visitors entrance, readily visible to passers-by, for 5% of the visitor motorized vehicle parking capacity with a minimum of 1 two bike capacity rack.

Long Term Parking for Multi Family Buildings, Provide on-site bicycle parking for at least 1 bicycle per every two dwelling units, may include.

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

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A4.106.9.3

Optional Elective Measure

Bicycle Parking

167

Long Term Parking for Hotel and Motel Buildings, Provide on-site bicycle parking for every 25,000 ft² but not less than 2. Shall be conveniently reached from the street and may include:

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

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A4.106.10

Optional Elective Measure

Blight Pollution Reduction [HR]

168

Outdoor Lighting Systems,

1. Meet the minimum requirements of the California Energy Code, for **Lighting Zones 1 – 4**; **and**
2. Backlight, Uplight and Glare (BUG) ratings as defined in IES TM-15-11; **and**
3. Allowable BUG ratings not exceeding those shown in Table A4.106.10; **or**

Comply with local ordinance whichever is more stringent.

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TABLE A4.106.10 MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS ^{1,2}				
ALLOWABLE RATING	LIGHTING ZONE 1	LIGHTING ZONE 2	LIGHTING ZONE 3	LIGHTING ZONE 4
Maximum Allowable Backlight Rating³				
Luminaire greater than 2 mounting heights (MH) from property line	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1 – 2 MH from property line	B2	B3	B4	B4
Luminaire back hemisphere is 0.5 – 1 MH from property line	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	B0	B0	B1	B2
Maximum Allowable Uplight Rating				
For area lighting ⁴	U0	U0	U0	U0
For all other outdoor light, including decorative luminaires	U1	U2	U3	U4
Maximum Allowable Glare Rating⁵				
Luminaire greater than 2 MH from property line	G1	G2	G3	G4
Luminaire front hemisphere is 1 – 2 MH from property line	G0	G1	G1	G2
Luminaire front hemisphere is 0.5 – 1 MH from property line	G0	G0	G1	G1
Luminaire back hemisphere is less than 0.5 MH from property line	G0	G0	G0	G1

1. IESNA Lighting Zones 0 and 5 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code*.

2. For property lines that abut public walkways, bikeways, plazas, and parking lots, the property line may be considered to be 5 feet beyond the actual property line for the purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.

3. If the nearest property line is less than or equal to two mounting heights from the back hemisphere of the luminaire distribution, the applicable reduced Backlight rating shall be met.

4. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaires located in these areas shall meet U value limits for "all other outdoor lighting."

5. If the nearest property line is less than or equal to two mounting heights from the front hemisphere of the luminaire distribution, the applicable reduced Glare rating shall be met.

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A4.107.1

INNOVATIVE CONCEPTS AND LOCAL ENVIRONMENTAL CONDITIONS

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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.

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Energy Efficiency

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Required Measures	Tier 1	Tier 2
Energy Efficiency	Meets T-24 Part 6 Performance	Meets T-24 Part 6 Performance
	Exceeds by 15%	Exceeds by 30%
	QII	QII
	Lighting Complies with T-24 Part 6, plus other requirements.	Lighting Complies with T-24 Part 6, plus other requirements.
	Additions and Alterations	Additions and Alterations

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A4.203.1

Performance Approach



173

Newly constructed low-rise residential buildings shall comply with:

A4.203.1.1,—Title 24 Part 6, QII, Lighting Requirements; **and either**

A4.203.1.2.1—Tier 1, Exceed T-24 Part 6 by 15%; **or**

A4.203.1.2.2—Tier 2, Exceed T-24 Part 6 by 30%;

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A4.203.1.1.2

Quality Insulation Installation



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Reference Residential Appendix RA3.5

2013 California Residential Cal Green

A4.203.1.1.3**Lighting**

175

T-24, Part 6 Section 150.0(k) and

1. All permanently installed lighting shall be high efficacy.

Exceptions:

1. Night Lights which comply with T-24 Part 6, Section 150.0(k)1E.
2. Lighting Integral to exhaust fans which comply with T-24 Part 6, Section 150.0(k)1F.

