# SECTION 01445 - TESTING FOR INDOOR AIR QUALITY, BASELINE IAQ, & MATERIALS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 specification sections, apply to this section.

### 1.2 SECTION INCLUDES

A. Requirements of Baseline Indoor Air Quality (IAQ) Testing for maximum indoor pollutant concentrations for acceptance of the facility.

B. Requirements for Independent Materials Testing of specific materials anticipated to have major impact on IAQ.

### 1.3 RELATED SECTIONS

A. Section 15950 - Testing, Adjusting and Balancing: Additional requirements for baseline testing for IAQ.

B. Section 15950 - Testing, Adjusting and Balancing: Cleaning of HVAC system including duct work, air intakes and returns, and changing of filters.

### 1.4 SUBMITTALS

A. Baseline IAQ Testing: Submit a report for each test site specified for IAQ baseline testing as prescribed in Section 15950. 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 the Owner to model indoor air concentrations.

### 1.5 QUALITY ASSURANCE

A. Perform material tests in accordance with ASTM D5116, “Standard Guide for Indoor Materials/Products.” Report results in accordance with ASTM D5116.

## PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 BASELINE lAQ 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 Owner, with a minimum of five (5) years experience in performing the types of testing specified herein, to test levels of indoor air contaminants for compliance with specified requirements.
   1. Submit a test plan for the approval of the Owner and Architect. The plan shall specify procedures, times, instrumentation, and sampling methods that will be employed.
   2. Perform testing in 16 different locations. Contaminant levels are to be measured on each floor of each building in an area agreed upon by the Contractor and the Architect. Areas with very high outside air ventilation rates such as laboratories are excluded from these testing requirements. The Architect is the sole judge of areas exempt from testing.
   3. Collect air samples on three (3) 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 air handling unit simultaneously with indoor tests to establish basis of comparison for these contaminant levels. Indoor testing will be done in the breathing zone; between four (4) and seven (7) feet from the floor.
   5. Acceptance of respective portions of building by the Architect 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 nine (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 percent outside air until the building passes both air quality tests and duct inspections. Retesting shall be performed at no additional expense to the Owner.

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 |
| 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 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

F. Credit EQ 3.1: Comply with SMACNA IAQ Guideline for Occupied Buildings under Construction.

G. Credit EQ 3.2:
   1. Conduct a two-week building air flush-out after construction ends with new filtration media and 100 percent outside air. Replace filtration media after building air flush-out.
      a. Section 15950, building air flush-out is specified in detail.
   2. Engage an independent testing and inspecting agency to conduct a baseline indoor air quality testing program according to EPA Protocol for Environmental Requirements, Baseline IAQ and Materials.

3.2 INDEPENDENT MATERIALS TESTING

A. Materials That Must Be Tested: Test materials listed below that are proposed for use on this project for permanent, in-place Indoor Air Quality performance in accordance with requirements of these specifications. Results shall be furnished to the Architect. 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 seven (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 D5116, "Standard Guide for Small Scale Environmental Chamber Determinations of Organic Emissions from indoor

Materials/Products." 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., one (1) hour, 24 hours, 72 hours) that will be modeled by the Architect 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 Architect's 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 (per ASTM) | PM (per NIOSH) |
|---|---|---|
| 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 (1) air change per hour.

1. Field Applied Paint 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 (4) walls and one-half of ceiling of model standard room enclosure.
2. Carpet and Adhesive Assembly: Assumes application to entire 10 x 10 ft floor surface of model standard room enclosure.
3. Ceiling Tile: Assumes application to entire 10 x 10 ft ceiling surface of model standard room enclosure.
4. Fireproofing: Assumes application to entire 10 x 10 ft area above the ceiling surface of model standard room enclosure.

E. Materials Test Reports: Submit test reports to the Owner and Architect. The report shall include the information outlined in Section 11 of ASTM D5116.

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