

**EXPRESS TERMS
FOR
PROPOSED BUILDING STANDARDS
OF THE
CALIFORNIA BUILDING STANDARDS COMMISSION**

**REGARDING ADOPTION OF AMENDMENTS FOR THE 2013 CALIFORNIA BUILDING STANDARDS CODE,
TITLE 24, CALIFORNIA CODE OF REGULATIONS (CCR), PART 11, CALIFORNIA GREEN BUILDING
STANDARDS CODE**

LEGEND FOR EXPRESS TERMS

1. New California language and modified language is underlined.
2. Repealed text: All such language appears in ~~strikeout~~.
3. *[Information for the reader is bracketed and in red italics]*

The California Building Standards Commission (CBSC) proposes to amend the 2010 edition of the California Green Building Standards Code (CGBSC) for the 2013 edition as shown on the following pages. Adopt new text as follows:

CHAPTER 1 ADMINISTRATION

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

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CHAPTER 2 DEFINITIONS

**SECTION 202
DEFINITIONS**

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ADDITION. *[Relocated from Division 5.7]*

ALTERATION OR ALTER. *[Relocated from Division 5.7]*

ALBEDO. *[Relocated from Division A5.1]*

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

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

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

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

DESIGN RATING. The sum of the annual TDV energy consumption for energy use components included in the performance compliance approach for the Standard Design Building (Energy Budget) and the annual TDV energy consumption for lighting and components not regulated by Title 24, Part 6 (such as domestic appliances and

consumer electronics) and accounting for the annual TDV energy offset by an on-site renewable energy system. The Design Rating is calculated by Compliance Software certified by the Energy Commission.

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

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

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

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

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

...

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

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

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

IESNA. Illuminating Engineering Society of North America.

...

LANDSCAPE (PLANT) COEFFICIENT (K_L). *[Relocated from Divisions 5.3 and A5.3.]*

LOW-RISE RESIDENTIAL BUILDING. For the purposes of CALGreen, any 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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MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MLO) (MWELO). *[Relocated from Divisions 5.3 and A5.3.]*

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

POTABLE WATER. *[Relocated from Divisions 5.3 and A5.3.]*

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PROCESS. *[Relocated from Division A5.2.]*

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

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RECYCLED WATER. *[Relocated from Divisions 5.3 and A5.3.]*

RESIDENTIAL BUILDING. (See “LOW-RISE RESIDENTIAL BUILDING” or “HIGH-RISE RESIDENTIAL BUILDING.”)

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SUBMETER. *[Relocated from Divisions 5.3 and A5.3.]*

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

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WATER BUDGET. Estimated total landscape irrigation water use shall not exceed the maximum applied water allowance calculated in accordance with the Department of Water Resources Model Efficient Landscape Ordinance (MLO) (MWELo) *[Relocated from Division 5.3.]*

CHAPTER 3 GREEN BUILDING

301.1 Scope. Buildings shall be designed . . . (No change)

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301.2 (Reserved for HCD)

301.3 Nonresidential additions and alterations [BSC]. The provisions of individual sections of Chapter 5 apply to both newly constructed buildings and to building additions for occupancies within the authority of California Building Standards Commission, of 1000 square feet and over or building alterations with a permit valuation or estimated construction cost of \$200,000 and above. 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 section will be designated by a banner to indicate where the section applies to newly constructed buildings only [N] or to additions and alterations as only [AA]. When the section applies to both, no banner will be used.

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CHAPTER 4 RESIDENTIAL MANDATORY MEASURES (RESERVED FOR HCD)

CHAPTER 5 NONRESIDENTIAL MANDATORY MEASURES

DIVISION 5.1 – PLANNING AND DESIGN

SECTION 5.101 GENERAL

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

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5.106.1 Storm water pollution prevention. Newly constructed projects and additions 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 . . .

5.106.1.2...

...

5.106.4 Bicycle parking. ~~Comply with Sections 5.106.4.1 and 5.106.4.2; or meet the applicable local ordinance, whichever is stricter.~~ For buildings regulated by the California Building Standards Commission as specified in Section 103, comply with Section 5.106.4.1. For buildings regulated by Division of the State Architect pursuant to Section 105, comply with Section 5.106.4.2.

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

5.106.4.1.1 Short-term bicycle parking [BSC]. If the new project or an addition or alteration that adds 10 or more vehicular parking spaces is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 100 feet of the visitors' entrance, readily visible to passers-by, for 5% of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack.

5.106.4.2.1.2 Long-term bicycle parking. For new buildings with over 10 tenant-occupants or additions or alterations that add 10 or more vehicular parking spaces, provide secure bicycle parking for 5% of motorized vehicle parking capacity, with a minimum of one space. Acceptable parking facilities shall be convenient from the street and may include: . . .

5.106.4.2 Bicycle parking [DSA] (reserved for DSA), . . .

5.106.5.2 Designated parking. In new projects or additions or alterations that add 10 or more vehicular parking spaces, provide ~~Provide~~ designated parking for any combination of low-emitting, fuel-efficient, and carpool/van pool vehicles as follows:

Table 5.106.5.2 [No change]

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

1. The minimum requirements in the California Energy Code for Lighting Zones 1-4 as defined in Chapter 10 of the California Administrative Code; and
2. Backlight, Uplight and Glare (BUG) ratings as defined in IESNA TM-15-11; and
3. 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.

Exceptions [N]:

1. Luminaires that qualify as exceptions in Section 147 of the California Energy Code
2. Emergency lighting

Note [N]: See also California Building Code, Chapter 12, Section 1205.6 for college campus lighting requirements for parking facilities and walkways.

~~**5.106.8.1 Effective date.** Newly constructed nonresidential projects with outdoor lighting for which an application for a building permit is submitted on or after July 1, 2012 shall comply with this section.~~

TABLE 5.106.8 [N]

Maximum Allowable Backlight, Uplight and Glare (BUG) Ratings^{1, 2}

[Contents of table to remain unchanged]

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

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

Exception: Additions and alterations not altering the drainage path.

DIVISION 5.2 – ENERGY EFFICIENCY

**SECTION 5.201
GENERAL**

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

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

DIVISION 5.3 – WATER EFFICIENCY AND CONSERVATION

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SECTION 5.302

DEFINITIONS

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GRAYWATER. Untreated household ... *[Relocated to Chapter 2 with a new definition]*

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MLO). *[Relocated to Chapter 2 with a correction to the acronym.]*

POTABLE WATER. *[Relocated to Chapter 2.]*

RECYCLED WATER. *[Relocated to Chapter 2.]*

SUBMETER. *[Relocated to Chapter 2.]*

WATER BUDGET. *[Relocated to Chapter 2 with a correction to the acronym.]*

**SECTION 5.303
INDOOR WATER USE**

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

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

1. ...
2. ...

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

5.303.2 20% percent ~~S~~ savings. A schedule of plumbing fixtures and fixture fittings that will reduce by 20 percent the overall use of potable water within the building ~~by 20%~~ shall be provided....

- 1...
- 2...

5.303.2.1 Areas of addition or alteration. For those occupancies within the authority of the California Building Standards Commission, the provisions of Section 5.303.2 shall apply to additions or areas of alteration to the building.

5.303.2.4 2 Multiple showerheads serving one shower. When a shower is served by more than one newly installed showerhead, the combined flow rate of all the showerheads controlled by a single valve shall not exceed the maximum flow rate at ≥ 20 percent reduction contained in Table 5.303.2.2 or the shower shall be designed to only allow one showerhead to be in operation at a time.

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TABLE 5.303.2.3 FIXTURE FLOW RATES

Fixture Type	Flow-rate	Maximum flow rate at 20% Reduction
Showerheads	2.5 gpm @ 80 psi	2 gpm @ 80 psi ⁴
Lavatory faucets nonresidential	0.5 gpm @ 60 psi	0.4 gpm @ 60 psi ³
...
Gravity tank type water closets	1.6 gallons per flush	1.28 gallons per flush ^{4 3}
	1.6 gallons per flush	1.28 gallons per flush ^{4 3}
	1.6 gallons per flush	1.28 gallons per flush ^{4 3}
	1.6 gallons per flush	1.28 gallons per flush ^{4 3}
...

...

³ Where complying faucets are unavailable, aerators rated at .35 gpm or other means may be used to achieve reduction.

^{4 3} Includes single and dual flush water closets with an effective flush of 1.28 gallons or.

Single Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the average flush volume when tested in accordance with ASME A112.19.233.2.

Dual Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with

ASME A112.19.2 and ASME A112.19.14.

⁴ Showerheads shall be certified to the performance criteria of the U.S. EPA Water Sense Specification for showerheads.

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

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

5.303.6 Standards for Plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall meet the standards referenced in Table 5.303.6 be installed in accordance with the *California Plumbing Code*, and shall meet the applicable standards referenced in Table 1401.1 of the *California Plumbing Code* and in Chapter 6 of this code.

**TABLE 5.303.6
STANDARDS FOR PLUMBING FIXTURES AND FIXTURE FITTINGS**

REQUIRED STANDARDS	
Water closets (toilets) — flushometer valve type single flush, maximum flush volume	ASME A112.19.2/CSA B45.1 — 1.28 gal (4.8 L)
Water closets (toilets) — flushometer valve type dual flush, maximum flush volume	ASME A112.19.14 and USEPA WaterSense Tank-Type High Efficiency Toilet Specification — 1.28 gal (4.8 L)
Water closets (toilets) — tank type	U.S. EPA WaterSense Tank-Type High Efficiency Toilet Specification
Urinals, maximum flush volume	ASME A112.19.2/CSA B45.1 — 0.5 gal (1.9 L)
Urinals, non-water urinals	ASME A112.19.19 (vitreous china) ANSI Z124.9 — 2004 or IAPMO Z124.9 (plastic)
Public lavatory faucets: Maximum flow rate — 0.5 gpm (1.9 L/min)	ASME A112.18.1/CSA B125.1
Public metering self-closing faucets: Maximum water use — 0.25 gal (1.0 L) per metering cycle	ASME A112.18.1/CSA B125.1
Residential bathroom lavatory sink faucets: Maximum flow rate — 1.5 gpm (5.7 l/min) ¹	ASME A112.18.1/CSA B125.1
Showerheads: Maximum flow rate — 2.5 gal (9.5 l/min)	ASME A112.18.1/CSA B125.1

**SECTION 5.304
OUTDOOR WATER USE**

5.304.1 Water budget. A water budget shall be developed for landscape irrigation use installed in conjunction with a new building or an addition or alteration 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. . . .

5.304.2 Outdoor potable water use. For new water service or for addition or alteration requiring upgraded water service for landscaped areas of at least 1000 square feet but not more than 5000 square feet (the level at which Water Code §535 applies), separate submeters shall be installed for outdoor potable water use.

5.304.3 Irrigation design. In new nonresidential construction or building addition or alteration with at least 1000 but not more than 2500 square feet of cumulative landscaped area (the level at which the MLO MWELO applies), install irrigation controllers and sensors which include the following criteria, and meet manufacturer's recommendations.

5.304.3.1. . .

DIVISION 5.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

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

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

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 non-absorbent floor and wall finishes within at least two feet around and perpendicular to such openings plus at least one 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

Notes:

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

5.407.2.2.2 Flashing. Install flashings integrated with a drainage plane.

SECTION 5.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

5.408.1 Construction waste management. Recycle and/or salvage for reuse a minimum of 50% of the non-hazardous construction and demolition waste in accordance with Section 5.408.1.1, 5.408.1.2 or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.

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

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

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

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

Exceptions to 5.408.1.1 and 5.408.1.2:

1. Excavated soil and land-clearing debris
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets, ~~where demolition of an existing structure(s) is necessary for the construction of a new structure.~~

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~~**5.408.2 Isolated jobsites.** The enforcing agency may make exceptions to the requirements of this section when jobsites are located in areas beyond the haul boundaries of the diversion facility.~~

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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.

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

5.410.1.1 Additions or alterations [AA]. Provide recycling areas on site in accordance with one of the following:

1. For additions or alterations by on owner or a tenant conducted within a 12-month period under single or multiple permits resulting in an increase of 30% or more in floor area
2. For additions or alterations by an owner or a tenant for which multiple permits are applied within a 12-month period resulting in an increase of 30% or more in floor area

5.410.1.4 2 Sample ordinance. Space allocation for recycling areas shall comply with Chapter 18, Part 3, Division 30 of the Public Resources Code. . . .

5.410.2 Commissioning [N]. For new buildings 10,000 square feet and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's project requirements. . . .

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- 7...

Exceptions:

1. Dry storage warehouses of any size . . .
2. ...
3. ...
4. Commissioning requirements for energy systems covered by the 2013 California Energy Code.

...

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

1. Environmental and Sustainability Goals.
- ~~2. Energy Efficiency Goals.~~
- ~~3. 2. Indoor Environmental Quality Requirements.~~
4. 3. Project program, including facility functions and hours of operation, and need for after hours operation.
- ~~5. 4. Equipment and Systems Expectations.~~
- ~~6. 5. Building Occupant and O&M Personnel Expectations.~~

5.410.2.2 Basis of Design (BOD) [N]. A written explanation of how the design of the building systems meets the OPR shall be completed at the design phase of the building project, and updated as necessary during the design and construction phases. 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. 1. Renewable Energy Systems
- ~~5. 2. Landscape Irrigation Systems~~
- ~~6. 3. Water Reuse Systems.~~

5.410.2.3 Commissioning plan [N]. Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned and shall be started during the design phase of the building project. . . . (No change to the balance of the section)

5.410.2.4 Functional performance testing [N]. Functional performance tests shall demonstrate the correct installation and operation of each component, system, and system-to-system interface in accordance with the approved plans and specifications. . . .

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

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5.410.2.6 Commissioning report [N]. A complete report of commissioning process activities undertaken through the design, construction and reporting recommendations for post-construction phases of the building project shall be completed and provided to the owner or representative.

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

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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- 1. Renewable energy systems
- 5- 2. Landscape Irrigation Systems
- 6- 3. Water Reuse Systems

5.410.4.3 Procedures. Perform testing and adjusting procedures in accordance with industry best practices and applicable standards on each system.

5.410.4.3.1 HVAC balancing. . . .

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DIVISION 5.5 – ENVIRONMENTAL QUALITY

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**SECTION 5.502
DEFINITIONS**

5.502.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

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

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

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

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

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

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

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PSIG. Pounds per square inch, gauge.

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

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

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

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**SECTION 5.503
FIREPLACES, WOODSTOVES AND FUEL BURNING APPLIANCES**

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

~~5.503.1.1 Woodstoves.~~ ~~Woodstoves and pellet stove shall comply with U.S. EPA Phase II emission limits where applicable.~~

5.503.1 General. Woodstoves, gas fireplaces, pellet stoves and fireplaces shall comply with applicable local ordinances and be installed in accordance with manufacturer's installation instructions.

5.503.2 Gas fireplaces. A decorative gas appliance shall be a fuel-burning appliance with a sealed combustion system that draws all air for combustion from the outside atmosphere, discharges are all flue gases to the outside atmosphere and shall be listed in accordance with ANSI Z21.50/CSA2.22. Gas fireplace heaters shall be direct-vent appliances and shall be listed in accordance with ANSI Z21.88/CSA2.33.

5.503.3 Wood burning appliances. Fireplace inserts and woodstoves shall be listed in accordance with UL 1482 and shall be certified in accordance with the requirements of the EPA Standards of Performance for New Residential Wood Heaters, Title 40 CFR Part 60 Subpart AAA.

5.503.4 Factory-built fireplaces. Factory-built fireplaces shall be listed in accordance with UL 127.

Note: For the purposes of this section, factory-built fireplaces shall include, but not be limited to, prefabricated metal "zero clearance" fireboxes and prefabricated blocks of reinforced precast lightweight concrete masonry or refractory masonry, which are assembled in the field using grout and mortar specified by the manufacturer.

5.503.4.1 Wood burning factory-built fireplaces. Wood burning factory-built fireplaces shall be qualified at the U.S. EPA's Voluntary Fireplace Program Phase 2 emissions level of 5.1 g/kg of wood burned.

5.503.5 Pellet stoves. Automatic feed, pellet fuel-burning room heaters that are intended to burn wood pellets or other suitable solid fuel shall be tested and listed in accordance with ASTM E1509-04.

**SECTION 5.504
POLLUTANT CONTROL**

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

...

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

**TABLE 5.504.4.5
FORMALDEHYDE LIMITS[†]
Maximum Formaldehyde Emissions in Parts per Million**

PRODUCT	CURRENT LIMIT	JANUARY 1, 2012	JULY 1, 2012
Hardwood plywood veneer core	0.05		
Hardwood plywood composite core	0.08		0.05
Particleboard	0.09		
Medium density fiberboard	0.11		
Thin medium density fiberboard ²	0.21	0.13	

**TABLE 5.504.4.5
FORMALDEHYDE LIMITS¹
Maximum Formaldehyde Emissions in Parts per Million**

PRODUCT	CURRENT LIMIT
Hardwood plywood veneer core	0.05
Hardwood plywood composite core	0.05

Particleboard	0.09
Medium density fiberboard	0.11
Thin medium density 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 1333-96(2002). For additional information, see *California Code of Regulations*, Title 17, Sections 93120 through 93120.12.
2. Thin medium density fiberboard has a maximum thickness of 5/16 inch (8 millimeters).

...

5.504.4.6 Resilient flooring systems. For ~~50%~~ 80 percent of floor area receiving resilient flooring, install resilient flooring which meets the following: ~~complying with the VOC emission limits defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on High Performance Products Database; products compliant with CHPS criteria certified under the Greenguard Children & Schools program; or certified under the Resilient Floor Covering Institute (RFCI) FloorScore program; or meet California Department of Public Health 2010 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as Specification 01350.)~~

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on is High Performance Database; or
4. Compliant with CDPH criteria as certified under the Greenguard Children's & Schools Program.

...

5.504.5.3 Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air that provide at least a Minimum Efficiency Reporting Value (MERV) of 8. MERV 8 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

Exception: ~~A MERV 1 filter shall be allowed for return air only or return with prefiltered outside air, if the filter is of a re-usable, non-disposable type, and the fan energy use of that air delivery system is 0.4W/cfm or less at design airflow. An ASHRAE 10 percent – 15 percent efficiency filter shall be permitted for an HVAC unit meeting the 2013 California Energy Code having 60,000 Btu/h or less capacity per fan coil, if the energy use of the air delivery system is 0.4 W/cfm or less at design air flow.~~

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

...

SECTION 5.506 INDOOR AIR QUALITY

...

5.506.2 Carbon dioxide (CO₂) monitoring. For buildings or additions equipped with demand control ventilation, CO₂ sensors and ventilation controls shall be specified and installed in accordance with the requirements of the ~~2010~~ 2013 California Energy Code, Section 124.0 (c) ~~(4)~~.

SECTION 5.507 ENVIRONMENTAL COMFORT

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

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

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

1. Within the 65 CNEL noise contour of an airport

Exceptions:

1. Ldn or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.
 2. Ldn or CNEL for other airports and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.
2. Within the 65 CNEL or L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan

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

5.507.4.2 Performance method. For buildings located as defined in Sections A5.507.4.1 or A5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (L_{eq}-1Hr) of 50 dBA in occupied areas during any hour of operation.

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

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

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

Note: Examples of assemblies and their various STC ratings may be found at the California Office of Noise Control: http://www.toolbase.org/PDF/CaseStudies/stc_icc_ratings.pdf.

**SECTION 5.508
OUTDOOR AIR QUALITY**

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

Exception: Refrigeration systems containing low-global warming potential (low-GWP) refrigerant with a GWP value less than 150 are not subject to this section. Low-GWP refrigerants are non-ozone-depleting refrigerants that include ammonia, carbon dioxide (CO₂), and potentially other refrigerants.

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

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

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

5.508.2.1.2.1 Anchorage. 1/4" OD tubing shall be securely clamped to a rigid base to keep vibration levels below 8 mils.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

DIVISION 5.7

ADDITIONS AND ALTERATIONS TO EXISTING NONRESIDENTIAL BUILDINGS

[This division is proposed for repeal, with replacement in individual sections within Divisions 5.1 through 5.5, scoped as appropriate for new construction, addition, or alteration; or all – see Section 301.3.]

SECTION 5.704 ADMINISTRATION

5.704.1 Scope. For those occupancies subject to section 103 of this code, the provisions of this division shall apply to the planning, design, operation, construction, use and occupancy of additions to buildings or structures, unless otherwise indicated in this code. The provisions of this Division shall only apply to the portions of the building being added or altered within the scope of the permitted work. Compliance for additions and alterations is required on or before the dates shown in Table 5.704.

TABLE 5.704

Effective date of compliance	Square footage of addition	Permit valuation or estimated construction cost of alteration
July 1, 2012	2000	\$500,000
Effective date of the 2013 California Building Standards Code	4000	\$200,000

Notes:

1. The effective date of the 2013 California Building Standards Code currently is projected to be January 1, 2014.

~~2. This division does not apply to additions and alterations of qualified historical buildings.~~

SECTION 5.702 DEFINITIONS

~~**5.702.1 Definitions.** Unless otherwise stated, the following words and terms shall, for the purposes of this code, have the meanings shown in this division. Refer also to definitions in Chapter 2 of this code.~~

~~ADDITION.~~ *[Relocated to Chapter 2.]*

~~ALTERATION OR ALTER.~~ *[Relocated to Chapter 2.]*

~~ARB (CARB).~~ The California Air Resources Board. *[Duplicate, already located in Chapter 2.]*

SECTION 5.703 GREEN BUILDING

~~**5.703.1 Scope.** Building additions and alterations shall be designed to include the green building measures specified as mandatory in the application checklists for alterations or additions contained in this code.~~

~~**5.703.2 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.~~

~~**5.703.2.1 Tenant improvements.** The provisions of this code shall apply to the initial tenant or occupant improvements to a project and to subsequent tenant improvements subject to Section 5.701.1.~~

SECTION 5.710 PLANNING AND DESIGN

~~**5.710.1 General.** The provisions of this chapter outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore, and enhance the environmental quality of the site and respect the integrity of adjacent properties.~~

~~**5.710.2 Definitions.** Refer to Section 5.102 of this code.~~

~~**5.710.3 Site selection (Reserved)**~~

~~**5.710.4 Site preservation (Reserved)**~~

~~**5.710.5 Deconstruction and reuse of existing structures (Reserved)**~~

~~**5.710.6 Site development**~~

~~**5.710.6.1 Storm water pollution prevention.** Additions that disturb soil of less than one acre shall prevent the pollution of stormwater runoff from the construction activities through one or more of the following measures:~~

~~**5.710.6.1.1 Local ordinance.** Comply with a lawfully enacted stormwater management and/or erosion control ordinance.~~

~~**5.710.6.1.2. 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 BMP 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 hydroseeding to stabilize disturbed soils~~
- ~~e. Erosion control to protect slopes~~
- ~~f. Protection of storm drain inlets (gravel bags or catch basin inserts)~~
- ~~g. Perimeter sediment control (perimeter silt fence, fiber rolls)~~
- ~~h. Sediment trap or sediment basin to retain sediment on site~~
- ~~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 performed off site
- f. Spill prevention and control
- g. Other housekeeping BMP acceptable to the enforcing agency

5.710.6.2 Bicycle parking. Comply with Sections 5.710.6.2.1 and 5.710.6.2.2; or meet the applicable local ordinance, whichever is stricter.

5.710.6.2.1 Short term bicycle parking. If the project is anticipated to generate visitor traffic and adds 10 or more vehicular parking spaces, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers by, for 5% of the additional visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack.

5.710.6.2.2 Long term bicycle parking. For buildings with over 10 tenant occupants that add 10 or more vehicular parking spaces, provide secure bicycle parking for 5% of additional motorized vehicle parking capacity, with a minimum of one space. Acceptable parking facilities shall be convenient from the street and may include:

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

5.710.6.3 Designated parking. For projects that add 10 or more vehicular parking spaces, provide designated parking for any combination of low emitting, fuel efficient, and carpool/van pool vehicles as shown in Table 5.106.5.2 of Division 5.1 based on the number of additional spaces.

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

**CLEAN AIR/
VANPOOL/EV**

5.710.6.4 Reserved.

5.710.6.5 Reserved.

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

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

Exception: Additions and alterations not altering the drainage path.

SECTION 5.714 ENERGY EFFICIENCY (Reserved)

SECTION 5.712 WATER EFFICIENCY AND CONSERVATION

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

5.712.2 Definitions. Refer to Section 5.302 of this code.

5.712.3 Indoor water use.

5.712.3.1 Meters. Separate submeters or metering device shall be installed for the uses described in Sections 5.712.3.1.1 and 5.712.3.1.2.

5.712.3.1.1 Additions to existing buildings in excess of 50,000 square feet (4645 m²). Separate submeters shall be installed as follows:

- 1. For each individual leased, rented, or other tenant space within the building projected to consume more than 100 gal/day (380 L/day), including, but not limited to, spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop.
- 2. Where meters for individual building tenants are unfeasible, for water supplied to the following subsystems:
 - a. Makeup water for cooling towers where flow through is greater than 500 gpm (30 L/s)

- b. ~~Makeup water for evaporative coolers greater than 6 gpm (0.04 L/s)~~
- c. ~~Steam and hot water boilers with energy input more than 500,000 Btu/h (147 kW)~~

5.712.3.1.2 Excess consumption. ~~Any addition or added space within an addition that is projected to consume more than 1,000 gal/day (3800 L/day).~~

5.712.3.2 20% Savings. ~~A schedule of newly installed plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the addition or area of alteration to the building by 20% shall be provided. The reduction shall be based on the maximum allowable water use per plumbing fixture and fittings as required by the California Building Standards Code. The 20% reduction in potable water use shall be demonstrated by one of the following methods:~~

1. ~~Prescriptive method. Each plumbing fixture and fitting shall not exceed the maximum flow rate at ≥ 20 percent reduction as specified in Table 5.303.2.3 of Division 5.3, or~~
2. ~~Performance method. A calculation demonstrating a 20% reduction in the building "water use baseline" as established in Table 5.303.2.2 shall be provided.~~

5.712.3.3 Multiple showerheads serving one shower. ~~When a shower is served by more than one newly installed showerhead, the combined flow rate of all the showerheads controlled by a single valve shall not exceed the maximum flow rate at ≥ 20 percent reduction contained in Table 5.303.2.2 or the shower shall be designed to only allow one showerhead to be in operation at a time.~~

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

5.712.3.4 (Reserved)

5.712.3.5 Plumbing fixtures and fittings. ~~Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall meet the standards referenced in Table 5.503.6 of Division 5.3.~~

5.712.4 Outdoor water use.

5.712.4.1 Water budget. ~~A water budget shall be developed for landscape irrigation use installed in conjunction with addition or alteration that conforms to the local water efficient landscape ordinance or to the California Department of Water Resources Model Water Efficient Landscape Ordinance where no local ordinance is applicable.~~

Note: ~~Prescriptive measures to assist in compliance with the water budget are listed in Sections 492.5 through 492.8, 492.10 and 492.11 of the ordinance, which may be found at:
<http://www.owue.water.ca.gov/landscape/ord/ord.cfm>~~

5.712.4.2 Outdoor potable water use. ~~For building addition or alteration requiring upgraded water service for landscaped areas of at least 1000 square feet but not more than 5000 square feet (the level at which Water Code §535 applies), separate submeters or metering devices shall be installed for outdoor potable water use.~~

5.712.4.3 Irrigation design. ~~In building addition or alteration with at least 1000 square feet but not more than 2500 square feet of cumulative landscaped area (the level at which the MLO applies), install irrigation controllers and sensors which include the following criteria, and meet manufacturer's recommendations.~~

Exception: ~~New irrigation controllers are not required when existing irrigation controllers have sufficient capacity to serve the new landscaped area.~~

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

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

Note: ~~More information regarding irrigation controller function and specifications is available from the Irrigation Association.~~

5.712.5 Water reuse systems (Reserved)

SECTION 5.713 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

5.713.1 Scope. ~~The provisions of this chapter shall outline means of achieving material conservation and resource efficiency through protection of buildings from exterior moisture, construction waste diversion, provisions in the workplace for recycling of materials, and system testing and adjusting and balancing of HVAC.~~

5.713.2 Definitions. Refer to Section 5.402 of this code.

5.713.3 Foundation systems (Reserved)

5.713.4 Efficient framing techniques (Reserved)

5.713.5 Material sources (Reserved)

5.713.6 Enhanced durability and reduced maintenance (Reserved)

5.713.7 Water resistance and moisture management.

5.713.7.1 Weather protection. Provide a weather-resistant exterior wall and foundation envelope as required by California Building Code Section 1403.2 (Weather Protection) and California Energy Code Section 150, (Mandatory Features and Devices), manufacturer's installation instructions, or local ordinance, whichever is more stringent.

5.713.7.2 Moisture control. Employ moisture control measures by the following methods.

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

5.713.7.2.2 Entries and openings. Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings.

Notes:

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

5.713.8 Construction waste reduction, disposal and recycling

5.713.8.1 Construction waste management. Recycle and/or salvage for reuse a minimum of 50% of the non-hazardous construction waste in accordance with Section 5.713.8.1.1 or 5.713.8.1.2; or meet a local construction and demolition waste management ordinance, whichever is more stringent.

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

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

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

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

Exceptions to 5.713.8.1.1 and 5.713.8.1.2:

1. Excavated soil and land-clearing debris
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets, where demolition of an existing structure(s) is necessary for the new construction

5.713.8.1.3 Documentation. Documentation shall be provided to the enforcing agency which demonstrates compliance with Section 5.713.8.1.1, Items through 4. The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

Notes:

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

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

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

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

Notes:

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

5.713.9 Life cycle assessment (Reserved)

5.713.10 Building maintenance and operation

5.713.10.1 Recycling by occupants. If not provided on the existing site and where site conditions permit, provide readily accessible areas that serve the entire building and are identified for the depositing, storage, and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals in accordance with one of the following:

1. For additions or alterations by an owner or a tenant conducted within a 12-month period under single or multiple permits resulting in an increase of 30% or more in floor area
2. For additions or alterations by an owner or a tenant for which multiple permits are applied within a 12-month period resulting in an increase of 30% or more in floor area
3. As required by a lawfully enacted local recycling ordinance, if more restrictive.

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

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

5.713.10.2 (Reserved)

5.713.10.3 (Reserved)

5.713.10.4 Testing and adjusting. Testing and adjusting of new systems installed to serve an addition or alteration subject to Section 5.701.1 shall be required.

5.713.10.4.1 (Reserved)

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

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

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

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

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

5.713.10.4.5 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. O & M instructions shall be consistent with OSHA requirements in CCR, Title 8, Section 5142, and other related regulations.

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

SECTION 5.714 ENVIRONMENTAL QUALITY

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

5.714.2 Definitions. Refer to Section 5.502 of this code.

5.714.3 Fireplaces.

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

5.714.3.1.1 Woodstoves. Woodstoves and pellet stoves shall comply with US EPA Phase II emission limits.

5.714.4 Pollutant control.

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

5.714.4.2 (Reserved)

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

5.714.4.4 Finish material pollutant control. Finish materials shall comply with Sections 5.714.4.4.1 through 5.714.4.4.4.

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

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2 in Division 5.5. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene), except for aerosol products as specified in subsection 2, below.

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

5.714.4.4.2 (Reserved)

5.714.4.4.3 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3 in Division 5.5, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3, shall be determined by classifying the coating as a Flat, Nonflat, or Nonflat High Gloss coating, based on its gloss, as defined in subsections 4.21, 4.36, and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure, and the corresponding Flat, Nonflat, or Nonflat High Gloss VOC limit in Table 5.504.4.3 shall apply.