2. All permanently installed lighting in bathrooms shall be controlled by a vacancy sensor.

Exception: 1 high efficacy luminaire with total lamp wattage rated to consume 26 watts or less.

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A4.203.1.1.3**Lighting**

176

T-24, Part 6 Section 150.0(k) and

3. Every room larger than 70 ft² which does not have permanently installed lighting and has receptacles installed shall have at least 1 switched receptacle.

4. **Single Family Residences**—All permanently installed outdoor lighting shall have controls per 150.0(k)9Ai.

Multi-family Residential Buildings—All permanently installed outdoor lighting controlled from within a dwelling unit shall be controlled per 150.0(k)9Ai and 9Aiii. Lighting not controlled from within a dwelling unit, per 150.0(k)9Bii.

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A4.204.1

Additions and Alterations



177

Additions and Alterations to low-rise residential buildings shall comply with:

A4.204.1.1,—Lighting Requirements; and either

A4.204.1.2.1—Tier 1, Exceed T-24 Part 6 by 5 - 10%; or

A4.204.1.2.2—Tier 2, Exceed T-24 Part 6 by 10 - 15%;

2013 California Residential Cal Green

A4.203.1.2

Performance Standard



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Tier 1—Exceed T-24 by 15%,

Tier 2—Exceed T-24 by 30%,

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A4.204.1**Additions and Alterations**

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Lighting

1. All newly installed, permanently installed lighting shall be High Efficacy.

Exceptions:

1. Night Lights which comply with T-24 Part 6, Section 150.0(k)1E.
2. Lighting Integral to exhaust fans which comply with T-24 Part 6, Section 150.0(k)1F.

2. All newly installed lighting in bathrooms shall be controlled by a vacancy sensor.

Exception: 1 high efficacy luminaire with total lamp wattage rated to consume 26 watts or less.

3. Every new room larger than 70 ft² which does not have permanently installed lighting and has receptacles installed shall have at least 1 switched receptacle.

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A4.204.1**Additions and Alterations**

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Lighting

4. **Single Family Residences**—All newly permanently installed outdoor lighting shall have controls per 150.0(k)9Ai.

Multi-family Residential Buildings—All newly permanently installed outdoor lighting controlled from within a dwelling unit shall be controlled per 150.0(k)9Ai and 9Aiii. Lighting not controlled from within a dwelling unit, per 150.0(k)9Bii.

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A4.204.1.2

Performance Standard



181

If the addition or alteration changes only the envelope with no change to any mechanical system then no additional performance requirements above T-24 Part 6 are required.

Tier 1—Only 1 Mechanical System, exceed T-24, P-6 by 5%; 2 or more Mechanical Systems exceed T-24, P-6 by 10%.

Tier 2—Only 1 Mechanical System, exceed T-24, P-6 by 10%; 2 or more Mechanical Systems exceed T-24, P-6 by 15%.

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Water Efficiency and Conservation

183

Required Measures	Tier 1	Tier 2
Water Efficiency and Conservation	Comply with landscape irrigation water budget requirements.	Comply with landscape irrigation water budget requirements.
	Potable Water use reduction for Irrigation (65% ETo)	Potable Water use reduction for Irrigation (60% ETo)
	Comply with at least 1 additional elective measures selected from A4.3	Comply with at least 3 additional elective measures selected from A4.3

2013 California Residential Cal Green

A4.303.1

INDOOR WATER USE

184

Kitchen faucets. The maximum flowrate of kitchen faucets shall not exceed 1.5 gpm @ 60 psi.

May temporarily exceed maximum flow rate, but may not exceed 2.2 gpm @ 60 psi and must default to 1.5 gpm.

2013 California Residential Cal Green

A4.303.2

Optional Elective Measure

INDOOR WATER USE

185

Alternate Water Sources for Non potable applications. Alternate nonpotable water sources are used for indoor potable water reduction.

