2013 California Green Building Standards Code (CAL Green)
Principles of Green Building

• Community Design
• Energy Efficiency
• Water Efficiency
• Resource Conservation
• Indoor Environmental Quality
Why a State Green Building Code?

• AB 32 Reduce GHG emissions to 1990 levels by 2020
• EO S-20-04: Reduce grid based electricity by 20% in state-owned buildings by 2015
• Numerous Green Building Bills vetoed by Governor Schwarzenegger.
• BSC directed to develop green building standards.
CAL Green Guides Available

A Guide to the California Green Building Standards Code (Low-Rise Residential)

Guide to the (Non-Residential) California Green Building Standards Code
Including changes effective July 1, 2012

May 2011 Second Edition

An educational publication by the California Building Standards Commission Third Edition January 2012
Structure of the CAL Green

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

• Each Jurisdiction is different with different approaches.
• No right or wrong way as long as we are working towards compliance.
• Jurisdictions could do a better job working towards regional consistency
Implementation

- Collaborate with other Departments in the jurisdiction to eliminate redundancies
  - Waste Diversion
  - Water Conservation
  - SWPPP
  - Outdoor Lighting
  - Bicycle Parking
Construction Documents and Installation Verification

- CALGreen requires that construction documents be submitted in one or more sets with a permit application.
- Documents must provide information in sufficient detail to determine compliance with CALGreen.
Implementation

- Plan review
  - Checklists incorporated in plans
  - Items on checklist reflected in plans
Implementation (RES addition/remodel)
### Implementation (NON-RES tenant improvement)

#### CAL GREEN NON-RESIDENTIAL TENANT IMPROVEMENT REMODEL APPLICATION CHECKLIST

<table>
<thead>
<tr>
<th>Feature or Measure</th>
<th>Required</th>
<th>N/A</th>
<th>Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>A6.203.1 Energy performance. Using an Alternative Calculation Method approved by the California Energy Commission, calculate each nonresidential building's TERV energy and CO2 emissions and compare to the standard or &quot;budget&quot; building.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5.303.1 Meters: Separate meters shall be installed for the uses described in Sections 503.1.1 through 503.1.3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.303.1.1 Buildings in excess of 70,000 square feet. Separate Meters shall be installed as follows:</td>
<td></td>
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</tr>
<tr>
<td>1. For each individual leased, rented or other tenant space within the building projected to consume more than 100 gajday.</td>
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</tr>
<tr>
<td>2. For spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory or beauty salon or barber shop projected to consume more than 100 gajday.</td>
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</tr>
<tr>
<td>5.303.2 20 percent savings. A schedule of plumbing fixtures and future fittings that will reduce the overall use of potable water within the building by 20 percent shall be provided. (Calculate savings by Water Use Workshops)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5.303.2.1 Multiple showerheads serving one shower. When single showerheads are served by more than one showerhead, the combined flow rate of all the showerheads shall not exceed the maximum flow rates specified in the 20 percent reduction column contained in Table 5.303.2.3 of the showerhead be designed to only allow one showerhead to be in operation at a time.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5.305.3.1 Tier 1 – 30 percent savings. A schedule of plumbing fixtures and future fittings that will reduce the overall use of potable water within the building by 30 percent shall be provided.</td>
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<tr>
<td>A5.406.4 Recycled content. Tier 1. Use materials, equivalent in performance to virgin materials, with postconsumer or postconsumer recycled content value (RCV) exceeding at least 10 percent of the total value, based on estimated cost of materials on the project. Provide documentation due to the respective vendor.</td>
<td></td>
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</tr>
<tr>
<td>A5.406.3.1 Permanent construction waste reduction. Direct to recycle or salvage nonhazardous construction and demolition debris generated at the site in compliance with one of the following: Tier 1. At least a 65 percent reduction</td>
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Implementation

- Field Inspection
- Handouts
- Dialogue with contractor
- Reduce surprises

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**VOC COMPLIANCE CERTIFICATION**

<table>
<thead>
<tr>
<th>Adhesive</th>
<th>Manufacturer</th>
<th>CAL Green Limit</th>
<th>Actual VOCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>(None)</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Sealant</th>
<th>Manufacturer</th>
<th>CAL Green Limit</th>
<th>Actual VOCs</th>
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<tbody>
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<table>
<thead>
<tr>
<th>Architectural Coatings</th>
<th>Manufacturer</th>
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<th>Actual VOCs</th>
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<tbody>
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<td>(None)</td>
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</table>

**FORMALDEHYDE COMPLIANCE CERTIFICATION**

<table>
<thead>
<tr>
<th>Product</th>
<th>Manufacturer</th>
<th>Current Limit</th>
<th>Actual VOCs</th>
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</thead>
<tbody>
<tr>
<td>Hardwood plywood veneer core</td>
<td></td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Hardwood plywood composite core</td>
<td></td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>Particleboard</td>
<td></td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>Medium density fiberboard</td>
<td></td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>Thin medium density fiberboard</td>
<td></td>
<td>0.21</td>
<td></td>
</tr>
</tbody>
</table>

All Carpet installed in the building interior meets the testing and product requirements of the following (check one):

- Carpet and Rug Institute’s Green Label
- California Department of Public Health Standard Practice for the testing of VOCs
- NSF/ANSI 140 at the Gold Level
- Scientific Certification Systems Indoor Advantage™ Gold
- No carpet installed on this project

I certify that the information provided on this form is accurate and that the materials used on this project comply with Section 4.504 of the 2010 California Green Building Standards Code.
The mandatory provisions of Chapter 4 shall be applied to additions or alterations of existing residential buildings where the addition or alteration increases the building’s conditioned area, volume, or size. The requirements shall apply only to and/or within the specific area of the addition or alteration.
301.1.1 Additions and alterations. [HCD]

**Note:** On and after January 1, 2014, residential buildings undergoing permitted alterations, additions or improvements shall replace noncompliant plumbing fixtures with water-conserving plumbing fixtures.

Plumbing fixture replacement is required prior to issuance of a certificate of final completion, certificate of occupancy or final permit approval by the local building department.

See Civil Code Section 1101.1, et seq., for the definition of a noncompliant plumbing fixture, types of residential buildings affected and other important enactment dates.
301.2 Low-rise and high-rise residential buildings. [HCD]

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

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

The provisions of individual sections of Chapter 5 apply to newly constructed buildings, building additions of 1,000 square feet or greater, and/or building alterations with a permit valuation of $200,000 or above (for occupancies within the authority of California Building Standards Commission).
301.3 Nonresidential additions and alterations. [BSC]

Code sections relevant to additions and alterations shall only apply to the portions of the building being added or altered within the scope of the permitted work.
A code section will be designated by a banner to indicate where the code section only applies to newly constructed buildings \([N]\) or to additions and alterations \([AA]\). When the code section applies to both, no banner will be used.
In mixed occupancy buildings, each portion of a building shall comply with the specific green building measures applicable to each specific occupancy.

