

SECTION 014400 - CONSTRUCTION INDOOR AIR QUALITY

PART 1 - GENERAL

1.1 SUMMARY

- A. IAQ Management Goals.
- B. IAQ Management Plan.
- C. IAQ Management Plan Implementation.

1.2 IAQ MANAGEMENT GOALS

- A. The Government has established that this Project shall prevent indoor air quality problems resulting from the construction process, to sustain long term installer and occupant health and comfort.
- B. Protect the ventilation system components during construction and cleanup of contaminated components after construction is complete.
- C. Control sources of potential IAQ pollutants by controlling selection of materials and processes used in project construction.
- D. With regard to these goals the Contractor shall develop, for Government and Architect's review, an IAQ Management Plan for this Project.

1.3 SUBMITTALS

- A. Construction IAQ Management Plan highlighting the five requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3 "Control Measures".
- B. Photographs documenting construction IAQ management measures implemented during construction such as duct protection measures and measures to protect on-site stored or installed absorptive materials from moisture.
- C. Cut sheets of filtration media used during construction and installed immediately prior to occupancy with MERV values highlighted
- D. Submit a letter from the Contractor describing building flushout procedures including actual dates of building flushout.

PART 2 - PRODUCTS

2.1 IAQ MANAGEMENT PLAN

- A. Develop a Draft Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows: (1) during construction meet or exceed the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction 1995, Chapter 3, (2) Protect stored on-site or installed absorptive materials from moisture damage, and (3) conduct a minimum two-week building flushout after construction ends and prior to occupancy.
1. The SMACNA IAQ Guidelines for Occupied Buildings under Construction provides an overview of air pollution associated with construction, control measures, construction process management, quality control, communicating with occupants, and case studies. These guidelines can be accessed at [www.smacna.org](http://www.smacna.org). Chapter 3 of the SMACNA Guidelines recommends Control Measures in five areas: HVAC protection, source control, pathway interruption, housekeeping, and scheduling. Review the applicability of each Control Measure and include those that apply in the Draft IAQ Management Plan.
    - a. HVAC Protection: Shut down the return side of the HVAC system whenever possible during heavy construction. If the system must remain operational during construction include the following strategies that apply:
      - 1) Fit the return side of the HVAC system with temporary filters of MERV 8 or better.
      - 2) Isolate the return side of the HVAC system from the surrounding environment as much as possible (e.g., place all tiles for the ceiling plenum, repair all ducts and air handler leaks).
      - 3) Damper off the return system in the heaviest work areas and seal the return system openings with plastic.
      - 4) Upgrade the filter efficiency where major loading is expected to affect operating HVAC system.
      - 5) Clean permanent return air ductwork per National Air Duct Cleaning Association standards upon completion of all construction and finish installation work.
      - 6) Install new clean media just prior to substantial completion and occupancy that has a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ASHRAE 52.2-1999.
    - b. Source Control: Propose the substitution of non-toxic formulations of materials that are generally the responsibility of the contractor such as caulks, sealants, and cleaning products.
    - c. Pathway Interruption: Prevent contamination of clean spaces. Include the following strategies that apply:
      - 1) Use 100% outside air ventilation (when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30% and 60%) with air exhausted directly to the outside during installation of finishes and other VOC emitting materials.
      - 2) Erect some type of barrier between work areas or between the inside and outside of the building to prevent unwanted airflow from dirty to clean areas
    - d. Housekeeping: Reduce construction contamination in the building prior to occupancy through HVAC and regular space cleaning activities.