2013 California Residential Cal Green

A4.303.3

Optional Elective Measure

INDOOR WATER USE

186

Appliances. Dishwashers and clothes washers shall comply with:

Install at least one qualified ENERGY STAR appliance with maximum water use as follows:

Standard Dishwashers—4.25 gpc

Compact Dishwashers—3.5 gpc

Clothes Washers—Water Factor of 6 g/ft³ of drum capacity

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A4.303.4**Optional Elective Measure****Nonwater supplied urinals and waterless toilets.**

187

Nonwater supplied urinals or composting toilets are installed.



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A4.304.1**Optional Elective Measure****OUTDOOR WATER USE**

188

Low-water consumption irrigation system. Install a low-water consumption irrigation system which minimizes the use of spray type heads. Spray type irrigation may only be used at turf areas. The remaining irrigation systems shall use only the following types of low-volume irrigation systems:

1. Drip irrigation
2. Bubblers
3. Drip emitters
4. Soaker hose
5. Stream-rotator spray heads
6. Other systems acceptable to the enforcing agency

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A4.304.2

Optional Elective Measure

Rainwater systems.

189

A rainwater capture, storage and re-use system is designed and installed to use rainwater generated by at least 65% of the available roof area.



2013 California Residential Cal Green

A4.304.3

Optional Elective Measure

Water budget.

190

When landscaping is provided by the builder, 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.

2013 California Residential Cal Green

www.water.ca.gov/wateruseefficiency/landscapeordinance/

191

Water Use Efficiency - Windows Internet Explorer

http://www.water.ca.gov/wateruseefficiency/landscapeordinance/

Model Water Efficient Landscape Ordinance

Home » Water Use Efficiency » Water Efficient Landscape Ordinance

Updated Model Water Efficient Landscape Ordinance AB 1881

Model Ordinance Technical Assurances

- Material and Literature
- Text changes needed if adopting the State Model Ordinance
- Examples of ordinances:
 - Posting of local ordinances on the Department of Water Resources website does not mean DWR approves or disapproves of an ordinance effectiveness or otherwise make any determination about that ordinance. Consult your Legal Counsel to determine if your ordinance is at least as effective in conserving water as the updated model ordinance adopted by the DWR.
 - Ordinance by City
 - Ordinance by County
- Sample Forms
- CIMIS
- Water Budget Calculator
- California Aerial Imagery

Adoption of the Updated Model Water Efficient Landscape Ordinance

Please read the attached letter from Department of Water Resources Director regarding the adoption of the Updated Model Water Efficient Landscape Ordinance.

- Director's Letter
- Enclosure 1

WATER USE EFFICIENCY

- Water Use Home
- The Water Conservation Act of 2009 (SB7) - **NEW!**
- Agricultural Water Use
- Funding (Financial Assistance)
- Eco/Model Labs
- Landscape
- Leak Detection
- Water Efficient Landscape Ordinance
- Commercial, Industrial, and Institutional
- Publications
- Contacts
- Links

DWR RELATED LINKS

- CIMIS
- Desalination

2013 California Residential Cal Green

Water Budget Workbook

192

Water Budget Workbook

Beta Version 1.01

May 11, 2010

California Department of Water Resources Integrated Water Planning

Water Use and Efficiency Branch

This program calculates Maximum Applied Water Allowance (MAWA) and based on reference evapotranspiration from Appendix A in the Model Ordinance.

Instructions:

- Cells with pale blue background are for entering data.
- Results show in cells with tan background.
- Messages and warnings are displayed in cells with yellow background.
- Select city by clicking on pale blue cell and choosing a city from the drop-down menu.
- ET_a appears in the tan cell below the name of the city.
- Enter total landscape area, including Special Landscape Area (SLA).
- SLA means an area of the landscape dedicated solely to edible plants, areas irrigated with recycled water, water features using recycled water and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface.
- Enter square footage of SLA, if any.
- Required for additional water for SLA (0.3 ET_a accounts for the additional water).
- MAWA results appear in the tan cells.