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

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

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

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

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

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

5.714.4.4.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 5.504.4.1 in Division 5.5.

5.714.4.4.5 Composite wood products. Hardwood plywood, particleboard, and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure for Composite Wood (17 CCR 93120 et seq.), by or before the dates specified in these sections, as shown in Table 5.504.4.5 in Division 5.5.

5.714.4.4.5.1 Early compliance. Reserved.

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

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

5.714.4.4.6 Resilient flooring systems. For 50% of floor area receiving resilient flooring, install resilient flooring complying with the VOC emission limits defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on its High Performance Database; products compliant with CHPS criteria certified under the Greenguard Children & Schools program; certified under the Resilient Floor Covering Institute (RFCI) FloorScore program; or meet California Department of Public Health 2010 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as Specification 01350.)

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

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

5.714.4.5.1 (Reserved)

5.714.4.5.2 (Reserved)

5.714.4.5.3 Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air that provide at least a Minimum Efficiency Reporting Value (MERV) of 8. MERV 8 filters shall be installed after any flush-out or testing and prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

Exception: A MERV 1 filter shall be allowed for return air only or return with prefiltered outside air, if the filter is of a re-usable, non-disposable type, and the fan energy use of that air delivery system is 0.4W/cfm or less at design airflow.

5.714.4.6 (Reserved)

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

5.714.5 Indoor moisture control

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

5.714.6 Indoor air quality

5.714.6.1 Outside air delivery. For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 121 (Requirements For Ventilation) of the 2010 California Energy Code, or the applicable local code, whichever is more stringent, and Chapter 4 of CCR, Title 8.

5.714.6.2 Carbon dioxide (CO₂) monitoring. For additions equipped with demand control ventilation, CO₂ sensors and ventilation controls shall be specified and installed in accordance with the requirements of the current edition of the 2010 California Energy Code, Section 121(e).

5.714.7 Environmental comfort

5.714.7.1 Acoustical control. Employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E90 and ASTM E413 or Outdoor Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E1332, using either the prescriptive or performance method in Section 5.714.7.1.1 or 5.714.7.1.2.

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

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

1. Within the 65 CNEL noise contour of an airport

Exceptions:

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

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

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

5.714.7.1.2 Performance method. For buildings located as defined in Sections A5.714.7.1.1 or A5.714.7.1.1.1, wall and roof ceiling assemblies exposed to the noise source making up the building addition or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (L_{eq} 1hr) of 50 dBA in occupied areas during any hour of operation.

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

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

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

Note: Examples of assemblies and their various STC ratings may be found at the California Office of Noise Control: http://www.toolbase.org/PDF/CaseStudies/stc_ice_ratings.pdf.

5.714.8 Outdoor air quality

5.714.8.1 Ozone depletion and greenhouse gas reductions. Installations of HVAC, refrigeration, and fire suppression equipment shall comply with Sections 5.714.8.1.1 and 5.714.8.1.2.

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

~~5.714.8.1.2 Halons. Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.~~

CHAPTER 6

REFERENCED ORGANIZATIONS AND STANDARDS

**SECTION 601
GENERAL**

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

<u>Organization</u>	<u>Standard</u>	<u>Referenced Section</u>
...		
...		
IESNA Illuminating Engineering Society of North America		
170 Wall St, Floor 17 New York, NY 10005-4001 http://www.ies.org	<u>IES TM-15-11</u>	5.10
...		6.8
...		
...		

**CHAPTER 8
COMPLIANCE FORMS AND WORKSHEETS**

**WORKSHEET (WS-1)
BASELINE WATER USE**

Fixture Type	Flow-rate (gpm)		Duration		Daily uses		Occupants ^{1,2}		Gallons per day
Showerheads	2.5 <u>gpm</u>	X	5 min.	X	1	X	Note 2a	=	
Showerheads Residential	2.5 <u>gpm</u>	X	8 min.	X	1	X		=	
Lavatory Faucets Residential	2.2 <u>gpm</u>	X	.25 min.	X	3	X		=	
Lavatory Faucets Nonresidential	0.5 <u>gpm</u>	X	.25 min.	X	3	X		=	
Kitchen Faucets	2.2 <u>gpm</u>	X	4 min.	X	1	X	Note 2b	=	
Replacement Aerators	2.2 <u>gpm</u>	X		X		X		=	
Wash Fountains	2.2 <u>gpm</u>	X		X		X		=	
Metering Faucets	0.25 <u>gal/cycle</u>	X	.25 min.	X	3	X		=	
Metering Faucets for Wash Fountains	2.2 <u>gpm</u>	X	.25 min.	X		X		=	
Gravity tank type Water Closets	1.6 <u>gal/flush</u>	X	1 flush	X	1 male ¹ 3 female	X		=	
Flushometer Tank Water Closets	1.6 <u>gal/flush</u>	X	1 flush	X	1 male ¹ 3 female	X		=	
Flushometer Valve Water Closets	1.6 <u>gal/flush</u>	X	1 flush	X	1 male ¹ 3 female	X		=	
Electromechanical Hydraulic Water Closets	1.6 <u>gal/flush</u>	X	1 flush	X	1 male ¹ 3 female	X		=	
Urinals	1.0 <u>gal/flush</u>	X	1 flush	X	2 male	X		=	
Total daily baseline water use (BWU)								=	
_____ (BWU) x .80 = _____ Allowable water use									

1. . . . (Footnotes remain unchanged.)

**WORKSHEET (WS-2)
20 PERCENT REDUCTION WATER USE**

Fixture Type	Flow-rate (gpm)		Duration		Daily uses		Occupants ^{2,3}		Gallons per day
Showerheads		X	5 min.	X	1	X	Note 3a	=	
Showerheads Residential		X	8 min.	X	1	X		=	
Lavatory Faucets Residential		X	.25 min.	X	3	X		=	
Lavatory Faucets Nonresidential		X	.25 min.	X	3	X		=	
Kitchen Faucets		X	4 min.	X	1	X	Note 3b	=	
Replacement Aerators		X		X		X		=	
Wash Fountains		X		X		X		=	
Metering Faucets		X	.25 min.	X	3	X		=	
Metering Faucets for Wash Fountains		X	.25 min.	X		X		=	
Gravity tank type Water Closets		X	1 flush	X	1 male ⁵ 3 female	X		=	
HET ⁴ High-Efficiency Toilet	1.28 gal/flush	X	1 flush	X	1 male ⁵ 3 female	X		=	
Flushometer Tank Water Closets		X	1 flush	X	1 male ⁵ 3 female	X		=	
Flushometer Valve Water Closets		X	1 flush	X	1 male ¹ 3 female	X		=	
Electromechanical Hydraulic Water Closets		X	1 flush	X	1 male ⁵ 3 female	X		=	
Urinals		X	1 flush	X	2 male	X		=	
Urinals Non-water supplied	0.0 gal/flush	X	1 flush	X	2 male	X		=	
Proposed water use								=	
_____ (BWU from WS-1) x .80 = _____ Allowable water use									

1. . . . (Footnotes 1 through 5 remain unchanged.)

WORKSHEET (WS-3)
30 - 35 OR 40 PERCENT REDUCTION WATER USE

Fixture Type	Flow-rate (gpm)		Duration		Daily uses		Occupants ^{2,3}		Gallons per day
Showerheads		X	5 min.	X	1	X	Note 3a	=	
Showerheads Residential		X	8 min.	X	1	X		=	
Lavatory Faucets Residential		X	.25 min.	X	3	X		=	
Lavatory Faucets Nonresidential ⁶		X	.25 min.	X	3	X		=	
Kitchen Faucets		X	4 min.	X	1	X	Note 3b	=	
Replacement Aerators		X		X		X		=	
Wash Fountains		X		X		X		=	
Metering Faucets		X	.25 min.	X	3	X		=	
Metering Faucets for Wash Fountains		X	.25 min.	X		X		=	
Gravity tank type Water Closets		X	1 flush	X	1 male ⁵ 3 female	X		=	
HET ⁴ High-Efficiency Toilet	1.12 gal/flush	X	1 flush	X	1 male ⁵ 3 female	X		=	
Flushometer Tank Water Closets		X	1 flush	X	1 male ⁵ 3 female	X		=	
Flushometer Valve Water Closets		X	1 flush	X	1 male ¹ 3 female	X		=	
Electromechanical Hydraulic Water Closets		X	1 flush	X	1 male ⁵ 3 female	X		=	
Urinals		X	1 flush	X	2 male	X		=	
Urinals Non-water supplied	0.0 gal/flush	X	1 flush	X	2 male	X		=	
Proposed water use								=	
30% Reduction _____ (BWU from WS-1) x .70 = _____								Allowable water use	
35% Reduction _____ (BWU from WS-1) x .65 = _____								Allowable water use	
40% Reduction _____ (BWU from WS-1) x .60 = _____								Allowable water use	

¹ . . . (Footnotes 1 through 5 remain unchanged.)

⁶ Where complying faucets are unavailable, aerators rated at .35 gpm or other means may be used to achieve reduction.

**APPENDIX A5
RESIDENTIAL VOLUNTARY MEASURES
DIVISION A5.1 – PLANNING AND DESIGN**

**SECTION A5.102
DEFINITIONS**

ALBEDO. *[Relocated to Chapter 2]*

**SECTION A5.106
SITE DEVELOPMENT**

[CBSC is continuing to coordinate this section with HCD, ARB and utility providers.]

A5.106.5.3 Electric vehicle charging. Provide facilities meeting Section 406.7 (Electric Vehicle) of the California Building Code and as follows:

A5.106.5.3.1 Electric vehicle supply wiring. For each space required in Table A5.106.5.3.1, provide sufficient panel capacity, and install conduit for one 208/240 amp circuit capable of accommodating a dedicated branch circuit, terminating within 5 feet of the midline of each non-adjacent parking space.

Table A5.106.5.3.1

Total Number of Parking Spaces⁴	Number of Required Spaces
1-50	1
51-200	2
201 and over	4

⁴ In a parking garage, the total number of parking spaces is for each individual floor or level.

A5.106.5.3.1 Single charging space requirements. When only a single charging space is required, install a listed raceway capable of accommodating a dedicated branch circuit. The raceway shall not be less than trade size 1. The raceway shall be securely fastened at the main service or subpanel and shall terminate in close proximity to the proposed location of the charging system into a listed cabinet, box or enclosure.

Exception: Other pre-installation methods approved by the local enforcing agency that provide sufficient conductor sizing and service capacity to install Level 2 EVSE.

A5.106.5.3.2 Multiple charging spaces required. When multiple charging spaces are required, plans shall include the location(s) and type of the EVSE, raceway method(s), wiring schematics and electrical calculations to verify that the electrical system has sufficient capacity to charge simultaneously all the electrical vehicles at all designated EV charging spaces at their full rated amperage. Plan design shall be based upon Level 2 EVSE at its maximum operating amperage. Only underground raceways and related underground equipment are required to be installed at the time of construction.

Note: Utilities and local enforcing agencies may have additional requirements for metering and EVSE installation, and should be consulted during the project design and installation.

A5.106.5.3.3 Tier 1. At least 3 percent of the total parking spaces, but not less than one, shall be capable of supporting installation of future electric vehicle supply equipment (EVSE).

A5.106.5.3.4 Tier 2. At least 5 percent of the total parking spaces, but not less than two, shall be capable of supporting installation of future EVSE.

A5.106.5.3.5 Labeling requirement. A label stating "EV CHARGE CAPABLE" shall be posted in a conspicuous place at the service panel or subpanel and the EV charging space.

A5.106.9 Building orientation. *[Relocated to Appendix A6.1 for OSHPD 1, 2 & 4 w/ amendments; proposed for repeal by BSC.]*

A5.106.11.2 Cool roof for reduction of heat island effect. Use roofing materials having a minimum ~~3-year~~ aged solar reflectance and thermal emittance complying with A5.106.11.2.1 and A5.106.11.2.2 or a minimum aged Solar Reflectance Index (SRI) complying with A5.106.11.2.3 and as shown in Table A5.106.11.2.4 2 for Tier 1 or Table A5.106.11.2.2 3 for Tier 2.

Exceptions:

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

A5.106.11.2.1 Solar reflectance. Roofing materials shall a minimum ~~3-year~~ aged solar reflectance equal to or greater than the values specified in Table A5.106.11.2.4 2 for Tier 1 and Table A5.106.11.2.2 3 for Tier 2.

If CRRC testing for an ~~3-year~~ aged solar reflectance is not available for any roofing products, the ~~3-year~~ aged value shall be determined using the Cool Roof Rating Council (CRRC) certified initial value using the equation $\rho_{aged} = [0.2 + 0.7(\rho_{initial} - 0.2)]$ $\rho_{aged} = [0.2 + \beta(\rho_{initial} - 0.2)]$, where $\rho_{initial}$ = the initial ~~s~~Solar ~~r~~Reflectance and soiling resistance β is listed by product type in Table A5.106.11.2.1.

**TABLE A5.106.11.2.1
VALUES OF SOILING RESISTANCE β BY PRODUCT TYPE**

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

...

A5.106.11.2.2 Thermal emittance. Roofing materials shall have a CRRC initial or ~~3-year~~ aged thermal emittance equal to or greater than those specified in Table A5.106.11.2.4 2 for Tier 1 and Table A5.106.11.2.2 3 for Tier 2.

Thermal emittance may also be certified by other supervisory entities approved by the Energy Commission pursuant to Title 24, Part 1, ~~Section 40-143~~ California Administrative Code.

A5.106.11.2.3 Solar reflectance index alternative. Solar Reflectance Index (SRI) equal to or greater than the values specified in Table A5.106.11.2.4 2 for Tier 1 and Table A5.106.11.2.2 3 for Tier 2 may be used as an alternative to compliance with the ~~3-year~~ aged solar reflectance values and thermal emittance.

SRI values used to comply with this section shall be calculated using the Solar Reflective Index (SRI) Calculation Worksheet (SRI-WS) developed by the California Energy Commission or in compliance with ASTM E1980-01 as specified in Title 24, Part 6, Section 118(i)3. Solar reflectance values used in the SRI-WS shall be based on the ~~3-year~~ aged reflectance value of the roofing product or the equation in section A5.106.11.2.1 if the CRRC certified aged solar reflectance are not available. Certified Thermal emittance used in the SRI-WS may be either the initial value or the ~~three-year~~ aged value listed by the CRRC.

...

**TABLE A5.106.11.2.4 2
TIER 1**

Roof Slope	Roof Weight	Climate Zone	Minimum 3-year Aged Solar Reflectance	Thermal Emittance	SRI
< 2 : 12	N.A	2 - 15 1 - 16	0.55	0.75	64
> 2 : 12	< 5 lbs./ft ²	2 - 16	0.20	0.75	46
	≥ 5 lbs./ft ²	1 - 16	0.15 0.20	0.75	40 16

**TABLE A5.106.11.2.2 3
TIER 2**

Roof Slope	Roof Weight	Climate Zone	Minimum 3-year Aged Solar Reflectance	Thermal Emittance	SRI
< 2 : 12	N.A	2 - 15 1 - 16	0.65	0.85	78
> 2 : 12	< 5 lbs./ft ²	2 - 16	0.23	0.85	23
	≥ 5 lbs./ft ²	1 - 16	0.30	0.85	30

DIVISION A5.2 – ENERGY EFFICIENCY

SECTION A5.201 GENERAL

A5.201.1 Scope. For the purposes of energy efficiency standards in this appendix, the California Energy Commission will continue to adopt mandatory standards. It is the intent of ~~this code~~ these voluntary standards to encourage buildings to achieve exemplary performance in the area of energy efficiency. ~~Specifically, a green building should achieve at least a 15% reduction in energy usage when compared to the State's mandatory energy efficiency standards.~~

SECTION A5.202 DEFINITIONS

A5.202.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

ENERGY STAR. *[Relocated unchanged to Appendix A6.1 for OSHPD 1, 2 & 4.]*

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

...

~~**GRID NEUTRAL.** A site that produces at least as much electricity as it uses in a year shall be deemed grid neutral.~~

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

~~**PROCESS.** *[Relocated to Chapter 2.]*~~

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

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

SECTION A5.203 PERFORMANCE APPROACH

[To be coordinated with the Energy Commission's final adopted language]

~~**A5.203.1 Energy performance.** Using an Alternative Calculation Method approved by the California Energy Commission, calculate each nonresidential building's TDV energy and CO₂ emissions, and compare it to the standard or "budget" building.~~

~~**A5.203.1.1 Tier 1 [BSC] Energy efficiency — 15% above Title 24, Part 6 [DSA-SS]** Exceed California Energy Code requirements, based on the 2008 Energy Efficiency Standards, by 15% and meet the requirements of Division A45.6.~~

~~**A5.203.1.2 Tier 2 [BSC] Energy efficiency — 30% above Title 24, Part 6 [DSA-SS]** Exceed California Energy Code requirements, based on the 2008 Energy Efficiency Standards, by 30% and meet the requirements of Division A45.6.~~

~~Field verify and document the measures and calculations used to reach the desired level of efficiency following the requirements specified in the Title 24 Reference Appendices.~~

~~**A5.203.1 Energy Efficiency.** *(Reserved for the Energy Commission)*~~

...

~~**A5.203.2 Energy performance.** *[Section and subsections relocated unchanged to Appendix A6.1 for OSHPD 1]*~~

SECTION A5.204

PRESCRIPTIVE APPROACH

A5.204.1 ENERGY STAR equipment and appliances. *[Relocated unchanged to Appendix A6.1 for OSHPD 1, 2 & 4; proposed for repeal by BSC and DSA.]* **A5.204.1 ENERGY STAR equipment and appliances.** All equipment and appliances provided by the builder shall be ENERGY STAR labeled if ENERGY STAR is applicable to that equipment or appliance.

A5.204.2 Energy monitoring. Provide sub-metering or equivalent combinations of sensor measurements and thermodynamic calculations, if appropriate, to record energy use data for each major energy system in the building, including chillers, heat pumps, packaged AC systems, fans, pumps, cooling towers, boilers and other heating systems, lighting systems, and process loads. This energy use data, once collected, shall be stored within a data management system.

A5.204.2.1 Data storage. The data management system must be capable of electronically storing energy data and creating user reports showing hourly, daily, monthly and annual energy consumption for each major energy system. Hourly data shall be retained a minimum of 30 days, daily data shall be retained a minimum of 6 months and monthly data shall be retained a minimum of 2 years.

A5.204.2.2 Data access. Hourly energy use data shall be accessible through a central data management system and must be available daily.

A5.204.3 Demand response. HVAC systems with Direct Digital Control Systems and centralized lighting systems shall include pre-programmed demand response strategies that are automated with either a Demand Response Automation Internet Software Client or dry contact relays.

A5.204.3.1 HVAC. The pre-programmed demand response strategies shall be capable of reducing the peak HVAC demand by cooling temperature set point adjustment.

A5.204.3.2 Lighting. The pre-programmed demand response strategies shall be capable of reducing the total lighting load by a minimum 30% through dimming control or bi-level switching.

A5.204.3.3 Software clients. The software clients shall be capable of communicating with a DR Automation Server.

A5.204.4 Commissioning. *[Section and subsections relocated unchanged to Appendix A6.1 for OSHPD 1, 2 & 4.]*

A5.204.6 Building orientation and shading. *[Relocated unchanged in Appendix A6.1 for OSHPD 1, 2 & 4; proposed for repeal by BSC.]* **A5.204.6 Building orientation and shading.** Locate, orient and shade the building as required in Section A5.106.9.

SECTION A5.205 BUILDING ENVELOPE

[Section, subsections and tables relocated unchanged to Appendix A6.1 for OSHPD 1, 2 & 4.]

SECTION A5.207 HVAC DESIGN, EQUIPMENT AND INSTALLATION

[Section, subsections and tables relocated unchanged to Appendix A6.1 for OSHPD 1, 2 & 4.]

A5.209 LIGHTING

[Section, subsections and tables relocated unchanged to Appendix A6.1 for OSHPD 1, 2 & 4.]

SECTION A5.210 APPLIANCES

A5.210.1 Appliances Regulated By The Appliance Efficiency Regulations. *[Relocated unchanged to Appendix A6.1 for OSHPD 1, 2 & 4.]*

SECTION A5.211 RENEWABLE ENERGY

A5.211.1 On-site renewable energy. Use on-site renewable energy sources such as solar, wind, geothermal, low-impact hydro, biomass and bio-gas for at least 1 percent of the electric power calculated as the product of the building service voltage and the amperage specified by the electrical service overcurrent protection device rating or 1kW, (whichever is greater), in addition to the electrical demand required to meet 1 percent of the natural gas and propane use. The building project's electrical service overcurrent protection device rating shall be calculated in accordance with the 2007 California Electrical Code. Natural gas or propane use is calculated in accordance with the 2007 California Plumbing Code.

A5.211.1.1 Documentation. Using a calculation method approved by the California energy Commission, calculate the renewable on-site energy system to meet the requirements of Section A5.211.1, expressed in kW. Factor in net-metering, if offered by local utility, on an annual basis.

A5.211.3 Green Power. If offered by local utility provider, participate in a renewable energy portfolio program that provides a minimum of 50 percent electrical power from renewable sources. Maintain documentation through utility billings.

~~**A5.211.4 Pre-wiring for future rooftop solar.** Size and install conduit from the building roof or eave to a location within the building identified as suitable for future installation of controls and/or storage batteries.~~

~~**A5.211.4.1 Grid-connected system without storage.** Location within the building shall be of sufficient dimensions to accommodate an inverter and/or other controls as approved by the utility.~~

~~**A5.211.4.2 System for future energy storage.** If battery storage is anticipated, location within the building shall:~~

- ~~1. Be stable, weather proof, insulated against very hot and very cold weather, and isolated from occupied spaces~~
- ~~2. Be able to accommodate batteries, ventilation complying with the California Fire Code, an inverter with or without a charge controller (regulator) and, if grid-connected, other controls as approved by the utility.~~

SECTION A5.212 ELEVATORS, ESCALATORS AND OTHER EQUIPMENT

A5.212.1 Elevators and escalators. In buildings with more than one elevator or two escalators, provide systems and controls to reduce the energy demand of elevators and escalators as follows.. Document systems operation and controls in the project specifications and commissioning plan.

A5.212.1.1 Elevators. Traction elevators shall have a regenerative drive system that feeds electrical power back into the building grid when the elevator is in motion.

A5.212.1.1.1 Car lights and fan. A parked elevator shall turn off its car lights and fan automatically until the elevator is called for use.

A5.212.1.2 Escalators. An escalator shall have a VVVF motor drive system that is fully regenerative when the escalator is in motion.

A5.212.1.4 Controls. Controls that reduce energy demand shall meet requirements of CCR, Title 8, Chapter 4, Subchapter 6 and shall not interrupt emergency operations for elevators required in CCR, Title 24, Part 2, California Building Code.

SECTION A5.213 ENERGY EFFICIENT STEEL FRAMING

A5.213.1 Steel framing. Design steel framing for maximum energy efficiency. Techniques for avoiding thermal bridging in the envelope include:

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

DIVISION A5.3 – WATER EFFICIENCY AND CONSERVATION

SECTION A5.302 DEFINITIONS

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

...

LANDSCAPE (PLANT) COEFFICIENT (Kl). *[Relocated to Chapter 2.]*

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MLO). *[Relocated to Chapter 2.]*

...

POTABLE WATER. *[Relocated to Chapter 2.]*

RECYCLED WATER. *[Relocated to Chapter 2.]*

REFERENCE EVAPOTRANSPIRATION (ET_o). [BSC] The estimated rate of evapotranspiration from a standardized surface of well watered, actively growing cool season ~~four- to seven-inch (10.16 – 17.78 cm) turfgrass clipped to 42 mm~~ with sufficient density to fully shade the soil. The water needs of a landscape planting can be calculated by multiplying the Landscape Coefficient [KI] and Reference Evapotranspiration {ET_o}

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

SUBMETER. *[Relocated to Chapter 2.]*

**SECTION A5.303
INDOOR WATER USE**

...

A5.303.2.3.4 Nonpotable water systems for indoor use. Utilizing nonpotable water systems (such as captured rainwater, treated graywater, and recycled water) intended to supply water closets, urinals, and other allowed uses, may be used in the calculations demonstrating the 30, 35 or 40 percent reduction. The nonpotable water systems shall comply with the current edition of the California Plumbing Code.

...

TABLE A5.303.2.3.1 FIXTURE FLOW RATES

Fixture Type	Flow-rate	Maximum flow rate at ≥30% Reduction
Showerheads	2.5 gpm @ 80 psi	2 gpm @ 80 psi ³
Lavatory faucets nonresidential	0.5 gpm @ 60 psi	0.35 gpm @ 60 psi ³
...

...

³ Where complying faucets are unavailable, aerators rated at 0.35 gpm or other means may be used to achieve reduction.

- A5.303.3 Appliances and fixtures for commercial application.** Appliances and fixtures shall meet the following:
1. Clothes washer shall have a maximum Water Factor (WF) that will reduce the use of water by 10 percent below the California Energy Commissions' WF standards for commercial clothes washers located in Title 20 of the California Code of Regulations.
 2. Dishwashers shall meet the following water use standards:
 - a. Residential—~~5.8 gallons (21.9 L) per cycle~~ ENERGY STAR
 - i. Standard Dishwashers – 4.25 gallons per cycle
 - ii. Compact Dishwashers – 3.5 gallons per cycle
 - b. Commercial—refer to Table 603.3 . . .

**SECTION A5.305
WATER REUSE SYSTEMS
(Reserved)**

A5.305.1 Nonpotable water systems. Nonpotable water systems for indoor and outdoor use shall comply with the current edition of the *California Plumbing Code*.

A5.305.2 Irrigation systems. Irrigation systems regulated by a local water efficient landscape ordinance or by the California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELo) shall use recycled water unless a written exemption has been granted by the local water purveyor stating that recycled water meeting all public health codes and standards is not available and will not be available for the foreseeable future. See the MWELo for additional information.

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DIVISION A5.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

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**SECTION A5.408
CONSTRUCTION WASTE REDUCTION, DISPOSAL, AND RECYCLING**

A5.408.3.1 Enhanced construction waste reduction – Tier 1. Divert to recycle or salvage at least 65% of non-hazardous construction and demolition waste generated at the site.

A5.408.3.1.1 Enhanced construction waste reduction – Tier 2. Divert to recycle or salvage at least 80% of non-hazardous construction and demolition waste generated at the site.

A5.408.3.1.2 Verification of compliance. A copy of the completed waste management report or documentation of certification of the waste management company utilized shall be provided.

Exceptions:

1. Excavated soil and land-clearing debris
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets, ~~where demolition of an existing structure(s) is necessary for the construction of a new structure.~~

...

DIVISION A5.5 – ENVIRONMENTAL QUALITY

**SECTION A5.504
POLLUTANT CONTROL**

...

~~**A5.504.4.5.1 Early compliance with formaldehyde limits, Tier 1.** Meet the requirements contained in Table A5.504.8.5 before the compliance dates.~~

A5.504.4.5.2 1 No added formaldehyde, Tier 2. Use composite wood products approved by the California Air Resources Board (ARB) as no-added formaldehyde (NAF) based resins or ultra-low emitting formaldehyde (ULEF) resins.

Notes:

1. ~~For Tier 2 requirements, s~~ See Title 17, Section 93120.3(c) and (d), respectively.
2. Documentation must be provided verifying that materials are certified to meet the pollutant emission limits. A list of manufacturers and their NAF and ULEF certified materials is provided at:
http://www.arb.ca.gov/toxics/compwood/naf_ulef/listofnaf_ulef.htm

...

~~**A5.504.4.7 Resilient flooring systems, Tier 1 [BSC]. Resilient flooring systems[DSA-SS].** For 80% 90 percent of floor area receiving resilient flooring, install resilient flooring that is complying with the VOC emission limits defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on High Performance Products Database; products compliant with CHPS criteria certified under the Greenguard Children & Schools program; or certified under the Resilient Floor Covering Institute (RFCI) FloorScore program.; or meet California Department of Public Health 2010 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as Specification 01350.)~~

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on is High Performance Database; or
4. Compliant with CDPH criteria as certified under the Greenguard Children's & Schools Program.

~~**A5.504.4.7.1 Resilient flooring systems, Tier 2.** For 90% 100 percent of floor area receiving resilient flooring, install resilient flooring that is complying with the VOC emission limits defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on High Performance Products Database; products compliant with CHPS criteria certified under the Greenguard Children & Schools program; or certified under the Resilient Floor Covering Institute (RFCI) FloorScore program.; or meet California Department of Public Health 2010 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as Specification 01350.)~~

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on is High Performance Database; or
4. Compliant with CDPH criteria as certified under the Greenguard Children's & Schools Program.

Exception: Allowance may be permitted in Tier 2 for up to 5 percent specialty purpose flooring.

A5.504.5.3.1 Filters, Tier 1 [BSC] Filters [DSA-SS]. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a Minimum Efficiency Reporting Value (MERV) of 11.

A5.504.5.3.1.1 Filters, Tier 2. In mechanically ventilated buildings, provide regularly occupied areas of the

building with air filtration media for outside and return air prior to occupancy that provides at least a Minimum Efficiency Reporting Value (MERV) of 13.

...

DIVISION A5.6 VOLUNTARY TIERS

[To be coordinated with the Energy Commission's final adopted language]

SECTION A5.601 CALGreen TIER 1 AND TIER 2

A5.601.1 Scope. The measures contained in this appendix are not mandatory unless adopted by local government as specified in Section 101.7. The provisions of this section outline means of achieving enhanced construction or reach levels by incorporating additional green building measures for newly constructed nonresidential buildings as well as additions and alterations. In order to meet one of the tier levels designers, builders, or property owners are required to incorporate additional green building measures necessary to meet the threshold of each level.

A5.601.2.1 Prerequisites. To achieve a CALGreen tier Tier 1 status, a project must meet all of the mandatory measures in Chapter 5, and, in addition, meet the provisions of this section.

~~**A5.601.2.2 Energy performance.** For the purposes of energy efficiency standards in this code the California Energy Commission will continue to adopt mandatory building standards.~~

~~Using an Alternative Calculation Method approved by the California Energy Commission, calculate each nonresidential building's annual TDV regulated energy use components, and compare them to the standard or "budget" building.~~

~~**Note:** The "percent better than" calculation omits Process and Receptacle energy use components in comparing the Standard and Proposed energy use.~~

~~**A5.601.2.3 Tier 1.** Exceed California Energy Code requirements, based on the 2010 California Energy Code, by 15%. Field verify and document the measures and calculations used to reach the desired level of efficiency following the requirements specified in the Title 24 Nonresidential Alternative Calculation Method Manual.~~

~~**A5.601.2.4 Voluntary measures for CALGreen Tier 1.** In addition to the provisions of Sections A5.601.2.1 and A5.601.2.3 above, compliance with the following voluntary measures from Appendix A5 is required for Tier 1:~~

1. From Division A5.1,
- ...
3. From Division A5.4,
 - a. Comply with recycled content of 10% of materials based on estimated total cost in Section A5.405.4.
 - b. Comply with the 65% reduction in construction and demolition waste in Section A5.408.3.1.
 - c. Comply with one elective measure selected from this division.
4. From Division A5.5,
 - a. Comply with resilient flooring systems for 80% 90 percent of resilient flooring in Section A5.504.4.7.
 - b. Comply with thermal insulation meeting 2009 CHPS low-emitting materials list Section A5.504.4.8.
 - c. Comply with one elective measure selected from this division.
5. Comply with one additional elective measure selected from this division.

