

Indoor Air Quality Testing in the Living Building Challenge 1.3/2.0/2.1

Prerequisites 13 and 14/Imperative 9

TESTING REQUIREMENTS

The following table provides a summary of requirements, which are included as reference thresholds:

LIVING BUILDING CHALLENGE INDOOR AIR QUALITY GUIDELINES

Requirement	Thresholds Specified for 1.3	Thresholds Specified for 2.0/2.1
Ventilation rates must be designed to comply with ASHRAE 62	ASHRAE 62.1-2007 and 62.2-2007	ASHRAE 62.1-2010 and 62.2-2010
CO Monitors	not specified	9 ppm or 2+outdoor level (Transects L3-L6)
CO2 Monitors	not specified	1000 ppm or 500 + outdoor level (Transects L3-L6)
Temperature Monitors	not specified	not specified
Humidity Monitors	not specified	not specified
Respirable Suspended Particulates	not specified	30 micrograms per cubic meter by mass measurement or 900,000 f3 by laser particle counter
Total Volatile Organic Compounds	All interior finishes, paints and adhesives must comply with SCAQMD 2007/2008 standards. All other interior materials such as flooring and case works must comply with California Standard 01350 for IAQ emissions.	500 micrograms per cubic meter

LIVING BUILDING CHALLENGE 2.0/2.1

The original intent of these thresholds was to offer context for the testing results. As indicated in Footnote 38 of versions 2.0 and 2.1 of the Standard:

Maximum thresholds will not be used to test compliance with the Living Building Challenge, but are listed in the Dialogue for reference.

Also stated in the following Dialogue post from February 7, 2012:

For projects pursuing certification under version 2.0 or previous releases of the Standard, the successful documentation of this Imperative is independent of whether the recorded concentration levels in the projects are lower than the reference thresholds. Rather, it is the testing process and the published results that are significant. This information serves as a valuable tool that allows the building industry to better attribute the relative influence of such vigorous product specification and construction practices, as well as the occupants' daily activities, on indoor air quality.

As of the date of this publication, teams must show they have met the reference thresholds using the testing protocols outlined in this document. If the testing results do not show compliance with these reference thresholds, then the project team must put an action plan in place to achieve levels below the reference thresholds.

TESTING PROTOCOL

The Living Building Challenge indoor air quality testing protocol is based upon the United States Environmental Protection Agency Compendium of Methods for the Determination of Air Pollutants in Indoor Air¹. Specific testing requirements are as follows:

CONDITIONS REQUIRED PRIOR TO AND DURING PRE-OCCUPANCY TESTING

1. All pollution-generating construction activities must be completed. Such activities include drywall-sanding, woodcutting or sanding, painting or other wet product application, installing of furnishings, cleaning of any kind

¹ US Environmental Protection Agency 600/S4-90-010, May 1990

(such as cleaning with solvents or sweeping). Unpacking boxes and limited final finish trim work and nonpolluting punch-list work may be acceptable.

2. For central HVAC systems, all doors and windows must remain closed for 24 hours prior to testing except for ingress and egress. For naturally ventilated buildings, the windows should be open the minimum amount to maintain minimum ventilation rates and comfort conditions.
3. Ventilation systems must be operating in normal occupancy mode. No commissioning, smoke test, fire damper testing or TAB work may be underway.
4. HVAC systems may not be in air economizer mode (more than minimum outdoor air introduced during cooling cycle when cool outdoor air is available). The systems must be operating with local jurisdiction required minimum outdoor air.
5. Electrical power will remain on during the testing.
6. At the completion of testing, the IAQ testing firm must be provided a written document from the building prime contractor stating that the above conditions were met during the testing.

TESTING REQUIREMENTS

1. Samples must be taken for a minimum of four hours in each area.
2. One data set for each 2,320 m² (25,000 ft²) for areas tested in commercial and institutional buildings must be included, if the areas are served by the same or identical HVAC systems and have similar uses. Areas with significantly different uses (shops, labs, gyms, cafes) must be tested separately.
3. One data set for each 140 m² (1,500 ft²) for areas tested in residential buildings must be included for single story buildings, or for buildings with multiple stories, for each occupied floor level.
4. Testing shall be done in the anticipated breathing zones of people using the space (approximately 1 m (3 ft) above the floor for seated people and 1.5 m (5 ft) above the floor for standing people). All building occupants should continue their normal activities during testing.
5. One outdoor control sample must be collected for all buildings where three or more samples are collected. The sample must be collected within 1.5m (4 ft) of the outdoor air inlet of the building, and weather and wind conditions must be noted.
6. The final IAQ testing report should include:
 - a. Date, times and locations tested. Include location selection criteria.
 - b. Executive summary.
 - c. Sampling methods:
 - i. Describe test instruments used – name, model number and use.
 - ii. Calibration certifications of the test equipment used.
 - iii. Airflow sampling rates.
 - iv. Environmental Lab accreditations, qualifications and certifications.
 - v. Qualifications of testing staff.
 - vi. Conditions during sampling, approximate number of occupants, occupant activities, HVAC, windows open, and weather.
 - vii. Unusual conditions or events prior to or during the testing.
 - viii. Findings.
 - ix. Environmental lab report.
 - x. Interpretation of the lab report and findings.
 - xi. Conclusions and recommendations.

CONDITIONS REQUIRED PRIOR TO AND DURING POST-OCCUPANCY TESTING

1. The building shall be occupied and operated normally for 24 hours prior to and during all testing. Testing must be done during normal working hours with at least 75% of building occupants present.
2. For central HVAC systems designed to maintain comfort and ventilation conditions for the building, all doors and windows must remain closed except for ingress and egress for 24 hours prior to, and during all testing. For naturally ventilated buildings windows should be open the minimum amount to maintain minimum ventilation rates and comfort conditions during the sampling period.
3. The ventilation systems must be operating in normal occupancy mode. The HVAC systems must not be in economizer mode (more than minimum outdoor air introduced during cooling cycle when cool outdoor air is available). The systems must be operating with local jurisdiction required minimum outdoor air. The conditions of the natural ventilation system during the testing must be documented by the building facilities/operations manager and confirmed by the IAQ testing firm.
4. At the completion of testing, the IAQ testing firm will be provided a written document from the building facilities/operations manager stating that the above conditions were met during the testing.

5. At the completion of testing, the IAQ testing firm shall be given unrestricted access to the HVAC system monitoring data that will be used to complete the final IAQ post-occupancy testing.