- Live/Work
- Residential
- Non-Residential
- Or both?
303.1 Phased projects. For shell buildings and others constructed for future tenant improvements, only those code measures relevant to the building components and systems considered to be new construction (or newly constructed) shall apply.
303.1.1 Tenant improvements. The provisions of this code shall apply only to the initial tenant or occupant improvements to a project.
Projects which disturb less than one acre of soil shall manage storm water drainage during construction.

California State Water Resources Control Board (SWRCB) issues permits for projects which are larger than one acre.
STORM WATER POLLUTION PREVENTION

The 2010 California Green Building Standards (CAL Green) include storm water pollution prevention requirements for construction projects that disturb less than one acre of land. These requirements include best management practices (BMPs) to prevent loss of soil as well as good housekeeping BMPs to prevent pollution. Some projects may be required to provide an erosion and sediment control plan that is specific to the site. When specific plans are not required, the general provisions outlined in this document may be implemented to comply with CALGreen requirements for storm water pollution prevention.

SOIL LOSS BMPs:
Sod loss BMPs shall be implemented as appropriate for each project. These BMPs include, but are not limited to, the following:

Perimeter sediment control (perimeter silt fence, fiber rolls)
- Erosion control measures to prevent soil loss from erosion

SILT FENCE

FIBER ROLLS

Protection of storm drain inlets (gravels bags or catch basin inserts)
Drain inlets (inlets) that are subject to runoff from construction activities must be protected from sediment laden runoff.
Drain inlet protection shall be in place and properly maintained at all times.

Stabilized construction access
A stabilized construction access is required where construction vehicles enter and leave the property if there is no paving provided. The access must be maintained to prevent tracking of mud and dirt onto public roads by construction vehicles. If mud or dirt is tracked onto the street, then it must be cleaned up using only dry methods. Dirt or mud shall not be cleaned off the street by wet methods.

Preservation of natural features, vegetation and soil
Limit the footprint of the construction activities to the extent possible in order to preserve existing vegetation on the site.

Scheduling construction activity
Weather conditions shall be considered when scheduling construction activities. Activities that are likely to disturb the soil shall not be undertaken when there is a 50% or greater chance of a significant rain event as forecasted by the National Weather Service. Grading and similar activities shall not be undertaken on windy days (wind in excess of 15 mph) until the site stabilized.

Some additional BMPs that may be required depending on site conditions:
- Wind erosion control
- Mulching or hydroseeding to stabilize disturbed soils
- Erosion control to protect slopes
- Sediment trap or sediment basin to retain sediment on site

Page 2 of 2
4.106.3 Grading and paving.

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

Note: IRC requires 6” fall within the first 10” of the building (5%).
Rainwater collection and disposal systems
4.201.1 Scope. For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards.
4.301.1 Scope. The provisions of this chapter shall establish the means of conserving water used indoors, outdoors and in wastewater conveyance.

Typical indoor residential water usage
50 to 300 gpcd – landscape 50%
Source - Water Education Foundation
4.303.1.1 Water closets. The effective flush volume of all water closets shall not exceed 1.28 gallons per flush.

Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-type Toilets.

Note: The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.
4.303.1.2 Urinals. The effective flush volume of urinals shall not exceed 0.5 gallons per flush.
4.303.1.3.1 Single showerhead. Showerheads shall have a maximum flow rate of not more than 2.0 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA Water Sense Specification for Showerheads.
4.303.1.3.2 Multiple showerheads serving one shower. When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 2.0 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.

Note: A hand-held shower shall be considered a showerhead.
4.303.1.4.1 Residential lavatory faucets. The maximum flow rate of residential lavatory faucets shall not exceed 1.5 gallons per minute at 60 psi. The minimum flow rate of residential lavatory faucets shall not be less than 0.8 gallons per minute at 20 psi.
4.303.1.4.2 Lavatory faucets in common and public use areas. The maximum flow rate of lavatory faucets installed in common and public use areas (outside of dwellings or sleeping units) in residential buildings shall not exceed 0.5 gallons per minute at 60 psi.
4.303.1.4.3 Metering faucets. Metering faucets when installed in residential buildings shall not deliver more than 0.25 gallons per cycle.
4.303.1.4.4 Kitchen faucets. The maximum flow rate of kitchen faucets shall not exceed 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

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

### CITY OF DAVIS
Department of Community Development and Sustainability
23 Russell Boulevard, Davis, CA 95616 (530) 757-5610

#### FIXTURE FLOW RATE COMPLIANCE CERTIFICATION

**SHOWERHEAD**

<table>
<thead>
<tr>
<th>MANUFACTURER &amp; MODEL NUMBER</th>
<th>CAL/Green Worksheet Flow Rate*</th>
<th>CAL/Green Prescriptive Flow Rate*</th>
<th>ACTUAL Flow Rate</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

**LAVATORY FAUCET**

<table>
<thead>
<tr>
<th>MANUFACTURER &amp; MODEL NUMBER</th>
<th>CAL/Green Worksheet Flow Rate*</th>
<th>CAL/Green Prescriptive Flow Rate*</th>
<th>ACTUAL Flow Rate</th>
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<tbody>
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</table>

**KITCHEN FAUCET**

<table>
<thead>
<tr>
<th>MANUFACTURER &amp; MODEL NUMBER</th>
<th>CAL/Green Worksheet Flow Rate*</th>
<th>CAL/Green Prescriptive Flow Rate*</th>
<th>ACTUAL Flow Rate</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

**REPLACEMENT AERATORS (RES) or WASH FOUNTAINS (NON-RES)**

<table>
<thead>
<tr>
<th>MANUFACTURER &amp; MODEL NUMBER</th>
<th>CAL/Green Worksheet Flow Rate*</th>
<th>CAL/Green Prescriptive Flow Rate*</th>
<th>ACTUAL Flow Rate</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
</tbody>
</table>

**WATER CLOSET / URINAL**

<table>
<thead>
<tr>
<th>MANUFACTURER &amp; MODEL NUMBER</th>
<th>CAL/Green Worksheet Flow Rate*</th>
<th>CAL/Green Prescriptive Flow Rate*</th>
<th>ACTUAL Flow Rate</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

I certify that the information provided on this form is accurate and that the fixtures used in this project comply with Section 4.303 (Residential) or 5.383 (Non-Residential) of the 2015 California Green Building Standards Code.

Signature __________________________  Date ____________

*a See other side of page for Prescriptive Flow Rates.