Maximum Applied Water Allowance Calculations for New and Rehabilitated Landscapes

Enter value in Pale Blue Cells

Tan Cells Show Results

Messages and Warnings

City Name	Fresno	Name of City
ET _a of City from Appendix A	51.10	ET _a (inches/year)
Enter total landscape including SLA	50,000.00	LA (ft ²)
Enter Special Landscape Area	2,000.00	SLA (ft ²)
Results:		
MAWA = (ET _a) × (0.62) × [(0.7 × LA) + (0.3 × SLA)]	1,127,608.00	Gallons
	150,766.50	Cubic Feet
	1,507.67	ACF
	3.46	Acres-Feet
	1.13	Millions of Gallons

2013 California Residential Cal Green

A4.304.4

Potable Water Reduction.



193

When landscaping is provided by the builder, a water efficient landscape irrigation system shall be installed that reduces potable water use. The potable water use reduction shall be calculated beyond the initial requirements for plant installation and establishment.

Calculations for the reduction shall be based on the water budget developed pursuant to [Section A4.304.3](#)

2013 California Residential Cal Green

A4.304.4

Potable Water Reduction



194

Tier 1—Reduce the use of potable water to a quantity that does not exceed 65 percent of ETo times the landscape area.

Tier 2—Reduce the use of potable water to a quantity that does not exceed 60 percent of ETo times the landscape area.

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A4.304.4

Optional Elective Measure

Potable Water Reduction

195

Note: Methods used to comply with this section must be designed to meet the requirements of the other parts of the California Building Standards Code and may include, but are not 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

2013 California Residential Cal Green

A4.304.6

Optional Elective Measure

Irrigation Metering Device

196

For new water service connections, landscaped irrigated areas more than 2,500 ft² shall be provided with separate submeters or metering devices for outdoor potable water use.

2013 California Residential Cal Green

A4.304.5

Optional Elective Measure

Potable Water Elimination.

197

When landscaping is provided by the builder and as allowed by local ordinance, a water efficient landscape irrigation design that eliminates the use of potable water beyond the initial requirements for plant installation and establishment.

Methods used . . . 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 gray water.

2013 California Residential Cal Green

A4.305

Optional Elective Measure

WATER REUSE SYTEMS

198

Graywater. Alternative plumbing piping is installed to permit the discharge from the clothes washer or other fixtures to be used for an irrigation system in compliance with the California Plumbing Code.

2013 California Residential Cal Green

A4.305.2

Optional Elective Measure

RECYCLED WATER PIPING

199

Based on projected availability, dual water piping is installed for future use of recycled water at the following locations:

1. 1. Interior piping for the use of recycled water is installed to serve all water closets, urinals and floor drains.
2. 2. Exterior piping is installed to transport recycled water from the point of connection to the structure.

A4.305.3 Recycled water is used for landscape irrigation.

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Material Conservation and Resource Efficiency

201

Required Measures	Tier 1	Tier 2
Material Conservation and Resource Efficiency	20% Cement Reduction	25% Cement Reduction
	10% Recycled Content	15% Recycled Content
	65% Reduction in Construction Waste	75% Reduction in Construction Waste
	Comply with at least 2 additional elective measures	Comply with at least 4 additional elective measures

2013 California Residential Cal Green

A4.403

Optional Elective Measure

FOUNDATION SYSTEMS

202

A4.403.1 Frost protected foundation systems. As allowed by local conditions, utilize a Frost-Protected Shallow Foundation (FPSF) in compliance with the California Residential Code (CRC). When an FPSF foundation system is installed, the Homeowner's Manual, shall include instructions to the owner or occupant regarding the necessity for heating the structure as required in **Section R403.3** of the California Residential Code.

R403.3 Frost protected shallow foundations. For buildings where the monthly mean temperature of the building is maintained at a minimum of 64°F, footings are not required to extend below the frost line when protected from frost by insulation in accordance with Figure R403.3(1) and Table R403.3(1).

