

## SPECIAL SPECIFICATION

### SECTION 01445S

#### TESTING FOR INDOOR AIR QUALITY, BASELINE IAQ, AND MATERIALS

##### PART 1 - GENERAL

###### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, other Division-1 Specification sections, and specifications of materials mentioned in this section, apply to this section.

###### 1.02 WORK INCLUDED

- A. General: This section provides (1) requirements Baseline IAO Testing for maximum indoor pollutant concentrations for acceptance of the facility, and (2) requirements for Independent Materials Testing of specific materials anticipated to have major impact on IAQ.
- B. This section specifies procedures for testing specific construction materials for Indoor Air Quality (IAQ) performance to assure compliance with EPA's IAQ program. Materials have been identified for independent testing based on the following three criteria: (1) large volume of the material used in office space, (2) the space is occupied during normal working hours, and (3) materials are used in an area where there is recirculating air.

###### 1.03 RELATED WORK:

- A. Additional specifications for baseline testing for Indoor Air Quality are included in Division 15 "Testing, Adjusting and Balancing."
- B. Sequencing of installation of finish materials during construction to avoid IAQ contamination of building systems is specified in Division 1 "Sequence of Finish Installation."
- C. Cleaning of HVAC system including all duct work, air intakes and returns, and changing of filters as specified in Division 15 "Testing, Adjusting and Balancing" section.
- D. Manufacturer's data shall be supplied for products, including content and outgassing of emissions as specified in Division 1 "Descriptive Submittals".

###### 1.04 SUBMITTALS

- A. Baseline IAO Testing: Submit a report for each test site specified for IAQ baseline testing as prescribed in Division 15 "Testing, Adjusting, and Balancing". Report on air concentrations of targeted pollutants as identified in Table 3.1 of this section.

- B. Product Emissions Test Reports: Submit a report for each material emissions test performed. Test results will be reported in terms of emission factors that will be used by EPA to model indoor air concentrations. These reports and the modeling data prepared by EPA shall be maintained in the "Sustainable Materials Log" specified in Division 1 "Descriptive Submittals".

#### 1.05 QUALITY ASSURANCE

- A. All material tests shall be performed in accordance with ASTM D 5116, "Standard Guide for Small Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products" (1990). Report results in accordance with Section 11 of the referenced ASTM Guide.

#### 1.06 SEQUENCING AND SCHEDULING

- A. Identify, program, and schedule any product emissions testing well in advance of construction in a manner to prevent delays to the performance of the work of this Contract.

### PART 2 - PRODUCTS

### PART 3 - EXECUTION

#### 3.01 BASELINE IAQ TESTING

- A. HVAC System Verification: To assure compliance with recognized standards for indoor air quality including ASHRAE Standard 62-1989 or latest version, the Contractor's independent testing and balancing agency shall verify the performance of each HVAC system including space temperature and space humidity uniformity, outside air quantity, filter installation, drain pan operation, and any obvious contamination sources.
- B. Indoor Air Quality Testing: Upon verification of HVAC system operation, the Contractor shall hire an independent contractor, subject to approval by the Contracting Officer's Representative, with a minimum of 5 years experience in performing the types of testing specified herein, to test levels of indoor air contaminants for compliance with specified requirements.
  1. A test plan shall be submitted for the approval of the Contracting Officer's Representative. The plan shall specify procedures, times, instrumentation, and sampling methods that will be employed.
  2. Testing will be done in 16 different locations. Contaminant levels are to be measured on each floor of each office building in an area agreed upon by the Contractor and the Contracting Officer's Representative. Areas with very high outside air ventilation rates such as laboratories are excluded from these testing requirements. The Contracting Officer's Representative is the sole judge of areas exempt from testing.
  3. Collect air samples on three consecutive days during normal business hours (between the hours of 8:00 am and 5:00 pm) with building operating at normal

HVAC rates. Average the results of each three-day test cycle to determine compliance or non-compliance of indoor air quality for each air handling zone tested.

4. Sample and record outside air levels of formaldehyde and TVOC contaminants at outside air intake of each respective airhandling unit simultaneously with indoor tests to establish basis of comparison for these contaminant levels. Indoor testing will be done in the breathing zone; between 4' and 7' from the floor.
  5. Acceptance of respective portions of buildings by the Owner is subject to compliance with specified limits of indoor air quality contaminant levels.
- C. Compliance Indoor air quality shall conform to the following standards and limits:
1. Carbon Monoxide: Not to exceed 9 ppm.
  2. Carbon Dioxide: Not to exceed 800 ppm.
  3. Airborne Mold and Mildew: Simultaneous indoor and outdoor readings.
  4. Maximum Air Concentration Standards: Indoor room air concentration levels, emission rates, and qualities of the listed contaminants shall not exceed the following limits specified in Table 3.1 below.
- D. Test Reports: Prepare test reports showing the results and location of each test, a summary of the HVAC operating conditions, a listing of any discrepancies and recommendations for corrective actions, if required.
1. Include certification of test equipment calibration with each test report.
- E. If any test fails the standard, the Contractor is responsible to ventilate the building with 100% outside air until the building passes both air quality tests and duct inspections. Retesting shall be performed at no additional expense to Sandia.

