

# MANAGEMENT MEMO

NUMBER:  
**MM 14-05**

SUBJECT:

**INDOOR ENVIRONMENTAL QUALITY: NEW,  
RENOVATED, AND EXISTING BUILDINGS**

DATE ISSUED:  
**MAY 21, 2014**

EXPIRES:  
UNTIL RESCINDED

REFERENCES: EXECUTIVE ORDER B-18-12 AND THE GREEN BUILDING ACTION PLAN;  
CALGREEN (DIVISIONS 4.5 AND 5.5 MANDATORY-ENVIRONMENTAL QUALITY;  
APPENDICES; DIVISIONS 4.5 AND 5.5 VOLUNTARY-ENVIRONMENTAL QUALITY)

ISSUING AGENCY:  
**DEPARTMENT OF GENERAL  
SERVICES**

## Purpose

This Management Memo (MM) announces policy and provides direction to state agencies that build, lease and operate state buildings, on reducing indoor pollutant levels and ensuring healthful indoor environments for occupants in new, renovated, leased, and existing state buildings, as directed in Governor's [Executive Order B-18-12](#) and the [Green Building Action Plan](#).

## Policy

State agencies shall implement measures to ensure a healthful indoor environment for their building occupants as follows:

New/Renovated State Buildings: State agencies shall implement mandatory measures and relevant and feasible voluntary measures of the *California Green Building Standards Code (CALGreen)*, Part 11, related to indoor environmental quality (IEQ) that are in effect at the time of new construction or alteration. The information is available at <http://www.bsc.ca.gov/home/calgreen.aspx><sup>1</sup>.

Existing State Buildings: When accomplishing Alterations, Modifications, and Maintenance Repairs and when relevant and feasible, state agencies shall implement the mandatory and voluntary measures of the *California Green Building Standards Code (CALGreen)*, Part 11, related to indoor environmental quality.

New and Renegotiated State Leased Buildings:  
The Department of General Services (DGS) will encourage Lessors to implement measures of the *California Green Building Standards Code (CALGreen)* related to indoor environmental quality, where economically feasible, for all new or renegotiated leases.

## Who is Affected

All state agencies under the definition of Government Code Section 11000: (a) As used in this title, "state agency" includes every state office, officer, department, division, bureau, board, and commission, managing leased or state-owned buildings; planning alterations of existing buildings; or involved in the construction of new state buildings. It is requested that entities of State government not under the Governor's direct executive authority also implement similar measures.

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## Background

In April 2012, the Governor issued EO B-18-12 directing state agencies to implement measures, including IEQ measures, to ensure that state buildings are green and sustainable. The Governor also released the Green Building Action Plan that includes direction for applying the EO to existing buildings. Also, the state has developed, and periodically updates the [California Green Building Standards Code \(California Code of Regulations Title 24, Part 11 \[CALGreen\]\)](#), which sets baseline requirements and also provides voluntary “reach” measures for green buildings in California.

Healthful IEQ not only protects the health of building occupants, but has been shown to directly affect workers’ productivity. Healthful IEQ is achieved only through proper and informed building design, construction, and ongoing maintenance and operation.

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## Definitions

For the purposes of this MM, the following definitions are used:

- **Alterations** - Any construction or renovation to an existing structure, other than repair, for the purpose of maintenance or addition.
  - **Modifications and Maintenance Repairs** - Making alterations to an existing structure such that it will be better suited to current needs. This type of work may involve changing the use of interior space by repositioning walls, replacing fixtures, or other such modifications under the \$200,000 threshold triggering *CALGreen* compliance.
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## Ensuring a Healthful Indoor Environment

There are major steps agencies can take to ensure a healthful indoor environment:

1. Use indoor products and materials that emit little or no harmful chemicals;
2. Provide appropriate ventilation, filtration and proper Heating, Ventilating, and Air Conditioning (HVAC) equipment maintenance;
3. Prevent water intrusion and the growth of mold;
4. Implement line of sight and “daylighting” for new buildings; and
5. Solicit feedback from tenants every two years.

Resources for implementing these steps are provided below.

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## Indoor Products and Materials

### 1. Use Indoor Products and Materials That Emit Little or No Harmful Chemicals.

#### Building Materials

- a) Building Materials
  - i) Use adhesives, sealants, caulks, paints, coatings, and aerosol paints and coatings that meet the volatile organic chemical (VOC) content limits specified in *CALGreen* (Sections 4.504.2.1 through 4.504.2.4, and 5.504.4.1 through 5.504.4.3.1).