### RESIDENTIAL - TABLE 4.303.2 FIXTURE FLOW RATES

<table>
<thead>
<tr>
<th>FIXTURE TYPE</th>
<th>MAXIMUM FLOW RATE AT ≥ 20 percent REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Showerheads</td>
<td>2 gpm @ 80 psi</td>
</tr>
<tr>
<td>Lavatory faucets, residential</td>
<td>1.5 gpm @ 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets, nonresidential</td>
<td>0.4 gpm @ 60 psi</td>
</tr>
<tr>
<td>Kitchen faucets</td>
<td>1.8 gpm @ 60 psi</td>
</tr>
<tr>
<td>Gravity tank-typewater closets</td>
<td>1.28 gallons/flush*</td>
</tr>
<tr>
<td>Flushometer tankwater closets</td>
<td>1.26 gallons/flush*</td>
</tr>
<tr>
<td>Flushometer valvewater closets</td>
<td>1.26 gallons/flush*</td>
</tr>
<tr>
<td>Electro mechanical hydraulic water closets</td>
<td>1.26 gallons/flush*</td>
</tr>
<tr>
<td>Urinals</td>
<td>5 gallons/flush</td>
</tr>
</tbody>
</table>

### NON-RESIDENTIAL - TABLE 6.303.2.3 FIXTURE FLOW RATES

<table>
<thead>
<tr>
<th>FIXTURE TYPE</th>
<th>MAXIMUM FLOW RATE AT 20 PERCENT REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Showerheads</td>
<td>2 gpm @ 80 psi</td>
</tr>
<tr>
<td>Lavatory faucets—residential</td>
<td>1.5 gpm @ 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets—nonresidential</td>
<td>0.4 gpm @ 60 psi</td>
</tr>
<tr>
<td>Kitchen faucets</td>
<td>1.8 gpm @ 60 psi</td>
</tr>
<tr>
<td>Wash fountains</td>
<td>1.8 [in.³/s] [0.02 gpm @ 60 psi]</td>
</tr>
<tr>
<td>Metering faucets</td>
<td>0.2 gallons/cycle</td>
</tr>
<tr>
<td>Metering faucets for wash fountains</td>
<td>0.2 [in.³/s] [0.02 gpm @ 60 psi]</td>
</tr>
<tr>
<td>Gravity tank type water closets</td>
<td>1.28 gallons/flush*</td>
</tr>
<tr>
<td>Flushometer tank water closets</td>
<td>1.26 gallons/flush*</td>
</tr>
<tr>
<td>Flushometer valve water closets</td>
<td>1.26 gallons/flush*</td>
</tr>
<tr>
<td>Electro mechanical hydraulic water closets</td>
<td>1.26 gallons/flush*</td>
</tr>
<tr>
<td>Urinals</td>
<td>5 gallons/flush</td>
</tr>
</tbody>
</table>

1. Lavatory Faucets Residential shall not have a flow rate less than 0.8 gpm at 20 psi.
2. Kitchen faucets may temporarily increase flow above the maximum rate, but not above 2.2 gpm @ 60 psi and must default to a maximum flow rate of 1.8 gpm @ 60 psi.
3. Where complying faucets are unavailable, aerators rated at 35 gpm or other means may be used to achieve reduction.
4. Includes single and dual flush water closets with an effective flush of 1.28 gallons or less.

Single flush toilets—The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the average flush volume when tested in accordance with ASME A 112.19.23.2.

Dual flush toilets—The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with ASME A112.19.2 and ASME A112.19.14.
### Fixture Flow Rate Compliance Certification

#### Showerhead

<table>
<thead>
<tr>
<th>MANUFACTURER &amp; MODEL NUMBER</th>
<th>CALGreen Worksheet Flow Rate¹</th>
<th>CALGreen Prescriptive Flow Rate¹</th>
<th>ACTUAL Flow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

#### Lavatory Faucet

<table>
<thead>
<tr>
<th>MANUFACTURER &amp; MODEL NUMBER</th>
<th>CALGreen Worksheet Flow Rate¹</th>
<th>CALGreen Prescriptive Flow Rate¹</th>
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</table>

#### Kitchen Faucet

<table>
<thead>
<tr>
<th>MANUFACTURER &amp; MODEL NUMBER</th>
<th>CALGreen Worksheet Flow Rate¹</th>
<th>CALGreen Prescriptive Flow Rate¹</th>
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</table>

#### Replacement Aerators (Res) or Wash Fountains (Non-Res)

<table>
<thead>
<tr>
<th>MANUFACTURER &amp; MODEL NUMBER</th>
<th>CALGreen Worksheet Flow Rate¹</th>
<th>CALGreen Prescriptive Flow Rate¹</th>
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</thead>
<tbody>
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</tbody>
</table>

#### Water Closet / Urinal

<table>
<thead>
<tr>
<th>MANUFACTURER &amp; MODEL NUMBER</th>
<th>CALGreen Worksheet Flow Rate¹</th>
<th>CALGreen Prescriptive Flow Rate¹</th>
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</table>

I certify that the information provided on this form is accurate and that the fixtures used on this project comply with Section 4.303 (Residential) or 5.303 (Non-Residential) of the 2010 California Green Building Standards Code.

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* See other side of page for Prescriptive Flow Rates
* Provide WS-1 and WS-2 if using CALGreen Worksheet Flow Rates

Print name: __________________________ Signature: __________________________ Date: __________________________
4.304 Outdoor Water Use

- Irrigation controllers.
  - Applies to controllers installed at time of final inspection.
  - This section does not mandate that controllers be installed.
4.304 Outdoor Water Use

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

- Openings as small as $\frac{1}{4}$ inch can be used by a rodent to enter a wall, crawl space or attic.
Recycle and/or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition debris.
Where a local jurisdiction does not have a construction and demolition waste management ordinance, a construction waste management plan shall be submitted:

1. Identify the *construction and demolition waste* materials to be diverted.
2. Specify if *construction and demolition waste* materials will be sorted on-site or co-mingled.
3. Identify the *facilities where construction and demolition waste material will be taken.*
4. Identify construction methods *employed* to reduce the *amount of construction and demolition waste generated.*
5. Specify the amount of *construction and demolition waste* calculated by weight or volume, *but not by both.*
Utilize a waste management company approved by the enforcing agency.

Most waste management companies can tell you what percent of construction waste is diverted.
Waste Stream Reduction Alt.

- If the project does not generate in excess of four pounds per sq. ft. of the building area complies with the 50% diversion.
Waste Stream Reduction Alt. (New in 2013)

4.408.4.1 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 two (2) pounds per square foot of the building area, shall meet the minimum 50-percent construction waste reduction requirement in Section 4.408.1.
Documentation.