Table 3.1 MAXIMUM INDOOR AIR CONCENTRATION STANDARDS

Indoor Contaminants	Allowable Air Concentration Levels*
Formaldehyde	<20 micrograms per cubic meter**
Total Volatile Organic Compounds (TVOC)	<200 micrograms per cubic meter**
4-Phenylcyclohexene (4-PC)***	<3 micrograms per cubic meter
Total Particulates (PM)	<20 micrograms per cubic meter

meter

Regulated Pollutants

<NAAQS

\* All levels must be achieved prior to acceptance of the building. The levels do not account for contributions from office furniture, occupants, and occupant activities.

\* \* Above outside air concentrations.

\*\*\* 4-phenylcyclohexene is an odorous contaminant constituent in carpets with styrene-butadienelatex rubber (SBR).

TLV-TWA Threshold Limit Value - Time Weighted Average

### 3.02 INDEPENDENT MATERIALS TESTING:

- A. **Materials That Must Be Tested:** All materials listed below that are proposed for use on this project shall be tested for permanent, in-place Indoor Air Quality performance in accordance with requirements of these specifications. Results shall be furnished to the Contracting Officer's Representative. Materials meeting the criteria for independent testing are as follows:
1. Field applied paint systems on appropriate substrate. Paint primers and intermediate coats (if used) should be applied with a typical drying time allowed between coats (not to exceed 7 days).
  2. Carpet including manufacturer's recommended adhesive. The carpet will be applied to the appropriate concrete flooring per manufacturer's instructions so that the testing is of the "carpet assembly".
  3. Ceiling tile.
  4. Fireproofing material applied to appropriate substrate
- B. **Materials For Testing:** Only test representative samples of actual products selected for use on this project. Tests of products generically and/or technically similar but produced by a manufacturer other than that of the product selected for use on this project is invalid.
- C. **Materials Testing Parameters**
1. Wrap each material to be tested in air tight covering for shipment direct from the factory to the testing laboratory to avoid contamination in transit. Unwrap material or apply material to substrate if material is wet-applied, such as paint or adhesive materials) in the testing lab.
  2. **Emissions Testing:** Perform all testing in accordance with ASTM D 5116, "Standard Guide for Small Scale Environmental Chamber Determinations of Organic Emissions from indoor Materials/Products" (1990). Report results in accordance with Section ii of referenced ASTM Guide. Report in terms of emission rates at a minimum of three distinct time intervals (e.g., 1 hour, 24

hours, 72 hours) that will be modeled by EPA to predict maximum indoor air concentrations and to assist the Contractor in determining suitability of products or materials. Assumptions that will be used for the EPA model are given below for information. This computer model will also be available to the Contractor at no cost.

3. Table 2.2 summarizes required product testing.

Table 3.2 PRODUCT EMISSION TESTING

Product Assembly to be tested:	TVOC ASTM)	(per PM NIOSH)	(per
Office wall paint on appropriate substrate, including any primer coat	Yes	No	
Carpet including adhesive and concrete flooring	Yes	No	
Ceiling Tile	No	Yes	
Fireproofing material on appropriate substrate	No	Yes	

- D. Model Assumptions Used by EPA for Predicting Indoor Air Concentrations: The model will assume the standard room enclosure as 10' long x 10' wide x 9' high. Each product tested will be modeled separately to provide information on the particular product. The model will assume a ventilation rate of one air change per hour.
  1. Field Applied Faint Systems: Test fully cured samples of each complete paint system including primers, intermediate coats (if used), and finish coats. The model assumes application to all four walls and one-half of ceiling of model standard room enclosure.
  2. Carpet and Adhesive Assembly: Assumes application to entire 10' x 10' floor surface of model standard room enclosure.
  3. Ceiling Tile: Assumes application to entire 10' x 10' ceiling surface of model standard room enclosure.
  4. Fireproofing: Assumes application to entire 10' x 10' area above the ceiling surface of model standard room enclosure.
- E. Materials Test Reports: Submit test reports to the Contracting Officer's Representative. The report shall include the information outlined in Section 11 of ASTM D 5116-90.
- F. Product/Material Evaluation: All products/materials shown by testing to comply with emissions limits and other criteria specified in this section will be approved for use on this project subject to compliance with all other specified requirements of the Project Manual. Products/materials shown by EPA's model to exceed specified

emission limits shall be discussed, test results interpreted, and a determination made as to alternative product uses or selections.

END OF SECTION