- 1) Store building materials in a weather tight, clean area prior to unpackaging for installation.
  - 2) Check for possible damage to the HVAC and Building system from high humidity.
  - 3) Clean all coils, air filters, and fans before testing and balancing procedures are performed.
- e. Scheduling: Specify construction sequencing to reduce absorption of VOC's by materials that act as sinks or contaminant sources. Complete application of wet and odor-emitting materials such as paints, sealants, and coatings before installing sink materials such as ceiling tiles, carpets, insulation, gypsum products, and fabric-covered furnishings are installed.
2. Protect stored on-site or installed absorptive materials from exposure to moisture through precipitation, plumbing leaks, or condensation from the HVAC system to prevent microbial contamination.
  3. As part of Indoor air quality management, one of the following requirements has to be met:
    - a. Building Flush Out: Just prior to Substantial Completion with all interior finishes installed, flush out building continuously (i.e. 24 hours per day, seven (7) days a week) by supplying a minimum of 99 109 L (3500 cu.ft) of outdoor air per sq. m (sq.ft) of floor area while maintaining an internal temperature of at least 16 deg C (60 deg F) and a relative humidity of 60%.
      - 1) Conduct building flushout with new filtration media at 100% outside air after construction ends and prior to occupancy. Filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ASHRAE 52.2-1999.
      - 2) When Contractor is required to perform touch-up work, provide temporary construction ventilation during installation and extend building flush-out by a minimum of four (4) days after touch-up installation with maximum tempered outside air for 24 hr per day.
      - 3) If construction schedule permits, extend flush-out period beyond 15 days.
      - 4) Return ventilation system to normal operation following flush-out period to minimize energy consumption.
    - OR
    - 5) Provide a copy of the IAQ testing results indicating that the maximum chemical contaminant concentration requirements are not exceeded.
  4. As part of Indoor air quality management, one of the following requirements has to be met:
    - a. Building Flush Out, Option 1: Just prior to Substantial Completion with all interior finishes installed, flush out building by supplying a minimum of 396 424 L (14,000 cu.ft) of outdoor air per sq. m (sq.ft) of floor area while maintaining an internal temperature of at least 16 deg C (60 deg F) and a relative humidity no higher than 60%.  
  
OR

- b. Building Flush Out, Option 2: if occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 99 109 L (3500 cu.ft) of outdoor air per sq. m (sq.ft) of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm/sq. ft. of outside air of the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 396 424 L (14,000 cu.ft) of outside air has been delivered to the space.

OR

- c. Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the United States Environmental Protection Agency Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the LEED for Schools Reference Guide. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:

- 1) Formaldehyde: 50 part per billion.
- 2) Particulates (PM10): 50 micrograms per cubic meter.
- 3) Total Volatile Organic Compounds (TVOC): 500 micrograms per cubic meter.
- 4) \* 4-Phenylcyclohexene (4-PCH): 6.5 micrograms per cubic meter.
- 5) Carbon Dioxide: 9 parts per million and no greater than 2 parts per million above outdoor levels.

\* This test is only required if carpets and fabrics with styrene butadiene rubber (SBR) latex backing materials are installed as part of the base building systems.

- B. Draft IAQ Management Plan Review Meeting: Once the Site Representative and Architect have reviewed the Draft IAQ Management Plan and prior to construction at the site, schedule and conduct a meeting to review the Draft IAQ Management Plan and discuss procedures, schedules and specific requirements for IAQ during the construction and pre-construction phases of the building. Discuss coordination and interface between the Contractor and other construction activities. Identify and resolve problems with compliance to the requirements. Record minutes of the meeting, identify all conclusions reached and matters requiring further resolution.

- 1. Attendees: The Contractor and related Contractor personnel associated with the work of this section, including personnel to be in charge of the IAQ management program, Architect, Owner and such additional personnel as the Architect or Owner deems appropriate.

- C. Final IAQ Management Plan: Make any revisions to the Draft IAQ Management Plan agreed upon during the meeting identified in item (B) above and incorporate resolutions agreed to be made subsequent to the meeting. Submit the revised plan to the Owner and Architect for approval within 10 calendar days of the meeting.

### PART 3 - EXECUTION

3.1 IMPLEMENTATION OF IAQ MANAGEMENT PLAN

- A. Manager: The Contractor shall designate an on-site party (or parties) responsible for instructing workers and overseeing and the IAQ Management Plan for the Project.
- B. Progress Meetings: Construction related IAQ procedures shall be included in the pre-construction and construction progress meeting agendas.
- C. Distribution: The Contractor shall distribute copies of the IAQ Management Plan to the Job Site Foreman, each Subcontractor, the Site Representative, and the Architect.
- D. Instruction: The Contractor shall provide on-site instruction of the IAQ procedures and ensure that all participants in the construction process understand the importance of the goals of the IAQ Management Plan.

END OF SECTION 014400