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**Indoor Products  
and Materials  
Building Materials  
(Cont.)**

- ii) Use carpet systems, carpet cushions, composite wood products, resilient (e.g., vinyl) flooring systems, and thermal insulation, acoustical ceilings and wall panels that meet the VOC emission limits specified in *CALGreen* (Sections 4.504.3 through 4.504.5, 5.504.4.4 through 5.504.4.6, A4.504.1 through A4.504.3, and A5.504.4.5.1 through A5.504.4.9.1).

**Furnishings and  
Seating**

- b) Furnishings and Seating  
Use office furniture and seating that complies with either:
- i. The DGS' Purchasing Standard and Specifications (*Technical Environmental Bid Specification 1-09-71-52*, Section 4.7) or
  - ii. The American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE) *Standard 189.1-2011* (Section 8.4.2.5).
  - iii. CALPIA manufacturing and associated products are compliant with the DGS' Purchasing Standard and Specifications (*Technical Environmental Bid Specification 1-09-71-52*

**Cleaning Products**

- c) Cleaning Products:  
Use cleaning products that are low emitting and meet Green Seal (GS) Standard GS-37, *Cleaning Products for Industrial and Institutional Use*. CALPIA offers GS certified cleaning products at: <http://catalog.pia.ca.gov>

For relevant building types/uses, consider:

- GS-53, *Specialty Cleaning Products for Industrial/Institutional Use*
- GS-8, *Cleaning Products for Household Use*, and
- GS-52, *Specialty Cleaning Products for Household Use*

All GS standards can be found at:

<http://www.greenseal.org/GreenBusiness/Standards.aspx>

**Cleaning  
Procedures**

- d) Cleaning Procedures:
- i. Specify, use and properly maintain effective vacuum cleaners that meet the Carpet and Rug Institute's TM 113 – 110901, *Laboratory Test Procedure for Quantifying Respirable Particulate From Vacuuming Carpet*. Information can be found at: [http://www.carpet-rug.org/documents/technical\\_bulletins/Test\\_Method\\_113.pdf](http://www.carpet-rug.org/documents/technical_bulletins/Test_Method_113.pdf)).
  - ii. Maintain entryways as specified in *CALGreen* (Section A5.504.5.1).
  - iii. Use non-chemical cleaning methods where feasible. Minimize the use of chemicals when cleaning floor surfaces.
  - iv. Follow the cleaning procedures of GS-42, *Commercial and Institutional Cleaning Services*.
  - v. Follow the Carpet and Rug Institute's *Carpet Maintenance Guidelines for Commercial Applications*. See <http://www.carpet-rug.org/commercial-customers/cleaning-and-maintenance/index.cfm>).

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**HVAC Operation and Maintenance**    2. **Provide Appropriate Ventilation, Filtration, and HVAC Equipment Maintenance.**

**Existing Buildings**

- a. Existing Buildings – Maintenance and Operation
- i. Operate HVAC systems continuously during work hours and provide no less than the required minimum outdoor air requirements in effect when the building permit was issued, or if no building permit was issued, when the building was designed, constructed or renovated. Please refer to Cal-OSHA's Title 8 regulations, Section §5142: Mechanically Driven Heating, Ventilating and Air-Conditioning (HVAC) Systems to Provide Minimum Building Ventilation, at <http://www.dir.ca.gov/title8/5142.html>.
  - ii. Inspect HVAC systems at least annually; all HVAC inspections and maintenance shall be documented in writing (as required by Title 8, Section 5142). Annual inspections shall also include:
    - Verification of minimum outdoor airflows using properly calibrated hand-held airflow measuring instruments.
    - Confirmation that air filters are clean and replaced according to the manufacturer's specified interval or more frequently as needed based on specific local or seasonal conditions. Use high Minimum Efficiency Reporting Value (MERV) filters as specified below.
    - Verify that outdoor dampers, actuators, and associated linkages operate properly.
    - Check the condition of all accessible heat exchanger surfaces for fouling and microbial growth, and take action as needed.
    - Check condensate drain pans for proper drainage and possible microbial growth, and take action as needed to correct and to prevent future drain blockages and microbial growth.
    - To the extent accessible, inspect the first 20 feet of all lined ductwork downstream of cooling coils for visible microbial growth. If microbial growth is found, correct and take action to prevent future growth.
    - Ensure that cooling towers are properly maintained and records of chemical treatment of cooling tower water are kept. Cooling tower plume discharges closer than 25 feet to any building intake shall be retrofitted where possible to meet the 25 foot requirement.
    - Building managers shall develop a comprehensive HVAC preventative maintenance program.