A5.601.3 CALGreen TIER 2

~~**A5.601.3.1 Prerequisites.** To achieve CALGreen Tier 2 status, a project must meet all of the mandatory measures in Chapter 5, and, in addition, meet the provisions of this section.~~

~~**A5.601.3.2 Energy performance.** For the purposes of energy efficiency standards in this code the California Energy Commission will continue to adopt mandatory building standards.~~

~~Using an Alternative Calculation Method approved by the California Energy Commission, calculate each nonresidential building's annual TDV regulated energy use components, and compare them to the standard or "budget" building.~~

~~**Note:** The "percent better than" calculation omits Process and Receptacle energy use components in comparing the Standard and Proposed energy use.~~

~~**A5.601.3.3 Tier 2.** Exceed California Energy Code requirements, based on the 2010 California Energy Code, by 30%. Field verify and document the measures and calculations used to reach the desired level of efficiency following the requirements specified in the Title 24 Nonresidential Alternative Calculation Method Manual.~~

~~**A5.601.3.4 Voluntary measures for CALGreen Tier 2.** In addition to the provisions of Sections A5.601.3.1 and A5.601.3.3 above, compliance with the following voluntary measures from Appendix A5 and additional elective measures shown in Table A5.601.3.4 is required for Tier 2:~~

2. From Division A5.1,

...

3. From Division A5.4,
 - a. Comply with recycled content of 10% of materials based on estimated total cost in Section A5.405.4.
 - b. Comply with the 80% reduction in construction and demolition waste in Section A5.408.3.1.
 - c. Comply with three elective measures selected from this division.
4. From Division A5.5,
 - a. Comply with resilient flooring systems for ~~80%~~ 100 percent of resilient flooring in Section A5.504.4.7.
Exception: Allowance may be permitted in Tier 2 for up to 5 percent specialty purpose flooring.
 - b. Comply with thermal insulation meeting 2009 CHPS low-emitting materials list Section A5.504.4.8.
 - c. Comply with three elective measures selected from this division.
5. Comply with three additional elective measures selected from any division.

...

**Table A5.601: NON-RESIDENTIAL BUILDINGS: Green Building Standards Code
Proposed Performance Approach**

Note: This table is intended only as an aid in illustrating the nonresidential tier structure

Category	Environmental Performance Goal	Tier 1	Tier 2
All	Minimum Mandatory	Meet all of the provisions of Chapter 5	Meet all of the provisions of Chapter 5
Planning and Design	Designated Parking for Fuel Efficient Vehicles	10 percent of total spaces	12 percent of total spaces
	Cool Roof to Reduce Heat Island Effect	Roof Slope \leq 2:12 SRI 64 Roof Slope > 2:12: SRI 16 < 5 lb/s.f. SRI 16 \geq 5 lb/s.f. SRI 10	Roof Slope \leq 2:12 SRI 78 Roof Slope > 2:12: SRI 30 < 5 lb/s.f. SRI 23 \geq 5 lb/s.f. SRI 30
		1 additional Elective from Division A5.1	3 additional Electives from Division A5.1
Energy Efficiency	Energy Performance	Exceed 2010 CA Energy Code by 15 percent	Exceed 2010 CA Energy Code by 30 percent
Water Efficiency and Conservation	Indoor Water Use	30 percent Savings	35 percent Savings
	Outdoor Water Use	Not exceed 60 percent of ETo times the landscape area	Not exceed 55 percent of ETo times the landscape area
		1 additional Elective from Division A5.3	3 additional Electives from Division A5.3
Material Conservation and Resource Efficiency²	Construction Waste Reduction	At least 65 percent reduction	At least 80 percent reduction
	Recycled Content	Utilize recycled content materials for 10 percent of total material cost	Utilize recycled content materials for 15 percent of total material cost
		1 additional Elective from Division A5.4	3 additional Electives from Division A5.4
Environmental Quality	Low-VOC Resilient Flooring	80 90 percent of flooring meets VOC limits	90 100 percent of flooring meets VOC limits ¹
	Low-VOC Thermal Insulation	Comply with VOC limits	Install no-added formaldehyde insulation & comply VOC limits
		1 additional Elective from Division A5.5	3 additional Electives from Division A5.5
Additional Measures	Added measures shall be achieved across at least 3 categories	1 Additional Elective	3 Additional Electives
Approximate Total Measures		14	24

¹ **Exception:** Allowance may be permitted in Tier 2 for up to 5 percent specialty purpose flooring.

APPENDIX A6 REFERENCED STANDARDS

The following CALGreen Referenced Standards are included herein as a convenience for the users of the California Green Building Standards Code and its Guidebook, but they are not considered to be part of the code unless they are officially adopted as such.

Contents

A6.1-2011 Part 1: Standards for Compliance with Building Commissioning	176.1
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A6.1 Voluntary Standards for health facilities under the authority of the Office of Statewide Health Planning and Development as specified in Section 106 XXX

**A6.1-2011, Part 1
STANDARDS for COMPLIANCE
with
BUILDING COMMISSIONING**

A6.1 Section 5.410.2 Commissioning.

Introduction:

The purpose of this code is to improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of concepts that reduce negative and increase positive environmental impacts. Commissioning is a vital element in this effort.

Definitions used in the CALGreen CX Guide:

Acronyms

BOD	Basis of Design
Cx	Commissioning
FPT	Functional Performance Test
HVAC	Heating Ventilating and Air Conditioning
O&M	Operations and Maintenance
OPR	Owner's Project Requirements

Glossary

Acceptance Criteria—The conditions that must be met for systems or equipment to meet defined expected outcomes.

Commissioning (Cx)—Building commissioning as required in this code involves a quality assurance process that begins during design and continues to occupancy. Commissioning verifies that the new building operates as the owner intended and that building staff are prepared to operate and maintain its systems and equipment. Exceptions are allowed for dry storage warehouses of any size and conditioned spaces under 10,000 square accessory to them; and for tenant improvements under 10,000 within a larger space.

Owner—The individual or entity holding title to the property on which the building is constructed.

Commissioning Coordinator—The person who coordinates the commissioning process. This can be either a third-party commissioning provider or an experienced member of the design team or owner in house staff member.

Commissioning Team—The key members of each party involved with the project designated to provide insight and carry out tasks necessary for a successful commissioning project. Team members may include the commissioning coordinator, owner or owner's representative, building staff, design professionals, contractors or manufacturer's representatives, and testing specialists.

Independent Third-Party Commissioning Professional—A commissioning consultant contracted directly by the owner who is not responsible to, or affiliated with any other member of the design and construction team.

Operation and Maintenance (O&M) Manuals—Documents that provide information necessary for operating and maintaining installed equipment and systems.

Owner Representative—An individual or entity assigned by the owner to act and sign on the owner's behalf.

Process Equipment—Energy using equipment and components that are not used for HVAC, Electrical, Plumbing and Irrigation operations.

Such devices would include but are not limited to heat transfer, water purifying, air cleaning, air vacuum and air compressing.

Sequence of Operation—A written description of the intended performance and operation of each control element and feature of the equipment and systems.

Selecting Trained Personnel for (Commissioning)

This code requires that “Commissioning shall be performed in accordance with this section by trained personnel with experience on projects of comparable size and complexity.” The trained personnel manage and facilitate the commissioning process. The trained personnel develop and implement the commissioning tasks and documentation identified in sections 5.410.2.1 through 5.410.2.7. Trained personnel may include appropriate members of owner staff, contractor and design team as well as independent commissioning professionals.

It is essential that there is a single person designated to lead and manage the commissioning activities. In practice, this individual has been referenced by various identifiers such as commissioning authority, agent, provider, coordinator, lead, etc. In this guide the term “commissioning coordinator” is used.

The designated commissioning coordinator may be an independent third party commissioning professional, a project design team member (e.g. engineer or architect), an owner’s engineer or facility staff, contractor or specialty sub contractor. Methods of evaluating the designated commissioning coordinator and trained personnel include review of the following:

1. Technical knowledge
2. Relevant experience
3. Potential conflict of interest concerns
4. Professional certifications and training
5. Communication and organizational skills
6. Reference and sample work products

Selection of “trained”, qualified personnel is required by this Code. In order to meet this requirement, the commissioning provider should be evaluated via the methods discussed above. In addition, various organizations have training and certification programs that may be a source for identification of qualified commissioning providers.

For information about enforcement and compliance of each commissioning element see sections 5.410.2.1 through 5.410.2.7.

Find sample forms and templates in Part 2 following the standard.

A6.1.1 Owner’s Project Requirements

CALGreen Section: 5.410.2.1 Owner’s or Owner representative’s Project Requirements (OPR).

A6.1.1.1 Intent:

The Owner’s Project Requirements (OPR) documents the functional requirements of a project and expectations of the building use and operation as it relates to systems being commissioned. The document describes the physical and functional building characteristics desired by the owner and establishes performance and acceptance criteria. The OPR is most effective when developed during pre design and used to develop the Basis of Design (BOD) during the design process. The level of detail and complexity of the OPR will vary according to building use, type and systems.

A6.1.1.2 Existing Law or Regulation:

No existing law or regulation. Review local ordinances for any applicable commissioning OPR requirement.

A6.1.1.3 Compliance Method:

Compliance is demonstrated by the owner or owner’s representative developing and/or approving the Owner’s Project Requirements (OPR) document and can be defined as follows:

1. **Environmental and Sustainability Goals**— Establish environmental project goals and objectives exceeding the code for the project’s sustainability which may include:
 - a) CALGreen voluntary measures or Tiers sought, or other specific green building rating system or program credits and/or level of certification sought
 - b) Specific environmental or sustainability goals such as water efficiency, water reuse, CO2 monitoring, xeriscaping, etc.
2. **Energy Efficiency Goals**— Establish goals and targets affecting energy efficiency which may include:
 - a) Overall energy efficiency less than the California Energy Code performance approach energy budget by ___%
 - b) Lighting system efficiency (less than the California Energy Code performance approach energy budget by ___%)
 - c) HVAC equipment efficiency & characteristics
 - d) Any other measures affecting energy efficiency desired by owner
 - Building orientation and siting
 - Daylighting
 - Facade, envelope and fenestration
 - Roof
 - Natural ventilation
 - Onsite renewable power generation and net zero energy use
 - Landscaping and shading

3. ~~Indoor Environmental Quality Requirements~~—For each program space describe indoor environmental requirements including intended use and anticipated schedule
 - a) ~~Lighting~~
 - b) ~~Temperature and humidity~~
 - c) ~~Acoustics~~
 - d) ~~Air quality, ventilation and filtration~~
 - e) ~~Desired adjustability of system controls~~
 - f) ~~Accommodations for after hours use~~
 - g) ~~Other owner requirements including natural ventilation, operable windows, daylight, views, etc.~~
4. ~~Project Program, Including facility functions and hours of operation, and need for after hours operation~~—Describe primary purpose, program and use of proposed project
 - a) ~~Building size, number of stories, construction type, occupancy type and number~~
 - b) ~~Building program areas including intended use and anticipated occupancy schedules~~
 - c) ~~Future expandability and flexibility of spaces~~
 - d) ~~Quality and/or durability of materials and building lifespan desired~~
 - e) ~~Budget or operational constraints~~
 - f) ~~Applicable codes~~
5. ~~Equipment and Systems Expectations~~—Describe the following for each system commissioned:
 - a) ~~Level of quality, reliability, equipment type, automation, flexibility, maintenance and complexity desired~~
 - b) ~~Specific efficiency targets, desired technologies, or preferred manufacturers for building systems, acoustics and vibration~~
 - c) ~~Degree of system integration, automation and functionality for controls; i.e., load shedding, demand response, energy management~~
6. ~~Building Occupant and O&M Personnel Expectations~~—Describe the following:
 - a) ~~How building will be operated and by whom~~
 - b) ~~Level of training and orientation required to understand, operate and use the building systems for building operation and maintenance staff, as well as occupants~~
 - c) ~~Building operation and maintenance staff location and capabilities~~

Find sample forms and templates in Part 2 following the standard.

A6.1.1.4 Enforcement:

At their discretion, the building official confirms demonstrated compliance at *Plan Intake* by:

- a) ~~Receipt of a copy of the OPR document, or~~
- b) ~~Receipt of a form signed by the owner or owner representative attesting that the OPR has been completed and approved by the owner.~~

Find sample forms and templates in Part 2 following the standard.

A6.1.2 Basis of Design (BOD)

CALGreen Section: 5.410.2.2 Basis of Design (BOD).

A6.1.2.1 Intent:

The Basis of Design (BOD) describes the building systems to be commissioned and outlines design assumptions not indicated in the design documents. The design team develops the BOD to describe how the building systems design meets the Owner's Project Requirements (OPR), and why the systems were selected. The BOD is most effective when developed early in the project design and updated as necessary throughout the design process.

A6.1.2.2 Existing Law or Regulation:

No existing law or regulation. Review local ordinances for any applicable commissioning BOD requirement.

A6.1.2.3 Compliance Method:

Compliance requires the completion of the BOD document and should include the following where applicable:

1. ~~Heating, Ventilation, Air Conditioning (HVAC) Systems and Controls~~
 - a) ~~Provide narrative description of system—system type, location, control type, efficiency features, outdoor air ventilation strategy, indoor air quality features, environmental benefits, other special features.~~
 - b) ~~Describe reasons for system selection—why chosen system is better than alternatives, issues such as comfort, performance, efficiency, reliability, flexibility, simplicity, cost, owner preference, site constraints, climate, maintenance, acoustics~~
 - c) ~~Provide design criteria including the following:~~
 - ~~Load calculation method/software~~
 - ~~Summer outdoor design conditions (___°F drybulb and ___°F wetbulb)~~
 - ~~Winter outdoor design conditions (___°F drybulb and ___°F wetbulb)~~
 - ~~Indoor design conditions (___°F drybulb cooling, ___%RH cooling; ___°F drybulb heating, ___%RH heating)~~

- Applicable codes, guidelines, regulations and other references used
 - Load calculation assumptions
 - d) Sequence of Operations — operating schedules, setpoints, may refer to plans or specifications if sequence indicated within permit documents
 - e) Describe how system meets the OPR
2. *Indoor Lighting System and Controls*
- a) Provide narrative description of system — type of fixtures, lamps, ballasts, controls
 - b) Describe reason for system selection — why chosen system better than alternatives, issues such as visual comfort, performance, efficiency, reliability, cost, flexibility, owner preference, color rendering, integration with daylighting, ease of control
 - c) Provide design criteria for each type of space including the following:
 - Applicable codes, guidelines, regulations and other references used
 - Illumination design targets (footcandles) and lighting calculation assumptions
 - d) Provide lighting power design targets for each type of space
 - Title 24 lighting power allowance and lighting power design target (watts/ft²)
 - e) Describe how system meets the OPR
3. *Water Heating System*
- a) Provide narrative description of system — system type, control type, location, efficiency features, environmental benefits, other special features
 - b) Describe reason for system selection — why chosen system is better than alternatives, issues such as performance, efficiency, reliability, space constraints, cost, utility company incentives, owner preference, ease of maintenance
 - c) Water heating load calculations
 - d) Describe how system meets the OPR
4. *Renewable Energy Systems*
- a) Provide narrative description of system — type, performance, control type, energy savings, payback period
 - b) Describe reason for system selection — why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference,
 - c) Sequence of Operation — operating schedules, setpoints, storage capacity
 - d) Describe how system meets the OPR
5. *Landscape Irrigation Systems*
- a) Provide narrative description of system — type, performance, water usage
 - b) Describe reason for system selection — why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, expandability, cost, owner preference, simplicity
 - c) Sequence of Operation — operating schedules, setpoints
 - d) Describe how system meets the OPR
6. *Water Reuse Systems*
- a) Provide narrative description of system — type, performance, capacity, reuse purpose
 - b) Describe reason for system selection — why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, expandability, cost, owner preference, simplicity
 - c) Sequence of Operation — operating schedules, setpoints
 - d) Describe how system meets the OPR

Find sample forms and templates in Part 2 following the standard.

A6.1.2.4 Enforcement:

At their discretion, the building official confirms demonstrated compliance at *Plan Intake* by:

- a) — Receipt of a copy of the BOD document, or
- b) — Receipt of a form signed by the architect, engineer or designer of record, attesting that the BOD has been completed and meets the requirements of the OPR.

Find sample forms and templates in Part 2 following the standard.

A6.1.3 Commissioning measures shown in the construction documents

CALGreen Section: 5.410.2 Commissioning.

This section provides details for element 3: *Commissioning measures shown in the construction documents.*

A6.1.3.1 Intent:

Include commissioning measures or requirements in the construction documents (plans and specifications). Commissioning measures or requirements should be clear, detailed and complete to clarify the commissioning process.

A6.1.3.2 Existing Law or Regulation:

Title 24 Part 6 requires that specific functional test procedure forms be included in the construction documents. These test forms create a subset of the broader CalGreen commissioning requirements described herein. Review local ordinances for additional applicable requirements.

A6.1.3.3 Compliance Method:

Compliance is achieved by including commissioning requirements in the project specifications. The commissioning specifications should include the following:

1. Primary (and optionally all) commissioning requirements are included in the general specification division (typically Division 1) and clear cross references of all commissioning requirements to and from the general division are included to ensure all subcontractors are held to them
2. A list of the systems and assemblies covered by the commissioning requirements.
3. Roles and responsibilities of all parties including:
 - General contractor and subcontractors, vendors, construction manager
 - Commissioning provider lead
 - Owner, facility staff
 - Architect and design engineers
 - Including the non-contractor parties in the construction specifications is for information only to provide the contractor with context for their work
 - Include who writes checklists and tests, who reviews and approves test forms, who directs tests, who executes tests, who documents test results and who approves completed tests. These roles may vary by system or assembly.
4. Meeting requirements
5. Commissioning schedule management procedures
6. Issue and non-compliance management procedures
7. Requirements for execution and documentation of installation, checkout and start up, including controls point-to-point checks and calibrations
8. Specific testing requirements by system, including:
 - Monitoring and trending
 - Opposite season or deferred testing requirements, functions and modes to be tested
 - Conditions of test
 - Acceptance criteria, and any allowed sampling
 - Include details of the format and rigor of the test forms required to document test execution
 - Including example forms is recommended
9. Submittal review requirements and approval process.
10. Content, authority and approval process of the commissioning plan.
11. Commissioning documentation and reporting requirements.
12. Facility staff training requirements and verification procedures.
13. O&M manual review and approval procedures.
14. System's manual development and approval requirements and procedures.
15. Definitions section.

Find sample forms and templates in Part 2 following the standard.

A6.1.3.4 Enforcement:

At their discretion, the building official confirms demonstrated compliance at *Plan Intake* by:

- a) — Receipt of a copy of the commissioning specifications, or
- b) — Receipt of a form signed by the owner or owner representative or designer of record attesting that the owner approved commissioning specifications are included in the construction documents.

Find sample forms and templates in Part 2 following the standard.

A6.1.4 Commissioning plan.
CALGreen Section: 5.410.2.3 Commissioning plan.

A6.1.4.1 Intent:

The Commissioning Plan (Cx Plan) establishes the commissioning process guideline for the project and commissioning team's level of effort by identifying the required Cx activities to ensure that the Owner's Project Requirements (OPR) and the Basis of Design (BOD) are met. The Cx Plan also includes a commissioning schedule from design to occupancy.

A6.1.4.2 Existing Law or Regulation:

No previous existing State of California laws or regulations. Review local county, city or jurisdiction ordinances for any applicable commissioning planning requirements.

A6.1.4.3 Compliance Method:

Compliance is demonstrated by preparation of a project specific Cx Plan that includes the elements listed in the code section above. The following gives guidance for developing the components of the Commissioning Plan:

1. *General project information*—Provide project identifying information including but not limited to the following:
 - Project Name, Owner, Location,
 - Building type, Building area,
 - Project Schedule
 - Contact information of individual/company providing the commissioning services
2. *Commissioning Goals*—Document the commissioning goals, including, but not limited to:
 - Meeting CALGreen code requirements for commissioning
 - Meeting OPR and BOD requirements
 - Carrying out requirements for commissioning activities as specified in plans and specifications
3. *Systems to be commissioned*—See BOD
 - a. *An explanation of the original design intent*—Document the performance objectives and design intent for each system listed to be commissioned in a written narrative
 - Refer to the OPR and BOD documents
 - b. *Equipment and systems to be tested, including the extent of tests*
 - Provide a list of equipment and systems to be tested
 - Describe the range and extent of tests to be performed for each system component, and interface between systems
 - c. *Functions to be tested*—Provide example functional test procedures to identify the level of testing detail required
 - See (section 5.410.2.4) FPT guidance for more information
 - d. *Conditions under which the test shall be performed*—Identify the conditions under which the major operational system functions are to be tested, including:
 - Normal operations and part load operations
 - Seasonal testing requirements
 - Restart of equipment and systems after power loss
 - System alarm confirmations
 - e. *Measurable criteria for acceptable performance*—Include measurable criteria for acceptable performance of each system to be tested
4. *Commissioning Team Information*—Provide a contact list for all Commissioning team members, including but not limited to:
 - Owner, owner's representative
 - Architect, Engineers
 - Designated commissioning representative
 - General contractor, sub-contractors, and construction manager
5. *Commissioning process activities, schedules and responsibilities*
 - Establish prescribed commissioning process steps and activities to be accomplished by the Cx team throughout the design to occupancy
 - For each phase of the work, define the roles and responsibilities for each member of the Cx team
 - List the required Cx deliverables, reports, forms and verifications expected at each stage of the commissioning effort
 - Include the confirmation process for the O&M manual, systems manual and the facility operator and maintenance staff training

Find sample forms and templates in Part 2 following the standard.

A6.1.4.4 Enforcement:

At their discretion, the building official confirms demonstrated compliance at *Plan Intake* by:

- a) — Receipt of a copy of the Commissioning Plan, or
- b) — Receipt of a form signed by the owner or owner representative attesting that the Cx Plan has been completed.

Find sample forms and templates in Part 2 following the standard.

A6.1.5 Functional performance testing

CALGreen Section: 5.410.2.4 Functional performance testing.

A6.1.5.1 Intent:

Develop and implement the functional performance tests to document, as set forth in the Commissioning Plan, that all components, equipment, systems and system-to-system interfaces were installed as specified, and operate according to the Owner's Project Requirements, Basis of Design, and plans and specifications.

The following systems to be functionally tested are listed in the Basis of Design (5.410.2.2 of the Code):

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

A6.1.5.2 Existing Law or Regulation:

Title 24 Acceptance Testing requirements call for functional testing of some systems and equipment required to be commissioned by CALGreen. Refer to Title 24 and Nonresidential Compliance Manual For California's 2008 Energy Efficiency Standards. http://www.energy.ca.gov/title24/2008standards/nonresidential_manual.html

Note: CALGreen Functional Performance Tests are not intended to replace the Title 24 Section 6 Acceptance Tests. Instead, the T24 acceptance tests, which focus on energy efficiency, can be part of the broader scope of testing forms and procedures required for CALGreen compliance.

Review local ordinances for any applicable requirements.

A6.1.5.3 Compliance Method:

Compliance is demonstrated by developing and implementing test procedures for each piece of commissioned equipment and interfaces between equipment and systems according to the building-specific Commissioning Plan. Tests should include verification of proper operation of all equipment features, each part of the sequence of operation, overrides, lockouts, safeties, alarms, occupied and unoccupied modes, loss of normal power, exercising a shutdown, startup, low load through full load (as much as is possible) and back, staging and standby functions, scheduling, energy efficiency strategies and loop tuning.

Elements of acceptable test procedures include:

1. *Date and Party* -- Identification of the date of the test and the party conducting the test.
2. *Signature Block* -- Signature of the designated commissioning lead and the equipment installing contractor attesting that the recorded test results are accurate.
3. *Prerequisites* -- Any conditions or related equipment checkout or testing that needs to be completed before conducting this test.
4. *Precautions* -- Identification of the risks involved to the test team members and the equipment and how to mitigate them.
5. *Instrumentation* -- Listing of the instrumentation and tools necessary to complete the test.
6. *Reference* -- In each procedure item, identify the source for what is being confirmed (e.g., sequence of operation ID, operating feature, specification requirement, etc.).
7. *Test Instructions* -- Step-by-step instructions of how to complete the test, including functions to test and the conditions under which the tests should be performed.
8. *Acceptance Criteria* -- Measurable pass / fail criteria for each step of the test, as applicable.
9. *Results* -- Expected system response and space to document the actual response, readings, results and adjustments.
10. *Return to Normal* -- Instructions that all systems and equipment are to be returned to their as-found state at the conclusion of the tests.
11. *Deficiencies* -- A list of deficiencies and how they were mitigated.

Find sample forms and templates in Part 2 following the standard.

A6.1.5.4 Enforcement:

At their discretion, the building official confirms demonstrated compliance during *Onsite Enforcement* by:

- a) -- Receipt of a copy of completed and signed Functional Performance Tests and corrected deficiencies, or
- b) -- Receipt of a form signed by the owner, owner representative or commissioning coordinator attesting that the Functional Performance Tests have been completed and any deficiencies corrected.

Find sample forms and templates in Part 2 following the standard.

A6.1.6.1 Documentation and training
CALGreen Section: 5.410.2.5 Documentation and training.
Section: 5.410.2.5.1 Systems manual.

A6.1.6.1.1 Intent:

The Systems Manual documents information focusing on the operation of the building systems. This document provides information needed to understand, operate, and maintain the equipment and systems and informs those not involved in the design and construction of the building systems. This document is in addition to the record construction drawings, documents, and the Operation & Maintenance (O&M) Manuals supplied by the contractor. The Systems Manual is assembled during the construction phase and available during the contractors' training of the facility staff.

A6.1.6.1.2 Existing Law or Regulation:

No existing law or regulation. Review local ordinances for any applicable Systems manual requirement.

A6.1.6.1.3 Compliance Method:

Compliance is demonstrated by providing the Systems Manual. The information in the Systems Manual includes the following information:

1. ~~Site information, including facility description, history and current requirements~~
 - a) ~~Site Information~~
 - i. ~~Location of property—Address~~
 - ii. ~~Site acreage~~
 - iii. ~~Local utility information~~
 - ~~-Water service provider~~
 - ~~-Natural/LPG gas service provider~~
 - ~~-Electrical service provider~~
 - ~~-Telecommunications service provider~~
 - ~~-Other service providers~~
 - b) ~~Facility Description~~
 - i. ~~Use/Function~~
 - ii. ~~Square footage~~
 - iii. ~~Occupancy Type~~
 - iv. ~~Construction Type~~
 - v. ~~Basis of design~~
 - vi. ~~Location of major systems & equipment~~
 - c) ~~Project History~~
 - i. ~~Project requirements~~
 - ~~—Owner's Project Requirements (OPR)~~
 - ~~—Basis of Design (BOD)~~
 - ii. ~~Project undocumented events~~
 - iii. ~~Record Drawings & Documents~~
 - iv. ~~Final control drawings and schematics~~
 - v. ~~Final control sequences~~
 - vi. ~~Construction documents—Location or delivery information~~
 - ~~-Mechanical & electrical drawings~~
 - ~~-Specifications~~
 - ~~-Submittals~~
 - ~~-Project change orders and information~~
 - d) ~~Current requirements~~
 - i. ~~Building operating schedules~~
 - ii. ~~Space temperature, humidity, & pressure, CO2 setpoints~~
 - iii. ~~Summer and winter setback schedules~~
 - iv. ~~Chilled & hot water temperatures~~
 - v. ~~As built control setpoints and parameters~~
2. ~~Site contact information~~
 - a) ~~Owner information~~
 - b) ~~Emergency contacts~~
 - c) ~~Design Team: Architect, Mechanical, Engineer, Electrical Engineer, etc.~~
 - d) ~~Prime Contractor contact information~~
 - e) ~~Subcontractor information~~
 - f) ~~Equipment supplier contact information~~
3. ~~Basic operation & maintenance, including general site operating procedures, basic trouble shooting, recommended maintenance requirements site events log~~
 - a) ~~Basic operation~~
 - i. ~~Written narratives of basic equipment operation~~

- ii. Interfaces, interlocks and interaction with other equipment and systems
 - iii. Initial maintenance provide by contactor
- b) General site operating procedures
 - i. Instructions for changes in major system operating schedules
 - ii. Instructions for changes in major system holiday & weekend schedules
- e) Basic troubleshooting
 - i. Cite any recommended troubleshooting procedures specific to the major systems and equipment installed in the building.
 - ii. Manual operation procedures
 - iii. Standby/Backup operation procedures
 - iv. Bypass operation procedures
 - v. Major system power fail resets and restarts
 - vi. Trend log listing
- d) Recommended maintenance events log
 - i. HVAC air filter replacement schedule & log
 - ii. Building control system sensor calibration schedule & log
- e) Operation & Maintenance Manuals—Location or delivery information
- 4. Major systems
 - a) HVAC systems & controls
 - i. Air conditioning equipment (chillers, cooling towers, pumps, heat exchanges, thermal energy storage tanks, etc)
 - ii. Heating equipment (boilers, pumps, tanks, heat exchanges, etc.)
 - iii. Air distribution equipment (fans, terminal units, accessories, etc.)
 - iv. Ventilation equipment (fans, accessories, and controls)
 - v. Building automation system (workstation, servers, panels, variable frequency drives, local control devices, sensors, actuators, thermostats, etc.)
 - b) Indoor lighting systems & controls
 - i. Lighting control panels
 - ii. Occupancy sensors
 - iii. Daylight harvesting systems
 - e) Renewable energy systems
 - i. Photovoltaic panels & inverters
 - ii. Wind powered electrical generators & inverters
 - d) Landscape irrigation systems
 - i. Water distribution diagrams
 - ii. Control system
 - e) Water reuse systems
 - i. Reclaimed water system for indoor use
 - ii. Reclaimed water for irrigation use
- 5. Site equipment inventory and maintenance notes
 - a) Spare parts inventory
 - b) Frequently required parts and supplies
 - e) Special equipment required to operate or maintain systems
 - d) Special tools required to operate or maintain systems
- 6. A copy of all special inspection verifications required by the enforcing agency of this code
- 7. Other resources and documentation

Find sample forms and templates in Part 2 following the standard.

A6.1.6.1.4 Enforcement:

At their discretion, the building official confirms demonstrated compliance during *Onsite Enforcement* by:

- a. Receipt of a copy of the Systems Manual, or
- b. Receipt of a form signed by the owner or owner representative attesting that the System's Manual has been completed.

Find sample forms and templates in Part 2 following the standard.

A6.1.6.2 Documentation and training

CALGreen Section: 5.410.2.5 Documentation and training.

Section: 5.410.2.5.2 Systems operations training.

A6.1.6.2.1 Intent:

The systems operation training verifies that a training program is developed to provide training to the appropriate maintenance staff for each equipment type and/or system and that this training program is documented in the commissioning report. The systems operations training program is specified in the project specifications for the major systems listed. The System Manual, Operation and Maintenance (O&M) documentation, and record drawings are prepared and available to the maintenance staff prior to implementation of any training or the development of a written training program. The training program is to be administered when the appropriate maintenance staff is made available to receive training.

A6.1.6.2.2 Existing Law or Regulation:

No existing law or regulation. Review local ordinances for any applicable Systems Operation Training requirement.

A6.1.6.2.3 Compliance Method:

The written training program includes: (a) learning goals and objectives for each session, (b) training agenda, topics, and length of instruction for each session, (c) instructor information and qualifications, (d) location of training sessions (onsite, off-site, manufacturer's or vendor's facility), (e) attendance forms, (f) training materials, and (g) description on how the training will be archived for future use.