- Documentation shall be provided to the enforcing agency which demonstrates compliance.
  - Sample forms found in “A Guide to the California Green Building Standards (Low Rise Residential)”
  - Construction and demolition debris processors can be found at Cal Recycle website. [http://www.calrecycle.ca.gov/ConDemo/Recyclers/RecyclerSearch.aspx](http://www.calrecycle.ca.gov/ConDemo/Recyclers/RecyclerSearch.aspx)
• 4.410.1 Operation and maintenance manual. At the time of final inspection, a manual, compact disc, web-based reference or other media acceptable to the enforcing agency which includes all of the following shall be placed in the building:
Operation and Maintenance Manual.

1. Directions to the owner or occupant
2. Instructions for the following:
   a. Equipment and appliances
   b. Roof and yard drainage
   c. Space conditioning systems
   d. Landscape irrigation systems
   e. Water reuse systems
3. Information from local utility
4. Public transportation and/or carpool options
5. Educational material on the positive impacts of an interior relative humidity between 30–60 percent
 Operation and Maintenance Manual.

6. Information about water-conserving landscape and irrigation design and controllers which conserve water.

7. Instructions for maintaining gutters and downspouts and diverting water at least 5 feet away from foundation.

8. Information on required routine maintenance measures, including, but not limited to, caulking, painting, grading around the building, etc.

9. Information about state solar energy and incentive programs available.

10. A copy of all special inspection verifications required by the enforcing agency or this code.
Fireplaces

- Shall be a direct-vent sealed-combustion type
- Woodstove or pellet stove shall comply with U.S. EPA Phase II
- Comply with applicable local ordinances

*No indoor air for combustion or exhaust*
Pollution Control

• All duct and other related air distribution component openings shall be covered
Adhesive VOC Limit

- Adhesives, sealants and caulks used on the project shall meet the requirements.

<table>
<thead>
<tr>
<th>ARCHITECTURAL APPLICATIONS</th>
<th>CURRENT VOC LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor carpet adhesives</td>
<td>50</td>
</tr>
<tr>
<td>Carpet pad adhesives</td>
<td>50</td>
</tr>
<tr>
<td>Outdoor carpet adhesives</td>
<td>150</td>
</tr>
<tr>
<td>Wood flooring adhesives</td>
<td>100</td>
</tr>
<tr>
<td>Rubber floor adhesives</td>
<td>60</td>
</tr>
<tr>
<td>Subfloor adhesives</td>
<td>50</td>
</tr>
<tr>
<td>Ceramic tile adhesives</td>
<td>65</td>
</tr>
<tr>
<td>VCT and asphalt tile adhesives</td>
<td>50</td>
</tr>
<tr>
<td>Drywall and panel adhesives</td>
<td>50</td>
</tr>
<tr>
<td>Cove base adhesives</td>
<td>50</td>
</tr>
<tr>
<td>Multipurpose construction adhesives</td>
<td>70</td>
</tr>
<tr>
<td>Structural glazing adhesives</td>
<td>100</td>
</tr>
<tr>
<td>Single-ply roof membrane adhesives</td>
<td>250</td>
</tr>
<tr>
<td>Other adhesives not specifically listed</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPECIALTY APPLICATIONS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC welding</td>
<td>510</td>
</tr>
<tr>
<td>CPVC welding</td>
<td>490</td>
</tr>
<tr>
<td>ABS welding</td>
<td>310</td>
</tr>
<tr>
<td>Plastic cement welding</td>
<td>250</td>
</tr>
<tr>
<td>Adhesive primer for plastic</td>
<td>550</td>
</tr>
<tr>
<td>Contact adhesive</td>
<td>80</td>
</tr>
<tr>
<td>Special purpose contact adhesive</td>
<td>250</td>
</tr>
<tr>
<td>Structural wood member adhesive</td>
<td>140</td>
</tr>
<tr>
<td>Top and trim adhesive</td>
<td>250</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUBSTRATE SPECIFIC APPLICATIONS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal to metal</td>
<td>30</td>
</tr>
<tr>
<td>Plastic foams</td>
<td>50</td>
</tr>
<tr>
<td>Porous material (except wood)</td>
<td>50</td>
</tr>
<tr>
<td>Wood</td>
<td>30</td>
</tr>
<tr>
<td>Fiberglass</td>
<td>80</td>
</tr>
</tbody>
</table>

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.
Verification

- Documentation may include, but is not limited to, the following:
  1. Manufacturer’s product specification.
  2. Field verification of on-site product containers.

<table>
<thead>
<tr>
<th>COATING CATEGORY</th>
<th>EFFECTIVE 1/1/2010</th>
<th>EFFECTIVE 1/1/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat coatings</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Nonflat coatings</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Nonflat-high gloss coatings</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Specialty Coatings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum roof coatings</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Basement specialty coatings</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Biurethane roof coatings</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Biurethane roof primers</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>Bond breakers</td>
<td>550</td>
<td></td>
</tr>
<tr>
<td>Concrete curing compounds</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>Concrete masonry sealers</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Driveway sealers</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Dry fog coatings</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Faux finishing coatings</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>Fire resistant coatings</td>
<td>550</td>
<td></td>
</tr>
<tr>
<td>Floor coatings</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Form-release compounds</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Graphic arts coatings (sign paints)</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>High temperature coatings</td>
<td>420</td>
<td></td>
</tr>
<tr>
<td>Industrial maintenance coatings</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Low solids coatings</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Magnesium cement coatings</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>Mastic texture coatings</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Metallic pigmented coatings</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Matticolor coatings</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Pretreatment wash primers</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>Primers, sealers, and undercoaters</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
VOC Limits

- Adhesives
- Paints and Coatings
- Aerosol Paints and Coatings
- Carpet Systems
- Resilient Flooring Systems (cork, vinyl, linoleum, rubber)
- Composite Wood Products
4.504.5.1 (5) “Other methods acceptable to the enforcing agency”
Concrete Slab Foundations

- Concrete slab foundations required to have a vapor retarder by California Building Code or the California Residential Code shall also comply with this section (4505.2).

- **1910 (CBC)**
  - Min thickness 3.5 inches
  - 6 mil polyethylene vapor retarder, joints lapped min 6” (with joints taped) placed between the base course or subgrade or other approved method to retard vapor transmission

- **R506 (CRC)**
  - Min thickness 3.5 inches
  - A 6-mil polyethylene or approved vapor retarder with joints lapped not less than 6 inches (with joints taped) shall be placed between the concrete floor slab and the base course or the prepared subgrade where no base course exists.
Capillary break

- Capillary break.
  1. A 4-inch (101.6 mm) thick base of 1/2 inch (12.7 mm) or larger clean aggregate shall be provided with a vapor barrier retarder (supplement) in direct contact with concrete.
  2. Other equivalent methods approved by the enforcing agency.
  3. A slab design specified by a licensed design professional.
Capillary break.