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A4.403.2**Reduction in Cement Use**

203

As allowed by the enforcing agency, cement used in foundation mix design shall be reduced as follows:

Tier 1—Not less than a 20% reduction in cement use.

Tier 2—Not less than a 25% reduction in cement use.

Note: Products commonly used to replace cement in concrete mix designs include, but are not limited to:

1. Fly ash
2. Slag
3. Silica fume
4. Rice hull ash

2013 California Residential Cal Green

A4.404**Optional Elective Measure****EFFICIENT FRAMING TECHNIQUES**

204

A4.404.1 Lumber size. Beams and headers and trimmers are sized and installed as specified in CRC Tables R502.5(1) and R502.5(2). Other calculations acceptable to the enforcing agency which use the minimum size member for the tributary load shall be acceptable.

A4.404.2 Building dimensions and layouts are designed to minimize waste by one or more of the following measures in at least 80% of the structure:

1. Building design dimensions in 2' increments are used.
2. Windows and doors are located at regular 16" or 24" stud positions.
3. Other methods acceptable to the enforcing agency.

2013 California Residential Cal Green

A4.404.3

Optional Elective Measure

Building systems.

205

Use premanufactured building systems to eliminate solid sawn lumber whenever possible.

One or more of the following premanufactured building systems is used:

1. Composite floor joist or premanufactured floor truss framing.
2. Composite roof rafters or premanufactured roof truss framing.
3. Panelized (SIPS, ICF or similar) wall framing system.
4. Other methods approved by the enforcing agency.

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A4.404.4

Optional Elective Measure

Pre-cut Materials and Details

206

Material lists are included in the plans which specify the material quantity and provide direction for on-site cuts to be made from the material provided. Material lists and direction shall be provided for the following systems:

1. Floor framing.
2. Wall framing.
3. Ceiling and roof framing.
4. Structural panels and roof sheathing.

2013 California Residential Cal Green

A4.405

Optional Elective Measure

MATERIAL SOURCES

207

A4.405.1 Prefinished building materials. Utilize prefinished building materials which do not require additional painting or staining when possible. One or more of the following building materials that do not require additional resources for finishing are used:

1. Exterior trim not requiring paint or stain.
2. Windows not requiring paint or stain.
3. Siding or exterior wall coverings which do not require paint or stain.

2013 California Residential Cal Green

A4.405.2

Optional Elective Measure

Concrete Floors

208

Floors that do not require additional coverings are used including but not limited to stained, natural or stamped concrete floors.



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A4.405.3**Recycled Content**

209

Use materials, equivalent in performance to virgin materials, with a total (combined) recycled content value (RCV) of:

Tier 1—Not less than a 10% recycled content value.

Required Total RCV (dollars) = Total Material Cost (dollars) x 0.10

Tier 2—Not less than a 15% recycled content value.

Required Total RCV (dollars) = Total Material Cost (dollars) x 0.15

Materials used as components of the structural frame shall not be used to calculate recycled content.

Note: Sources and recycled content of some recycled materials can be obtained from CalRecycle.

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www.calrecycle.ca.gov/

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Home Page: CalRecycle - Windows Internet Explorer
http://www.calrecycle.ca.gov/

Home | Reduce Waste | Recycle | Buy Recycled | Beverage Containers | Enforcement | Local Partners | About Us

Search: California CalRecycle

Office of Governor
Jerry Brown
Visit his Website

Assistant Resources Agency
John Laird

Welcome to the Department of Resources Recycling and Recovery (CalRecycle)

CalRecycle is the state's leading authority on recycling, waste reduction, and product reuse. Officially known as the Department of Resources Recycling and Recovery, CalRecycle plays an important role in the stewardship of California's vast resources and promotes innovation in technology to encourage economic and environmental sustainability.

This website is designed for California consumers, businesses, recycling and waste-hauling industries, nonprofit organizations, educational facilities, and others. CalRecycle welcomes [input](#) on how this site can best serve the needs of its visitors.

Information For...

