

SECTION 01 57 19.11
INDOOR AIR QUALITY MANAGEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Special requirements for Indoor Air Quality (IAQ) management during construction operations.
 - a. Control of emissions during construction.
 - b. Moisture control during construction.
2. Procedures for testing baseline IAQ. Baseline IAQ requirements, specify maximum indoor pollutant concentrations for acceptance of the facility.

1.2 DEFINITIONS

- A. Definitions pertaining to sustainable development: As defined in ASTM E2114.
- B. Adequate Ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of particulates, dust, fumes, vapors, or gases.
- C. Hazardous Materials: Any material regulated as a hazardous material in accordance with 49 CFR 173 (Code of Federal Regulations), requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.
 1. Hazardous materials include pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).
- D. Indoor Air Quality (IAQ): Composition and characteristics of air in an enclosed space that affect occupants of that space. Indoor air quality of a space refers to relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including impact on thermal comfort such as air temperature, relative humidity and air speed.
- E. Interior Final Finishes: Materials and products exposed to interior occupied spaces; including flooring, wall covering, finish carpentry, and ceilings.

- F. Packaged Dry Products: Materials and products installed in dry form delivered in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.
- G. Wet Products: Materials and products installed in wet form, including paints, sealants, adhesives, special coatings, and materials which require curing.

1.3 QUALITY ASSURANCE

- A. Inspection and Testing Lab Qualifications: Minimum of 5 years of experience in performing types of testing specified herein.

1.4 SUBMITTALS

- A. Action Submittals:

1. Indoor Air Quality (IAQ) Management Plan:

- a. Before Pre-construction conference, prepare and submit IAQ Management Plan, including:

1) Procedures for control of emissions during construction.

- a) Identify schedule for application of interior finishes: Identify each interior finish that generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors. Indicate air handling zone, sequence of application, and curing times.
- b) Identify potential sources of odor and dust.
- c) Identify construction activities likely to produce odor or dust.
- d) Identify areas of Project potentially affected, especially occupied areas.
- e) Evaluate potential problems by severity and describe methods of control.
- f) Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
- g) Describe cleaning and dust control procedures.
- h) Describe coordination with commissioning procedures.

2) Procedures for moisture control during construction.

- a) Identify porous materials and absorptive materials.
- b) Identify schedule for inspection of stored and installed porous and absorptive materials.

- 3) Revise and resubmit Plan as required by Contracting Officer (CO).
 - a) Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

B. Informational Submittals:

1. Product Data:

- a. Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
- b. Safety Data Sheets (SDS): Submit SDSs for inclusion in Operation and Maintenance Manual for the following. SDSs are to be readily accessible at all times and are to be updated whenever a new chemical is brought onsite.
 - 1) Adhesives.
 - 2) Floor and wall patching/leveling materials.
 - 3) Caulking and sealants.
 - 4) Insulating materials.
 - 5) Fireproofing and firestopping.
 - 6) Carpet.
 - 7) Paint.
 - 8) Clear finish for wood surfaces.
 - 9) Lubricants.
 - 10) Cleaning products.

2. Inspection and Test Reports:

- a. Moisture content testing.
- b. Moisture penetration testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 IAQ MANAGEMENT - EMISSIONS CONTROL

- A. During construction operations, follow the recommendations in Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction.

B. HVAC Protection:

1. Seal return registers during construction operations.
2. Provide temporary exhaust during construction operations.
3. To greatest extent possible, isolate and/or shut down return side of HVAC system during construction. When ventilation system must be operational during construction activities, provide temporary filters at air inlets (returns) and at locations for filters prescribed in the design.
4. Contractor shall bear cost of cleaning required due to failure to protect ducts and equipment from construction dust.

C. Source Control: Provide low and zero VOC materials as specified.

D. Pathway Interruption: Isolate areas of work to prevent contamination of clean or occupied spaces. Provide pressure differentials and/or physical barriers to protect clean or occupied spaces.

E. Housekeeping: During construction, maintain project and building products and systems to prevent contamination of building spaces.

F. Temporary Ventilation:

1. For materials/products that generally require ventilation for off gassing, provide an ACH (air changes per hour) of 1.5 or more and as follows:
 - a. Provide minimum 48-hour pre-ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degrees F maximum continuously during ventilation period. Do not ventilate within limits of Work unless otherwise approved by Contracting Officer.
 - b. Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
 - c. Provide filtration media with a MERV of 8 as determined by ASHRAE 52.2 during construction and a MERV as described in the construction documents during NPS occupancy. Coordinate with work of Division 23, Heating, Ventilating, and Air Conditioning (HVAC).