1. A 4-inch (101.6 mm) thick base of 1/2 inch (12.7 mm) or larger clean aggregate shall be provided with a vapor barrier retarder (supplement) in direct contact with concrete.

2. Other equivalent methods approved by the enforcing agency.

3. A slab design specified by a licensed design professional.
VAPOR RETARDER CLASS. (CBC Definitions) A measure of a material or assembly's ability to limit the amount of moisture that passes through that material or assembly. Vapor retarder class shall be defined using the desiccant method of ASTM E 96 as follows:

- **Class I**: 0.1 perm or less.
- **Class II**: 0.1 < perm ≤ 1.0 perm.
- **Class III**: 1.0 < perm ≤ 10 perm.

- ASTM E96-00 Standard Test Methods for Water Vapor Transmission of Materials
**Capillary break**

- **VAPOR BARRIER.** (CALGreen). Material that has a permeance of one perm or less and that provides resistance to the transmission of water vapor. (*Test Standard not defined in CAL Green*)

- **VAPOR RETARDER.** (No definition in CAL Green)

  - ASTM E1643 - 11 Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

  - ASTM E 1754: These test methods covers flexible, preformed sheet membrane materials to be used as vapor retarders in contact with soil or granular fill under concrete slabs.
Vapor Retarder ASTM E-96
(10 mill, 2 layers)
Alternate Methods & Materials

1800 SUPER-ADMIX is a ready-to-use liquid admixture formulated for concrete to improve water retention and reduce consumption, allowing better control around water conditions. This product is highly effective for a variety of concrete applications, including but not limited to: reducing bleeding and segregation, improving initial and final setting times, and enhancing workability.

**Package Contents:**
- **1800 SUPER-ADMIX**
- **1800**

**Technical Information:**
- **Weight per bag:** 50 lbs
- **Chemical Composition:** Sodium Naphthalene Sulfonate Formaldehyde

**Storage:**
- Store in a dry, cool, and well-ventilated area.
- Keep away from heat and direct sunlight.

**Handling:**
- Use appropriate personal protective equipment (PPE) during handling.

**Warranty:**
- 1 year limited warranty.

**Emergency Response:**
- **Eye:** Rinse eyes with plenty of water.
- **Skin:** Wash with soap and water.
- **Inhalation:** Remove to fresh air.
- **Ingestion:** Do not induce vomiting.

**Precautions:**
- Do not mix with other chemicals.
- Do not incinerate. Use only as directed.

**Safety Data Sheet (SDS):**
- Available upon request.

---

**Alternate Materials or Methods of Construction/Design Request:**

**Project Name:**
- **Project Description:**
- **Materials:**
- **Alternatives:**
- **Methods:**
- **Design:**

---

**Contact Information:**
- **Name:**
- **Phone:**
- **Email:**

---

**Approval:**
- **Date:**
- **Signature:**

---

**Additional Notes:**
- **Notes:**

---

**References:**
- **Related Literature:**
- **Technical Papers:**
- **Product Manuals:**

---
Alternate Methods & Materials

MOXIE 1800 SUPER-ADMIX is a ready to use liquid admixture formulated for concrete to stop moisture vapor migration and alkali efflorescence attack above and below grade. Ideal for use on stucco, shotcrete, mortar and white portland cement pool plaster applications. A complex process converts the by-products of hydration into a higher density of cementitious materials thereby reducing permeability. The additional cementitious materials, by their very chemical and physical nature, produce concrete with a much greater density and surface hardness, a dramatic increase in bond, flexural, tensile and compressive strength, and reducing shrinkage cracking while achieving near-zero capillary voids. Adhesion characteristics of the surface are improved by providing the ideal surface dry condition necessary for coatings, paint or floor coverings. The use of MOXIE 1800 SUPER-ADMIX alone, without any other additives, will produce of the highest quality, impermeable concrete possible for the given mix design.

Advantages:
- Stops moisture migration, above/below grade (0.011 WVT)
- Increased flexural strength up to 200% or more
- Replaces sand/visqueen vapor barrier
- Shrinkage compensating thermal barrier
- Plasticizer
- Curing compound sealer
- Dust proofing compound
- Prevents chloride intrusion
- Resists freeze thaw
- Resists spalling and flaking
- Resists acids and sulfates erosion
- Resistant to extreme abrasion
- Ideal for stucco, plaster, shotcrete, grout and mortar
- Increased compression strength up to 177%
- Increased surface hardness to 200% or more
- Corrosion inhibitor
- Pumping-quality mix
- Finishing aid
- Reduces internal chloride ion levels
- Resists scaling
- Resistant to oils fats and solvents
- Resists chlorides and hydrogencarbonate sulfides
- Resists lichen, moss and other accretions
- Resists rust and water-borne stains
Alternate Methods & Materials

CONCRETE MIX REQUIREMENT
SLAB CONCRETE MIX MUST CONTAIN MOXIE 1800 SUPER-ADMIX TO PREVENT MOISTURE MIGRATION THROUGH THE SLAB
Moisture Content

- Wall and floor framing shall not be enclosed when the framing members exceed 19 percent moisture content.
Moisture Content

- Determined with either a probe-type or contact-type moisture meter. 
  *Equivalent verification per 101.8 (supplement)*
- **Readings shall be taken at a point 2 feet to 4 feet from the grade stamped end**
- **At least three random moisture readings shall be performed on wall and floor framing**
**Moisture Content**

- *Insulation products which are visibly wet or have a high moisture content shall be replaced or allowed to dry prior to enclosure.*
- **Crawlspace?**
Indoor Air Quality and Exhaust

- **4.506.1** Bathroom exhaust fans 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 humidistat control

- **capable of adjustment between** \(\leq 50\) to a maximum of 80 percent
- May utilize manual or automatic means of adjustment (supplement)
- May be separate from the fan, not required to be integral
The heat loss and heat gain is established according to ACCA Manual J, ASHRAE handbooks or other equivalent design software or methods.

Calculates heating and cooling loads.
Duct systems are sized according to ACCA 29-D Manual D, ASHRAE handbooks or other equivalent design software or methods.