Recycling	Consumers	Industry	Government
- Beverage Containers - Electronic Waste - More recycling information...			- Construction Debris - Motor Oil

Resources

- Events Calendar
- Broadcasts
- Publications
- Forms
- Listsers
- Videos
- Logos & Clip Art
- Directories/Databases

Contact Us

- Contact Us Home
- Office Locations
- Staff Directory
- Provide Feedback
- Public Record Requests

Hot Topics

- Green Roads Campaign

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www.calrecycle.ca.gov/RCP/Search.asp

211

Product Search (Advanced): Recycled Content Product Directory - Windows Internet Explorer

http://www.calrecycle.ca.gov/RCP/Search.asp

File Edit View Favorites Tools Help

CalRecycle

CA.GOV CalRecycle

Skip to: [Content](#) | [Footer](#) | [Accessibility](#)

Search

California CalRecycle

Home Reduce Waste Recycle Buy Recycled Beverage Containers Enforcement Local Partners About Us

Buy Recycled Home Environmentally Preferable Purchasing Recycled Product Directory RecycleStore

Recycled Content Products Directory

Product Search

Use one or more of the search criteria below to narrow your search of recycled-content products. The products in the RCP Directory are also searchable by product types using [Product Type Search](#) page.

Product Search

Keyword(s):

Company with Business Type:

Minimum Total Recycled Content: %

Minimum Postconsumer Recycled Content: %

Sort Results By:

[Search Hints](#)

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A4.405.3.1.1 – 3.1.5

Optional Elective Measure

Determination of Recycled Content Value

212

Described through these sections are multiple methods of calculating Recycled content.

Table A4.406.3—Square Foot Valuation

Type of Structure	Square foot Construction Costs
Residential, 1 and 2 family	\$101.90
Residential, Multifamily	\$92.94

2013 California Residential Cal Green

A4.405.4

Optional Elective Measure

Use of Building Materials from Renewable Sources

213

One or more of the following materials manufactured from rapidly renewable sources or agricultural by-products is used:

1. Insulation
2. Bamboo or cork
3. Engineered wood products
4. Agricultural based products
5. Solid wood products
6. Other products acceptable to the enforcing agency

Note: The intent of this section is to utilize building materials and products which are typically harvested within a 10-year or shorter cycle.

2013 California Residential Cal Green

A4.407

Optional Elective Measure

WATER RESISTANCE AND MOISTURE MANAGEMENT

214

A4.407.1 Drainage around foundations. Install foundation and landscape drains which discharge to a dry well, sump, bioswale or other approved on-site location.

A4.407.2 Roof drainage. Install gutter and downspout systems to route water at least 5' away from the foundation or connect to landscape drains which discharge to a dry well, sump, bioswale, rainwater capture system or other approved on-site location.

2013 California Residential Cal Green

A4.407.3

Optional Elective Measure

Flashing Details

215

Provide flashing details on the building plans which comply with accepted industry standards or manufacturer's instructions. Details are shown on house plans at all of the following locations:

1. Around windows and doors
2. Roof valleys
3. Deck connections to the structure
4. Roof-to-wall intersections
5. Chimneys to roof intersections
6. Drip caps above windows and doors with architectural projections



Note: Reference details may be found in the Residential Sheet Metal Guidelines published by the Sheet Metal and Air Conditioning Contractors' National Association Inc. (SMACNA)

2013 California Residential Cal Green

A4.407.3

Optional Elective Measure

Flashing Details

216

A4.407.4 Material protection. Protect building materials delivered to the construction site from rain and other sources of moisture.

A4.407.5 Ice and water barriers.

In Climate Zone 16, an ice and water barrier is installed at valley, eaves and wall to roof intersections. The ice and water barrier shall extend at least 24" inside the exterior wall line or as specified by the manufacturer's installation instructions.



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A4.407.6

Optional Elective Measure

Door Protection.

217

Exterior doors to the dwelling are covered to prevent water intrusion by one or more of the following:

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

A4.407.7 Roof overhangs. A permanent overhang or awning at least 2 feet in depth is provided at all exterior walls.

