SECTION 01 8119

CONSTRUCTION INDOOR AIR QUALITY

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes general requirements and procedures for achieving Owner's indoor air quality goals for job site operations on project, within the limits of the construction schedule, contract sum, and available materials, equipment, products and services.

1. These goals include:
   a. Protect workers on the site from undue health risks during construction.
   b. Install low-VOC materials.
   c. Prevent residual problems with indoor air quality in the completed building.
   d. Provide and maintain adequate air exchanges during construction by providing ventilation equipment, coordinated with spaces experiencing high humidity, curing, off-gassing and other polluting activities.
2. Contractor shall develop a Construction Indoor Air Quality Management Plan (alternately referred to as “the Plan”) for approval by the Owner and Architect. The Plan shall be implemented throughout the duration of the project construction.

1.2 DEFINITIONS

A. Volatile Organic Compounds (VOC’s): Chemical compounds common in and emitted by many building products, including solvents in paints, coatings, adhesives and sealants, wood preservatives; composite wood binder, and foam insulations. Not all VOC’s are harmful, but many of those contained within building products contribute to the formation of smog and irritate (at best) building occupants by their smell and/ or health impact.

B. Materials that act as “sinks” for VOC contamination: Absorptive materials, typically dry and soft (such as textiles, carpeting, acoustical ceiling tiles and gypsum board) that readily absorb VOC’s emitted by “source” materials and release them over a prolonged period of time.

C. Materials that act as “sources” for VOC contamination: Products with high VOC contents that emit VOC’s either rapidly during application and curing (typically "wet" products, such as paints, sealants, adhesives, caulks and sealers) or over a prolonged period (typically “dry” products such flooring coverings with plasticizers and engineered wood with formaldehyde:

1.3 SUBMITTALS

A. Submit a detailed Construction Indoor Air Quality Management Plan within thirty (30) working days of construction start. Provide data on VOC levels for all adhesives, caulks, sealants, finishes, paints, other architectural and industrial maintenance coatings, and other items which could affect air quality; also provide information on manufacturers’ recommended maintenance, cleaning, refinishing and disposal procedures for materials and products.

1.4 SUBMITTALS

A. Construction IAQ Management Plan highlighting the five requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction, 2nd Edition 2007, Chapter 3 “Control Measures”.

B. Cut sheets of filtration media used during construction and installed immediately prior to

occupancy with MERV values highlighted:

C. Submit a letter from the Contractor describing building flush-out procedures including actual dates of building flush-out, hours of ventilation, ventilation rates, and indoor temperature and humidity levels.

1.5 IAQ MANAGEMENT GOALS

A. Owner 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.

1. Protect the ventilation system components during construction and cleanup of contaminated components after construction is complete.
2. Control sources of potential IAQ pollutants by controlling selection of materials and processes used in project construction.

1.6 IAQ MANAGEMENT PLAN

A. Within fourteen (14) working days after receipt of Notice of Award and prior to beginning any work on the site, the Contractor shall develop and submit to the Owner for review a construction indoor air quality management plan.

B. The IAQ management plan shall comply with the five requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3: HVAC protection, source control, pathway interruption, housekeeping, and scheduling and shall include:

1. List of IAQ protective measures to be instituted on the site:
   a. HVAC system protection during construction.
   b. Source control through specification and installation of low-toxic or non•toxic materials.
   c. Pathway interruption to isolate work areas where emitting materials are being installed.
   d. Housekeeping to protect materials that are stored before installation and to avoid spreading contamination through the Project.
   e. Sequencing installation of materials to avoid contaminating absorptive materials during construction.
2. Schedule for inspection and maintenance of IAQ measures.

1.7 IMPLEMENTATION OF IAQ MANAGEMENT PLAN

A. Manager: Contractor shall be 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 construction progress meeting agendas.

C. Preinstallation Meetings: Construction related IAQ procedures shall be included in the construction preinstallation meeting agendas.

D. Distribution: Contractor shall distribute copies of the IAQ Management Plan to the Job Site Foreman, each Subcontractor, the Owner, Contractor, and Architect.

E. Instruction: Contractor shall provide on-site instruction of IAQ procedures and ensure that each participant in the construction process understands the importance of each IAQ Management Plan goal.