Design duct system based on heating and cooling loads and cfm requirements per room.
Select heating and cooling equipment according to ACCA 36-S Manual S or other equivalent design software or methods.
Site Development (2010)

- Storm Water Pollution Prevention Plan (SWPPP) required for new projects less than an acre.
- Must conform to the State storm water National Pollutant Discharge Elimination System (NPDES) Construction Permit or local ordinance, whichever is stricter.
5.106.1 Storm water pollution prevention. Newly constructed projects which disturb less than one acre of land shall prevent the pollution of stormwater runoff from the construction activities through one or more of the following measures:

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

- **5.106.1.2. Best management practices (BMP).** Prevent the loss of soil through wind or water erosion by implementing an effective combination of erosion and sediment control and good housekeeping BMP.
1. Soil loss BMPs that should be considered for implementation as appropriate for each project include, but are not limited to, the following:
   a. Scheduling construction activity
   b. Preservation of natural features, vegetation and soil
   c. Drainage swales or lined ditches to control stormwater flow
   d. Mulching or hydroteeading to stabilize disturbed soils
   e. Erosion control to protect slopes
   f. Protection of storm drain inlets (gravel bags or catch basin inserts)
   g. Perimeter sediment control (perimeter silt fence, fiber rolls)
   h. Sediment trap or sediment basin to retain sediment on site
   i. Stabilized construction exits
   j. Wind erosion control
   k. Other soil loss BMP acceptable to the enforcing agency
2. Good housekeeping BMP to manage construction equipment, materials, and wastes that should be considered for implementation as appropriate for each project include, but are not limited to, the following:

- a. Material handling and waste management
- b. Building materials stockpile management
- c. Management of washout areas (concrete, paints, stucco, etc.)
- d. Control of vehicle/equipment fueling to contractor’s staging area
- e. Vehicle and equipment cleaning
- f. Spill prevention and control
- g. Other housekeeping BMP acceptable to the enforcing agency
Bicycle Parking and Changing Rooms

- Short-Term bicycle parking.
  - Permanently anchored within 200 feet
  - Equivalent to 5% of the motorized vehicle parking capacity.
Bicycle Parking and Changing Rooms

- Long-Term secure bicycle parking for buildings with over 10 tenant-occupants or alterations or additions that add 10 or more tenant vehicle parking spaces (2013 CALGreen), provide amount equivalent to 5% of vehicle parking
  - Covered, lockable enclosures
  - Lockable bike rooms
  - Lockable bicycle lockers
Designated Parking

- Provide designated parking for any combination of low-emitting, fuel-efficient and carpool/van pool vehicle
- Parking stall marking “CLEAN AIR/VANPOOL/EV”

Note: Vanpool and EV added by supplement
Light Pollution Reduction

- Comply with the California Energy Code, Lighting Zones 1-4.
Light Pollution Reduction
CHAPTER 10
ADMINISTRATIVE REGULATIONS FOR THE CALIFORNIA ENERGY COMMISSION (CEC)

ARTICLE 1
ENERGY BUILDING REGULATIONS
(a) This article contains administrative regulations relating to the energy building regulations in Title 24, Part 6. This article applies to all residential and nonresidential buildings.
(b) Nothing in this section imposes any necessary qualifications, inspections, or other permits on the construction or installation of new or existing buildings, or on the design or construction of any equipment, such as windows, doors, or the like, that are not connected to energy systems, or that do not affect the energy efficiency of the building.

10-102. Definitions. In this article, the following definitions apply:
ACCEPTANCE REQUIREMENTS are the acceptance requirements for code compliance as defined in Section 10-131(b) of Part 6.
APPLIANCE EFFICIENCY REGULATIONS are the regulations in Title 20, Section 608 of the California Code of Regulations.
APPROVED CALCULATION METHOD is the Public Domain Computer Program approved by the California Energy Commission as defined in Section 10-131(b) of Part 6.
BUILDING PERMIT is such electrical, plumbing, structural, or other permit as required by the local building department, or the local building code.
COMMISION is the State Energy Resources Conservation and Development Commission.
CONFORMANCE APPROACH is any one of the alternate methods, by which the design and construction of a building may be demonstrated to be in conformance with Part 6. The compliance approaches for the preconstruction approach and the prescriptive approach are defined in Section 10-131(b) of Part 6.
CONDITIONED FLOOR AREA is defined as the area of the floor that is conditioned with a separate heating and cooling system as defined in Section 10-131(b) of Part 6.
CR-1 is the Cool Roof Rating Council document called "Cool-Rated Roofing Materials".
ENERGY BUDGET is the "energy budget" as defined in Section 10-131(b) of Part 6.
ENFORCEMENT AGENCY is the county, city, or state agency responsible for ensuring a building is in compliance.
EXECUTIVE DIRECTOR is the executive director of the Commission.
HVAC SYSTEMS is the "HVAC system" as defined in Section 10-131(b) of Part 6.
MANUFACTURED DEVICE is a "manufactured device" as defined in Section 10-131(b) of Part 6.
PART 6 in Title 24, Part 6 of the California Code of Regulations.
PUBLIC ADVISER is the Public Adviser to the Commission.
PRICE VALUE is the measured or calculated resistance of materials or building envelope systems on all lighting and space conditioning systems components, demand, optimizers, and components, including but not limited to lighting systems, control systems, and building performance as defined in the NFRC 400 document.
RECORD TRANSMISSION is the transmission of the building's energy performance data on all lighting and space conditioning systems components, demand optimizers, and components, including but not limited to lighting systems, control systems, and building performance as defined in the NFRC 400 document.

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# Light Pollution Reduction

**TABLE 10-114-A LIGHTING ZONE CHARACTERISTICS AND RULES FOR AMENDMENTS BY LOCAL JURISDICTIONS**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Ambient Illumination</th>
<th>State wide Default Location</th>
<th>Moving Up to Higher Zones</th>
<th>Moving Down to Lower Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>LZ1</td>
<td>Dark</td>
<td>Government designated parks, recreation areas, and wildlife preserves. Those that are wholly contained within a higher lighting zone may be considered by the local government as part of that lighting zone.</td>
<td>A government designated park, recreation area, wildlife preserve, or portions thereof, can be designated as LZ2 or LZ3 if they are contained within such a zone.</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>LZ2</td>
<td>Low</td>
<td>Rural areas, as defined by the 2000 U.S. Census.</td>
<td>Special districts within a default LZ2 zone may be designated as LZ3 or LZ4 by a local jurisdiction. Examples include special commercial districts or areas with special security considerations located within a rural area.</td>
<td>Special districts and government designated parks within a default LZ2 zone may be designated as LZ1 by the local jurisdiction for lower illumination standards, without any size limits.</td>
</tr>
<tr>
<td>LZ3</td>
<td>Medium</td>
<td>Urban areas, as defined by the 2000 U.S. Census.</td>
<td>Special districts within a default LZ3 may be designated as a LZ4 by local jurisdiction for high intensity nighttime use, such as entertainment or commercial districts or areas with special security considerations requiring very high light levels.</td>
<td>Special districts and government designated parks within a default LZ3 zone may be designated as LZ1 or LZ2 by the local jurisdiction, without any size limits.</td>
</tr>
<tr>
<td>LZ4</td>
<td>High</td>
<td>None.</td>
<td>Not applicable.</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>
Light Pollution Reduction