2013 California Residential Cal Green

A4.408

CONSTRUCTION WASTE DISPOSAL REDUCTION



218

A4.408.1 Enhanced construction waste reduction.

Nonhazardous construction and demolition debris generated at the site is diverted to recycle or salvage in compliance with one of the following:

Tier 1—At least a 65% reduction.

Tier 2—At least a 75% reduction.

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A4.408.1**Enhanced construction waste reduction**

219

Exceptions:

1. Equivalent or alternative waste reduction methods are developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
2. The enforcing agency may make exceptions to the requirements of this section when jobsites are located in areas beyond the haul boundaries of the diversion facility.

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Material Conservation and Resource Efficiency

221

Required Measures	Tier 1	Tier 2
Environmental Quality	90% Resilient Flooring	100% Resilient Flooring
	Thermal insulation requirements (VOC Limits)	Thermal insulation requirements (VOC Limits)
	Comply with at least 2 additional elective measures	Comply with at least 1 additional elective measures

2013 California Residential Cal Green

MERV? Filters

222

MERV, or Minimum Efficiency Reporting Value, a number from 1 to 16 that is relative to an air filter's efficiency. The higher the MERV, the more efficient the air filter is at removing particles.

At the lower end of the efficiency spectrum a fiberglass panel filter may have a MERV of 4 or 5. At the higher end, a MERV 14 filter is typically the filter of choice for critical areas of a hospital (to prevent transfer of bacteria and infectious diseases).

New Construction in California requires at least a MERV 6 Air Filter.

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A4.504**Optional Elective Measure****POLLUTANT CONTROL**

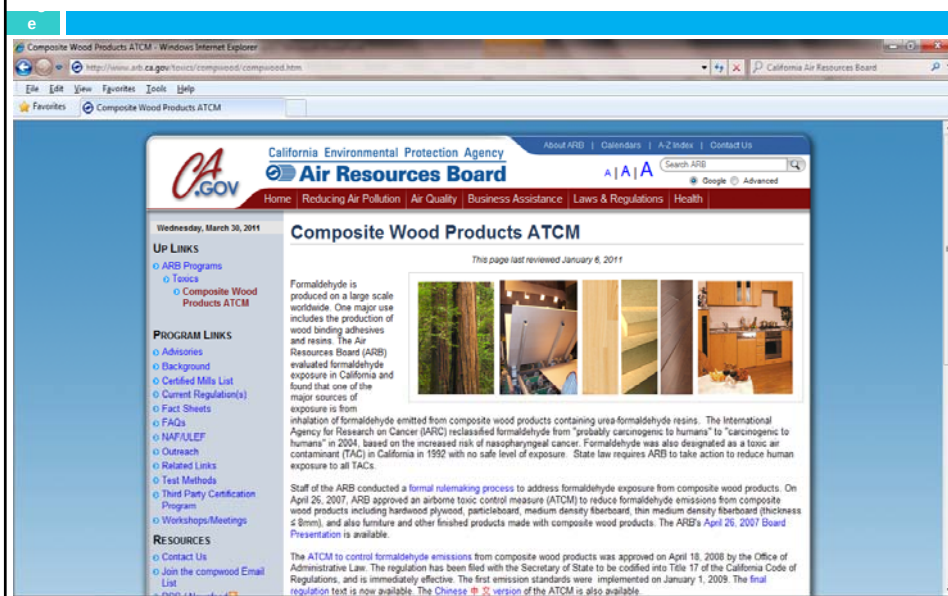
223

A4.504.1 Compliance with Formaldehyde Limits. Use composite wood products made with either California Air Resources Board approved no-added formaldehyde (NAF) resins or ultra-low emitting formaldehyde (ULEF) resins.

Note: Documentation must be provided that verifies that finish materials are certified to meet the pollutant emission limits.