1. Systems/equipment overview

- a) Review OPR and BOD related to the major systems and equipment
- b) Describe system type and configuration
- c) Explain operation all major systems and equipment and how it interfaces with other systems and equipment
- d) Describe operation of critical devices, controls and accessories
- e) Review location of the major systems and equipment
- f) Describe operation of control system for each system, location of critical control elements, and procedures to properly operate control system
- g) Review recommendations for implementation to reduce energy and water use

2. Review and demonstration of servicing/preventive maintenance

- a) Explain location or delivery contact of the Operation & Maintenance manuals
- b) Review of all manufacturer's recommended maintenance activities to maintain warranty
- c) Review and demonstrate frequent maintenance activities (air filter replacement, lubrication, fan belt inspection and/or replacement, condenser water treatment, etc.), and suggested schedule.
- d) Review and demonstrate typical servicing procedures and techniques (electrical current, pressure, and flow readings, etc; calibration procedures, point trending, power fail restart procedures, etc.)
- e) Locate, observe and identify major equipment, systems, accessories and controls
- f) Review emergency shut offs and procedures

3. Review of the information in the Systems Manual

- a) Describe use of System Manual
- b) Review elements of System Manual
- c) Explain how to update and add revisions to System Manual

4. Review record drawings on the systems/equipment

- a) Explain location or delivery contact of the record drawings
- b) Review record drawings, revisions, and changes to original design drawings.
- c) Review equipment schedules and compare with actual installed systems

Find sample forms and templates in Part 2 following the standard.

A6.1.6.2.4 Enforcement:

At their discretion, the building official confirms demonstrated compliance during *Onsite Enforcement* by:

1. In the event appropriate maintenance staff is made available to receive training for each equipment type and/or system installed in the building:
 - a. Receipt of a copy of the written training program and completed attendance forms, or
 - b. Receipt of a form signed by the owner or owner representative attesting that the training program and delivery of training has been completed
2. In the event appropriate maintenance staff are unavailable to receive training for each equipment type and/or system installed in the building.

- a. ~~Receipt of a copy of the training program provided to the owner or owner's representative, or~~
- b. ~~Receipt of a form signed by the owner or owner representative attesting that the written training program has been provided.~~

Find sample forms and templates in Part 2 following the standard.

A6.1.7 Commissioning report
CALGreen Section: 5.410.2.6 Commissioning report.

A6.1.7.1 Intent:

The Commissioning Report documents the commissioning process and test results. The report includes confirmation from the commissioning agent verifying that commissioned systems meet the conditions of the Owner's Project Requirements (OPR), Basis of Design (BOD), and Contract Documents.

A6.1.7.2 Existing Law or Regulation:

No existing law or regulation. Review local ordinances for any applicable Commissioning Report requirement.

A6.1.7.3 Compliance Method:

The Components of the Commissioning Report include the following and are defined as follows:

1. Executive summary of process and results of commissioning program including observations, conclusions and any outstanding items.
2. History of any system deficiencies and how resolved
 - a) Include outstanding deficiencies and plans for resolution
 - b) Include plans for seasonal testing scheduled for a later date
3. System performance test results and evaluations
4. Summary of training process completed and scheduled
5. Attach commissioning process documents
 - a) Commissioning Plan
 - b) Owners Project Requirements (OPR)
 - c) Basis of Design (BOD)
 - d) Executed installation checklists
 - e) Executed Functional Performance Test (FPT) forms
 - f) Recommendations for end-of warranty review activities

Find sample forms and templates in Part 2 following the standard.

A6.1.7.4 Enforcement:

At their discretion, the building official confirms demonstrated compliance during *Onsite Enforcement* by:

- a) Receipt of a copy of the Commissioning Report, or
- b) Receipt of a form signed by the owner or owner representative attesting that the Cx Report has been completed.

Find sample forms and templates in Part 2 following the standard.

Notation

Authority: Health and Safety Code Sections 18928, 18930.5, 18934.5, and 18938(b)

Reference: Health and Safety Code, commencing with Section 18901; and Section 38500 et seq.

A6.1-2011, Part 2
SAMPLE FORMS AND TEMPLATES for COMMISSIONING

Note: Following are examples of templates and/or forms that may be used or adopted for verification of compliance with commissioning. Code users may provide their own documents as permitted by the enforcing agency. For each subsection of commissioning, samples are provided; in a few cases with narrative templates, and in most cases with compliance forms. Simplified forms or more detailed forms, but not both, may be selected to submit for each project.

CALGreen Compliance Template- Owner's Project Requirements (OPR)	CALGreen Std. BSC-5.4-4 10-08-10
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[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-mounted lighting, illumination requirements, special applications.]~~
- b) ~~Occupant lighting control requirements: [List any non-standard requirements. E.g. multi-mode controls for assembly spaces]~~
- c) ~~Thermal comfort requirements: [List any non-standard temperature or humidity requirements]~~
- d) ~~Ventilation and filtration requirements: [List any non-standard requirements]~~
- e) ~~Occupancy HVAC control requirements: [List any non-standard requirements. E.g. integration with existing control systems]~~
- f) ~~Acoustic environment requirements: [List any non-standard requirements. E.g. local noise sources requiring mitigation, spaces such as classrooms that require low background noise and short reverberation times]~~
- g) ~~Other Owner requirements: [E.g. natural ventilation, operable windows, daylight, views]~~

Equipment and Systems Expectations

- a) ~~Special HVAC equipment requirements: [E.g. equipment type, quality, reliability, efficiency, control system type, preferred manufacturers, maintenance requirements]~~
- b) ~~Unacceptable HVAC system types or equipment: [List if applicable]~~
- c) ~~Special lighting equipment requirements: [E.g. list preferred lamp and ballast types that comply with Owner standards if applicable]~~
- d) ~~Other system requirements:~~

Building Occupant and O&M Personnel Expectations

~~**Day-to-day HVAC operation by:** [occupants, operating staff]~~

~~**Periodic HVAC maintenance performed by:** [building occupants, operating staff, service company, Owner staff, other]~~

~~**Lighting system maintenance will be performed by:** [building occupants, operating staff, service company, Owner staff, other]~~

~~**Training required for building occupants:** [e.g. demonstration, instruction documents]~~

~~**Training required for operating and maintenance staff:** [e.g. demonstration, classroom training, instruction documents]~~

~~**Other Owner requirements:**~~

CALGreen Compliance Form- Owner's Project Requirements (OPR)

**CALGreen
Std. BSC-5.4-5
10-08-10**

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

CALGreen Commissioning Requirement 5.410.2.1 Owner's Project Requirements (OPR)

5.410.2.1 Owner's Project Requirements (OPR). The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. The OPR includes the checked elements listed below and have been approved by the Owner or Owner Representative.

	OPR Elements	Included
1.	Environmental and Sustainability Goals.	<input type="checkbox"/>
2.	Energy Efficiency Goals.	<input type="checkbox"/>
3.	Indoor Environmental Quality Requirements.	<input type="checkbox"/>
4.	Project program, including facility functions and hours of operation, and need for after hours operation.	<input type="checkbox"/>
5.	Equipment and Systems Expectations.	<input type="checkbox"/>
6.	Building Occupant and O&M Personnel Expectations.	<input type="checkbox"/>

Owner / Owner Representative Signature _____ Date

CALGreen Compliance Form- Owner's Project Requirements (OPR)

CALGreen
Std. BSC 5.4 5.1
7-15-11

INCORPORATE THIS FORM IN THE PLANS

Project Address: _____

Permit Number: _____

ITEM #	OPR ITEMS	PAGE NUMBER IN OPR DOCUMENT
-	PROJECT PROGRAM	-
1	General building information (size, stories, construction type, occupancy type and number)	
2	Intended uses and schedules	
3	Future expandability and flexibility of spaces	
4	Quality and/or durability of materials and desired building lifespan	
5	Budget or operation constraints	
-	ENVIRONMENTAL AND SUSTAINABILITY GOALS	
6	Level of compliance with the California Green Building Standards Code: Mandatory, Tier 1, or Tier 2	-
7	Specific environmental or sustainability goals (e.g. water efficiency, water reuse, CO ₂ monitoring, xeriscaping, etc.)	-
-	ENERGY EFFICIENCY GOALS	-
8	Overall efficiency of building: meet California Energy Code or exceed by (%)	-
9	Lighting system efficiency: meet California Energy Code or exceed by (%)	-
10	HVAC equipment efficiency and characteristics	-
11	Other measures affecting energy efficiency desired by owner (e.g. Building orientation, shading, daylighting, natural ventilation, renewable power, etc.)	-
-	INDOOR ENVIRONMENTAL QUALITY REQUIREMENTS	-
12	Lighting	-
13	Temperature and Humidity	-
14	Acoustics	-
15	Air quality, ventilation, and filtration	-
16	Desired adjustability of system controls	-
17	Accommodations for after-hours use	-
18	Other owner requirements (e.g. natural ventilation, daylight, views, etc.)	

	EQUIPMENT AND SYSTEMS EXPECTATIONS	-
19	Level of quality, reliability, equipment type, flexibility, maintenance, and complexity desired	-
20	Specific efficiency targets, desired technologies, or preferred manufacturers for building systems, acoustics and vibration	-
21	Degree of system integration, automation, and functionality for controls (i.e. load shedding, demand response, energy management)	-
-	BUILDING OCCUPANT AND O&M PERSONNEL EXPECTATIONS	-
22	Description of how the building will be operated and by whom	-
23	Level of training and orientation required to understand, operate and use the building systems for building operation and maintenance staff, as well as occupants	-
24	Building operation and maintenance staff location and capabilities	-
	COMMISSIONING AGENT INFORMATION	
25	Name of Commissioning Agency:	
26	Address of Agency:	
27	Contact person(s) Name(s):	

Owner/Owner Representative Acknowledgement

Owner's Project Requirements (OPR). The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. The OPR includes the elements listed above and have been approved by the Owner or Owner Representative.

Name: _____ Owner _____ Owner Representative

Company Name (if applicable): _____

Signature: _____ Date: _____

CALGreen Compliance Template Basis of Design (BOD)

CALGreen
Std. BSC-5.4-6
10-08-10

[Documentation of the Basis of Design (BOD) is a step required for compliance with 2010 CALGREEN Code, section 5.410.2.1, for newly constructed buildings greater than 10,000 sq. ft. This template is a guide for use by the design team.]

1. HVAC System

1.1. Narrative Description of System

- A. [System type(s), location, control type, efficiency features, outdoor air ventilation strategy, indoor air quality features, noise reduction features, environmental benefits, other special features]
- B. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

1.2. Reasons for System Selection

- A. [Reasons that the selected system is a better choice than alternatives. E.g. comfort performance, efficiency, reliability, flexibility, simplicity, cost, owner preferences, site constraints, climate, availability of maintenance, acoustics]

1.3. Load Calculations

- A. Load calculation method/software: _____
- B. Summer outdoor design conditions: ___°F drybulb, ___°F wetbulb
- C. Winter outdoor design conditions: ___°F drybulb
- D. Indoor design conditions: ___°F, ___%RH cooling; ___°F heating

E. Internal heat gain assumptions:

Space	Lighting Load	Plug Load	Occupant Load	Infiltration Load	Other:

F. Calculated cooling loads and system size:

System/ Air Handler ID	Calculated Peak Cooling Load	Selected System Cooling Capacity	Reasons for difference between calculated load and selected system capacity

G. Other load calculation assumptions:

1.4. Sequence of Operations

- A. [Operating schedules, setpoints, etc. May refer to plans and/or specifications if sequence of operations is included there.]

2. Indoor Lighting System

2.1. Narrative Description of System

- A. Fixture type(s)
- B. Lamp and ballast type
- C. Control type
- D. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

2.2. Reasons for System Selection

A. [Reasons that the selected lighting system is a better choice than alternatives. E.g. visual comfort performance, efficiency, reliability, flexibility, simplicity, cost, owner preferences, color rendering, integration with daylighting, ease of maintenance, etc.]

2.3. Lighting Design Criteria

Space ID	Space Type	Illumination Design Target (footcandles)	Source of Target (e.g. IES Standard, Owner Requirement)	Other Lighting Design Criteria: [e.g. CRI, CCT]

2.4. Lighting Power Design Targets

Space Type	Title 24 Lighting Power Allowance (watts/ft ²)	Lighting Power Design Target (watts/ft ²)

3. Water Heating System

3.1. Narrative Description of System

- A. [System type(s), location, control type, efficiency features, environmental benefits, other special features]
- B. [Describe how system meets any special requirements listed in the Owner’s Project Requirements document.]

3.2. Reasons for System Selection

A. [Reasons that the selected water heating system is a better choice than alternatives. E.g. performance, efficiency, reliability, simplicity, space constraints, cost, owner preferences, ease of maintenance, utility company incentives, etc.]

3.3. Water Heating Load Calculations

A. [Describe sizing calculation method, assumptions, and results]

4. Renewable Energy Systems

4.1. Narrative Description of System

- A. [System type(s), location, inverter type, control type, performance, efficiency, energy savings, payback period]
- B. [Describe how system meets any special requirements listed in the Owner’s Project Requirements document.]

4.2. Reasons for System Selection

A. [Reasons that the selected renewable energy systems are a better choice than alternatives. E.g. performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference, space constraints, cost, owner preferences, ease of maintenance, etc.]

4.3. Renewable Energy System Generation Calculations

A. [Describe sizing calculation method, assumptions, and results]

5. ~~Landscape Irrigation Systems~~

5.1. ~~Narrative Description of System~~

- A. ~~[System type(s), location, control type, performance, efficiency, water savings]~~
- B. ~~[Describe how system meets any special requirements listed in the Owner's Project Requirements document.]~~

5.2. ~~Reasons for System Selection~~

- A. ~~[Reasons that the selected landscape irrigation systems are a better choice than alternatives. E.g. performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference, cost, owner preferences, ease of maintenance, etc.]~~

5.3. ~~Landscape Irrigation System Calculations~~

- A. ~~[Describe sizing calculation method, assumptions, and results]~~

6. ~~Water Reuse Systems~~

6.1. ~~Narrative Description of System~~

- A. ~~[System type(s), location, space requirements, equipment requirements, control type, performance, efficiency, potable water savings, payback period]~~
- B. ~~[Describe how system meets any special requirements listed in the Owner's Project Requirements document.]~~

6.2. ~~Reasons for System Selection~~

- A. ~~[Reasons that the selected water reuse systems are a better choice than alternatives. E.g. performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference, space constraints, cost, owner preferences, ease of maintenance, etc.]~~

6.3. ~~Water Reuse System Calculations~~

- ~~[Describe sizing calculation method, assumptions, and results]~~

CALGreen Compliance Form- Basis of Design (BOD)

CALGreen
Std. BSC 5.4.6.1
7-15-11

INCORPORATE THIS FORM IN THE PLANS

Project Address: _____

Permit Number: _____

ITEM #	BOD ITEMS	PAGE NUMBER IN BOD DOCUMENT
	HVAC SYSTEMS AND CONTROLS	
1	Narrative description of system (i.e. system type(s), location, control type, efficiency features, outdoor air ventilation strategy, indoor air quality features, noise reduction features, environmental benefits, other features)	
2	Description of how the system meets requirements in OPR	
3	Reasons for system selection, as opposed to alternatives (e.g. comfort performance, efficiency, reliability, cost, acoustics, etc.)	
4	Load calculations (i.e. method/software, summer outdoor conditions, winter outdoor conditions, indoor design conditions, assumptions, other)	
5	Sequence of Operations (i.e. operating schedules, setpoints, other)	
	INDOOR LIGHTING SYSTEM	
6	Narrative Description of system (e.g. fixture type(s), lamp & ballast type, control type, etc.)	
7	Description of how the system meets requirements in OPR	
8	Reasons for system selection, as opposed to alternatives (e.g. visual comfort performance, efficiency, reliability, flexibility, simplicity, cost, etc.)	
9	Lighting Design Criteria (i.e. space ID, space type, illumination design target, source of target, other)	
10	Lighting Power Design Target (i.e. space type, Title 24 Energy Code lighting power allowance, lighting power design target, other)	
	WATER HEATING SYSTEM	
11	Narrative description of system (i.e. system type, location, control type, efficiency features, environmental benefits, other)	
12	Description of how the system meets requirements in OPR	
13	Reasons for system selection, as opposed to alternatives (e.g. performance, efficiency, reliability, simplicity, cost, ease of maintenance, other)	
14	Water heating load calculations: sizing calculation method, assumptions, and results	
	RENEWABLE ENERGY SYSTEMS (IF ANY)	
15	Narrative description of system (i.e. system type(s), location, inverter type, control type, performance, efficiency, energy savings, payback period, other)	
16	Description of how the system meets requirements listed in OPR	
17	Reasons for system selection, as opposed to alternatives (e.g. performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, etc.)	
18	Renewable energy system generation calculations: sizing calculation method, assumptions, and results	
	LANDSCAPE IRRIGATION SYSTEMS	
19	Narrative description of system (i.e. system type(s), location, control type, performance, efficiency, water savings, other)	
20	Description of how the system meets requirements in OPR	
21	Reasons for system selection, as opposed to alternatives (e.g. performance, efficiency, reliability, flexibility, cost, utility company incentives, etc.)	
22	Landscape irrigation system calculations: sizing calculation method, assumptions, and results	
	WATER REUSE SYSTEM (IF ANY)	
23	Narrative description of system (i.e. system type(s), location, space	

	requirements, equipment requirements, control type, performance, efficiency, potable water savings, payback period, other)	
24	Description of how the system meets requirements in OPR	
25	Reasons for system selection, as opposed to alternatives (e.g. performance, efficiency, reliability, flexibility, simplicity, cost, payback period, etc.)	
26	Water reuse system calculations: sizing calculation method, assumptions, and results	

Architect/Engineer/Designer Acknowledgement

I hereby acknowledge the Basis of Design (BOD) document has been completed and meets the Owner's Project Requirements (OPR)

	Name	License Number	Signature	Date
Architect of Record				
Mechanical Designer				
Electrical Designer				
Plumbing Designer				
Landscape Architect				
Renewable Energy System Designer				
Other (specify):				

Commissioning Agent Acknowledgment

I have reviewed the Basis of Design (BOD) and verified that it meets the Owner's Project Requirements (OPR):

Name: _____

Company Name (if applicable): _____

Agent's Signature: _____ Date: _____

CALGreen Compliance Form- Commissioning Measures in the Construction Documents

CALGreen
Std. BSC 5.4-7
10-08-10

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.

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

[†]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 _____ Date
or Designer of Record Signature

**CALGreen Compliance Form-
Commissioning Measures in the Construction Documents**

**CALGreen
Std. BSC-5.4-7.1
7-15-11**

INCORPORATE THIS FORM IN THE PLANS

Project Address: _____

Permit Number: _____

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

Commissioning Agent Acknowledgment

I have reviewed the construction documents listed above and verified their compliance with the owner's project requirements, basis of design, and commissioning plan.

Name: _____

Company Name (if applicable): _____

Agent's signature: _____ Date: _____

CALGreen Compliance Form- Commissioning Plan

CALGreen
Std. BSC-5.4-8
10-08-10

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 5.410.2.3 Commissioning Plan

5.410.2.3 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. The commissioning plan includes the checked elements listed below and has been approved by the Owner or Owner Representative.

	Commissioning Plan Elements	Included
1.	General project information	<input type="checkbox"/>
2.	Commissioning goals	<input type="checkbox"/>
4.	An explanation of original design intent	<input type="checkbox"/>
5.	Equipment and systems to be commissioned and tested, including extent of tests	<input type="checkbox"/>
6.	Functions to be tested and conditions of tests [†]	<input type="checkbox"/>
7.	Measurable performance criteria	<input type="checkbox"/>
8.	Cx team information	<input type="checkbox"/>
9.	Cx activities, schedules and responsibilities	<input type="checkbox"/>

[†]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 Signature _____ Date

CALGreen Compliance Form- Commissioning Plan

CALGreen
Std. BSC-5.4.8.1
10-08-10

INCORPORATE THIS FORM IN THE PLANS

Project Address: _____

Permit Number: _____

ITEM #	COMMISSIONING PLAN ITEMS*	PAGE NUMBER IN COMMISSIONING PLAN DOCUMENT
	GENERAL PROJECT INFORMATION	
1	Project name, owner, location	
2	Building type, building area	
3	Overall project commissioning schedule	
4	Contact information for individual/company providing commissioning services	
	COMMISSIONING GOALS	
5	Meet California Green Building Standards Code requirements for commissioning	
6	Meeting OPR and BOD requirements	
7	Carrying out requirements for commissioning activities as specified in plans and specifications	
	SYSTEMS TO BE COMMISSIONED	
8	Explanation of the original design intent (refer to OPR and BOD documents)	
9	Equipment and systems to be tested*, functions to be tested, conditions under which the test shall be performed, and measurable criteria for acceptable performance	
	COMMISSIONING TEAM INFORMATION	
10	List of all team members and contact information (i.e. owner, owner's representative, architect, engineers, designated commissioning representative, and (if available): general contractor, sub-contractors, and construction manager)	
	COMMISSIONING PROCESS ACTIVITIES, SCHEDULES, AND RESPONSIBILITIES	
11	Prescribed commissioning process steps and activities to be accomplished by the Cx team throughout the design to occupancy	
12	Roles and responsibilities for each member of the Cx team for each phase of the work	
13	Required Cx deliverables, reports, forms, and verifications expected at each stage of the commissioning effort	
14	Confirmation process for the O&M manual, systems manual and the facility operator and maintenance staff training	

* ~~The following systems shall be tested: HVAC & controls, indoor lighting system & controls, water~~

~~heating system, renewable energy systems, landscape irrigation systems and water reuse systems~~

Owner/Owner Representative Acknowledgment

The commissioning plan includes the items listed above and have been approved by the Owner or Owner Representative:

Name: _____ Owner _____ Owner Representative

Company Name (if applicable): _____

Signature: _____ Date: _____

**CALGreen Compliance Form-
Functional Performance Testing**

**CALGreen
Std. BSC-5.4.9
10-08-10**

Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2.4 Functional Performance Testing

5.410.2.4 Functional performance tests shall demonstrate the correct installation and operation of each component, system, and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized, and include any readings and adjustments made. Test forms have been developed for each piece of commissioned equipment and system and include the checked elements listed below. These tests have been executed with deficiencies corrected.

	Functional Test Elements	Included
1.	Date and parties participating	<input type="checkbox"/>
2.	Signature block attesting test is complete and accurate	<input type="checkbox"/>
3.	Prerequisites	<input type="checkbox"/>
4.	Precautions	<input type="checkbox"/>
5.	Instrumentation required	<input type="checkbox"/>
6.	Reference to the source of what is being confirmed (sequences, packaged features, etc.)	<input type="checkbox"/>
7.	Detailed step by step test instructions	<input type="checkbox"/>
8.	Acceptance criteria	<input type="checkbox"/>
9.	Results	<input type="checkbox"/>
10.	Confirmation of returning to normal	<input type="checkbox"/>
11.	Deficiency list	<input type="checkbox"/>

Cx Coordinator Signature _____ Date

Minimum Requirements for Test Report

1. ~~Date and Party~~—Identification of the date of the test and the party conducting the test.
2. ~~Signature Block~~—Signature of the designated commissioning lead and the equipment installing contractor attesting that the recorded test results are accurate.
3. ~~Prerequisites~~—any conditions or related equipment checkout or testing that needs to be completed before conducting this test.
4. ~~Precautions~~—Identification of the risks involved to the test team members and the equipment and how to mitigate them.
5. ~~Instrumentation~~—Listing of the instrumentation and tools necessary to complete the test.
6. ~~Reference~~—In each procedure item, identify the source for what is being confirmed (e.g. sequence of operation ID, operating feature, specification requirement, etc.)
7. ~~Test Instructions~~—Step by step instructions of how to complete the test, including functions to test and the conditions under which the tests should be performed.
8. ~~Acceptance Criteria~~—Measurable pass/fail criteria for each step of the test, as applicable.
9. ~~Results~~—Expected system response and space to document the actual response, readings, results, and adjustments.
10. ~~Return to Normal~~—Instructions that all systems and equipment are to be returned to their as found state at the conclusion of the tests.
11. ~~Deficiencies~~—A list of deficiencies and how they were mitigated.

CALGreen Compliance Form- Systems Manual

**CALGreen
Std. BSC 5.4-10
10-08-10**

Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2.5.1 Documentation and Training Systems Manual

5.410.2.5.1 Systems Manual. Documentation of the operational aspects of the building shall be completed within the Systems Manual and delivered to the building owner or representative and facilities operator. The Systems Manual includes the checked elements listed below.

	System Manual Elements	Included
1.	Site information including facility description, history and current requirements	<input type="checkbox"/>
2.	Site contact information	<input type="checkbox"/>
3.	Basic operations and maintenance and troubleshooting	<input type="checkbox"/>
4.	Systems covered include major systems listed under the BOD.	<input type="checkbox"/>
5.	Site equipment inventory and maintenance notes	<input type="checkbox"/>
6.	Special inspection verifications	<input type="checkbox"/>
7.	Other resources and documentation	<input type="checkbox"/>

Owner or Owner Representative Signature _____ Date _____

CALGreen Compliance Form- Training

CALGreen
Std. BSC 5.4.11
10-08-10

Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2.5.2 Documentation and Training Training

5.410.2.5.2 Systems Operations Training. The training of the appropriate maintenance staff for each equipment type and/or system shall be documented in the commissioning report. The written training program includes the checked elements listed below.

	Training Program Elements	Included
1.	System/equipment overview (what it is, what it does and with what other systems and/or equipment it interfaces)	<input type="checkbox"/>
2.	Review and demonstration of servicing & preventive maintenance	<input type="checkbox"/>
3.	Review of the information in the Systems Manual	<input type="checkbox"/>
4.	Review of the record drawings on the system/equipment	<input type="checkbox"/>

The Owner or Owner Representative attest that when the appropriate maintenance staff are made available prior to certificate of occupancy that the written training program was executed with these staff. Or, that if appropriate maintenance staff are not available, that the written training program was submitted and approved by the Owner or Owner Representative.

Owner or Owner Representative Signature _____ Date

THIS FORM IS TO COMPLETED FOR THE TIME OF INSPECTION

Project Address: _____

Permit Number: _____

Part One: System Manual

ITEM #	SYSTEM MANUAL ELEMENTS	PAGE NUMBER IN MANUAL
	SITE INFORMATION	
1	General (i.e. address, acreage, local utility information, other)	
2	Facility description (i.e. use/function, square footage, occupancy type, construction type, basis of design, location of major systems & equipment)	
3	Project history (i.e. project requirements (BOD/OPR), project undocumented events, record drawings & documents, final control drawings & schematics, final control sequences, construction documents)	
4	Current requirements (i.e. building operating schedules, space temperature, humidity, pressure, CO ₂ setpoints, summer and winter setback schedules, chilled and hot water temperatures, As-built control setpoints & parameters)	
	SITE CONTACT INFORMATION	
5	Owner Information	
6	Emergency contacts	
7	Design Team (i.e. architect, mechanical engineer, electrical engineer, other)	
8	Prime Contractor contact information	
9	Subcontractor information	
10	Equipment supplier contact information	
	BASIC OPERATIONS & MAINTENANCE	
11	Basic operation (i.e. narratives of basic equipment operation, interfaces, interlocks & interaction with other equipment & systems, initial maintenance provided by the contractor)	
12	General site operating schedules (i.e. instructions for changes in major system operating schedules, instructions for changes in major system holiday & weekend schedules)	
13	Basic troubleshooting (i.e. cite recommended troubleshooting procedures specific to major systems & equipment, manual operation procedures, standby/backup/bypass operation procedures, major system power fail resets and restarts, trend log listing)	
14	Recommended maintenance events log (i.e. HVAC air filter replacement schedule & log, building control system sensor calibration schedule & log)	
15	Operation & maintenance manuals (location or delivery information)	
	MAJOR SYSTEMS	
16	HVAC systems & controls (i.e. AC equipment, heating equipment, air distribution equipment, ventilation equipment, building automation system)	
17	Indoor lighting systems & controls (i.e. lighting control panels, occupancy sensors, daylight harvesting systems)	
18	Renewable energy systems (i.e. photovoltaic panels & inverters, wind powered electrical generators & inverters)	
19	Landscape irrigation systems (i.e. water distribution diagrams, and control system)	
20	Water reuse systems (i.e. reclaimed water system for indoor use, reclaimed	

	water for irrigation use)	
SITE EQUIPMENT INVENTORY & MAINTENANCE NOTES		
21	Spare parts inventory	
22	Frequently required parts and supplies	
23	Special equipment required to operate or maintain systems	
24	Special tools required to operate or maintain systems	
SPECIAL INSPECTIONS		
25	Copies of all special inspection verifications required by the enforcing agency of this code	
OTHER		
26	Other resources and documentation	

Part Two: Training

ITEM #	TRAINING PROGRAM ELEMENTS	PAGE NUMBER IN TRAINING DOCUMENT
1	System/equipment overview (i.e. what it is, what it does, and with what other systems and/or equipment it interfaces)	
2	Review and demonstration of servicing & preventative maintenance	
3	Review of the information in the Systems Manual	
4	Review of the record drawings on the system/equipment	

Owner/Owner Representative Acknowledgment

- Documentation of the operation aspects of the building shall be completed within the systems manual and delivered to the building owner or representative and facilities operator. The Systems Manual includes the elements listed in part one of this form; or
- When the appropriate maintenance staff is made available prior to the certificate of occupancy, the written training program will be executed to these staff. The written training program includes the elements listed in part two of this form.

Name: _____ Owner _____ Owner Representative

Company Name (if applicable): _____

Signature: _____ Date: _____

CALGreen Compliance Form- Commissioning Report

**CALGreen
Std. BSC 5.4.12
10-08-10**

Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2.6 Commissioning Report

5.410.2.6 Commissioning Report. A complete report of commissioning process activities undertaken through the design, construction and reporting recommendations for post-construction phases of the building project shall be completed and provided to the owner or representative. The commissioning report includes the checked elements listed below and has been approved by the Owner or Owner Representative.

	Commissioning Report Elements	Included
1.	Executive summary with conclusions and outstanding issues	<input type="checkbox"/>
2.	History of system deficiencies and resolution	<input type="checkbox"/>
3.	Summary of system functional test results	<input type="checkbox"/>
4.	Summary of training completion	<input type="checkbox"/>
5.	Attachments of Commissioning plan, OPR, BOD, executed (filled in) installation checklists, executed functional tests, recommendations for end-of-warranty review	<input type="checkbox"/>

Owner / Owner Representative Signature _____ Date

CALGreen Compliance Form- Commissioning Report

CALGreen
Std. BSC 5.4 12.1
7-15-11

THIS FORM IS TO COMPLETED FOR THE TIME OF INSPECTION

Project Address: _____

Permit Number: _____

ITEM #	COMMISSIONING REPORT ELEMENTS	PAGE NUMBER IN COMMISSIONING REPORT DOCUMENT
	EXECUTIVE SUMMARY	
4	Executive summary of process and results of commissioning program (include observations, conclusions, and any outstanding items)	
	HISTORY OF ANY SYSTEM DEFICIENCIES AND HOW RESOLVED	
6	Outstanding deficiencies and plans for resolution	
7	Plans for seasonal testing scheduled for a later date	
	RESULTS	
8	System performance test results and evaluations	
	SUMMARY OF TRAINING	
9	Summary of training process completed and scheduled	
	ATTACH COMMISSIONING PROCESS DOCUMENTS	
10	Commissioning Plan	
11	Owner's Project Requirements (OPR)	
12	Basis of Design (BOD)	
13	Executed installation checklists	
14	Executed Functional Performance Test (FPT) forms	
15	Recommendations for end-of-warranty review activities	

Owner & Commissioning Agent Acknowledgment

The commissioning report includes the items listed above and is approved by the owner/owner representative and commissioning agent below.