1.8 SCHEDULING

A. Install porous materials only after closing-in building. Porous materials, such as insulation, fireproofing, carpet and drywall, shall not be installed until the building envelope is fully weathertight.

B. Account for curing time and offgassing when scheduling construction activities. It is important to understand which materials will offgas VOCs or release moisture as they cure and how long that curing will take. Incorporate this information into the scheduling of various construction activities. See specific recommendations below.

C. Install carpeting and furnishings after interior finishes have cured. Some have suggested that the VOCs emitted from carpeting or furnishings can adsorb onto unfinished drywall and other porous materials. As a precaution, the Contractor is to paint walls before installing carpeting, furnishings, adhesives or other material that may offgas significant levels of VOCs.

D. Provide adequate ventilation during curing period. To aid in curing of interior finishes and other products used during construction and to remove pollutants, provide proper filtration and adequate ventilation with 100% outside air. During humid periods or when very high moisture materials are present, significant dehumidification may be required during this curing period. Dedicated ventilation will be used for curing materials that release VOC’s.

1. Construct interior porous materials like woodwork and casework to allow for expansion and contraction due to moisture fluctuations during bake-out or high ventilation.

PART 2 PRODUCTS

2.1 PRODUCTS

A. If air handlers must be used during construction, temporary filtration media with a Minimum Efficiency Reporting Value (MERV) of 8, as determined by ASHRAE 52.5 - 1999, must be used at each return air grille.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. Use safety meetings, signage, and Subcontractor agreements to communicate the goals of the construction indoor air quality management construction plan.

B. Conduct regular inspection and maintenance of indoor air quality measures including ventilation system protection, and ventilation rate.

C. Heat, dehumidify, and ventilate building during course of Work. Maintain environmental conditions suitable for drying and curing materials and for prevention of conditions suitable for mold and mildew growth.

1. Ventilate building to remove moisture, dust, fumes, and odors.
2. Temper and dehumidify air to remove excess moisture.
3. Do not use propane heaters and other moisture generating heating systems.

D. Require VOC-safe masks for interior and exterior workers installing VOC-emitting products (products that contain 150 g/ L or more VOCs).

E. Use low-toxic cleaning supplies for surfaces, equipment, and worker’s personal use.

F. Smoking is prohibited inside the building once the building is closed in by any means or absorptive materials are located within the structure.

3.2 VENTILATION SYSTEM PROTECTION:

A. Do not run HVAC system during course of construction without prior written approval of Owner or as otherwise permitted by these specifications. Seal ductwork intake and exhaust vents to prevent contamination from dust, moisture, and chemical contamination.

B. Store HVAC equipment in a clean, dry location.

C. Seal all HVAC inlets and outlets.

D. Seal HVAC components during installation.

E. Use a temporary ventilation system during construction.

F. Use temporary filtration media.

1. Temporary filtration media shall have a Minimum Efficiency Reporting Value [MERV] of 8 as determined by ASHRAE 52.2-1999) on any return air systems operational during construction. For air intakes into rooms that are very sensitive to dust contamination, such as computer rooms, filtration media should be the best that the HVAC systems fans can handle, up to an MERV rating of
2. Permanent filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 13, as determined by ASHRAE 52.519

G. Clean air plenums before closing them in.

H. Inspect filters regularly.

3.3 MICROBIAL AND FUNGAL CONTAMINATION PREVENTION

A. Perform, schedule, and sequence Work as required to limit conditions supporting formations of microbes, molds, and fungi:

1. Ensure that construction detailing will not result in moisture intrusion.
2. Protect on-site stored and installed absorptive materials (such as insulation, drywall, and wood) from moisture damage and from contamination by construction dust, debris, and fumes during all phases of construction, both before and after installation.
3. Control water penetration, dampness, and humidity to protect products not treated for exterior use.
4. Do not install moisture-damaged materials.

B. When visible microbial, mold and fungal formations are observed, promptly contact Owner and Architect for determination by industrial hygienist employed by Owner.

1. Clean non-absorbent materials using low hazard cleaners accepted by Owner and Architect.
2. Remove and replace affected materials that cannot be completely cleaned by non-abrasive surface treatments.
3. Remove and replace affected materials identified as being food sources for microbes, molds, and fungi.