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www.arb.ca.gov/toxics/compwood/compwood.htm



2013 California Residential Cal Green

A4.504

Optional Elective Measure

POLLUTANT CONTROL

225

A4.504.1 Compliance with Formaldehyde Limits. Use composite wood products made with either California Air Resources Board approved no-added formaldehyde (NAF) resins or ultra-low emitting formaldehyde (ULEF) resins.

Note: Documentation must be provided that verifies that finish materials are certified to meet the pollutant emission limits.

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A4.504.2

Resilient Flooring Systems



226

Resilient flooring systems installed in the building shall meet the percentages specified in this section and comply with the VOC-emission limits defined in at least one of the following:

1. The Collaborative for High Performance Schools (CHPS)
2. Products compliant with CHPS criteria under the Greenguard Children and Schools program.
3. Certification under the Resilient Floor Covering Institute (RFCI) FloorScore program.
4. Must meet Specification 01350.

Tier 1—At least 80% of the total area of resilient flooring installed shall comply.

Tier 2—At least 90% of the total area of resilient flooring installed shall comply.

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A4.504.3**Thermal insulation.**

227

Thermal insulation installed in the building shall meet the following requirements:

Tier 1—Install thermal insulation in compliance with the VOC-emission limits defined in Collaborative for High Performance Schools (CHPS) Low-emitting Materials List.

Tier 2—Install insulation which complies with Tier 1 plus does not contain any added formaldehyde.

Note: Documentation must be provided that verifies the materials are certified to meet the pollutant emission limits in this section.

2013 California Residential Cal Green

A4.506

Optional Elective Measure

INDOOR AIR QUALITY AND EXHAUST

228

A4.506.1 Filters. Return air filters with a value greater than **MERV 6** shall be installed on HVAC systems. Pressure drop across the filter shall not exceed 0.1 iwc.

A4.506.2 Construction filter [HR]. Provide filters on return openings rated at MERV 6 or higher during construction.

A4.506.2 Direct-vent appliances. Direct-vent heating and cooling equipment is utilized if the equipment will be located in the conditioned space or install the space heating and water heating equipment in an isolated mechanical room.

2013 California Residential Cal Green

Davis Energy Group Filter Findings

229

Table 6-1: Filters Selected for Testing

Filter Make & Model	Thickness	MERV
3M Filtrete 1000	1"	11
3M Filtrete 1085	1"	11
3M Filtrete 1550	4"	12
3M Filtrete 1700	1"	12
3M Filtrete 600	1"	8
Ace 30 day Model 10004.011625	1"	2
Ace Microparticle, Model No. 4122354	1"	11
Ace Pleated, Model 4044566	1"	8
Aeolus Synthetic Mini-pleat	2"	13
American Filters Dirt Demon Dust Shield	1"	6
Flanders NaturalAire Standard	1"	8
Flanders Pre-pleat 40	2"	8
WEB Lifetime	1"	8

2013 California Residential Cal Green

Davis Energy Group Filter Findings

e

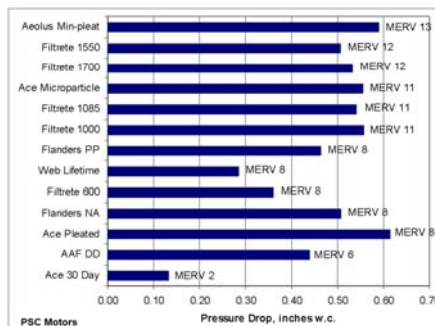


Figure 6-5: Filter Pressure Drop at 492 FPM

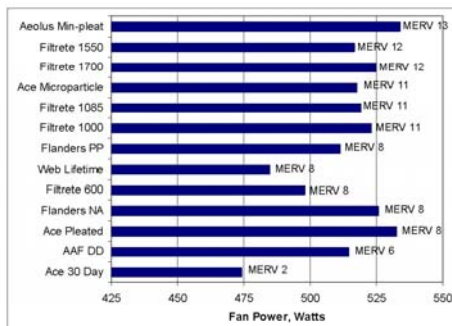


Figure 6-6: Fan Motor Power for ECM Motor at 492 FPM

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