1. Owner/Owner Representative

The commissioning report includes the items listed above and have been approved by the Owner or Owner Representative.

Name: _____ Owner Owner Representative

Company Name (if applicable): _____

Signature: _____ Date: _____

2. Commissioning Agent

Name: _____

Company Name (if applicable): _____

Signature: _____ Date: _____

Notation

Authority: Health and Safety Code Sections 18928, 18930.5, 18934.5, and 18938(b)

Reference: Health and Safety Code, commencing with Section 18901; and Section 38500 et seq.

APPENDIX A6.1
VOLUNTARY STANDARDS for HEALTH FACILITIES [OSHPD 1, 2 & 4]

The following sections are relocated from the voluntary appendices into one appendix to assist code users in the planning, design and construction of environmentally sustainable medical facilities under the authority of the Office of Statewide Health Planning and Development specified in Chapter 1 of this code.

[OSHPD and CBSC will cross-check the provisions of this section with the published sections in the 2010 CALGreen Code to insure accuracy and to aid in publication.]

MATRIX ADOPTION TABLE

Adopting Agency	BSC	SFM	HCD			DSA		OSHPD				CSA	DHS	A	DWR	CEC	CA	SL	SLC
			1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire CA Chapter																			
Adopt Entire Chapter as amended (amended sections listed below)								X	X		X								
Adopt only those sections that are listed below																			
Chapter / Section																			
A5.106.9								X	X		X								
A5.203								X	†		†								

DIVISION A5.1 SITE PLANNING AND DESIGN

SECTION A5.106
SITE DEVELOPMENT

A5.106.9 Building orientation. Locate and orient the building as follows:

1. When site and location permit, orient the building with the long sides facing north and south.
2. Protect the building from thermal loss, drafts, and degradation of the building envelope caused by wind and wind-driven materials such as dust, sand, snow, and leaves with building orientation and landscape features.

Note: For information on sun angles and shading, visit: <http://www2.aud.ucla.edu/energy-design-tools/> . Calculations may be made using the Solar-2 tool.

DIVISION A5.2 ENERGY EFFICIENCY

SECTION A5.202
DEFINITIONS

A5.202.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

ENERGY STAR. A joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy. ENERGY STAR is a voluntary program designed to identify and promote energy-efficient products and practices.

SECTION A5.203
PERFORMANCE APPROACH

A5.203.2 Energy performance. It is the intent of this code to encourage green buildings to achieve exemplary performance in the area of energy efficiency.

A5.203.2.1 CALGREEN Tier 1 [OSHPD 1]. To achieve CALGREEN Tier 1, buildings must comply with the latest edition of "Savings By Design, Healthcare Modeling Procedures" found online at <http://www.energysoft.com/ep/2007SBDHProcedures.pdf> .

A5.203.2.2 CALGREEN Tier 2 [OSHPD 1]. To achieve CALGREEN Tier 2, buildings must exceed the latest edition of "Savings By Design, Healthcare Modeling Procedures" by a minimum of 15 percent.

SECTION A5.204
PRESCRIPTIVE APPROACH

A5.204.1 ENERGY STAR equipment and appliances. All equipment and appliances provided by the builder shall be ENERGY STAR labeled if ENERGY STAR is applicable to that equipment or appliance.

A5.204.4 Commissioning. Building commissioning shall be included in the design and construction processes of the building project to verify that the building's energy related systems are installed, calibrated, and perform according to the owner's project requirements, basis of design, and construction documents.

The Owner and Designer shall designate an individual as the Commissioning Authority (CxA) to lead, review and oversee the completion of the commissioning process activities. The Owner shall document the Owner's Project Requirements (OPR). The design team shall develop the Basis of Design (BOD). The CxA shall review these documents for clarity and completeness. The Owner and design team shall be responsible for updates to their respective documents, develop and incorporate commissioning requirements into the construction documents, and develop and implement a commissioning plan. The CxA shall verify the installation and performance of the systems to be commissioned, verify that training and operation and maintenance documentation have been provided to the owner's operations staff, and complete a commissioning report.

Commissioning process activities shall be completed for the following energy-related systems, at a minimum:

1. Heating, ventilating, air conditioning and refrigeration (HVAC&R) systems (mechanical and passive) and associated controls.
2. Lighting and daylighting controls
3. Domestic hot water systems
4. Renewable energy systems (wind, solar etc.)
5. Building envelope systems

A5.204.4.1 Owner's Project Requirements (OPR). The expectations and requirements of the building shall be documented by the Owner and the Designer before the design phase of the project begins. . . .

A5.204.4.2 Basis of Design (BOD). A written explanation of how the design of the building systems meets the Owner's Project Requirements shall be completed at the design phase of the building project, and updated as necessary during the design and construction phases. . . .

A5.204.4.3 Commissioning plan. A commissioning plan shall be completed to document the approach to how the project will be commissioned and shall be started during the design phase of the building project. . . .

A5.204.4.4 Functional performance testing. Functional performance tests shall demonstrate the correct installation and operation of each component, system, and system-to-system interface in accordance with the approved plans and specifications. . . .

A5.204.4.5 Post construction documentation and training

A5.204.4.5.1 Systems manual. Documentation of the operational aspects of the building shall be completed within the Systems Manual and delivered to the building owner and facilities operator. . A Systems Manual and Systems Operations Training are required. . . .

A5.204.4.5.2 Systems operations training. The CxA shall oversee the training of the appropriate maintenance staff for each equipment type and/or system. . . .

A5.204.4.6 Commissioning report. The CxA shall create a complete report of commissioning process activities undertaken through the design, construction and post-construction phases of the building project and provided to the owner.

A5.204.6 Building orientation and shading. Locate, orient and shade the building as required in Section A5.106.9.

SECTION A5.205 BUILDING ENVELOPE

A5.205.1 Fenestration Products and Exterior Doors

A5.205.1.1 Certification of Fenestration Products and Exterior Doors other than Field-fabricated. Any fenestration product and exterior door, other than field-fabricated fenestration products and field-fabricated exterior doors, may be installed only if the manufacturer has certified to the California Energy Commission, or if an independent certifying organization approved by the Commission has certified, that the product complies with all of the applicable requirements of this subsection.

A5.205.1.1.1 Air leakage. Manufactured fenestration products and exterior doors shall have air infiltration rates not exceeding 0.3 cfm/ft² of window area, 0.3 cfm/ft² of door area for residential doors, 0.3 cfm/ft² of door area for nonresidential single doors (swinging and sliding), and 1.0 cfm/ft² for nonresidential double doors (swinging), when tested according to NFRC-400 or ASTM E 283 at a pressure differential of 75 pascals (or 1.57 pounds/ft²), incorporated herein by reference.

A5.205.1.1.2- U-factor. A fenestration product's U-factor shall be rated in accordance with NFRC 100, or the applicable default U-factor set forth in TABLE A.5.205.1-A.

Exception: If the fenestration product is a skylight or is site-built fenestration in a building covered by the nonresidential standards with less than 10,000 square feet of site-built fenestration, the default U-factor may be calculated as set forth in Reference Nonresidential Appendix NA6 of the California Energy Commission 2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings.

A5.205.1.1.3 SHGC. A fenestration product's SHGC shall be rated in accordance with NFRC 200 for site-built fenestration, or use the applicable default SHGC set forth in TABLE A5.205.1-B.

Exception: If the fenestration product is a skylight or is site-built fenestration in a building covered by the nonresidential standards with less than 10,000 square feet of site-built fenestration, the default SHGC may be calculated as set forth in Reference Nonresidential Appendix NA6 of the California Energy Commission 2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings.

A5.205.1.1.4 Labeling. Fenestration products shall:

1. Have a temporary label (or label certificate for site-built fenestration) meeting the requirements of Section 10-111(a)1 of Title 24, Part 1 not to be removed before inspection by the enforcement agency, listing the certified U-factor and SHGC, and certifying that the air leakage requirements of Section A5.205.1.1.1 are met for each product line; and
2. Have a permanent label (or label certificate for site-built fenestration) meeting the requirements of Section 10-111(a)2 of Title 24, Part 1 if the product is rated using NFRC procedures.

A5.205.1.1 Fenestration Acceptance Requirements. Before an occupancy permit is granted site-built fenestration products in other than low-rise residential buildings shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified by the Reference Nonresidential Appendix NA7 of the California Energy Commission 2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings to ensure that site-built fenestration meet Standards requirements, including a matching label certificate for each product installed and be readily accessible at the project location. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the fenestration product meets the acceptance requirements.

Exception: Fenestration products removed and reinstalled as part of a building alteration or addition.

A5.205.1.2 Installation of Field-fabricated Fenestration and Exterior Doors. Field-fabricated fenestration and field-fabricated exterior doors may be installed only if the compliance documentation has demonstrated compliance for the installation using U-factors from TABLE A.5.205.1-A and SHGC values from TABLE A5.205.1-B. Field-fabricated fenestration and field-fabricated exterior doors shall be caulked between the fenestration products or exterior door and the building, and shall be weatherstripped.

Exception: Unframed glass doors and fire doors need not be weatherstripped or caulked.

TABLE A.5.205.1-A DEFAULT FENESTRATION PRODUCT U-FACTORS

FRAME	PRODUCT TYPE	SINGLE PANE U-FACTOR	DOUBLE PANE ¹ U-FACTOR	GLASS BLOCK ² U-FACTOR
Metal	Operable	1.28	0.79	0.87
	Fixed	1.19	0.71	0.72
	Greenhouse/garden window	2.26	1.40	N.A.
	Doors	1.25	0.77	N.A.
	Skylight	1.98	1.30	N.A.
Metal, Thermal Break	Operable	N.A.	0.66	N.A.
	Fixed	N.A.	0.55	N.A.
	Greenhouse/garden window	N.A.	1.12	N.A.
	Doors	N.A.	0.59	N.A.
	Skylight	N.A.	1.11	N.A.
Nonmetal	Operable	0.99	0.58	0.60
	Fixed	1.04	0.55	0.57
	Doors	0.99	0.53	N.A.
	Greenhouse/garden windows	1.94	1.06	N.A.
	Skylight	1.47	0.84	N.A.

1. For all dual-glazed fenestration products, adjust the listed U-factors as follows:
a. Add 0.05 for products with dividers between panes if spacer is less than 7/16 inch wide.
b. Add 0.05 to any product with true divided lite (dividers through the panes).
2. Translucent or transparent panels shall use glass block values.

TABLE A5.205.1-B DEFAULT SOLAR HEAT GAIN COEFFICIENT (SHGC)

FRAME TYPE	PRODUCT	GLAZING	TOTAL WINDOW SHGC		
			Single Pane	Double Pane	Glass Block ¹
Metal	Operable	Clear	0.80	0.70	0.70
	Fixed	Clear	0.83	0.73	0.73
	Operable	Tinted	0.67	0.59	N.A.
	Fixed	Tinted	0.68	0.60	N.A.
Metal, Thermal Break	Operable	Clear	N.A.	0.63	N.A.
	Fixed	Clear	N.A.	0.69	N.A.
	Operable	Tinted	N.A.	0.53	N.A.
	Fixed	Tinted	N.A.	0.57	N.A.
Nonmetal	Operable	Clear	0.74	0.65	0.70
	Fixed	Clear	0.76	0.67	0.67
	Operable	Tinted	0.60	0.53	N.A.
	Fixed	Tinted	0.63	0.55	N.A.

1. Translucent or transparent panels shall use glass block values.

A5.205.2 Joints And Other Openings. Joints and other openings in the building envelope that are potential sources of air leakage shall be caulked, gasketed, weatherstripped, or otherwise sealed to limit infiltration and exfiltration.

A5.205.3 Insulation And Roofing Products

A5.205.3.1 Certification by Manufacturers. Any insulation shall be certified by Department of Consumer Affairs, Bureau of Home Furnishing and Thermal Insulation that the insulation conductive thermal performance is approved pursuant to the California Code of Regulations, Title 24, Part 12, Chapters 12-13, Article 3, "Standards for Insulating Material."

A5.205.3.2 Installation of Urea Formaldehyde Foam Insulation. Urea formaldehyde foam insulation may be applied or installed only if:

1. It is installed in exterior side walls; and
2. A four-mil-thick plastic polyethylene vapor barrier or equivalent plastic sheathing vapor barrier is installed between the urea formaldehyde foam insulation and the interior space in all applications.

A5.205.3.3 Flame spread Rating. All insulating material shall be installed in compliance with the flame spread rating and smoke density requirements of the Title 24, Part 2, California Building Code.

A5.205.3.4 Installation of Insulation in Existing Buildings. Insulation installed in an existing attic, or on an existing duct or water heater, shall comply with the applicable requirements of subsections A5.205.3.4.1, A5.205.3.4.2, and A5.205.3.4.3 below. If a contractor installs the insulation, the contractor shall certify to the customer, in writing, that the insulation meets the applicable requirements of subsections A5.205.3.4.1, A5.205.3.4.2, and A5.205.3.4.3 below.

A5.205.3.4.1 Attics. If insulation is installed in the existing attic of a low-rise residential building, the R-value of the total amount of insulation (after addition of insulation to the amount, if any, already in the attic) shall be at least R-38 in climate zones 1 and 16; and R-30 in all other climate zones.

Exception: Where the accessible space in the attic is not large enough to accommodate the required R-value, the entire accessible space shall be filled with insulation provided such installation does not violate Section 1203.2 of Title 24, Part 2, California Building Code.

A5.205.3.4.2 Water heaters. If external insulation is installed on an existing unfired water storage tank or on an existing back-up tank for a solar water-heating system, it shall have an R-value of at least R-12, or the heat loss of the tank surface based on an 80°F water-air temperature difference shall be less than 6.5 Btu per hour per square foot.

A5.205.3.4.3 Ducts. If insulation is installed on an existing space-conditioning duct, it shall comply with Section 605 of the CMC.

A5.205.3.5 Placement of roof/ceiling insulation. Insulation installed to limit heat loss and gain through the top of conditioned spaces shall comply with the following:

A5.205.3.5.1. Insulation shall be installed in direct contact with a continuous roof or ceiling which is sealed to limit infiltration and exfiltration as specified in Section A5.205.2, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling; and

A5.205.3.5.2 When insulation is installed at the roof in nonresidential buildings, fixed vents or openings to the outdoors or to unconditioned spaces shall not be installed and the space between the ceiling and the roof is either directly or indirectly conditioned space and shall not be considered an attic for the purposes of complying with CBC attic ventilation requirements; and

A5.205.3.5.3 Insulation placed on top of a suspended ceiling with removable ceiling panels shall be deemed to have no effect on envelope heat loss; and

Exception: When there are conditioned spaces with a combined floor area no greater than 2,000 square feet in an otherwise unconditioned building, and when the average height of the space between the ceiling and the roof over these spaces is greater than 12 feet, insulation placed in direct contact with a suspended ceiling with removable ceiling panels shall be an acceptable method of reducing heat loss from a conditioned space and shall be accounted for in heat loss calculations.

A5.205.3.5.4 Insulation shall be installed below the roofing membrane or layer used to seal the roof from water penetration unless the insulation has a maximum water absorption of 0.3 percent by volume when tested according to ASTM Standard C 272.

Note: Vents, which do not penetrate the roof deck, that are designed for wind resistance for roof membranes are not within the scope of Section A5.205.3.5.2.

A5.205.3.6 Demising Walls in Nonresidential Buildings. The opaque portions of framed demising walls in nonresidential buildings shall be insulated with an installed R-value of no less than R-13 between framing members.

A5.205.3.7 Insulation Requirements for Heated Slab Floors. Heated slab-on-grade floors shall be insulated according to the requirements in Table A5.205.3-A.

A5.205.3.7.1 Insulation materials in ground contact must:

A5.205.3.7.1.1 Comply with the certification requirements of Section A5.205.3.1 and

A5.205.3.7.1.2 Have a water absorption rate for the insulation material alone without facings that is no greater than 0.3 percent when tested in accordance with Test Method A – 24 Hour-Immersion of ASTM C272.

A5.205.3.7.2 Insulation installation must:

A5.205.3.7.2.1 Cover the insulation with a solid guard that protects against damage from ultraviolet radiation, moisture, landscaping operation, equipment maintenance, and wind; and

A5.205.3.7.2.2 Include a rigid plate, which penetrates the slab and blocks the insulation from acting as a conduit for insects from the ground to the structure above the foundation.

A5.205.3.8 Wet Insulation Systems. When insulation is installed on roofs above the roofing membrane or layer used to seal the roof from water penetration, the effective R-value of the insulation shall be as specified in Reference Joint Appendix JA4 of the California Energy Commission 2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings.

A5.205.3.9 Roofing Products Solar Reflectance and Thermal Emittance.

A5.205.3.9.1 In order to meet the requirements of Sections 141, 142, 143(a)1, 149(b)1B, 151(f)12, 152(b)1H or 152(b)2 of Title 24, Part 6, a roofing product's thermal emittance and 3-year aged solar reflectance shall be certified and labeled according to the requirements of Section 10-113 of Title 24, Part 1.

Exception: Roofing products that are not certified according to Section 10-113 of Title 24, Part 1 shall assume the following default aged reflectance/emittance values:

A5.205.3.9.1.1 For asphalt shingles, 0.08/0.75

A5.205.3.9.1.2 For all other roofing products, 0.10/0.75

A5.205.3.9.2 If CRRC testing for 3-year aged reflectance is not available for any roofing products, the 3-year aged value shall be derived from the CRRC initial value using the equation $R_{aged} = [0.2 + 0.7[\rho_{initial} - 0.2]]$, Where $\rho_{initial}$ = the initial Solar Reflectance.

A5.205.3.9.3 Solar Reflectance Index (SRI), calculated as specified by ASTM E 1980-01, may be used as an alternative to thermal emittance and 3-year aged solar reflectance when complying with the requirements of Sections 141, 142, 143(a)1, 149(b)1B, 151(f)12, 152(b)1H, or 152(b)2 of Title 24, Part 6. SRI calculations shall be based on moderate wind velocity of 2-6 meters per second. The SRI shall be calculated based on the 3-year aged reflectance value of the roofing products.

A5.205.3.9.4 Liquid applied roof coatings applied to low-sloped roofs in the field as the top surface of a roof covering shall:

A5.205.3.9.4.1 Be applied across the entire roof surface to meet the dry mil thickness or coverage recommended by the coating manufacturer, taking into consideration the substrate on which the coating is applied, and

A5.205.3.9.4.2 Meet the minimum performance requirements listed in Table A5.205.3-B or the minimum performance requirements of ASTM C836, D3468, D6083, or D6694, whichever are appropriate to the coating material.

Exception 1: Aluminum-pigmented asphalt roof coatings shall meet the requirements of ASTM D2824 or ASTM D6848 and be installed as specified by ASTM D3805.

Exception 2: Cement-based roof coatings shall contain a minimum of 20 percent cement and shall meet the requirements of ASTM C1583, ASTM D822, and ASTM D5870.

TABLE A5.205.3-A SLAB INSULATION REQUIREMENTS FOR HEATED SLAB-ON-GRADE

Insulation Location	Insulation Orientation	Installation Requirements	Climate Zone	Insulation R-Factor
Outside edge of heated slab, either inside or outside the foundation wall	Vertical	From the level of the top of the slab, down 16 inches or to the frost line, whichever is greater. Insulation may stop at the top of the footing where this is less than the required depth. For below grade slabs, vertical insulation shall be extended from the top of the foundation wall to the bottom of the foundation (or the top of the footing) or to the frost line, whichever is greater.	1 – 15	5
			16	10
Between heated slab and outside foundation wall	Vertical and Horizontal	Vertical insulation from top of slab at inside edge of outside wall down to the top of the horizontal insulation. Horizontal insulation from the outside edge of the vertical insulation extending 4 feet toward the center of the slab in a direction normal to the outside of the building in plan view.	1 – 15	5
			16	10 vertical and 7 horizontal

TABLE A5.205.3-B MINIMUM PERFORMANCE REQUIREMENTS FOR LIQUID APPLIED ROOF COATINGS

Physical Property	ASTM Test Procedure	Requirement
Initial percent elongation (break)	D 2370	Minimum 200% 73 °F (23 °C)
Initial percent elongation (break) OR Initial Flexibility	D 2370 D522, Test B	Minimum 60% 0°F (-18 °C) Minimum pass 1" mandrel 0°F (-18 °C)
Initial tensile strength (maximum stress)	D 2370	Minimum 100 psi (1.38 Mpa) 73 °F (23 °C)
Initial tensile strength (maximum stress) OR Initial Flexibility	D 2370 D522, Test B	Minimum 200 psi (2.76 Mpa) 0°F (-18 °C) Minimum pass 1" mandrel 0°F (-18 °C)
Final percent elongation (break) after accelerated weathering 1000 h	D 2370	Minimum 100% 73 °F (23 °C)
Final percent elongation (break) after accelerated weathering 1000 h OR Flexibility after accelerated weathering 1000h	D2370	Minimum 40% 0°F (-18 °C) Minimum pass 1" mandrel 0°F (-18 °C)
Permeance	D 1653	Maximum 50 perms
Accelerated weathering 1000 h	D 4798	No cracking or checking ¹
¹ Any cracking or checking visible to the eye fails the test procedure.		

**SECTION A5.207
HVAC DESIGN, EQUIPMENT AND INSTALLATION**

A5.207.1 Space-Conditioning Equipment Certification by Manufacturers. Any space-conditioning equipment listed in this section may be installed only if the manufacturer has certified that the equipment complies with all the applicable requirements of this section.

A5.207.1.1 Efficiency. Equipment shall meet the applicable requirements in TABLE A5.207.1-A through TABLE A5.207.1-M, subject to the following:

1. If more than one standard is listed for any equipment in TABLE A5.207.1-A through TABLE A5.207.1-M, the equipment shall meet all the applicable standards that are listed; and
2. If more than one test method is listed in TABLE A5.207.1-A through TABLE A5.207.1-M, the equipment shall comply with the applicable standard when tested with each test method; and

3. Where equipment can serve more than one function, such as both heating and cooling, or both space heating and water heating, it shall comply with all the requirements applicable to each function; and
4. Where a requirement is for equipment rated at its "maximum rated capacity" or "minimum rated capacity," the capacity shall be as provided for and allowed by the controls, during steady-state operation.

Exception: Water-cooled centrifugal water-chilling packages that are not designed for operation at ARI Standard 550 test conditions of 44°F leaving chilled water temperature and 85°F entering condenser water temperature shall have a minimum full load COP rating as shown in Table A5.207.1-H, Table A5.207.1-I, and Table A5.207.1-J, and a minimum NPLV rating as shown in Table A5.207.1-K, TABLE A5.207.1-L, and TABLE A5.207.1-M The table values are only applicable over the following full load design ranges:

Leaving Chiller Water Temperature	40 to 48°F
Entering Condenser Water Temperature	75 to 85°F
Condensing Water Temperature Rise	5 to 15°F

A5.207.1.2 Controls for Heat Pumps with Supplementary Electric Resistance Heaters. Heat pumps with supplementary electric resistance heaters shall have controls:

A5.207.1.2.1 That prevent supplementary heater operation when the heating load can be met by the heat pump alone; and

A5.207.1.2.2 In which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compression heating is higher than the cut-off temperature for supplementary heating.

Exception: The controls may allow supplementary heater operation during:

1. Defrost; and
2. Transient periods such as start-ups and following room thermostat setpoint advance, if the controls provide preferential rate control, intelligent recovery, staging, ramping or another control mechanism designed to preclude the unnecessary operation of supplementary heating.

A5.207.1.3 Thermostats. All unitary heating and/or cooling systems including heat pumps that are not controlled by a central energy management control system (EMCS) shall have a setback thermostat.

1. **Setback Capabilities.** All thermostats shall have a clock mechanism that allows the building occupant to program the temperature set points for at least four periods within 24 hours. Thermostats for heat pumps shall meet the requirements of Section A5.207.1.2.

Exception: Gravity gas wall heaters, gravity floor heaters, gravity room heaters, non-central electric heaters, fireplaces or decorative gas appliances, wood stoves, room air conditioners, and room air-conditioner heat pumps need not comply with this requirement. Additionally, room air-conditioner heat pumps need not comply with Section A5.207.1.2 Under performance method of compliance, the resulting increase in energy use due to elimination of the setback thermostat shall be factored into the compliance analysis in accordance with a method prescribed by the Executive Director.

A5.207.1.4 Gas- and Oil-Fired Furnace Standby Loss Controls. Gas-fired and oil-fired forced air furnaces with input ratings $\geq 225,000$ Btu/h shall also have an intermittent ignition or interrupted device (IID), and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for furnaces where combustion air is drawn from the conditioned space. All furnaces with input ratings $\geq 225,000$ Btu/h, including electric furnaces, that are not located within the conditioned space shall have jacket losses not exceeding 0.75 percent of the input rating.

TABLE A5.207.1-A ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS – MINIMUM EFFICIENCY REQUIREMENTS

Equipment Type	Size Category	Efficiency ^a		Test Procedure
		Before 1/1/2010	After 1/1/2010	
Air Conditioners, Air Cooled	> 65,000 Btu/h and < 135,000 Btu/h	10.3 EER ^b	11.2 EER ^b	ARI 340/360
	> 135,000 Btu/h and < 240,000 Btu/h	9.7 EER ^b	11.0 EER ^b	
	> 240,000 Btu/h and < 760,000 Btu/h	9.5 EER ^b and 9.7 IPLV ^b	10.0 EER ^b and 9.7 IPLV ^b	
	> 760,000 Btu/h	9.2 EER ^b and 9.4 IPLV ^b	9.7 EER ^b and 9.4 IPLV ^b	
Air Conditioners, Water and Evaporatively Cooled				ARI 210/240
	> 240,000 Btu/h	11.0 EER ^b and 10.3 IPLV ^b		ARI 340/360
Condensing Units, Air Cooled	> 135,000 Btu/h	10.1 EER and 11.2 IPLV		ARI 365
Condensing Units, Water or Evaporatively Cooled	> 135,000 Btu/h	13.1 EER and 13.1 IPLV		

^a IPLVs are only applicable to equipment with capacity modulation.

^b Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.

TABLE A5.207.1-B UNITARY AND APPLIED HEAT PUMPS, MINIMUM EFFICIENCY REQUIREMENTS

Equipment Type	Size Category	Subcategory or Rating Condition	Efficiency ^a		Test Procedure
			Before 1/1/2010	After 1/1/2010	
Air Cooled (Cooling Mode)	> 65,000 Btu/h and < 135,000 Btu/h	Split System and Single Package	10.1 EER ^b	11.0	ARI 340/360
	> 135,000 Btu/h and < 240,000 Btu/h		9.3 EER ^b	10.6	
	> 240,000 Btu/h		9.0 EER ^b and 9.2 IPLV ^b	9.5 EER ^b and 9.2 IPLV ^b	
Air Cooled (Heating Mode)	> 65,000 Btu/h and < 135,000 Btu/h (Cooling Capacity)	47°F db/43°F wb Outdoor Air	3.2 COP	3.3 COP	ARI 210/240
	> 135,000 Btu/h (Cooling Capacity)	47°F db/43°F wb Outdoor Air	3.1 COP	3.2 COP	ARI 340/360

^a IPLVs and Part load rating conditions are applicable only to equipment with capacity modulation.

^b Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.

TABLE A5.207.1-C AIR-COOLED GAS-ENGINE HEAT PUMPS

Equipment Type	Size Category	Subcategory or Rating Condition	Efficiency	Test Procedure
Air-Cooled Gas-Engine Heat Pump (Cooling Mode)	All Capacities	95° F db Outdoor Air	0.60 COP	ANSI Z21.40.4

Air-Cooled Gas-Engine Heat Pump (Heating Mode)	All Capacities	47° F db/43 F wb Outdoor Air	0.72 COP	ANSI Z21.40.4
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TABLE A5.207.1-D WATER CHILLING PACKAGES – MINIMUM EFFICIENCY REQUIREMENTS

Equipment Type	Size Category	Efficiency	Test Procedure
Air Cooled, With Condenser, Electrically Operated	< 150 Tons	2.80 COP	ARI 550/590
	> 150 Tons	3.05 IPLV	
Air Cooled, Without Condenser, Electrically Operated	All Capacities	3.10 COP 3.45 IPLV	
Water Cooled, Electrically Operated, Positive Displacement (Reciprocating)	All Capacities	4.20 COP 5.05 IPLV	ARI 550/590
Water Cooled, Electrically Operated, Positive Displacement (Rotary Screw and Scroll)	< 150 Tons	4.45 COP 5.20 IPLV	ARI 550/590
	> 150 Tons and < 300 Tons	4.90 COP 5.60 IPLV	
	> 300 Tons	5.50 COP 6.15 IPLV	
Water Cooled, Electrically Operated, Centrifugal	< 150 Tons	5.00 COP 5.25 IPLV	ARI 550/590
	> 150 Tons and < 300 Tons	5.55 COP 5.90 IPLV	
	> 300 Tons	6.10 COP 6.40 IPLV	
Air Cooled Absorption Single Effect	All Capacities	0.60 COP	ARI 560
Water Cooled Absorption Single Effect	All Capacities	0.70 COP	
Absorption Double Effect, Indirect-Fired	All Capacities	1.00 COP	
		1.05 IPLV	
Absorption Double Effect, Direct-Fired	All Capacities	1.00 COP 1.00 IPLV	
Water Cooled Gas Engine Driven Chiller	All Capacities	1.2 COP 2.0 IPLV	ANSI Z21.40.4

TABLE A5.207.1-E PACKAGED TERMINAL AIR CONDITIONERS AND PACKAGED TERMINAL HEAT PUMPS – MINIMUM EFFICIENCY REQUIREMENTS

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Efficiency ^a	Test Procedure
PTAC (Cooling Mode) New Construction	All Capacities	95°F db Outdoor Air	12.5 - (0.213 x Cap/1000) ^a EER	ARI 310/380

PTAC (Cooling Mode) Replacements ^b			10.9 - (0.213 x Cap/1000) ^a EER	
PTHP (Cooling Mode) New Construction			12.3 - (0.213 x Cap/1000) ^a EER	
PTHP (Cooling Mode) Replacements ^b			10.8 - (0.213 x Cap/1000) ^a EER	
PTHP (Heating Mode) New Construction			3.2 - (0.026 x Cap/1000) ^a COP	
PTHP (Heating Mode) Replacements ^b			2.9 - (0.026 x Cap/1000) ^a COP	
SPVAC (Cooling Mode)	<65,000 Btu/h	95°F db / 75°F wb Outdoor Air	9.0 EER	ARI 390
	>=65,000 Btu/h and <135,000 Btu/h		8.9 EER	
	>=135,000 Btu/h and <240,000 Btu/h		8.6 EER	
SPVHP (Cooling Mode)	<65,000 Btu/h	95°F db / 75°F wb Outdoor Air	9.0 EER	
	>=65,000 Btu/h and <135,000 Btu/h		8.9 EER	
	>=135,000 Btu/h and <240,000 Btu/h		8.6 EER	
SPVHP (Heating Mode)	<65,000 Btu/h	47°F db / 43°F wb Outdoor Air	3.0 COP	
	>=65,000 Btu/h and <135,000 Btu/h		3.0 COP	
	>=135,000 Btu/h and <240,000 Btu/h		2.9 COP	
<p>^a Cap means the rated cooling capacity of the product in Btu/h. If the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculation.</p> <p>^b Replacement units must be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16 inches high and less than 42 inches wide.</p>				

TABLE A5.207.1-G PERFORMANCE REQUIREMENTS FOR HEAT REJECTION EQUIPMENT^d

Equipment Type	Total System Heat Rejection Capacity at Rated Conditions	Subcategory or Rating Condition	Performance Required ^{a,b}	Test Procedure ^c
Propeller or Axial Fan Open Cooling Towers	All	95°F Entering Water 85°F Leaving Water 75 °F wb Outdoor Air	> 38.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal Fan Open Cooling Towers	All	95°F Entering Water 85°F Leaving Water 75 °F wb Outdoor Air	> 20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Air Cooled Condensers	All	125°F Condensing Temperature R22 Test Fluid 190°F Entering Gas Temperature 15°F Subcooling 95°F Entering Drybulb	> 176,000 Btu/h·hp	ARI 460

^a For purposes of this table, open cooling tower performance is defined as the maximum flow rating of the tower divided by the fan nameplate rated motor power.