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**HVAC Operation  
and Maintenance  
Existing Buildings  
(Cont.)**

- iii. Where feasible, use filters with a MERV rating of no less than 11, as specified in Section A5.504.5.3.1 of *CALGreen*. Existing HVAC systems incapable of accommodating increased pressure drops associated with the 11 MERV rating shall use the highest MERV rating that their fan(s) can accommodate while providing the design airflows. To the extent possible, all fan change-outs shall be sized to accommodate MERV 13 filters.
- iv. Provide ongoing factory training for stationary engineers on proper operation and maintenance of all new and existing equipment, as well as all building management systems.
- v. Initiate a computer-based preventive maintenance program for all HVAC equipment (see DGS' [California Best Practices Manual, Section 2.3.5](#) for a description of the computerized maintenance management system).
- vi. Provide specialized air treatment for buildings in areas where air quality standards are routinely exceeded. Consider using:
  - Particulate matter air filters with a minimum MERV rating of 13 or higher (if feasible) for buildings in areas where the Environmental Protection Agency (US EPA) standards for PM10 (particulate matter) or PM2.5 are routinely exceeded.
  - Ozone-removing air cleaning devices<sup>2</sup> with a minimum volumetric ozone removal efficiency of 40 percent in areas where the US EPA 8-hour average ambient ozone standard is routinely exceeded. These devices should be operated continuously during times that the relevant air quality standard is exceeded and the building is occupied. See <http://www.arb.ca.gov/adam/index.html> or contact your local air quality management district to determine whether a specific site falls into this category.
- vii. Purge buildings prior to daily occupancy with outdoor air, with either the minimum ventilation rate for one hour, or three complete air changes as required for non-residential buildings (Section 120.1(c)2 of the 2013 *California Code of Regulations*, Title 24, Part 6.)

**New/Renovated  
Buildings**

- b. New and Renovated Buildings
  - i. Commission new buildings to ensure proper installation and operation of all building systems, including the proper delivery of the required amount of outdoor air (Title 24, Part 6, Section 120.8).
  - ii. Implement relevant *mandatory* measures and relevant and feasible *voluntary* measures from *CALGreen* (Division 5.5, and Appendix section A5.5).

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**HVAC Operation  
and Maintenance  
New/Renovated  
Buildings (Cont.)**

- iii. Provide specialized air treatment for buildings in areas where air quality standards are routinely exceeded.
  - Use particulate matter air filters with a minimum MERV rating of 13. MERV 16 or HEPA (high efficiency particulate arrestance) filters should be considered where feasible for institutional residential buildings that house sensitive groups such as the elderly or infirm, and buildings used by children.
  - Consider using ozone-removing air cleaning devices<sup>2</sup> with a minimum volumetric ozone removal efficiency of 40 percent in areas where the US EPA 8-hour average ambient ozone standard is routinely exceeded. These devices should be operated continuously during times that the relevant air quality standard is exceeded and the building is occupied. See <http://www.arb.ca.gov/adam/index.html> to determine whether a specific site falls into this category.
- iv. Specify that all HVAC systems above 2,000 cubic feet per minute (cfm) be equipped with outdoor airflow measuring stations and be connected to a building energy management system. Building management systems shall be programmed to provide audible and visible alarms when minimum outdoor airflow rates are not met. If feasible, HVAC systems smaller than 2,000 cfm shall also be equipped with such airflow measuring stations.
- v. Specify that all HVAC systems above 2,000 cubic feet per minute (cfm) be equipped with outdoor airflow measuring stations and be connected to a building energy management system. Building management systems shall be programmed to provide audible and visible alarms when minimum outdoor airflow rates are not met. If feasible, HVAC systems smaller than 2,000 cfm shall also be equipped with such airflow measuring stations.
- vi. Develop an IEQ Construction Management Plan that incorporates measures in *CALGreen* Sections A5.504.1 through A5.504.2 for actions during and after construction to ensure healthful IEQ.