C. Remove interior products and finishes, identified as food sources, that have absorbed sufficient moisture to become damp, and are not immediately made dry, whether or not microbial, mold, or fungal growth is observed. Include:

1. Gypsum board.
2. Organic materials composed of cellulose fiber or paper.
3. Materials containing sucrose or other binders and glues identified as supporting microbial growth.
4. Fibrous insulation materials including duct liner, fiberglass insulation, and mineral fiber.
5. Mechanical ductwork.

D. Wood Lumber and Engineered Products:

1. Take remedial action to reduce moisture content of wood products measured by a moisture meter as exceeding 15 percent moisture content.
2. Oriented strand board (OSB), is not accepted roof sheathing, floor sheathing, exterior wall sheathing, and other locations subject to water exposure during or after construction.
3. Remove wood and cellulose based products showing signs of mildew from construction site, including in-place construction not accepted by Owner’s industrial hygienist.

E. Promptly correct conditions supporting or subject to become an environment microbial, mold, and fungal growth.

1. Repair conditions leading to moisture condensation and water penetration.
2. Do not permit conditions leading to standing water.

3.4 POLLUTION SOURCE CONTROL

A. Use low-emitting products (specified in appropriate sections).

B. Provide strategies to avoid tracking pollutants into the work areas.

C. Allow high-VOC materials to off-gas prior to installation. For example, all dry furnishing and materials (such as carpet, floor tile, acoustical tile, textiles, office furniture, wood shelving, etc.) shall be allowed to “air-out” in clean environments prior to installation in a building.

1. Use the least amount of "wet" materials (such as adhesives, sealants, glazes, caulks, paints, etc.) during construction and product applications while still maintaining installation protocol required to meeting for manufacturer’s warrantee requirements.

3.5 POLLUTANT PATHWAY INTERRUPTION

A. Use an air barrier or pressure differential to isolate areas at different stages of completion.

3.6 HOUSEKEEPING

A. Confine dust-generating activities and promptly clean up dust and other potential airborne contaminants as they are generated.

B. Use wet sanding for gypsum board assemblies. Exception: Dry sanding allowed subject to owner approval of the following measures:

1. Provide full isolation of space under finishing
2. Install plastic protection sheeting to provide air sealing during sanding operations
3. Close/ seal all air system devices and ductwork
4. Sequence construction work to prevent contamination of other spaces with gypsum dust
5. Provide worker protection

C. Keep work area dry and promptly clean up all spills.

D. Keep containers of volatile liquids covered when not in use.

E. Do not allow accumulations of sawdust, dust, rags, debris, and carbon-based materials and materials emitting fumes and odors to accumulate within concealed construction, including within stud spaces and wall cavities. Remove and clean prior to enclosing behind permanent construction.

F. Vacuum carpet, upholstery, and other porous materials throughout building using a high-efficiency particulate arrestor HEPA filter vacuum cleaner just prior to Substantial Completion. Replace and dispose of vacuum bags when bag is half full.

3.7 SCHEDULING

A. Account for curing time and off-gassing when scheduling construction activities.

B. Enclose building, control humidity, ventilate, and make watertight prior to installing interior materials and finishes.

C. Allow furnishings and materials such as carpet, floor tile, acoustical tile, textiles, office furniture, and casework, to air out in clean environment prior to installation.

D. Install porous materials only after closing in the building.

E. Allow sufficient time for work generating significant moisture to dry and cure before installing absorbent materials such as carpet, acoustical material, textiles, and other material of type that may attract and retain moisture.

F. Provide adequate ventilation during curing period.

1. Provide supplemental (spot) ventilation for at least 72 hours after work is completed. Preferred HVAC system operation uses supply air fans and ducts only; exhaust provided through windows. Use exhaust fans to pull exhaust air from deep interior locations. Stair towers and other paths to exterior can be useful during this process.

3.8 REMEDIAL ACTION

A. Promptly take action as necessary to inspect and remediate conditions suspected of supporting biological, particulate, and chemical indoor air pollution. Identify, stop, and repair causes of uncontrolled water penetration into building.

B. Promptly notify and consult with Owner and Architect, prior to beginning removal material, where contamination by hazardous chemicals, microbes, and fungi is suspected.

3.9 COMMISSIONING

A. Inspect ductwork for refuse, contaminants, moisture, and other foreign contamination prior to Commissioning. Notify Commissioning Agent of satisfactory inspection prior to beginning of Commissioning.

END OF SECTION