^b For purposes of this table air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate rated motor power.

^c Open cooling towers shall be tested using the test procedures in CTI ATC-105. Performance of factory assembled open cooling towers shall be either certified as base models as specified in CTI STD-201 or verified by testing in the field by a CTI approved testing agency. Open factory assembled cooling towers with custom options added to a CTI certified base model for the purpose of safe maintenance or to reduce environmental or noise impact shall be rated at 90% of the CTI certified performance of the associated base model or at the manufacturer's stated performance, whichever is less. Base models of open factory assembled cooling towers are open cooling towers configured in exact accordance with the Data of Record submitted to CTI as specified by CTI STD-201. There are no certification requirements for field erected cooling towers.

^d The efficiencies for open cooling towers listed in Table A5.207.1-G are not applicable for closed-circuit cooling towers.

TABLE A5.207.1-H COPS FOR NON-STANDARD CENTRIFUGAL CHILLERS < 150 TONS

Centrifugal Chillers < 150 Tons								
COPstd = 5.0								
			Condenser Flow Rate					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT ^a	Required COP					
46	75	29	5.58	5.83	6.03	6.32	6.54	6.70
45	75	30	5.50	5.74	5.92	6.19	6.38	6.53
44	75	31	5.42	5.65	5.82	6.07	6.24	6.37
43	75	32	5.35	5.57	5.72	5.95	6.11	6.23
42	75	33	5.27	5.49	5.64	5.85	6.00	6.11
41	75	34	5.19	5.41	5.56	5.75	5.89	5.99
46	80	34	5.19	5.41	5.56	5.75	5.89	5.99
40	75	35	5.11	5.33	5.48	5.67	5.79	5.88
45	80	35	5.11	5.33	5.48	5.67	5.79	5.88
44	80	36	5.03	5.26	5.40	5.58	5.70	5.79
43	80	37	4.94	5.18	5.32	5.50	5.62	5.70
42	80	38	4.84	5.10	5.25	5.43	5.53	5.61
41	80	39	4.73	5.01	5.17	5.35	5.46	5.53
46	85	39	4.73	5.01	5.17	5.35	5.46	5.53
40	80	40	4.62	4.92	5.09	5.27	5.38	5.45
45	85	40	4.62	4.92	5.09	5.27	5.38	5.45
44	85	41	4.49	4.82	5.00	5.20	5.30	5.38
43	85	42	4.35	4.71	4.91	5.12	5.23	5.30
42	85	43	4.19	4.59	4.81	5.03	5.15	5.22
41	85	44	4.02	4.46	4.70	4.94	5.06	5.14
40	85	45	3.84	4.32	4.58	4.84	4.98	5.06
Condenser DT ^b			14.04	11.23	9.36	7.02	5.62	4.68

^a LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)

^b Condenser DT = Leaving Condenser Water Temperature (°F) – Entering Condenser Water Temperature (°F)

$$K_{adj} = 6.1507 - 0.30244(X) + 0.0062692(X)^2 - 0.000045595(X)^3$$

where X = Condenser DT + LIFT

$$COP_{adj} = K_{adj} * COP_{std}$$

TABLE A5.207.1-I COPS FOR NON-STANDARD CENTRIFUGAL CHILLERS > 150 TONS, □ 300 TONS

Centrifugal Chillers > 150 Tons, < 300 Tons								
COP _{std} = 5.55								
			Condenser Flow Rate					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT ^a (°F)	Required COP					
46	75	29	6.17	6.44	6.66	6.99	7.23	7.40
45	75	30	6.08	6.34	6.54	6.84	7.06	7.22
44	75	31	6.00	6.24	6.43	6.71	6.9	7.05
43	75	32	5.91	6.15	6.33	6.58	6.76	6.89
42	75	33	5.83	6.07	6.23	6.47	6.63	6.75
41	75	34	5.74	5.98	6.14	6.36	6.51	6.62
46	80	34	5.74	5.98	6.14	6.36	6.51	6.62
40	75	35	5.65	5.90	6.05	6.26	6.40	6.51
45	80	35	5.65	5.90	6.05	6.26	6.40	6.51
44	80	36	5.56	5.81	5.97	6.17	6.30	6.40
43	80	37	5.46	5.73	5.89	6.08	6.21	6.30
42	80	38	5.35	5.64	5.80	6.00	6.12	6.20
41	80	39	5.23	5.54	5.71	5.91	6.03	6.11
46	85	39	5.23	5.54	5.71	5.91	6.03	6.11
40	80	40	5.10	5.44	5.62	5.83	5.95	6.03
45	85	40	5.10	5.44	5.62	5.83	5.95	6.03
44	85	41	4.96	5.33	5.55	5.74	5.86	5.94
43	85	42	4.81	5.21	5.42	5.66	5.78	5.86
42	85	43	4.63	5.08	5.31	5.56	5.69	5.77
41	85	44	4.45	4.93	5.19	5.46	5.60	5.69
40	85	45	4.24	4.77	5.06	5.35	5.50	5.59
Condenser DT ^b			14.04	11.23	9.36	7.02	5.62	4.68

^a LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)

^b Condenser DT = Leaving Condenser Water Temperature (°F) - Entering Condenser Water Temperature (°F)

$$K_{adj} = 6.1507 - 0.30244(X) + 0.0062692(X)^2 - 0.000045595(X)^3$$

where X = Condenser DT + LIFT

$$COP_{adj} = K_{adj} * COP_{std}$$

TABLE A5.207.1-J COPS FOR NON-STANDARD CENTRIFUGAL CHILLERS > 300 TONS

Centrifugal Chillers > 300 Tons								
COP _{std} = 6.1								
			Condenser Flow Rate					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (□F)	Entering Condenser Water Temperature (□F)	LIFT ^a (□F)	Required COP					
46	75	29	6.80	7.11	7.35	7.71	7.97	8.16
45	75	30	6.71	6.99	7.21	7.55	7.78	7.96
44	75	31	6.61	6.89	7.09	7.40	7.61	7.77
43	75	32	6.52	6.79	6.98	7.26	7.45	7.60
42	75	33	6.43	6.69	6.87	7.13	7.31	7.44
41	75	34	6.33	6.60	6.77	7.02	7.18	7.30
46	80	34	6.33	6.60	6.77	7.02	7.18	7.30
40	75	35	6.23	6.50	6.68	6.91	7.06	7.17
45	80	35	6.23	6.50	6.68	6.91	7.06	7.17
44	80	36	6.13	6.41	6.58	6.81	6.95	7.05
43	80	37	6.02	6.31	6.49	6.71	6.85	6.94
42	80	38	5.90	6.21	6.40	6.61	6.75	6.84
41	80	39	5.77	6.11	6.30	6.52	6.65	6.74
46	85	39	5.77	6.11	6.30	6.52	6.65	6.74
40	80	40	5.63	6.00	6.20	6.43	6.56	6.65
45	85	40	5.63	6.00	6.20	6.43	6.56	6.65
44	85	41	5.47	5.87	6.10	6.33	6.47	6.55
43	85	42	5.30	5.74	5.98	6.24	6.37	6.46
42	85	43	5.11	5.60	5.86	6.13	6.28	6.37
41	85	44	4.90	5.44	5.72	6.02	6.17	6.27
40	85	45	4.68	5.26	5.58	5.90	6.07	6.17
Condenser DT ^b			14.04	11.23	9.36	7.02	5.62	4.68

^a LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)

^b Condenser DT = Leaving Condenser Water Temperature (□F) - Entering Condenser Water Temperature (□F)

$$K_{adj} = 6.1507 - 0.30244(X) + 0.0062692(X)^2 - 0.000045595(X)^3$$

where X = Condenser DT + LIFT

$$COP_{adj} = K_{adj} * COP_{std}$$

TABLE A5.207.1-K IPLV/NPLV FOR NON-STANDARD CENTRIFUGAL CHILLERS < 150 TONS

Centrifugal Chillers < 150 Tons								
IPLV _{std} = 5.25								
			Condenser Flow Rate					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT ^a (°F)	Required IPLV/NPLV					
46	75	29	5.84	6.10	6.30	6.61	6.84	7.00
45	75	30	5.75	6.00	6.19	6.47	6.68	6.83
44	75	31	5.67	5.91	6.08	6.34	6.53	6.67
43	75	32	5.59	5.82	5.99	6.23	6.39	6.52
42	75	33	5.51	5.74	5.90	6.12	6.27	6.39
41	75	34	5.43	5.66	5.81	6.02	6.16	6.26
46	80	34	5.43	5.66	5.81	6.02	6.16	6.26
40	75	35	5.35	5.58	5.73	5.93	6.06	6.15
45	80	35	5.35	5.58	5.73	5.93	6.06	6.15
44	80	36	5.26	5.50	5.65	5.84	5.96	6.05
43	80	37	5.16	5.42	5.57	5.76	5.87	5.96
42	80	38	5.06	5.33	5.49	5.67	5.79	5.87
41	80	39	4.95	5.24	5.41	5.60	5.71	5.78
46	85	39	4.95	5.24	5.41	5.60	5.71	5.78
40	80	40	4.83	5.14	5.32	5.52	5.63	5.70
45	85	40	4.83	5.14	5.32	5.52	5.63	5.70
44	85	41	4.69	5.04	5.25 ^c	5.43	5.55	5.62
43	85	42	4.55	4.93	5.13	5.35	5.47	5.54
42	85	43	4.38	4.80	5.03	5.26	5.38	5.46
41	85	44	4.21	4.67	4.91	5.17	5.30	5.38
40	85	45	4.01	4.52	4.79	5.06	5.20	5.29
Condenser DT ^b			14.04	11.23	9.36	7.02	5.62	4.68

^a LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)
^b Condenser DT = Leaving Condenser Water Temperature (°F) – Entering Condenser Water Temperature (°F)
^c All values shown are NPLV except at conditions of 3 gpm/ton and 41 °F LIFT which is IPLV.
 $K_{adj} = 6.1507 - 0.30244(X) + 0.0062692(X)^2 - 0.000045595(X)^3$
 where X = Condenser DT + LIFT
 $COP_{adj} = K_{adj} * COP_{std}$

TABLE A5.207.1-L IPLV/NPLV FOR NON-STANDARD CENTRIFUGAL CHILLERS > 150 TONS, < 300 TONS

Centrifugal Chillers > 150 Tons, < 300 Tons								
IPLV _{std} = 5.9								
			Condenser Flow Rate					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT ^a (°F)	Required IPLV/NPLV					
46	75	29	6.58	6.87	7.11	7.46	7.71	7.90
45	75	30	6.49	6.76	6.98	7.30	7.53	7.70
44	75	31	6.40	6.66	6.86	7.15	7.36	7.52
43	75	32	6.31	6.56	6.75	7.02	7.21	7.35
42	75	33	6.22	6.47	6.65	6.90	7.07	7.20
41	75	34	6.13	6.38	6.55	6.79	6.95	7.06
46	80	34	6.13	6.38	6.55	6.79	6.95	7.06
40	75	35	6.03	6.29	6.46	6.68	6.83	6.94
45	80	35	6.03	6.29	6.46	6.68	6.83	6.94
44	80	36	5.93	6.20	6.37	6.58	6.72	6.82
43	80	37	5.82	6.11	6.28	6.49	6.62	6.72
42	80	38	5.71	6.01	6.19	6.40	6.53	6.62
41	80	39	5.58	5.91	6.10	6.31	6.44	6.52
46	85	39	5.58	5.91	6.10	6.31	6.44	6.52
40	80	40	5.44	5.80	6.00	6.22	6.35	6.43
45	85	40	5.44	5.80	6.00	6.22	6.35	6.43
44	85	41	5.29	5.68	5.90 ^c	6.13	6.26	6.34
43	85	42	5.13	5.55	5.79	6.03	6.16	6.25
42	85	43	4.94	5.41	5.67	5.93	6.07	6.16
41	85	44	4.74	5.26	5.54	5.82	5.97	6.07
40	85	45	4.52	5.09	5.40	5.71	5.87	5.97
Condenser DT ^b			14.04	11.23	9.36	7.02	5.62	4.68

^a LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)
^b Condenser DT = Leaving Condenser Water Temperature (°F) – Entering Condenser Water Temperature (°F)
^c All values shown are NPLV except at conditions of 3 gpm/ton and 41 °F LIFT which is IPLV.
 $K_{adj} = 6.1507 - 0.30244(X) + 0.0062692(X)^2 - 0.000045595(X)^3$
 where X = Condenser DT + LIFT
 $COP_{adj} = K_{adj} * COP_{std}$

TABLE A5.207.1-M IPLV/NPLV FOR NON-STANDARD CENTRIFUGAL CHILLERS > 300 TONS

Centrifugal Chillers > 300 Tons								
IPLV _{std} = 6.4								
			Condenser Flow Rate					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT ^a (°F)	Required IPLV/NPLV					
46	75	29	7.15	7.47	7.72	8.10	8.37	8.58
45	75	30	7.05	7.35	7.58	7.93	8.18	8.36
44	75	31	6.95	7.23	7.45	7.77	8.00	8.16
43	75	32	6.85	7.13	7.33	7.63	7.83	7.98
42	75	33	6.75	7.03	7.22	7.49	7.68	7.82
41	75	34	6.65	6.93	7.12	7.37	7.55	7.67
46	80	34	6.65	6.93	7.12	7.37	7.55	7.67
40	75	35	6.55	6.83	7.01	7.26	7.42	7.54
45	80	35	6.55	6.83	7.01	7.26	7.42	7.54
44	80	36	6.44	6.73	6.92	7.15	7.30	7.41
43	80	37	6.32	6.63	6.82	7.05	7.19	7.30
42	80	38	6.20	6.53	6.72	6.95	7.09	7.19
41	80	39	6.06	6.42	6.62	6.85	6.99	7.08
46	85	39	6.06	6.42	6.62	6.85	6.99	7.08
40	80	40	5.91	6.30	6.52	6.76	6.89	6.98
45	85	40	5.91	6.30	6.52	6.76	6.89	6.98
44	85	41	5.75	6.17	6.40 ^c	6.66	6.79	6.89
43	85	42	5.57	6.03	6.28	6.55	6.70	6.79
42	85	43	5.37	5.88	6.16	6.44	6.59	6.69
41	85	44	5.15	5.71	6.01	6.33	6.49	6.59
40	85	45	4.91	5.53	5.86	6.20	6.37	6.48
Condenser DT ^b			14.04	11.23	9.36	7.02	5.62	4.68

^a LIFT = Entering Condenser Water Temperature (°F) – Leaving Chilled Water Temperature (°F)
^b Condenser DT = Leaving Condenser Water Temperature (°F) – Entering Condenser Water Temperature (°F)
^c All values shown are NPLV except at conditions of 3 gpm/ton and 41 °F LIFT which is IPLV.
 $K_{adj} = 6.1507 - 0.30244(X) + 0.0062692(X)^2 - 0.000045595(X)^3$
 where X = Condenser DT + LIFT
 $COP_{adj} = K_{adj} * COP_{std}$

A5.207.2 Space Conditioning Systems. A building complies with this section by being designed with and having constructed and installed a space-conditioning system that meets the requirements of Subsections A5.207.2.1 through A5.207.2.6.

A5.207.2.1 Supply Air Temperature Reset Controls. Mechanical space-conditioning systems supplying heated or cooled air to multiple zones shall include controls that automatically reset supply-air temperatures:

1. In response to representative building loads or to outdoor air temperature; and

2. By at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

Air distribution systems serving zones that are likely to have constant loads, such as interior zones, shall be designed for the air flows resulting from the fully reset supply air temperature.

Exception 1: Systems that meet the requirements of Section 144(d) of Title 24, Part 6, without using Exception 1 or 2 to that section.

Exception 2: Where supply-air temperature reset would increase overall building energy use.

Exception 3: Zones in which specific humidity levels are required to satisfy process needs.

A5.207.2.2 Electric Resistance Heating. Electric resistance heating systems shall not be used for space heating.

Exception 1: Where an electric-resistance heating system supplements a heating system in which at least 60 percent of the annual energy requirement is supplied by site-solar or recovered energy.

Exception 2: Where the total capacity of all electric-resistance heating systems serving the entire building is less than 10 percent of the total design output capacity of all heating equipment serving the entire building.

Exception 3: Where an electric resistance heating system serves an entire building that is not a high-rise residential or hotel/motel building; and has a conditioned floor area no greater than 5,000 square feet; and has no mechanical cooling; and is in an area where natural gas is not currently available and an extension of a natural gas system is impractical, as determined by the natural gas utility.

A5.207.2.3 Heat Rejection Systems.

A5.207.2.3.1 General. Subsection A5.207.2.3 applies to heat rejection equipment used in comfort cooling systems such as air-cooled condensers, open cooling towers, closed-circuit cooling towers, and evaporative condensers.

A5.207.2.3.2 Fan Speed Control. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at 2/3 of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exception 1: Heat rejection devices included as an integral part of the equipment listed in Table A5.207.1-A through Table A5.207.1-E.

Exception 2: Condenser fans serving multiple refrigerant circuits.

Exception 3: Condenser fans serving flooded condensers.

Exception 4: Up to 1/3 of the fans on a condenser or tower with multiple fans where the lead fans comply with the speed control requirement.

A5.207.2.3.3 Tower Flow Turndown. Open cooling towers configured with multiple condenser water pumps shall be designed so that all cells can be run in parallel with the larger of:

1. The flow that's produced by the smallest pump, or
2. 33 percent of the design flow for the cell.

A5.207.2.3.4 Limitation on Centrifugal Fan Cooling Towers. Open cooling towers with a combined rated capacity of 900 gpm and greater at 95°F condenser water return, 85°F condenser water supply and 75°F outdoor wet-bulb temperature shall use propeller fans and shall not use centrifugal fans.

Exception 1: Cooling towers that are ducted (inlet or discharge) or have an external sound trap that requires external static pressure capability.

Exception 2: Cooling towers that meet the energy efficiency requirement for propeller fan towers in Section A5.207.1, Table A5.207.1-G.

A5.207.2.4 Hydronic System Measures

A5.207.2.4.1 Hydronic Variable Flow Systems. HVAC chilled and hot water pumping shall be designed for variable fluid flow and shall be capable of reducing pump flow rates to no more than the larger of: a) 50 percent or less of the design flow rate; or b) the minimum flow required by the equipment manufacturer for the proper operation of equipment served by the system.

Exception 1: Systems that include no more than three control valves.

Exception 2: Systems having a total pump system power less than or equal to 1-1/2 HP.

A5.207.2.4.2 Chiller Isolation. When a chilled water plant includes more than one chiller, provisions shall be made so that flow through any chiller is automatically shut off when that chiller is shut off while still maintaining flow through other operating chiller(s). Chillers that are piped in series for the purpose of increased temperature differential shall be considered as one chiller.

A5.207.2.4.3 Boiler Isolation. When a hot water plant includes more than one boiler, provisions shall be made so that flow through any boiler is automatically shut off when that boiler is shut off while still maintaining flow through other operating boiler(s).

A5.207.2.4.4 Chilled and Hot Water Temperature Reset Controls. Chilled and hot water systems with a design capacity exceeding 500,000 Btu/hr supplying chilled or heated water (or both) shall include controls that automatically reset supply water temperatures as a function of representative building loads or outside air temperature.

Exception: Hydronic systems that use variable flow to reduce pumping energy in accordance with Section A5.207.2.4.1.

A5.207.2.4.5 Water -Cooled Air Conditioner and Hydronic Heat Pump Systems. Water circulation systems serving water-cooled air conditioners, hydronic heat pumps, or both that have total pump system power exceeding 5 hp shall have flow controls that meet the requirements of Section A5.207.2.4.6. Each air conditioner or heat pump shall have a two-position automatic valve interlocked to shut off water flow when the compressor is off.

A5.207.2.4.6 Variable Flow Controls.

A5.207.2.4.6.1 Variable Speed Drives. Individual pumps serving variable flow systems and having a motor horsepower exceeding 5 hp shall have controls and/or devices (such as variable speed control) that will result in pump motor demand of no more than 30 percent of design wattage at 50 percent of design water flow. The pumps shall be controlled as a function of required differential pressure.

A5.207.2.4.6.2 Pressure Sensor Location and Setpoint.

1. For systems without direct digital control of individual coils reporting to the central control panel, differential pressure shall be measured at or near the most remote heat exchanger or the heat exchanger requiring the greatest differential pressure.
2. For systems with direct digital control of individual coils with central control panel, the static pressure set point shall be reset based on the valve requiring the most pressure, and the setpoint shall be no less than 80 percent open. The pressure sensor(s) may be mounted anywhere.

Exception 1: Heating hot water systems.

Exception 2: Condenser water systems serving only water-cooled chillers.

A5.207.2.4.7 Hydronic Heat Pump (WLHP) Controls. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are capable of providing a heat pump water supply temperature dead band of at least 20°F between initiation of heat rejection and heat addition by the central devices.

Exception: Where a system loop temperature optimization controller is used to determine the most efficient operating temperature based on real-time conditions of demand and capacity, dead bands of less than 20°F shall be allowed.

A5.207.2.5 Air Distribution System Duct Leakage Sealing. All duct systems shall be sealed to a leakage rate not to exceed 6 percent of the fan flow if the duct system:

A5.207.2.5.1 Is connected to a constant volume, single zone, air conditioners, heat pumps or furnaces; and

A5.207.2.5.2 Serving less than 5,000 square feet of floor area; and

A5.207.2.5.3 Having more than 25 percent duct surface area located in one or more of the following spaces:

1. Outdoors; or
2. In a space directly under a roof where the U-factor of the roof is greater than the U-factor of the ceiling; or
Exception: Where the roof meets the requirements of Section 143(a)1C of Title 24, Part 6.
3. In a space directly under a roof with fixed vents or openings to the outside or unconditioned spaces; or
4. In an unconditioned crawlspace; or
5. In other unconditioned spaces.

The leakage rate shall be confirmed through field verification and diagnostic testing, in accordance with procedures set forth in the Reference Nonresidential Appendix NA1 of the California Energy Commission 2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings.

A5.207.2.6 Variable air volume control for single zone systems. Effective January 1, 2012, all unitary air conditioning equipment and air-handling units with mechanical cooling capacity at ARI conditions greater than or equal to 110,000 Btu/hr that serve single zones shall be designed for variable supply air volume with their supply fans controlled by two-speed motors, variable speed drives, or equipment that has been demonstrated to the Executive Director to use no more energy. The supply fan controls shall modulate down to a minimum of 2/3 of the full fan speed or lower at low cooling demand.

A5.207.3 Service Water-Heating Systems and Equipment

A5.207.3.1 Certification by Manufacturers. Any service water-heating system or equipment may be installed only if the manufacturer has certified that the system or equipment complies with all of the requirements of this subsection for that system or equipment.

A5.207.3.1.1 Temperature controls for service water-heating systems. Service water-heating systems shall be equipped with automatic temperature controls capable of adjustment from the lowest to the highest acceptable temperature settings for the intended use as listed in Table 2, Chapter 9 of the ASHRAE Handbook, HVAC Applications Volume.

A5.207.3.2 Efficiency. Equipment shall meet the applicable requirements of the Appliance Efficiency Regulations as required by Section A5.210.1, subject to the following:

1. If more than one standard is listed in the Appliance Efficiency Regulations, the equipment shall meet all the standards listed; and
2. If more than one test method is listed in the Appliance Efficiency Regulations, the equipment shall comply with the applicable standard when tested with each test method; and
3. Where equipment can serve more than one function, such as both heating and cooling, or both space heating and water heating, it shall comply with all the requirements applicable to each function; and
4. Where a requirement is for equipment rated at its "maximum rated capacity" or "minimum rated capacity," the capacity shall be as provided for and allowed by the controls, during steady-state operation.

A5.207.3.3 Installation. Any service water-heating system or equipment may be installed only if the system or equipment complies with all of the applicable requirements of this subsection for the system or equipment.

A5.207.3.3.1 Outlet temperature controls. On systems that have a total capacity greater than 167,000 Btu/hr, outlets that require higher than service water temperatures as listed in the ASHRAE Handbook, Applications Volume, shall have separate remote heaters, heat exchangers, or boosters to supply the outlet with the higher temperature.

A5.207.3.3.2 Temperature controls for public lavatories. The controls shall limit the outlet temperature to 110°F.

A5.207.3.3.3 Insulation. Unfired service water heater storage tanks and backup tanks for solar water-heating systems shall have:

1. External insulation with an installed R-value of at least R-12; or
2. Internal and external insulation with a combined R-value of at least R-16; or
3. The heat loss of the tank surface based on an 80°F water-air temperature difference shall be less than 6.5 Btu per hour per square foot.

A5.207.3.3.4 Service water heaters in state buildings. Any newly constructed building constructed by the State shall derive its service water heating from a system that provides at least 60 percent of the energy needed for service water heating from site solar energy or recovered energy.

Exception: Buildings for which the state architect determines that service water heating from site solar energy or recovered energy is economically or physically infeasible.

A5.207.4 Natural Gas Central Furnaces, Cooking Equipment, and Pool and Spa Heaters: Pilot Lights Prohibited

Any natural gas system or equipment listed below may be installed only if it does not have a continuously burning pilot light:

1. Fan-type central furnaces.
2. Household cooking appliances.

Exception: Household cooking appliances without an electrical supply voltage connection and in which each pilot consumes less than 150 Btu/hr.

3. Pool heaters.

4. Spa heaters.

A5.207.5 Controls For Space-Conditioning Systems. Space-conditioning systems shall be installed with controls that comply with the applicable requirements of Subsections A5.207.5.1 through A5.207.5.5.

A5.207.5.1 Thermostatic Controls for Each Zone. The supply of heating and cooling energy to each space-conditioning zone or dwelling unit shall be controlled by an individual thermostatic control that responds to temperature within the zone and that meets the applicable requirements of Section A5.207.5.2.

Exception: An independent perimeter heating or cooling system may serve more than one zone without individual thermostatic controls if:

1. All zones are also served by an interior cooling system;
2. The perimeter system is designed solely to offset envelope heat losses or gains;
3. The perimeter system has at least one thermostatic control for each building orientation of 50 feet or more; and
4. The perimeter system is controlled by at least one thermostat located in one of the zones served by the system.

A5.207.5.2 Criteria for Zonal Thermostatic Controls. The individual thermostatic controls required by Section A5.207.5.1 shall meet the following requirements as applicable:

1. Where used to control comfort heating, the thermostatic controls shall be capable of being set, locally or remotely, down to 55°F or lower.
2. Where used to control comfort cooling, the thermostatic controls shall be capable of being set, locally or remotely, up to 85°F or higher.
3. Where used to control both comfort heating and comfort cooling, the thermostatic controls shall meet Items 1 and 2 and shall be capable of providing a temperature range or dead band of at least 5°F within which the supply of heating and cooling energy to the zone is shut off or reduced to a minimum.

Exception: Systems with thermostats that require manual changeover between heating and cooling modes.

4. Thermostatic controls for all unitary single zone, air conditioners, heat pumps, and furnaces, shall comply with the setback thermostat requirements of Section A5.207.1.3 or, if equipped with DDC to the Zone level, with the Automatic Demand Shed Controls of Section A5.207.5.5.

Exception: Systems serving zones that must have constant temperatures to prevent degradation of materials, a process, plants or animals.

A5.207.5.3 Heat Pump Controls. All heat pumps with supplementary electric resistance heaters shall be installed with controls that comply with Section A5.207.1.2.

A5.207.5.4 Dampers for Air Supply and Exhaust Equipment. Outdoor air supply and exhaust equipment shall be installed with dampers that automatically close upon fan shutdown.

Exception 1: Where it can be demonstrated to the satisfaction of the enforcing agency that the equipment serves an area that must operate continuously.

Exception 2: Gravity and other nonelectrical equipment that has readily accessible manual damper controls.

Exception 3: At combustion air intakes and shaft vents.

Exception 4: Where prohibited by other provisions of law.

A5.207.5.5 Automatic Demand Shed Controls. HVAC systems with DDC to the Zone level shall be programmed to allow centralized demand shed for non-critical zones as follows:

1. The controls shall have a capability to remotely setup the operating cooling temperature set points by 4 degrees or more in all non-critical zones on signal from a centralized contact or software point within an Energy Management Control System (EMCS).
2. The controls shall remotely setdown the operating heating temperature set points by 4 degrees or more in all non critical zones on signal from a centralized contact or software point within an EMCS.
3. The controls shall have capabilities to remotely reset the temperatures in all non critical zones to original operating levels on signal from a centralized contact or software point within an EMCS.
4. The controls shall be programmed to provide an adjustable rate of change for the temperature setup and reset.

A5.207.6 Pipe Insulation. The piping for all space-conditioning and service water-heating systems with fluid temperatures listed in Table A5.207.6-A shall have the amount of insulation specified in Subsection A5.207.6.1 or A5.207.6.2. Insulation conductivity shall be determined in accordance with ASTM C335 at the mean temperature listed in Table A5.207.6-A, and shall be rounded to the nearest 1/100 Btu-inch per hour per square foot per °F.

Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind, including but not limited to, the following:

Insulation exposed to weather shall be suitable for outdoor service e.g., protected by aluminum, sheet metal, painted canvas, or plastic cover. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation that can cause degradation of the material.

Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall include a vapor retardant located outside the insulation (unless the insulation is inherently vapor retardant), all penetrations and joints of which shall be sealed.

Exception 1: Factory-installed piping within space-conditioning equipment certified under Section A5.210.1 or A5.207.1.

Exception 2: Piping that conveys fluids with a design operating temperature range between 60°F and 105°F.

Exception 3: Piping that serves process loads, gas piping, cold domestic water piping, condensate drains, roof drains, vents, or waste piping.

Exception 4: Where the heat gain or heat loss to or from piping without insulation will not increase building source energy use.

Exception 5: Piping that penetrates framing members shall not be required to have pipe insulation for the distance of the framing penetration. Metal piping that penetrates metal framing shall use grommets, plugs, wrapping or other insulating material to assure that no contact is made with the metal framing.

A5.207.6.1 For insulation with a conductivity in the range shown in Table A5.207.6-A for the applicable fluid temperature range, the insulation shall have the applicable thickness shown in Table A5.207.6-A.

A5.207.6.2 For insulation with a conductivity outside the range shown in Table A5.207.6-A for the applicable fluid temperature range, the insulation shall have a minimum thickness as calculated with Equation A5.207.6-A below.

EQUATION A5.207.6-A INSULATION THICKNESS EQUATION

$$T = PR \left[\left(1 + \frac{t}{PR} \right)^{\frac{K}{k}} - 1 \right]$$

WHERE:

- T* = Minimum insulation thickness for material with conductivity *K*, inches.
- PR* = Pipe actual outside radius, inches.
- t* = Insulation thickness from Table A5.207.6-A, inches.
- K* = Conductivity of alternate material at the mean rating temperature indicated in Table A5.207.6-A, for the applicable fluid temperature range, in Btu-inch per hour per square foot per °F.
- k* = The lower value of the conductivity range listed in Table A5.207.6-A, for the applicable fluid temperature range, Btu-inch per hour per square foot per °F.