**Water Intrusion  
and Mold**

**3. Prevent Water Intrusion and Growth of Mold**

Keep all buildings clean and sanitary as required by Title 8 Section 3362 (<http://www.dir.ca.gov/Title8/3362.html>). When exterior water intrusion, leakage from interior water sources, or other uncontrolled accumulation of water occurs, the intrusion, leakage or accumulation shall be corrected, typically within 24-48 hours because these conditions may cause the growth of mold.

**Line of Sight and Daylighting****4. Line of Sight and Daylighting – New Buildings**

- a. Toplighting and sidelighting are recommended per *CALGreen* (Section A5.507.2); recommended are the use of light shelves, reflective room surfaces, means to eliminate glare, photosensor controls and not using diffuse daylighting glazing where views are desired. See <http://newbuildings.org/lighting> and [http://www.wbdg.org/resources/daylighting.php?r=dd\\_lightingdsqn](http://www.wbdg.org/resources/daylighting.php?r=dd_lightingdsqn) for additional information.
- b. Direct line of sight to the outdoor environment via vision glazing between 2.5 and 7.5 feet above the finished floor in 90 percent of all regularly occupied areas is required. (*CALGreen* Section A5.507.3).

**Tenant Input****5. Input from Occupants – Existing Buildings**

Input from building occupants should be solicited every two years to obtain feedback on any IEQ and/or comfort concerns. One of the following methods should be used:

- a. Occupant surveys to collect information on IEQ, as well as on other sustainability issues, such as the need or desirability for electric vehicle charging stations, commute alternatives, etc.
- b. Maintenance and regular review of an occupant complaint database documenting complaints related to IEQ and responses to the complaints.

**Resources**

Guidelines and standards can help state agencies achieve acceptable IEQ, including but not limited to:

1. VOC emission limits for building materials established by CDPH (<http://www.cal-iaq.org/separator/voc/standard-method/>);
2. Architectural coatings guidelines and composite wood rules from CARB (see *CALGreen*, <http://www.arb.ca.gov/coatings/arch/docs.htm>, and <http://www.arb.ca.gov/toxics/compwood/compwood.htm>);
3. Green Seal guidelines for cleaning products and processes (<http://www.greenseal.org/GreenBusiness/Standards.aspx>);
4. Ventilation, filtration, and daylighting regulations from the Energy Commission (see current building efficiency standards at <http://www.energy.ca.gov/title24/>);
5. Cal-OSHA requirements (<http://www.dir.ca.gov/title8/5142.html>, <http://www.dir.ca.gov/title8/3362.html>, and others);
6. Measures included in criteria from green building organizations such as those in the US Green Building Council's Leadership in Energy & Environmental Design program (<http://www.usgbc.org/leed/rating-systems/>);

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**Resources  
(Cont.)**

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7. ASHRAE (consensus) standards for ventilation and filtration (<https://www.ashrae.org/>);
  8. California Best Practices Manual: Better Building Management for a Better Tomorrow (<http://www.green.ca.gov/GreenBuildings/BBBTManual.aspx>);
  9. California Buying Green Guide: Standards and Specifications for Environmentally Preferable Purchases (<http://www.dgs.ca.gov/buyinggreen/Home/BuyersMain.aspx>); and
  10. Building Standards Commission Guidebooks (<http://www.bsc.ca.gov/pubs/guides.aspx>).
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**Questions**

If you have any questions or concerns regarding these matters, contact:

- Peggy Jenkins, California Air Resources Board, [mjenkins@arb.ca.gov](mailto:mjenkins@arb.ca.gov); or
  - Leon Alevantis, California Department of Public Health, [Leon.Alevantis@cdph.ca.gov](mailto:Leon.Alevantis@cdph.ca.gov)
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**Signature**



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Fred Klass, Director  
Department of General Services

5/21/14

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Date

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**Notes:**


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<sup>1</sup> Note that you may have to access several documents to determine the current requirements. *CALGreen* Section numbers cited in this document are for the 2013 *CALGreen Code*; note that section numbers may change in future versions. The link will be updated, when updates become available.

<sup>2</sup> Some air cleaning devices advertised to remove ozone or volatile organic compounds (VOC) such as those using photocatalytic oxidation (PCO) may produce hazardous secondary pollutants and should be avoided pending further research on their safety. The most effective filtration technologies currently available to provide limited removal of ozone and VOC include those using activated carbon, potassium permanganate, and Purafil® media.