- Backlight, Uplight and Glare (BUG) ratings as defined in IESNA TM-15-11; and
- Allowable BUG ratings not exceeding those shown in Table 5.106.8, or
- Comply with a local ordinance lawfully enacted pursuant to Section 101.7, whichever is more stringent.
## Light Pollution Reduction

<table>
<thead>
<tr>
<th>TABLE 5.106.3</th>
<th>MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ALLOWABLE RATING</strong></td>
<td><strong>LIGHTING ZONE 1</strong></td>
</tr>
<tr>
<td>Maximum Allowable Backlight Rating ¹ ²</td>
<td>No Limit</td>
</tr>
<tr>
<td>Luminaire greater than 2 mounting heights (MH) from property line</td>
<td>No Limit</td>
</tr>
<tr>
<td>Luminaire back hemisphere is 1 – 2 MH from property line</td>
<td>B2</td>
</tr>
<tr>
<td>Luminaire back hemisphere is 0.5 – 1 MH from property line</td>
<td>B1</td>
</tr>
<tr>
<td>Luminaire back hemisphere is less than 0.5 MH from property line</td>
<td>B0</td>
</tr>
</tbody>
</table>

**Maximum Allowable Uplight Rating**

For area lighting ³ ⁴

<table>
<thead>
<tr>
<th>Lighting Zone 1</th>
<th>Lighting Zone 2</th>
<th>Lighting Zone 3</th>
<th>Lighting Zone 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>U0</td>
<td>U0</td>
<td>U0</td>
<td>U0</td>
</tr>
</tbody>
</table>

For all other outdoor lighting, including decorative luminaires

<table>
<thead>
<tr>
<th>Lighting Zone 1</th>
<th>Lighting Zone 2</th>
<th>Lighting Zone 3</th>
<th>Lighting Zone 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1</td>
<td>U2</td>
<td>U3</td>
<td>U4</td>
</tr>
</tbody>
</table>

**Maximum Allowable Glare Rating**

<table>
<thead>
<tr>
<th>Lighting Zone 1</th>
<th>Lighting Zone 2</th>
<th>Lighting Zone 3</th>
<th>Lighting Zone 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>G2</td>
<td>G3</td>
<td>G4</td>
</tr>
</tbody>
</table>

1. IFNSA 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 purposes 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.
Exceptions:
1. Luminaires that qualify as exceptions in Section 147 of the California Energy Code (14 exceptions)
Light Pollution Reduction

- **Exceptions:**
  - 2. Emergency lighting

- **5.106.8.1 Effective date.**
  Newly constructed nonresidential projects submitted on or after July 1, 2012 shall comply with this section.
**Moisture Control**

Employ moisture control measures.

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

  - **5.407.2.2.1 Exterior door protection.** Primary exterior entries shall be covered to prevent water intrusion by using nonabsorbent floor and wall finishes within at least 2 feet around and perpendicular to such openings plus at least one of the following:
    1. An installed awning at least 4 feet in depth.
    2. The door is protected by a roof overhang at least 4 feet in depth.
    3. The door is recessed at least 4 feet.
    4. Other methods which provide equivalent protection

- **5.407.2.2.2 Flashing.** Install flashings integrated with a drainage plane.
Construction Waste Diversion

- **Section: 5.408.1 Construction waste management.** Recycle and/or salvage for reuse a minimum of 50 percent of the non-hazardous construction waste in accordance with:
  - 5.408.1.1,
  - 5.408.1.2
  - 5.408.1.3;
  - meet a local construction and demolition waste management ordinance, whichever is more stringent.
5.410.1 Recycling by occupants. Provide readily accessible areas that serve the entire building
- Paper
- Corrugated cardboard
- Glass
- Plastics
- Metals
5.410.1.1 Additions. [A] All additions conducted within a 12-month period under single or multiple permits, resulting in an increase of 30 percent or more in floor area, shall provide recycling areas on site.

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

- Buildings 10,000 square feet and over performed by trained personnel
- Commissioning requirements shall include:
  - 1. Owner’s project requirements
  - 2. Basis of design
  - 3. Commissioning measures shown in the construction documents
  - 4. Commissioning plan
  - 5. Functional performance testing
  - 6. Documentation and training
  - 7. Commissioning report
- Some exceptions included in supplement
What is Commissioning?

- Quality assurance process
- Spans the entire design and construction process
- Ensures that the building’s performance meets owner expectations.
Commissioning

• “Commissioning shall be performed by trained personnel with experience on projects of comparable size and complexity.”
• Trained personnel may include members of owner staff, contractor and design team as well as independent commissioning professionals.
• It is essential that there is a single person designated to lead and manage the commissioning activities.
• Methods of evaluating the trained personnel include review of:
  • 1. Technical knowledge
  • 2. Relevant experience
  • 3. Potential conflict of interest concerns
  • 4. Professional certifications and training
  • 5. Communication and organizational skills
  • 6. Reference and sample work products
5.410.2.1 Owner’s Project Requirements (OPR) The expectations and requirements of the building shall be documented before the design phase of the project begins. This documentation shall include the following:

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

• The Basis of Design document shall cover the following systems:
  • 1. Heating, ventilation, air conditioning (HVAC) systems and controls
  • 2. Indoor lighting system and controls
  • 3. Water heating system
  • 4. Renewable energy systems
  • 5. Landscape irrigation systems
  • 6. Water reuse systems
Commissioning

- 5.410.2.3 Commissioning plan.
  - *Prior to permit issuance* a commissioning plan shall be completed to document how the project will be commissioned *and* shall be started during the design phase of the building project.
Commissioning

- The Commissioning Plan shall include the following:
  - 1. General project information
  - 2. Commissioning goals
  - 3. Systems to be commissioned.
  - 4. Commissioning team information
  - 5. Commissioning process activities, schedules and responsibilities. Plans for the completion of commissioning shall be included.
5.410.2.4 Functional performance testing. Functional performance tests shall demonstrate the correct installation and operation of:

- each component
- system
- system to system interface

Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized.
Commissioning

- 5.410.2.5 Documentation and training. A Systems Manual and Systems Operations Training are required.
Commissioning

• The Systems Manual shall include the following:
  • 1. Site information
  • 2. Site contact information
  • 3. Basic operations and maintenance
  • 4. Major systems
  • 5. Site equipment inventory and maintenance notes
  • 6. Special inspection verifications
  • 7. Other resources and documentation
**Commissioning**

- **5.410.2.5.2 Systems operations training.** A program for training of the appropriate maintenance staff for each equipment type and/or system shall be documented in the commissioning report and shall include the following:
  1. System/equipment overview
  2. Review and demonstration of servicing/preventive maintenance
  4. Review of the record drawings on the system/ equipment
Commissioning

