

SAM – ENERGY AND SUSTAINABILITY

ENSURING A HEALTHY INDOOR ENVIRONMENT

1825.4

(New 8/2014)

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:

Step 1: Use Indoor Products and Materials That Emit Little or No Harmful Chemicals

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).
- 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).

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*).

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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>

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
- 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/Carpet-for-Business/Cleaning-and-Maintenance.aspx>

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Step 2: Provide Appropriate Ventilation, Filtration, and HVAC Equipment Maintenance.

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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- 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 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.](#))

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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).
- 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 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.

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- 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.

Step 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.

Step 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_lightingdsn 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).

Step 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 response to the complaints.