TABLE A5.207.6-A PIPE INSULATION THICKNESS

FLUID TEMPERATURE RANGE (°F)	CONDUCTIVITY RANGE (in Btu-inch per hour per square foot per °F)	INSULATION MEAN RATING TEMPERATURE (°F)	NOMINAL PIPE DIAMETER (in inches)					
			Runouts up to 2	1 and less	1.25-2	2.50-4	5-6	8 and larger
			INSULATION THICKNESS REQUIRED (in inches)					
Space heating systems (steam, steam condensate and hot water)								
Above 350	0.32-0.34	250	1.5	2.5	2.5	3.0	3.5	3.5
251-350	0.29-0.31	200	1.5	2.0	2.5	2.5	3.5	3.5
201-250	0.27-0.30	150	1.0	1.5	1.5	2.0	2.0	3.5
141-200	0.25-0.29	125	0.5	1.5	1.5	1.5	1.5	1.5
105-140	0.24-0.28	100	0.5	1.0	1.0	1.0	1.5	1.5
Service water-heating systems (recirculating sections, all piping in electric trace tape systems, and the first 8 feet of piping from the storage tank for nonrecirculating systems)								
Above 105	0.24-0.28	100	0.5	1.0	1.0	1.5	1.5	1.5
Space cooling systems (chilled water, refrigerant and brine)								
40-60	0.23-0.27	75	0.5	0.5	0.5	1.0	1.0	1.0
Below 40	0.23-0.27	75	1.0	1.0	1.5	1.5	1.5	1.5

**SECTION A5.209
LIGHTING**

A5.209.1 Lighting Control Devices, Ballasts, and Luminaires. Any lighting control device, ballast, or luminaire subject to the requirements of Section A5.209 shall be installed only if the manufacturer has certified to the Commission that the device complies with all of the applicable requirements of Section A5.209.

Lighting control devices may be individual devices or systems consisting of two or more components. For control systems consisting of two or more components, such as an Energy Management Control System (EMCS), the manufacturer of the control system shall certify each of the components required for the system to comply with Section A5.209.

A5.209.1.1 All Devices: Instructions for Installation and Calibration. The manufacturer shall provide step-by-step instructions for installation and start-up calibration of the device.

A5.209.1.2 Indicator Lights. Indicator lights integral to lighting control devices shall consume no more than one watt of power per indicator light.

A5.209.1.3 Automatic Time Switch Control Devices. Automatic time switch control devices or system shall:

1. Be capable of programming different schedules for weekdays and weekends; and
2. Have program backup capabilities that prevent the loss of the device's schedules for at least 7 days, and the device's time and date setting for at least 72 hours if power is interrupted.

A5.209.1.4 Occupant Sensors, Motion Sensors, and Vacancy Sensors. Occupant sensors, motion sensors, and vacancy sensors shall be capable of automatically turning off all the lights in an area no more than 30 minutes after the area has been vacated, and shall have a visible status signal that indicates that the device is operating properly or that it has failed or malfunctioned. The visible status signal may have an override switch that turns the signal off. In addition, ultrasonic and microwave devices shall have a built-in mechanism that allows calibration of the sensitivity of the device to room movement in order to reduce the false sensing of occupants, and shall comply with either subsection A5.209.1.4.1 or A5.209.1.4.2 below, as applicable:

A5.209.1.4.1 If the device emits ultrasonic radiation as a signal for sensing occupants within an area, the device shall:

1. Have had a Radiation Safety Abbreviated Report submitted to the Center for Devices and Radiological Health, Federal Food and Drug Administration, under 21 Code of Federal Regulations, Section 1002.12 (1996), and a copy of the report shall have been submitted to the California Energy Commission; and
2. Emit no audible sound; and

3. Not emit ultrasound in excess of the decibel (dB) values shown in TABLE A5.209.1-A, measured no more than 5 feet from the source, on axis.

A5.209.1.4.2 If the device emits microwave radiation as a signal for sensing occupants within the area, the device shall:

1. Comply with all applicable provisions in 47 Code of Federal Regulations, Parts 2 and 15 (1996), and have an approved Federal Communications Commission Identifier that appears on all units of the device and that has been submitted to the California Energy Commission; and
2. Not emit radiation in excess of 1 milliwatt per square centimeter measured at no more than 5 centimeters from the emission surface of the device; and
3. Have permanently affixed to it installation instructions recommending that it be installed at least 12 inches from any area normally used by room occupants.

A5.209.1.5 Multi-Level Occupant Sensor. Multi-level occupant sensors shall have an automatic OFF function that turns off all the lights, and either an automatic or a manually controlled ON function capable of meeting all the multi-level and uniformity requirements of Section A5.209.2.2 for the controlled lighting. The first stage shall be capable of activating between 30-70 percent of the lighting power in a room either through an automatic or manual action, and may be a switching or dimming system. After that event occurs the device shall be capable of all of the following actions when manually called to do so by the occupant:

1. Activating the alternate set of lights.
2. Activating 100 percent of the lighting power.
3. Deactivating all lights.

A5.209.1.6 Automatic Daylighting Control Devices. Automatic daylighting control devices used to control lights in daylit zones shall:

1. Be capable of reducing the power consumption of the general lighting in the controlled area by at least two thirds in response to the availability of daylight; and
2. If the device is a dimmer controlling incandescent or fluorescent lamps, provide electrical outputs to lamps for reduced flicker operation through the dimming range, so that the light output has an amplitude modulation of less than 30 percent for frequencies less than 200 Hz, and without causing premature lamp failure; and
3. If the devices reduce lighting in control steps, incorporate time-delay circuits to prevent cycling of light level changes of less than 3 minutes and have a manual or automatic means of adjusting the deadband to provide separation of on and off points for each control step; and
4. If the device is placed in calibration mode, automatically restore its time delay settings to normal operation programmed time delays after no more than 60 minutes; and
5. Have a setpoint control that easily distinguishes settings to within 10 percent of full scale adjustment; and
6. Have a light sensor that has a linear response with 5percent accuracy over the range of illuminance measured by the light sensor; and
7. Have a light sensor that is physically separated from where calibration adjustments are made, or is capable of being calibrated in a manner that the person initiating calibration is remote from the sensor during calibration to avoid influencing calibration accuracy, and

A5.209.1.7 Interior Photosensors. Interior photosensor shall not have a mechanical slide cover or other device that permits easy unauthorized disabling of the control, and shall not be incorporated into a wall-mounted occupant-sensor.

A5.209.1.8 Multi-level Astronomical Time-Switch Controls. Multi-level astronomical time-switch controls used to control lighting in daylit zones shall:

1. Contain at least 2 separately programmable steps per zone that reduces illuminance in a relatively uniform manner as specified in Section A5.209.2.2 and
2. Have a separate offset control for each step of 1 to 240 minutes; and
3. Have sunrise and sunset prediction accuracy within +/- 15 minutes and timekeeping accuracy within 5 minutes per year; and
4. Store astronomical time parameters (used to develop longitude, latitude, time zone) for at least 7 days if power is interrupted; and
5. Display date/time, sunrise and sunset, and switching times for each step; and
6. Have an automatic daylight savings time adjustment; and
7. Have automatic time switch capabilities specified in Section A6.209.1.3.

A5.209.1.9 Outdoor Astronomical Time-Switch Controls. Outdoor astronomical time-switch controls used to control outdoor lighting as specified in Section A5.209.3.3 shall:

1. Contain at least 2 separately programmable steps per function area; and
2. Have the ability to independently offset the on and off times for each channel by 0 to 99 minutes before or after sunrise or sunset; and
3. Have sunrise and sunset prediction accuracy within +/- 15 minutes and timekeeping accuracy within 5 minutes per year; and
4. Store astronomical time parameters (used to develop longitude, latitude, time zone) for at least 7 days if power is interrupted; and
5. Display date/time, sunrise and sunset; and
6. Have an automatic daylight savings time adjustment; and
7. Have automatic time switch capabilities specified in Section A5.209.1.3.

A5.209.1.10 Dimmers. Dimmers used to control lighting shall:

1. Be capable of reducing power consumption by a minimum of 65 percent when the dimmer is at its lowest light level; and
2. If the device is a dimmer controlling incandescent or fluorescent lamps, provide electrical outputs to lamps for reduced flicker operation through the dimming range, so that the light output has an amplitude modulation of less than 30 percent for frequencies less than 200 Hz, and without causing premature lamp failure; and
3. Be listed by a rating lab recognized by the International Code Council (ICC) as being in compliance with Underwriters Laboratories Standards; and
4. If the device is a wall box dimmer designed to be used in a three or more-way circuit with non-dimmable switches, the level set by the dimmer, shall not be overridden by any of the switches in the circuit. The dimmer and all of the switches in the circuit shall have the capability of turning lighting OFF if it is ON, and turning lighting ON to the level set by the dimmer if the lighting is OFF. Any wall box dimmer that is connected to a system with an emergency override function shall be controlled by the emergency override.
5. If the device is a stepped dimmer, it shall include an off position to turn lights completely off.

TABLE A5.209.1-A ULTRASOUND MAXIMUM DECIBEL VALUES

MIDFREQUENCY OF SOUND PRESSURE THIRD-OCTAVE BAND (in kHz)	MAXIMUM dB LEVEL WITHIN THIRD-OCTAVE BAND (in dB reference 20 micropascals)
Less than 20	80
20 or more to less than 25	105
25 or more to less than 31.5	110
31.5 or more	115

A5.209.2 Indoor Lighting Controls

A5.209.2.1 Area Controls.

A5.209.2.1.1 Each area enclosed by ceiling-height partitions shall have an independent switching or control device. This switching or control device shall be:

1. Readily accessible; and
2. Located so that a person using the device can see the lights or area controlled by that switch, or so that the area being lit is annunciated; and
3. Manually operated, or automatically controlled by an occupant-sensor that meets the applicable requirements of Section A5.209.1.

A5.209.2.1.2 Other devices may be installed in conjunction with the switching or control device provided that they:

1. Permit the switching or control device to manually turn the lights off in each area enclosed by ceiling-height partitions; and
2. Reset the mode of any automatic system to normal operation without further action.

Exception 1 to Section A5.209.2.1: Up to 0.3 watts per square foot of lighting in any area within a building that must be continuously illuminated for reasons of building security or emergency egress, if:

1. The area is designated a security or emergency egress area on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Title 24, Part 1; and
2. The security or egress lighting is controlled by switches accessible only to authorized personnel.

Exception 2 to Section A5.209.2.1: Public areas with switches that are accessible only to authorized personnel.

A5.209.2.2 Multi-Level Lighting Controls. The general lighting of any enclosed space 100 square feet or larger, and has a connected lighting load that exceeds 0.8 watts per square foot, shall have multi-level lighting controls. Multi-level controls shall have at least one control step that is between 30 percent and 70 percent of design lighting power and allow the power of all lights to be manually turned off. A reasonably uniform level of illuminance shall be achieved by any of the following:

1. Continuous or stepped dimming of all lamps or luminaires; or
2. Switching alternate lamps in luminaires, alternate luminaires, and alternate rows of luminaires.

Exceptions:

1. Lights in corridors.
2. A space that has only one luminaire with no more than two lamps.

A5.209.2.3 Daylight Areas.

A5.209.2.3.1 Daylight areas shall be defined as follows:

A5.209.2.3.1.1 Daylight Area the total daylight area shall not double count overlapping areas with any primary sidelit daylight area, secondary sidelit daylight area, or skylit daylight area.

A5.209.2.3.1.2 Daylight Area, Primary Sidelit is the combined primary sidelit area without double counting overlapping areas. The floor area for each primary sidelit area is directly adjacent to vertical glazing below the ceiling with an area equal to the product of the sidelit width and the primary sidelit depth.

The primary sidelit width is the width of the window plus, on each side, the smallest of:

1. 2 feet; or
2. The distance to any 5 feet or higher permanent vertical obstruction.

The primary sidelit depth is the horizontal distance perpendicular to the glazing which is the smaller of:

1. One window head height; or
2. The distance to any 5 feet or higher permanent vertical obstruction.

A5.209.2.3.1.3 Daylight Area, Secondary Sidelit is the combined secondary sidelit area without double counting overlapping areas. The floor area for each secondary sidelit area is directly adjacent to primary sidelit area with an area equal to the product of the sidelit width and the secondary sidelit depth.

The secondary sidelit width is the width of the window plus, on each side, the smallest of:

1. 2 feet; or
2. The distance to any 5 feet or higher permanent vertical obstruction; or
3. The distance to any skylit daylight area.

The secondary sidelit depth is the horizontal distance perpendicular to the glazing which begins from one window head height, and ends at the smaller of:

1. Two window head heights;
2. The distance to any 5 feet or higher permanent vertical obstruction; or
3. The distance to any skylit daylight area.

A5.209.2.3.1.4 Daylight Area, Skylit is the combined daylight area under each skylight without double counting overlapping areas. The daylight area under each skylight is bounded by the rough opening of the skylight, plus horizontally in each direction the smallest of:

1. 70 percent of the floor-to-ceiling height; or
2. The distance to any primary sidelit area, or the daylight area under rooftop monitors; or
3. The distance to any permanent partition or permanent rack which is farther away than 70 percent of the distance between the top of the permanent partition or permanent rack and the ceiling.

A5.209.2.3.2 Luminaires providing general lighting that are in or are partially in the skylit daylight area and/or the primary sidelit daylight area shall be controlled as follows:

A5.209.2.3.2.1 Primary sidelit and skylit daylight areas shall have at least one lighting control that:

1. Controls at least 50 percent of the general lighting power in the primary sidelit and skylit daylight areas separately from other lighting in the enclosed space.
2. Controls luminaires in primary sidelit areas separately from skylit areas.

Exception: Primary sidelit and skylit daylight areas that have a combined area totaling less than or equal to 250 square feet within any enclosed space.

A5.209.2.3.2.2 For all skylit daylight areas:

1. The skylit daylight area shall be shown on the plans.
2. All of the general lighting in the skylit area shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section A5.209.1.
3. The automatic daylighting control shall be installed in accordance with Section A5.209.2.3.2.4.

Exception 1: Where the total skylit daylight area in any enclosed space is less than or equal to 2,500 square feet.

Exception 2: Skylit daylight areas where existing adjacent structures obstruct direct beam sunlight for at least 6 hours per day during the equinox as calculated using computer or graphical methods.

Exception 3: When the skylight effective aperture is greater than 4.0 percent, and all general lighting in the skylit area is controlled by a multi-level astronomical time switch that meets the requirements of Section A5.209.1.8 and that has an override switch that meets the requirements of Section A5.209.2.4.2.

Exception 4: Skylit daylight areas where the effective aperture is less than 0.006. The effective aperture for skylit daylight areas is specified in Section 146(a)2E of Title 24, Part 6.

- C. The primary sidelit area(s) shall be shown on the plans, and the general lighting in the primary sidelit areas shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section A5.209.1 and is installed in accordance with Section A5.209.2.3.2.4.

Exception 1: Where the total primary sidelit daylight area in any enclosed space has an area less than or equal to 2,500 square feet.

Exception 2: Primary sidelit daylight areas where the effective aperture is less than 0.1. The effective aperture for primary sidelit daylight areas is specified in Section 146(a)2E of Title 24, Part 6.

Exception 3: Primary sidelit daylight areas where existing adjacent structures are twice as tall as their distance away from the windows.

Exception 4: Parking garages.

- D. Automatic Daylighting Control Device Installation and Operation. Automatic daylighting control devices shall be installed and configured to operate according to all of the following requirements:

1. Automatic daylighting control devices shall have photosensors that are located so that they are not readily accessible in accordance with the designer's or manufacturer's instructions.
2. The location where calibration adjustments are made to the automatic daylighting control device shall be readily accessible to authorized personnel, or located within 2 feet of a ceiling access panel that is no higher than 11 feet above floor level.
3. Automatic daylighting controls shall be multi-level, including continuous dimming, and have at least one control step that is between 50 percent to 70 percent of rated power of the controlled lighting.

Exception 1: Controlled lighting having a lighting power density less than 0.3 W/ft².

Exception 2: When skylights are replaced or added to on an existing building with an existing general lighting system.

4. Under all daylight conditions in all areas served by the controlled lighting, the combined illuminance from the controlled lighting and daylight is not less than the illuminance from controlled lighting when no daylight is available.
5. When all areas served by the controlled lighting are receiving daylight illuminance levels greater than 150 percent of the illuminance from controlled lighting when no daylight is available, the controlled lighting power consumption shall be no greater than 35 percent of the rated power of the controlled lighting.

A5.209.2.4 Shut-off Controls.

A5.209.2.4.1 In addition to the manual controls installed to comply with Section A5.209.2.1 and A5.209.2.2 for every floor, all indoor lighting systems shall be equipped with separate automatic controls to shut off the lighting. These automatic controls shall meet the requirements of Section A5.209.1 and may be an occupant sensor, automatic time switch, or other device capable of automatically shutting off the lighting.

Exception 1: Where the lighting system is serving an area that must be continuously lit, 24 hours per day/365 days per year.

Exception 2: Lighting in corridors, guestrooms, dwelling units of high-rise residential buildings and hotel/motels, and parking garages.

Exception 3: Up to 0.3 watts per square foot of lighting in any area within a building that must be continuously illuminated for reasons of building security or emergency egress, provided that the area is designated a security or emergency egress area on the plans and specifications submitted to the enforcement agency under

Section 10-103(a)2 of Title 24, Part 1.

A5.209.2.4.2 If an automatic control device is installed to comply with Section A5.209.2.4.1, it shall incorporate an override switching device that:

1. Is readily accessible; and
2. Is located so that a person using the device can see the lights or the area controlled by that switch, or so that the area being lit is annunciated; and
3. Is manually operated; and
4. Allows the lighting to remain on for no more than 2 hours when an override is initiated; and

Exception: In malls, auditoriums, single tenant retail spaces, industrial facilities, and arenas, where captive-key override is utilized, override time may exceed 2 hours.

5. Controls an area enclosed by ceiling height partitions not exceeding 5,000 square feet.

Exception: In malls, auditoriums, single tenant retail spaces, industrial facilities, convention centers and arenas, the area controlled may not exceed 20,000 square feet.

A5.209.2.4.3 If an automatic time switch control device is installed to comply with Section A5.209.2.4.1, it shall incorporate an automatic holiday "shut-off" feature that turns off all loads for at least 24 hours, and then resumes the normally scheduled operation.

Exception: Retail stores and associated malls, restaurants, grocery stores, churches, and theaters.

A5.209.2.4.4 Offices 250 square feet or smaller; multipurpose rooms of less than 1000 square feet, and classrooms and conference rooms of any size, shall be equipped with occupant sensor(s) to shut off the lighting. In addition, controls shall be provided that allow the lights to be manually shut off in accordance with Section A5.209.2.1 regardless of the sensor status.

A5.209.3 Outdoor Lighting Controls And Equipment

A5.209.3.1 Outdoor Lighting. All permanently installed outdoor luminaires employing lamps rated over 100 watts shall either have a lamp efficacy of at least 60 lumens per watt or be controlled by a motion sensor.

Exception 1: Lighting required by a health or life safety statute, ordinance, or regulation, including but not limited to, emergency lighting.

Exception 2: Lighting used in or around swimming pools, water features, or other locations subject to Article 680 of Title 24, Part 3, California Electrical Code.

Exception 3: Searchlights.

Exception 4: Theme lighting for use in theme parks.

Exception 5: Lighting for film or live performances.

Exception 6: Temporary outdoor lighting.

Exception 7: Light emitting diode, light emitting capacitors, neon and cold cathode lighting.

Exception 8: Sign lighting

A5.209.3.2 Luminaire Cutoff Requirements. All outdoor luminaires that use lamps rated greater than 175 watts in hardscape areas including parking lots, building entrances, sales and non-sales canopies, and all outdoor sales areas

shall be designated Cutoff for light distribution. To comply with this requirement, the luminaire shall be rated Cutoff in a photometric test report that includes any tilt or other non-level mounting condition of the installed luminaire. Cutoff is a luminaire light distribution classification where the candela per 1000 lamp lumens does not numerically exceed 25 at or above a vertical angle of 90 degrees above nadir, and 100 at or above a vertical angle of 80 degrees above nadir. Nadir is in the direction of straight down, as would be indicated by a plumb line. 90 degrees above nadir is horizontal. 80 degrees above nadir is 10 degrees below horizontal.

Exception 1: Signs.

Exception 2: Lighting for building facades, public monuments, statues, and vertical surfaces of bridges.

Exception 3: Lighting required by a health or life safety statute, ordinance, or regulation, including but not limited to, emergency lighting.

Exception 4: Temporary outdoor lighting.

Exception 5: Lighting used in or around swimming pools, water features, or other locations subject to Article 680 of the California Electrical Code.

Exception 6: Replacement of existing pole mounted luminaires in hardscape areas meeting all of the following conditions:

1. Where the existing luminaire does not meet the luminaire cutoff requirements in A5.209.3.2; and
2. Spacing between existing poles is greater than 6 times the mounting height of the existing luminaires; and
3. Where no additional poles are being added to the site; and
4. Where new wiring to the luminaires is not being installed; and
5. Provided that the connected lighting power wattage is not increased.

A5.209.3.3 Controls for Outdoor Lighting

A5.209.3.3.1 All permanently installed outdoor lighting shall be controlled by a photocontrol or astronomical time switch that automatically turns off the outdoor lighting when daylight is available.

Exception: Lighting in tunnels and large covered areas that require illumination during daylight hours.

A5.209.3.3.2 For lighting of building facades, parking lots, sales and non-sales canopies, all outdoor sales areas, and student pick-up/drop-off zones where two or more luminaires are used, an automatic time switch shall be installed that is capable of (1) turning off the lighting when not needed and (2) reducing the lighting power (in watts) by at least 50 percent but not exceeding 80 percent or providing continuous dimming through a range that includes 50 percent through 80 percent reduction. This control shall meet the requirements of Section A5.209.1.3.

Exception 1: Lighting required by a health or life safety statute, ordinance, or regulation, including but not limited to, emergency lighting.

Exception 2: Lighting for steps or stairs that require illumination during daylight hours.

Exception 3: Lighting that is controlled by a motion sensor and photocontrol.

Exception 4: Lighting for facilities that have equal lighting requirements at all hours and are designed to operate continuously.

Exception 5: Temporary outdoor lighting.

Exception 6: Signs.

A5.209.4 Outdoor Lighting. This section applies to all outdoor lighting, whether attached to buildings, poles, structures or self supporting, including but not limited to, hardscape areas including parking lots, lighting for building entrances, sales and non-sales canopies; lighting for all outdoor sales areas; and lighting for building facades.

Exceptions: When more than 50 percent of the light from a luminaire falls on one or more of the following applications, the lighting power for that luminaire shall be exempt from Section A5.209.4.2.

1. Temporary outdoor lighting.
2. Lighting required and regulated by the Federal Aviation Administration and the Coast Guard.
3. Lighting for public streets, roadways, highways, and traffic signage lighting, including lighting for driveway entrances occurring in the public right-of-way.
4. Lighting for sports and athletic fields, and children's playground.
5. Lighting for industrial sites, including but not limited to, rail yards, maritime shipyards and docks, piers and marinas, chemical and petroleum processing plants, and aviation facilities.

6. Lighting specifically for Automated Teller Machines as required by California Financial Code Section 13040, or required by law through a local ordinance.
7. Lighting of public monuments.
8. Signs shall meet the requirements of Section A5.209.5.
9. Lighting used in or around swimming pools, water features, or other locations subject to Article 680 of Title 24, Part 3, California Electrical Code.
10. Lighting of tunnels, bridges, stairs, wheelchair elevator lifts for American with Disabilities Act (ADA) compliance, and ramps that are other than parking garage ramps.
11. Landscape lighting.
12. In theme parks: outdoor lighting for themes and special effects.
13. Lighting for outdoor theatrical and other outdoor live performances, provided that these lighting systems are additions to area lighting systems and are controlled by a multiscene or theatrical cross-fade control station accessible only to authorized operators.
14. Outdoor lighting systems for qualified historic buildings, as defined in Title 24, Part 8, California Historic Building Code, if they consist solely of historic lighting components or replicas of historic lighting components. If lighting systems for qualified historic buildings contain some historic lighting components or replicas of historic components, combined with other lighting components, only those historic or historic replica components are exempt. All other outdoor lighting systems for qualified historic buildings shall comply with Section A5.209.4.

A.5.209.4.1 Outdoor Lighting Power Trade-offs. Outdoor lighting power trade-offs shall be determined as follows:

1. Allowed lighting power determined according to Section A5.209.4.4.1 for general hardscape lighting allowance may be traded to specific applications in Section A5.209.4.4.2, provided the hardscape area from which the lighting power is traded continues to be illuminated in accordance with Section A5.209.4.4.1.1.
2. Allowed lighting power determined according to Section A5.209.4.4.2 for additional lighting power allowances for specific applications shall not be traded between specific applications, or to hardscape lighting in Section A5.209.4.4.1.
3. Allowed lighting power determined according to Section A5.209.4.4.3 for additional lighting power allowances for local ordinance shall not be traded to specific applications in Section A5.209.4.4.2 or to hardscape areas not covered by the local ordinance.
4. Trading off lighting power allowances between outdoor and indoor areas shall not be permitted.

A5.209.4.2 Outdoor Lighting Power. An outdoor lighting installation complies with this section if the actual outdoor lighting power installed is no greater than the allowed outdoor lighting power calculated under Section A5.209.4.4. The allowed outdoor lighting shall be calculated by Lighting Zone as defined in Section 10-114 of Title 24, Part 1. Local governments may amend lighting zones in compliance with Section 10-114 of Title 24, Part 1.

A5.209.4.3 Calculation of Actual Lighting Power. The wattage of outdoor luminaires shall be determined in accordance with Section 130(d) of Title 24, Part 6.

A5.209.4.4 Calculation of Allowed Lighting Power. The allowed lighting power shall be the combined total of the sum of the general hardscape lighting allowance determined in accordance with Section A5.209.4.4.1, the sum of the additional lighting power allowance for specific applications determined in accordance with Section A5.209.4.4.2, and the sum of the additional lighting power allowances for local ordinance determined in accordance with Section A5.209.4.4.3.

A5.209.4.4.1 General Hardscape Lighting Allowance. Determine the general hardscape lighting power allowances as follows:

A5.209.4.4.1.1 The general hardscape area of a site shall include parking lot(s), roadway(s), driveway(s), sidewalk(s), walkway(s), bikeway(s), plaza(s), and other improved area(s) that are illuminated. In plan view of the site, determine the illuminated hardscape area, which is defined as any hardscape area that is within a square pattern around each luminaire or pole that is ten times the luminaire mounting height with the luminaire in the middle of the pattern, less any areas that are within a building, beyond the hardscape area, beyond property lines, or obstructed by a structure. The illuminated hardscape area shall include portions of planters and landscaped areas that are within the lighting application and are less than or equal to 10 feet wide in the short dimensions and are enclosed by hardscape or other improvement on at least three sides. Multiply the illuminated hardscape area by the Area Wattage Allowance (AWA) from Table A5.209.4-A for the appropriate Lighting Zone.

A5.209.4.4.1.2 Determine the perimeter length of the general hardscape area. The total perimeter shall not include portions of hardscape that is not illuminated according to Section A5.209.4.4.1.1. Multiply the hardscape perimeter by the Linear Wattage Allowance (LWA) for hardscape from Table A5.209.4-A for the appropriate

lighting zone. The perimeter length for hardscape around landscaped areas and permanent planters shall be determined as follows:

1. Landscaped areas completely enclosed within the hardscape area, and which have width or length less than 10 feet wide, shall not be added to the hardscape perimeter length.
2. Landscaped areas completely enclosed within the hardscape area, and which width or length are a minimum of 10 feet wide, the perimeter of the landscaped areas or permanent planter shall be added to the hardscape perimeter length.
3. Landscaped edges that are not abutting the hardscape shall not be added to the hardscape perimeter length.

A5.209.4.4.1.3 Determine the Initial Wattage Allowance (IWA) for general hardscape lighting from Table A.209.4-A for the appropriate lighting zone. The hardscape area shall be permitted one IWA per site.

A5.209.4.4.1.4 The general hardscape lighting allowance shall be the sum of the allowed watts determined from A5.209.4.4.1.1, A5.209.4.4.1.2 and A5.209.4.4.1.3 above.

A5.209.4.4.2 Additional Lighting Power Allowance for Specific Applications: Additional lighting power for specific applications shall be the smaller of the additional lighting allowances for specific applications determined in accordance with Table A5.209.4-B for the appropriate lighting zone, or the actual installed lighting power meeting the requirements for the allowance.

A5.209.4.4.3 Additional Lighting Power Allowance for Local Ordinance Requirements: For hardscape areas, including parking lots, site roadways, driveways, sidewalks, walkways or bikeways, when specific light levels are required by law through a local ordinance, and provided the local ordinance meets Section 10-114 of Title 24, Part 1, additional lighting power for those hardscape areas covered by the local ordinance requirement shall be the smaller of the additional lighting allowances for local ordinance determined from Table A5.209.4-C for the appropriate lighting zone, or the actual installed lighting power meeting the requirements for the allowance.

TABLE A5.209.4-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE

Type of Power Allowance	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Area Wattage Allowance (AWA)	0.036 W/ft ²	0.045 W/ft ²	0.092 W/ft ²	0.115 W/ft ²
Linear Wattage Allowance (LWA)	0.36 W/lf	0.45 W/lf	0.92 W/lf	1.15 W/lf
Initial Wattage Allowance (IWA)	340 W	510 W	770 W	1030 W

TABLE A5.209.4-B ADDITIONAL LIGHTING POWER ALLOWANCE FOR SPECIFIC APPLICATIONS

All area and distance measurements in plan view unless otherwise noted.