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

• Lack of awareness of code requirements
• Lack of personnel
• Lack of resources/training
• Lack of expertise and experience in commissioning
• Lack of clear direction in the code regarding roles and responsibilities
CALGreen Commissioning Requirements

**Defined**
- Commissioning Required
- Trained Personnel
- Owners Project Requirements
- Basis of Design
- Commissioning Plan Required
- Functional Testing Required
- Documentation and Training
- Commissioning Report

**Unclear**
- Who is ultimately responsible for compliance?
- Business owner or building owner (OPR)?
- Who is responsible for verification of compliance?
- Does the AHJ have a role in QA/QC?
- Is the Report required to be completed prior to final sign-off?
- Does the AHJ have a role in final review of the Report?
Building Department’s Role in Commissioning

- Building Department staff needs to be informed about CAL Green commissioning requirements
- Define expectations for staff review and inspection
- Notify applicants early on in the process (Design Review)
  - What is required
  - Scope of review and inspection

5.410.2.3 Commissioning Plan.

Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned and shall be started during the design phase of the building project.
Commissioning Plan/Report

54 pages

1200+ pages
CALGreen Compliance Template - Owner’s Project Requirements (OPR)

[The Owner’s Project Requirements (OPR) is a step of commissioning required for compliance with the 2010 CALGREEN Code, section 5.410.2.1, for newly constructed buildings greater than 10,000 sq. ft. This template is a guide to collecting the information recommended for the OPR. The information should be developed by the project team in collaboration with the Owner.]

Owner and User Requirements

a) Typically already covered in Project Scope as described in the building program. Includes primary purpose, program and use of project. May also describe future expansion needs, flexibility, quality of materials, construction and operation costs.

Environmental and Sustainability Goals

a) Project shall meet performance requirements required by the owner.
b) Other Owner requirements: [e.g. Owner priorities among CALGREEN Code or other areas]

Energy Efficiency Goals

a) Project shall comply with Title 24 building energy efficiency standards, or achieve increased level of efficiency determined by owner.
b) Lighting systems offer cost effective energy savings potential, and lighting fixtures and/or controls shall be selected to exceed Title 24 minimum efficiency requirements by level determined by owner.
c) High efficiency HVAC equipment offers cost effective energy savings, and HVAC equipment shall be selected that exceeds Title 24 minimum efficiency requirements by level determined by owner.
d) Additional energy efficiency measures that provide cost effective energy savings shall be included wherever feasible.
e) Other Owner requirements: [e.g. orientation, siting, daylighting, cool roof, natural ventilation, landscaping]

Indoor Environmental Quality Requirements

a) Indoor lighting requirements: [List any specific non-standard requirements. E.g. pendant-mouted lighting, illumination requirements, special applications.]
b) Occupant lighting control requirements: [List any non-standard requirements. E.g. multi-mode controls for assembly spaces]

CALGreen Compliance Form - Commissioning Measures in the Construction Documents

The following form may be required to be printed on the permit set of construction drawings or submitted separately. Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2 - Commissioning Measures in the Construction Documents

5.410.2. Commissioning measures shall be shown in the construction documents. The commissioning measures shown in the construction documents include the checked elements listed below and have been approved by the Owner, Owner Representative, or Designer of record.

<table>
<thead>
<tr>
<th>Commissioning Measure Elements</th>
<th>Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Measures shown in the specifications and cross referenced</td>
<td>☐</td>
</tr>
<tr>
<td>2. List of commissioned equipment and systems</td>
<td>☐</td>
</tr>
<tr>
<td>3. Cx roles and responsibilities of all parties</td>
<td>☐</td>
</tr>
<tr>
<td>4. Meeting requirements</td>
<td>☐</td>
</tr>
<tr>
<td>5. Commissioning schedule management procedures</td>
<td>☐</td>
</tr>
<tr>
<td>6. Procedures for addressing outstanding issues or non-compliance</td>
<td>☐</td>
</tr>
<tr>
<td>7. Requirements for execution and documentation of installation and equipment start up</td>
<td>☐</td>
</tr>
<tr>
<td>8. Specific testing requirements for each system type</td>
<td>☐</td>
</tr>
<tr>
<td>9. Submittal review and approval requirements</td>
<td>☐</td>
</tr>
<tr>
<td>10. Contents and approval process of the commissioning plan</td>
<td>☐</td>
</tr>
<tr>
<td>11. Cx documentation and reporting requirements</td>
<td>☐</td>
</tr>
<tr>
<td>12. Facility staff training requirements and verification procedures</td>
<td>☐</td>
</tr>
<tr>
<td>13. O&amp;M manual review and approval procedures</td>
<td>☐</td>
</tr>
<tr>
<td>14. Systems manual development and approval procedures</td>
<td>☐</td>
</tr>
<tr>
<td>15. Definitions</td>
<td>☐</td>
</tr>
</tbody>
</table>

[These are not the detailed step-by-step test procedures, but are lists of features, elements, modes and conditions of tests for specific equipment.]

Owner / Owner Representative or Designer of Record Signature

Date

2010 Guide Supplement
Including changes effective July 1, 2012

Page 177 of 205

Page 183 of 205
SECTION 5.410 - BUILDING MAINTENANCE AND OPERATION

• NOTE: Title 24, Part 6, Section 120.8 describes the Building Commissioning requirements for energy systems covered by the Nonresidential Building Energy Efficiency Standards. The following Commissioning requirements are for building systems NOT covered by Title 24, Part 6.
Section 120.8 – Building Commissioning

• New Section for the 2013 Energy Code
• For Energy Systems
• Similar to requirements in CALGreen
Scheduled to be completed and approved in 2014
Testing and Adjusting

- 5.410.4 Testing and adjusting. Testing and adjusting of systems shall be required for buildings less than 10,000 square feet or for new systems to serve an assition or alteration subject to Sections 303.1.
5.410.4.2 Systems. Develop a written plan of procedures for testing and adjusting systems. Systems to be included for testing and adjusting shall include at a minimum, as applicable to the project:

1. HVAC systems and controls
2. Indoor and outdoor lighting and controls
3. Water heating systems
4. Renewable energy systems
5. Landscape irrigation systems
6. Water reuse systems
Testing and Adjusting

- **5.410.4.3 Procedures.** Perform testing and adjusting procedures in accordance with industry best practices and applicable standards on each system as determined by the building official.
5.410.4.3.1 HVAC balancing. The system shall be balanced in accordance with:

- Testing Adjusting and Balancing Bureau National Standards;
- National Environmental Balancing Bureau Procedural Standards
- Associated Air Balance Council National Standards
Testing and Adjusting

- **5.410.4.4 Reporting.** After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.
5.410.4.5 Operation and maintenance (O &M) manual. Provide the building owner or representative with detailed operating and maintenance instructions and copies of guaranties/warranties for each system.