G. Scheduling: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible.

- H. Flush-Out: After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square feet of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60 percent.
1. Obtain Contracting Officer's concurrence that construction is complete enough before beginning flush-out.
 2. If additional construction involving materials that produce particulates or any of specified contaminants is conducted during or after flush-out, then flush-out process must be restarted.
 3. Install new HVAC filtration media in locations identified to have permanent filtration in Contract Documents after completion of flush-out and before occupancy or further testing.

3.2 IAQ MANAGEMENT – MOISTURE CONTROL

A. Housekeeping:

1. Keep materials dry. Protect stored onsite and installed absorptive materials from moisture damage.
2. Verify installed materials and products are dry prior to sealing and weatherproofing building envelope.
3. Store interior absorptive materials only after building envelope is sealed and weatherproofed.

B. Inspections: Document and report results of inspections; state whether or not inspections indicate satisfactory conditions.

1. Examine materials for dampness as they arrive. If acceptable to Contracting Officer, dry damp materials completely prior to installation; otherwise, reject materials that arrive damp.
2. Examine materials for mold as they arrive and reject materials that arrive contaminated with mold.
3. Inspect stored and installed absorptive materials regularly for dampness and mold growth. Inspect weekly.
 - a. If stored or installed absorptive materials become wet, notify Contracting Officer. Inspect for damage. If acceptable to the Contracting Officer, dry completely prior to closing in assemblies; otherwise, remove (in accordance with the Waste Management Plan) and replace with new materials.
4. Site Drainage: Verify final grades of Site Work and landscaping drain surface water and ground water away from building.

5. Weatherproofing: Inspect moisture control materials as they are being installed. Include:
 - a. Air Barrier: Verify air barrier is installed without punctures and/or other damage. Verify air barrier is sealed completely.
 - b. Flashing: Verify correct shingling of flashing for roof, walls, windows, doors, and other penetrations.
 - c. Vapor Barrier: Verify vapor barrier is installed in accordance with Contract Documents.
 - d. Insulation Layer: Verify insulation is installed without voids.
 - e. Roofing: In accordance with ASTM D7186, Standard Practice for Quality Assurance Observation of Roof Construction and Repair.
6. Plumbing: Verify satisfactory pressure test of pipes and drains is performed before closing in and insulating lines.
7. HVAC:
 - a. Inspect HVAC system as specified in Section 01 91 14, Equipment Testing and Facility Startup, and inspect HVAC to verify:
 - 1) Condensate pans are sloped and plumbed correctly;
 - 2) Access panels are installed to allow for inspection and cleaning of coils and ductwork downstream of coils;
 - 3) Ductwork and return plenums are air sealed;
 - 4) Duct insulation is installed and sealed; and
 - 5) Chilled water line and refrigerant line insulation are installed and sealed.

C. Schedule:

1. Schedule work such that absorptive materials, such as porous insulations, paper-faced gypsum board, ceiling tile, and finish flooring, are not installed until they can be protected from rain and construction-related water.
2. Weather-proof as quickly as possible. Schedule installation of moisture-control materials, including but not limited to air barriers, flashing, exterior sealants and roofing, at earliest possible time.

D. Testing for Moisture Content: Test moisture content of porous materials and absorptive materials to ensure they are dry before sealing them into an assembly. Document and report results of testing. Where tests are not satisfactory, dry materials and retest. If satisfactory results cannot be obtained with retest, remove and replace with new materials.

1. Concrete:
 - a. Moisture test as per one or more of the following; unless otherwise indicated, acceptable upper limits for concrete are less than 4 percent top

inch; less than 85 percent headspace relative humidity (RH); less than 3 pounds per 1,000 square feet per day:

- 1) ASTM D4263, Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
 - 2) ASTM F1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 3) ASTM F2170, Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.
2. Wood: Moisture test as per ASTM D4444, Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters; unless otherwise indicated acceptable upper limits for wood products are less than 20 percent at center of piece; less than 15 percent at surface.

E. Testing for Moisture Penetration:

1. Windows: Test as per ASTM E1105, Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference; unless otherwise indicated, acceptable upper limits are no leakage for 15 minutes.
2. Horizontal Waterproofing (not roofing): Test as per ASTM D5957, Standard Guide for Flood Testing Horizontal Waterproofing Installations; acceptable upper limits are no leakage for 15 minutes.
3. Masonry: Test as per ASTM C1601, Standard Test Method for Field Determination of Water Penetration of Masonry Wall Surfaces; acceptable upper limits are no leakage for 15 minutes.
4. Exterior Walls:
 - a. Air Tightness of the Enclosure Test: ASTM E779, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization or ASTM E1827, Standard Test Methods for Determining Air tightness of Buildings Using an Orifice Blower Door; acceptable upper limits are 0.25 cfm/sf or less at 50 Pascal's.
 - b. Water Leakage: Review as per ASTM E2128, Standard Guide for Evaluating Water Leakage of Building Walls.
5. Submit copies of all moisture penetration test results as part of Project closeout.

END OF SECTION