Lighting Application	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4	
WATTAGE ALLOWANCE PER APPLICATION. Use all that apply as appropriate.					
Building Entrances or Exits. Allowance per door. Luminaires qualifying for this allowance shall be within 20 feet of the door.	30 watts	75 watts	100 watts	120 watts	
Primary Entrances to Senior Care Facilities, Police Stations, Hospitals, Fire Stations, and Emergency Vehicle Facilities. Allowance per primary entrance(s) only. Primary entrances shall provide access for the general public and shall not be used exclusively for staff or service personnel. This allowance shall be in addition to the building entrance or exit allowance above. Luminaires qualifying for this allowance shall be within 100 feet of the primary entrance.	45 watts	80 watts	120 watts	130 watts	
Drive Up Windows. Allowance per customer service location. Luminaires qualifying for this allowance shall be within 2 mounting heights of the sill of the window.	40 watts	75 watts	125 watts	200 watts	
Vehicle Service Station Uncovered Fuel Dispenser. Allowance per fueling dispenser. Luminaires qualifying for this allowance shall be within 2 mounting heights of the dispenser.	120 watts	175 watts	185 watts	330 watts	
WATTAGE ALLOWANCE PER UNIT LENGTH (w/linear ft). May be used for one or two frontage side(s) per site.					
Outdoor Sales Frontage. Allowance for frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. Luminaires qualifying for this allowance shall be located between the principal viewing location and the frontage outdoor sales area.	No Allowance	22.5 W/linear ft	36 W/linear ft	45 W/linear ft	
WATTAGE ALLOWANCE PER HARDSCAPE AREA (W/ft²). May be used for any illuminated hardscape area on the site.					
Hardscape Ornamental Lighting. Allowance for the total site illuminated hardscape area. Luminaires qualifying for this allowance shall be rated for 100 watts or less as determined in accordance with Section 130(d), and shall be post-top luminaires, lanterns, pendant luminaires, or chandeliers.	No Allowance	0.02 W/ft ²	0.04 W/ft ²	0.06 W/ft ²	
WATTAGE ALLOWANCE PER SPECIFIC AREA (W/ft²). Use as appropriate provided that none of the following specific applications shall be used for the same area.					
Building Facades. Only areas of building façade that are illuminated shall qualify for this allowance. Luminaires qualifying for this allowance shall be aimed at the façade and shall be capable of illuminating it without obstruction or interference by permanent building features or other objects.	No Allowance	0.18 W/ft ²	0.35 W/ft ²	0.50 W/ft ²	
Outdoor Sales Lots. Allowance for uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale. Driveways, parking lots or other non sales areas shall be considered hardscape areas even if these areas are completely surrounded by sales lot on all sides. Luminaires qualifying for this	0.164 W/ft ²	0.555 W/ft ²	0.758 W/ft ²	1.285 W/ft ²	

Lighting Application	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
allowance shall be within 5 mounting heights of the sales lot area.				
Vehicle Service Station Hardscape. Allowance for the total illuminated hardscape area less area of buildings, under canopies, off property, or obstructed by signs or structures. Luminaires qualifying for this allowance shall be illuminating the hardscape area and shall not be within a building, below a canopy, beyond property lines, or obstructed by a sign or other structure.	0.014 W/ft ²	0.155 W/ft ²	0.308 W/ft ²	0.485 W/ft ²
Vehicle Service Station Canopies Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.514 W/ft ²	1.005 W/ft ²	1.358 W/ft ²	2.285 W/ft ²
Sales Canopies Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	No Allowance	0.655 W/ft ²	0.908 W/ft ²	1.135 W/ft ²
Non-sales Canopies. Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.084 W/ft ²	0.205 W/ft ²	0.408 W/ft ²	0.585 W/ft ²
Guard Stations. Allowance up to 1,000 square feet per vehicle lane. Guard stations provide access to secure areas controlled by security personnel who stop and may inspect vehicles and vehicle occupants, including identification, documentation, vehicle license plates, and vehicle contents. Qualifying luminaires shall be within 2 mounting heights of a vehicle lane or the guardhouse.	0.154 W/ft ²	0.355 W/ft ²	0.708 W/ft ²	0.985 W/ft ²
Student Pick-up/Drop-off zone. Allowance for the area of the student pick-up/drop-off zone, with or without canopy, for preschool through 12th grade school campuses. A student pick-up/drop off zone is a curbside, controlled traffic area on a school campus where students are picked-up and dropped off from vehicles. The allowed area shall be the smaller of the actual width or 25 feet, times the smaller of the actual length or 250 feet. Qualifying luminaires shall be within 2 mounting heights of the student pick-up/drop-off zone.	No Allowance	0.12 W/ft ²	0.45 W/ft ²	No Allowance
Outdoor Dining. Allowance for the total illuminated hardscape of outdoor dining. Outdoor dining areas are hardscape areas used to serve and consume food and beverages. Qualifying luminaires shall be within 2 mounting heights of the hardscape area of outdoor dining.	0.014 W/ft ²	0.135 W/ft ²	0.258 W/ft ²	0.435 W/ft ²
Special Security Lighting for Retail Parking and Pedestrian Hardscape. This additional allowance is for illuminated retail parking and pedestrian hardscape identified as having special security needs. This allowance shall be in addition to the building entrance or exit allowance.	0.007 W/ft ²	0.009 W/ft ²	0.019 W/ft ²	No Allowance

TABLE A5.209.4-C ADDITIONAL LIGHTING POWER ALLOWANCE FOR ORDINANCE REQUIREMENTS

ADDITIONAL LIGHTING POWER ALLOWANCE (W/ft ²) WHEN AVERAGE LIGHT LEVELS ARE REQUIRED BY LOCAL ORDINANCE.				
Required (horizontal foot-candles, AVERAGE)	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
0.5	0	0	0	0
1.0	0.004	0	0	0
1.5	0.024	0.015	0	0
2.0	0.044	0.035	0	0
3.0	0.084	0.075	0.028	0.005
4.0 or greater	0.124	0.115	0.068	0.045

ADDITIONAL LIGHTING POWER ALLOWANCE (W/ft²) WHEN MINIMUM LIGHT LEVELS ARE REQUIRED BY LOCAL ORDINANCE.				
Required (horizontal foot-candles, MINIMUM)	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
0.5	0.004	0	0	0
1.0	0.044	0.035	0	0
1.5	0.124	0.115	0.068	0.045
2.0	0.164	0.155	0.108	0.085
3.0	0.164	0.155	0.108	0.085
4.0 or greater	0.164	0.155	0.108	0.085

A5.209.5 Signs. This section applies to all internally illuminated and externally illuminated signs, unfiltered light emitting diodes (LEDs), and unfiltered neon, both indoor and outdoor. Each sign shall comply with either subsection A5.209.5.1 or A5.209.5.2, as applicable.

A5.209.5.1 Maximum Allowed Lighting Power.

A5.209.5.1.1 For internally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 12 watts per square foot. For double-faced signs, only the area of a single face shall be used to determine the allowed lighting power.

A5.209.5.1.2 For externally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 2.3 watts per square foot. Only areas of an externally lighted sign that are illuminated without obstruction or interference, by one or more luminaires, shall be used.

A5.209.5.2 Alternate Lighting Sources. The sign shall comply if it is equipped only with one or more of the following light sources:

A5.209.5.2.1 High pressure sodium lamps; or

A5.209.5.2.2 Metal halide lamps that are:

1. Pulse start or ceramic served by a ballast that has a minimum efficiency of 88 percent or greater, or
2. Pulse start that are 320 watts or smaller, are not 250 watt or 175 watt lamps, and are served by a ballast that has a minimum efficiency of 80 percent.

Where ballast efficiency is the measured output wattage to the lamp divided by the measured operating input wattage when tested according to ANSI C82.6-2005; or

A5.209.5.2.3 Neon or cold cathode lamps with transformer or power supply efficiency greater than or equal to following:

1. A minimum efficiency of 75 percent when the transformer or power supply rated output current is less than 50 mA; or
2. A minimum efficiency of 68 percent when the transformer or power supply rated output current is 50 mA or greater.

Where the ratio of the output wattage to the input wattage is at 100 percent tubing load; or

A5.209.5.2.4 Fluorescent lamps with a minimum color rendering index (CRI) of 80; or

A5.209.5.2.5 Light emitting diodes (LEDs) with a power supply having an efficiency of 80 percent or greater; or

Exception: Single voltage external power supplies that are designed to convert 120 volt AC input into lower voltage DC or AC output, and have a nameplate output power less than or equal to 250 watts, shall comply with the applicable requirements of the Appliance Efficiency Regulations (Title 20).

A5.209.5.2.6 Compact fluorescent lamps that do not contain a medium screw base sockets (E24/E26) ; or

A5.209.5.2.7 Electronic ballasts with a fundamental output frequency not less than 20 kHz;

Exception 1 to Section A5.209.5: Unfiltered incandescent lamps that are not part of an electronic message center (EMC), an internally illuminated sign, or an externally illuminated sign.

Exception 2 to Section A5.209.5: Exit signs. Exit signs shall meet the requirements of the Appliance Efficiency Regulations.

Exception 3 to Section A5.209.5: Traffic Signs. Traffic signs shall meet the requirements of the Appliance Efficiency Regulations.

A5.209.6 Sign Lighting Controls. All signs with permanently connected lighting shall meet the requirements below:

1. **Automatic Time Switch Control.** All signs with permanently connected lighting shall be controlled with an automatic time switch control that complies with the applicable requirements of Section A5.209.1.
2. **Photocontrol or outdoor astronomical time switch control.** All outdoor signs shall be controlled with a photocontrol or outdoor astronomical time switch control.
Exception: Outdoor signs in tunnels and large covered areas that require illumination during daylight hours.
3. **Dimming.** All outdoor signs shall be controlled with a dimmer that provides the ability to automatically reduce sign power by a minimum of 65 percent during nighttime hours.

Exception 1: Signs that are illuminated for less than 1 hour per day during daylight hours.

Exception 2: Outdoor signs in tunnels and large covered areas that require illumination during daylight hours.

Exception 3: Metal halide, high pressure sodium, cold cathode, and neon lamps used to illuminate signs or parts of signs.

Exception 4: Demand Responsive Electronic Message Center Control. An Electronic Message Center (EMC) having a new connected lighting power load greater than 15 kW shall have a control installed that is capable of reducing the lighting power by a minimum of 30 percent when receiving a demand response signal that is sent out by the local utility.

Exception 5: EMCs required by a health or life safety statute, ordinance, or regulation, including but not limited to exit signs and traffic signs.

A5.209.7 Nonresidential Lighting Control Acceptance. Before an occupancy permit is granted for a new building or space, or a new lighting system serving a building, space, or site is operated for normal use, all indoor and outdoor lighting controls serving the building, space, or site shall be certified as meeting the Acceptance Requirements for Code Compliance. A Certificate of Acceptance shall be submitted to the enforcement agency under Section 10-103(a) of Title 24, Part 1, that:

1. Certifies plans, specifications, installation certificates, and operating and maintenance information meet the requirements of Title 24, Part 6.
2. Certifies that automatic daylighting controls meet the applicable requirements of Section A5.209.1 and Section A5.209.2.3.2.4.
3. Certifies that when a multi-level astronomical time switch is used to meet Exception 3 to Section A5.209.2.3.2.2 all general lighting in the skylit area is controlled by a multi-level astronomical time switch that meets the applicable requirements of Section A5.209.1 and that has an override switch that meets the requirements of Section A209.2.4.2.
4. Certifies that lighting controls meet the requirements of Section A5.209.2.1 through A5.209.2.3 and Title 24, Part 6, Sections 131(e) and (f), and 146(a)2, as applicable.
5. Certifies that automatic lighting controls meet the applicable requirements of Section A5.209.1 and Section A5.209.2.4.
6. Certifies that occupant-sensors meet the applicable requirements of Section A5.209.1 and Section A5.209.2.4.
7. Certified that outdoor lighting controls meet the applicable requirements of Section A5.209.1 and Section A5.209.3.

SECTION A5.210 APPLIANCES

A5.210.1 Appliances Regulated By The Appliance Efficiency Regulations. Any appliance for which there is a California standard established in the Appliance Efficiency Regulations may be installed only if the manufacturer has certified to the Commission, as specified in those regulations, that the appliance complies with the applicable standard for that appliance.

Note: For certified appliances, go to www.energy.ca.gov/appliances/database/ .

DIVISION A5.4 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

SECTION A5.407 WATER RESISTANCE AND MOISTURE MANAGEMENT

A5.407.3 Weather protection. Provide a weather-resistant exterior wall and foundation envelope as required by

California Building Code Section 1403.2 and California Energy Code Section 150, manufacturer's installation instructions, or local ordinance, whichever is more stringent.

A5.407.4 Moisture control. Employ moisture control measures by the following methods.

A5.407.4.1 Sprinklers. Design and maintain landscape irrigation systems to prevent spray on structures.

A5.407.4.2 Entries and openings. Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings.

Notes:

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

A5.408.5 Construction waste diversion. Establish a construction waste management plan for the diverted materials, or meet local construction and demolition waste management ordinance, whichever is more stringent.

A5.408.6 Construction waste reduction of at least 50 percent. Recycle and/or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition debris, or meet a local construction and demolition waste management ordinance, whichever is more stringent. Calculate the amount of materials diverted by weight or volume, but not by both.

Exceptions:

1. Excavated soil and land-clearing debris
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.

A5.408.7 Excavated soil and land clearing debris. 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed.

A5.410.6 Recycling by occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage, and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals.

DIVISION A5.5 ENVIRONMENTAL QUALITY

SECTION A5.504 POLLUTANT CONTROL

A5.504.4.5.1 Early compliance with formaldehyde limits. Where complying composite wood product is readily available for non-residential occupancies, meet requirements before the compliance dates indicated in Table A5.504.8.5 (Tier 1), or use composite wood products made with either CARB-approved no-added formaldehyde (NAF) resins or CARB-approved ultra-low emitting formaldehyde (ULEF) resins (Tier 2).

A5.504.4.9 Acoustical ceilings and wall panels. Comply with Chapter 8 in Title 24, Part 2, the California Building Code, and with the VOC-emission limits defined in the 2009 CHPS criteria and listed on its Low-emitting Materials List, (or Product Registry).

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

A5.504.5 Hazardous particulates and chemical pollutants. Minimize and control pollutant entry into buildings and cross-contamination of regularly occupied areas.

A5.504.5.1 Entryway systems. Install permanent entryway systems measuring at least six feet in the primary direction of travel to capture dirt and particulates at entryways directly connected to the outdoors.

1. Qualifying entryways are those that serve as regular entry points for building users.
2. Acceptable entryway systems include, but are not limited to, permanently installed grates, grilles, or slotted systems that allow cleaning underneath.
3. Roll-out mats are acceptable only when maintained regularly by janitorial contractors as documented in service contract, or by in-house staff as documented by written policies and procedures.

A5.504.8 Finish material pollutant control. Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.4.

A5.504.8.1 Adhesives, sealants, and caulks. Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards.

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

with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in-Tables A5.504.8.1 and A5.504.8.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene), except for aerosol products as specified in subsection 2, below.

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

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

**TABLE A5.504.8.1
ADHESIVE AND SEALANT 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
Dry Wall and Panel Adhesives	50
Cove Base Adhesives	50
Multipurpose Construction Adhesives	70
Structural Glazing Adhesives	100
Single Ply Roof Membrane Adhesives	250
Other Adhesive not specifically listed	50
Specialty Applications	Current VOC Limit
PVC Welding	285
CPVC Welding	270
ABS Welding	325
Plastic Cement Welding	250
Adhesive Primer for Plastic	250
Contact Adhesive	80
Special Purpose Contact Adhesive	250
Structural Wood Member Adhesive	140
Top and Trim Adhesive	250
Substrate Specific Applications	Current VOC Limit
Metal to Metal	30
Plastic Foams	50
Porous Material (except wood)	50
Wood	30
Fiberglass	80

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

**TABLE A5.504.8.2
SEALANT VOC LIMIT**

Less Water and Less Exempt Compounds in Grams per Liter

Sealants	Current VOC Limit
Architectural	250
Marine Deck	760
Nonmembrane Roof	300

Roadway	250
Single-Ply Roof Membrane	450
Other	420
Sealant Primers	Current VOC Limit
Architectural	
Non Porous	250
Porous	775
Modified Bituminous	500
Marine Deck	760
Other	750

¹ **Note:** For additional information regarding methods to measure the VOC content specified in these tables, see South Coast Air Quality Management District Rule 1168: <http://www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF>.

A5.504.8.3 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table A5.504.8.3, unless local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table A5.504.8.3, shall be determined by classifying the coating as a Flat, Nonflat, or Nonflat-High Gloss coating, based on its gloss, as defined in subsections 4.21, 4.36, and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure, and the corresponding Flat, Nonflat, or Nonflat-High Gloss VOC limit in Table A5.504.8.3 shall apply.

A5.504.8.3.1 Aerosol Paints and Coatings. Aerosol paints and coatings shall meet the Product-Weighted MIR Limits for ROC in section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in sections 94522(c)(2) and (d)(2) of California Code of Regulations, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

Notes:

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

**TABLE A5.504.8.3
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	
Faux Finishing Coatings	350	
Fire Resistive Coatings	350	
Floor Coatings	100	
Form-Release Compounds	250	
Graphic Arts Coatings (Sign Paints)	500	
High Temperature Coatings	420	
Industrial Maintenance Coatings	250	
Low Solids Coatings ¹	120	
Magnesite Cement Coatings	450	
Mastic Texture Coatings	100	
Metallic Pigmented Coatings	500	
Multi-Color Coatings	250	
Pre-Treatment Wash Primers	420	
Primers, Sealers, and Undercoaters	100	
Reactive Penetrating Sealers	350	

Recycled Coatings	250	
Roof Coatings	50	
Rust Preventative Coatings	400	250
Shellacs:		
Clear	730	
Opaque	550	
Specialty Primers, Sealers, and Undercoaters	350	100
Stains	250	
Stone Consolidants	450	
Swimming Pool Coatings	340	
Traffic Marking Coatings	100	
Tub and Tile Refinish Coatings	420	
Waterproofing Membranes	250	
Wood Coatings	275	
Wood Preservatives	350	
Zinc-Rich Primers	340	

¹ Grams of VOC Per Liter of Coating, Including Water and Including Exempt Compounds

² The specified limits remain in effect unless revised limits are listed in subsequent columns in the Table.

³ Values in this table are derived from those specified by the California Air Resources Board, Architectural Coatings Suggested Control Measure, February 1, 2008. More information is available at http://www.arb.ca.gov/coatings/arch/Approved_2007_SCM.pdf.

A5.504.8.3.2 Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

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

A5.504.8.4 Carpet systems. All carpet installed in the building interior shall meet the testing and product requirements of one of the following:

1. Carpet and Rug Institute's Green Label Plus Program
2. California Department of Public Health Standard Practice for the testing of VOCs (Specification 01350)
3. NSF/ANSI 140 at the Gold level
4. Scientific Certifications Systems Sustainable Choice

Notes:

1. For Green Label Plus, see <http://www.carpet-rug.com/>.
2. For NSF/ANSI 140, see <http://www.carpet-rug.org/carpet-and-rug-industry/sustainability/sustainable-carpet-list.cfm>.
3. For Sustainable Choice, see <http://www.scscertified.com/gbc/sustainablecarpet.php>

A5.504.8.4.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.

A5.504.8.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table A5.504.8.1.

A5.504.8.5 Composite wood products [OSHPD 1, 2 & 4]. Hardwood plywood, particleboard, and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure for Composite Wood (17 CCR 93120 et seq.), by or before the dates specified in those sections, as shown in Table A5.504.8.5

A5.504.8.5.2 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following.

1. Product certifications and specifications.
2. Chain of custody certifications.
3. Other methods acceptable to the enforcing agency.

**TABLE A5.504.8.5 [BSC, DSA-SS, OSHPD 1, 2 & 4]
FORMALDEHYDE LIMITS¹**

Maximum formaldehyde emissions in parts per million.

Product	Current Limit	Jan 1, 2012	Jul 1, 2012
Hardwood Plywood Veneer Core	0.05		
Hardwood Plywood Composite Core	0.08		0.05
Particle Board	0.09		
Medium Density Fiberboard	0.11		

Thin Medium Density Fiberboard ²	0.21	0.13	
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¹ Values in this table are derived from those specified by the California Air Resources Board, Air Toxics Control Measure for Composite Wood as tested in accordance with ASTM E1333-96 (2002). For additional information, see California Code of Regulations, Title 17, Sections 93120 through 93120.12.

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

A5.504.9 Environmental tobacco smoke (ETS) control. Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and in buildings; or as enforced by ordinances, regulations, or policies of any city, county, city and county, California Community College, campus of the California State University, or campus of the University of California, whichever are more stringent. When ordinances, regulations, or policies are not in place, post signage to inform building occupants of the prohibitions.

**SECTION A5.505
INDOOR MOISTURE CONTROL**

A5.505.2 Indoor moisture control. Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24, Part 2, Sections 1203 and Chapter 14.

**NONRESIDENTIAL OCCUPANCIES
APPLICATION CHECKLIST [OSHPD 1, 2 & 4]**

Feature or Measure	Compliance Levels		Notes
	Mandatory CALGREEN	Voluntary CALGREEN Tier 1 Tier 2	
DIVISION A5.1 SITE PLANNING AND DESIGN			
SECTION SITE DEVELOPMENT			
A5.106.9 Building orientation. Locate and orient the building as follows: 1. Long sides facing north and south 2. Protect the building from thermal loss, drafts, and degradation of the building envelope caused by wind and wind-driven materials.	<input type="checkbox"/>	<input type="checkbox"/>	
DIVISION A5.2 ENERGY EFFICIENCY			
SECTION A5.203 PERFORMANCE MEASURES			
A5.203.1 Energy performance. [OSHPD 1] A5.203.1.1 CALGREEN Tier 1. [OSHPD 1] Buildings must comply with the latest edition of "Savings By Design, Healthcare Modeling Procedures". A.5.203.1.2 CALGREEN Tier 2. [OSHPD 1] Buildings must exceed the latest edition of "Savings By Design, Healthcare Modeling Procedures" by 15%.	<input type="checkbox"/>	<input type="checkbox"/>	
SECTION A5.204 PRESCRIPTIVE MEASURES			
A5.204.1 ENERGY STAR equipment and appliances. All equipment and appliances provided by the builder shall be ENERGY STAR labeled if ENERGY STAR is applicable to that equipment or appliance	<input type="checkbox"/>	<input type="checkbox"/>	
A5.204.4 Commissioning. Building commissioning for all building systems covered by T24, Part 6, process systems, and renewable energy systems shall be included in the design and construction processes of the building project. Commissioning requirements shall include as a minimum items listed in A5.204.4. A5.204.4.1 Owner's Project Requirements (OPR). Documented before the design phase of the project begins the OPR shall include items listed in A5.204.4. A5.204.4.2 Basis of Design (BOD). A written explanation of how the design of the building systems meets the OPR shall be completed at the design phase of the building project and updated periodically to cover the systems listed in A5.204.4.2. A5.204.4.3 Commissioning plan. A commissioning plan describing how the project will be commissioned shall be started during the design phase of the building project and shall include as a minimum items listed in A5.204.4.3. A5.204.4.4 Functional performance testing shall demonstrate the correct installation and operation of each component, system, and system-to-system interface in accordance with the approved plans and specifications. A5.204.4.5 Post construction documentation and training. A Systems Manual and Systems Operations Training are required. A5.204.4.5.1 Systems manual. The Systems Manual shall be delivered to the building owner and facilities operator and shall include the items listed in A5.204.4.5.1. A5.204.4.5.2 Systems operations training. The training of the appropriate maintenance staff for each equipment type and/or system shall include as a minimum items listed	<input type="checkbox"/>	<input type="checkbox"/>	

**NONRESIDENTIAL OCCUPANCIES
APPLICATION CHECKLIST [OSHPD 1, 2 & 4]**

Feature or Measure	Compliance Levels		Notes
	Mandatory CALGREEN	Voluntary CALGREEN Tier 1 Tier 2	
in A5.204.4.5.2. A5.204.4.6 Commissioning report. A complete report of commissioning process activities undertaken through the design, construction and post-construction phases of the building project shall be completed and provided to the owner.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.204.6 Building orientation and shading. Locate, orient and shade the building as required in Section A5.106.11.	<input type="checkbox"/>	<input type="checkbox"/>	
SECTION A5.205 BUILDING ENVELOPE			
A5.205.1 Fenestration products and exterior doors.			
A5.205.1.1 Certification of fenestration products and exterior door other than field-fabricated.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.205.1.2 Installation of field-fabricated fenestration and exterior doors.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.205.2 Joints and other openings	<input type="checkbox"/>	<input type="checkbox"/>	
A5.205.3 Installation and roofing products.	<input type="checkbox"/>	<input type="checkbox"/>	
SECTION A5.207 HVAC DESIGN, EQUIPMENT AND INSTALLATION			
A5.207.1 Space-conditioning equipment certification by manufacturers.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.1.1 Efficiency.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.1.2 Controls for heat pumps with supplementary electric resistance heaters.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.1.3 Thermostats	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.1.4 Gas-and oil-fired furnace standby loss controls.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2 Space conditioning systems.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.1 Supply air temperature reset controls.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.2 Electric resistance heating.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.3 Heat rejection systems.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.4 Hydronic system measures.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.5 Air distribution system duct leakage sealing.	<input type="checkbox"/>	<input type="checkbox"/>	
A5.207.2.6 Variable air volume control for single zone			

**NONRESIDENTIAL OCCUPANCIES
APPLICATION CHECKLIST [OSHPD 1, 2 & 4]**

Feature or Measure	Compliance Levels		Notes
	Mandatory <i>CALGREEN</i>	Voluntary <i>CALGREEN</i> Tier 1 Tier 2	
systems.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.3 Service water-heating systems and equipment.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.3.1 Certification by manufacturers.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.3.2 Efficiency.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.3.3 Installation.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.4 Natural gas central furnaces, cooking equipment, and pool and spa heaters: Pilot lights prohibited.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.5 Controls for space-conditioning systems.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.5.1 Thermostatic controls for each zone.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.5.2 Criteria for zonal thermostatic controls.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.5.3 Heat pump controls.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.5.4 Dampers for air supply and exhaust equipment.		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.5.5 Automatic demand shed controls		<input type="checkbox"/> <input type="checkbox"/>	
A5.207.6 Pipe insulation.		<input type="checkbox"/> <input type="checkbox"/>	
SECTION A5.209 LIGHTING			
A5.209.1 Lighting control devices, ballasts and luminaires.		<input type="checkbox"/> <input type="checkbox"/>	
A5.209.1.1 All devices: Instructions and calibration.		<input type="checkbox"/> <input type="checkbox"/>	
A5.209.1.2 Indicator lights.		<input type="checkbox"/> <input type="checkbox"/>	
A5.209.1.3 Automatic time switch control devices.		<input type="checkbox"/> <input type="checkbox"/>	
A5.209.1.4 Occupant sensors, motion sensors and vacancy sensors.		<input type="checkbox"/> <input type="checkbox"/>	
A5.209.1.5 Multi-level occupant sensor.		<input type="checkbox"/> <input type="checkbox"/>	
A5.209.1.6 Automatic daylighting control devices.		<input type="checkbox"/> <input type="checkbox"/>	
A5.209.1.7 Interior Photosensors.		<input type="checkbox"/> <input type="checkbox"/>	

**NONRESIDENTIAL OCCUPANCIES
APPLICATION CHECKLIST [OSHPD 1, 2 & 4]**

Feature or Measure	Compliance Levels		Notes	
	Mandatory CALGREEN	Voluntary CALGREEN Tier 1 Tier 2		
A5.209.4.4.2 Additional lighting power allowance for specific applications.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.4.4.2.3 Additional lighting power allowance for local ordinance requirements.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.5 Signs.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.5.1 Maximum allowed lighting power.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.5.2 Alternate lighting sources.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.6 Sign lighting controls.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.209.7 Nonresidential lighting control acceptance.		<input type="checkbox"/>	<input type="checkbox"/>	
SECTION A5.210 APPLIANCES				
A5.210.1 Appliances regulated by the appliance efficiency regulations.		<input type="checkbox"/>	<input type="checkbox"/>	
DIVISION A5.4 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY				
SECTION A5.407 WATER RESISTANCE AND MOISTURE MANAGEMENT				
A5.407.3 Weather Protection		<input type="checkbox"/>	<input type="checkbox"/>	
A5.407.4.1 Moisture control		<input type="checkbox"/>	<input type="checkbox"/>	
A5.407.4.2 Sprinklers		<input type="checkbox"/>	<input type="checkbox"/>	
A5.407.4.3 Entries and openings		<input type="checkbox"/>	<input type="checkbox"/>	
SECTION A5.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING				
A5.408.5 Construction waste diversion. Establish a construction waste management plan or meet local ordinance, whichever is more stringent.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.408.6 Construction waste. Recycle and/or salvage for reuse a minimum of 50% of non-hazardous construction and demolition debris or meet local ordinance, whichever is more stringent. Exceptions: 1. Excavated soil and land-clearing debris. 2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.		<input type="checkbox"/>	<input type="checkbox"/>	
A5.408.7 Excavated soil and land clearing debris. 100% of				

**NONRESIDENTIAL OCCUPANCIES
APPLICATION CHECKLIST [OSHPD 1, 2 & 4]**

Feature or Measure	Compliance Levels		Notes
	Mandatory CALGREEN	Voluntary CALGREEN Tier 1 Tier 2	
trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled.		<input type="checkbox"/> <input type="checkbox"/>	
SECTION A5.410 BUILDING MAINTENANCE AND OPERATION			
A5.410.6 Recycling by occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage, and collection of non-hazardous materials for recycling.		<input type="checkbox"/> <input type="checkbox"/>	
DIVISION A5.5 ENVIRONMENTAL QUALITY			
SECTION A5.504 POLLUTANT CONTROL			
<p>A5.504.4.5.1 Early Compliance with formaldehyde limits. Where complying composite wood product is readily available for non-residential occupancies, meet requirements before the compliance dates indicated in Table A5.504.8.5 (Tier 1), or use composite wood products made with either CARB-approved no-added formaldehyde (NAF) resins or CARB-approved ultra-low emitting formaldehyde (ULEF) resins (Tier 2).</p> <p>A5.504.8 Finish material pollutant control. Finish materials shall comply with Sections A5.504.8.1 through A5.504.8.4.</p> <p>A5.504.8.1 Adhesives, sealants and caulks. Adhesives, sealants and caulks used on the project shall meet the requirements of the following standards.</p> <ol style="list-style-type: none"> 1. Adhesives, adhesive bonding primers, and adhesive primers, sealants and sealant primers shall comply with Table A5.504.8.1. 2. Aerosol adhesives shall meet the requirements of California Code of Regulations, Title 17, commencing with Section 94507, http://ccr.oal.ca.gov/. <p>A5.504.8.2 Paints and coatings. Architectural paints and coatings shall comply with Table A5.504.8.3.</p> <p>A5.504.8.3.2 Verification.</p> <p>A5.504.8.4 Carpet systems. All carpet installed in the building interior shall meet the testing and product requirements of one of the standards listed in A5.504.8.3.</p> <p>A5.504.8.4.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.</p> <p>A5.504.8.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table A5.504.8.1.</p> <p>A5.504.8.5 Composite wood products. Hardwood plywood, particleboard, and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in Table A5.504.8.</p> <p>A5.504.8.5.2 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following.</p>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

**NONRESIDENTIAL OCCUPANCIES
APPLICATION CHECKLIST [OSHPD 1, 2 & 4]**

Feature or Measure	Compliance Levels		Notes
	Mandatory CALGREEN	Voluntary CALGREEN Tier 1 Tier 2	
1. Product certifications and specifications. 2. Chain of custody certifications. 3. Other methods acceptable to the enforcing agency.		<input type="checkbox"/> <input type="checkbox"/>	
A5.504.4.9 Acoustical ceilings and wall panels. Comply with Chapter 8 in Title 24, Part 2 and with the VOC-emission limits defined in the CHPS Low-emitting Materials List		<input type="checkbox"/> <input type="checkbox"/>	
A5.504.5 Hazardous particulates and chemical pollutants. Minimize and control pollutant entry into buildings and cross-contamination of regularly occupied areas. A5.504.5.1 Entryway systems. Install permanent entryway systems measuring at least six feet in the primary direction of travel to capture dirt and particulates at entryways directly connected to the outdoors as listed in Items 1 through 3 in A5.504.5.1.		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
A5.504.9 Environmental tobacco smoke (ETS) control. Prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and in buildings; or as enforced by ordinances, regulations, or policies of any city, county, city and county, California Community College, campus of the California State University, or campus of the University of California, whichever are more stringent.		<input type="checkbox"/> <input type="checkbox"/>	
SECTION A5.505 INDOOR MOISTURE CONTROL			
A5.505.2 Indoor moisture control. Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24, Part 2, Sections 1203 and Chapter 14.		<input type="checkbox"/> <input type="checkbox"/>	
SECTION A5.507 ENVIRONMENTAL COMFORT			
Reserved			