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013560 - Indoor Air Quality (IAQ) Requirements

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SECTION 01 3560 – INDOOR AIR QUALITY (IAQ) REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general requirements and procedures for compliance with indoor air quality requirements.

1.2 REFERENCES

- A. SMACNA'S "IAQ Guidelines for Occupied Buildings Under Construction": Referenced standard for measures to protect the building HVAC system during construction and demolition activities. Provides an overview of air pollutants associated with construction, control measures, construction process management, quality control, communicating with occupants, and case studies.
- B. ANSI/ASHRAE 52.2 – 1999 "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size": Methods for testing air cleaners for two (2) performance characteristics; the ability of the device to remove particles from the air stream and the device's resistance to airflow. Standard for a complete explanation of MERV value calculations. Filtration media used during the construction process shall have a minimum MERV of 13.

1.3 DEFINITIONS

- A. SMACNA: Sheet Metal and Air Conditioning National Contractor's Association.
- B. MERV: Minimum Efficiency Reporting Value.
- C. Type 1 Finishes. Materials and finishes which have the potential for short-term off-gassing, because of the way they are manufactured or because they contain solvents which evaporate during drying or curing. Type 1 finishes include:
 - 1. Architectural coatings.
 - 2. Adhesives, caulks and sealants.
 - 3. Wood preservatives and finishes.
 - 4. Control and/or expansion joint fillers.
 - 5. All hard finishes requiring adhesive installation.
 - 6. Composite wood products, including millwork, wood paneling, doors or furniture made from particle board or medium density fiberboard containing urea formaldehyde resin.

7. Materials and finishes that can be categorized as both a Type 1 finish and a Type 2 finish.
- D. Type 2 Finishes. Materials that are woven, fibrous or porous in nature and finishes which tend to adsorb contaminants associated with Type 1 finishes. They also collect dust and can retain moisture, promoting mold growth. Type 2 finishes include:
1. Carpet and carpet cushion.
 2. Fabric-covered partitions and acoustic wall panels.
 3. Fabric wall coverings.
 4. Acoustical ceiling tiles.
 5. Upholstered furniture.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Develop Indoor Air Quality Management Plan that results in meeting or exceeding the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995.

1.5 SUBMITTALS

- A. Submittals contained herein are in addition to other submittals required in the technical specifications. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated IAQ requirements.
- B. Action Plans: Provide preliminary submittals within 14 days of date established for commencement of the Work indicating how the following IAQ requirements will be met.

1. Indoor Air Quality Management Plan During Construction:

- a. Construction indoor air quality management plan highlighting areas and methods of compliance.
- b. Product Data for temporary filtration media.
- c. Product Data for temporary filtration media used during construction and installed immediately prior to occupancy with MERV values highlighted.
- d. Construction Documentation: Six photographs at three different occasions during construction along with a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.

2. Submit a special construction schedule to prevent Type 2 Finishes from acting as sinks for storage and subsequent release of contaminants emitted from Type 1 Finishes.

- a. Include appropriate allowances for drying or curing times of Type 1 Finishes before installation of Type 2 Finishes, based on technical specifications provided by the manufacturers.

3. Substantial Completion Indoor Air Quality Management Plan:

- a. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
- b. Product Data for filtration media used during flush-out and during occupancy.
- c. Report from testing and inspecting agency indicating results of IAQ testing and documentation showing conformance with IAQ testing procedures and requirements.

C. Qualification Data: For Project Representative with daily responsibilities for IAQ issues.

1.6 QUALITY ASSURANCE

A. Preconstruction Conference: Conduct conference at Project site to comply with requirements in Chapter 5, Division 01. Review methods and procedures related to Indoor Air Quality requirements including, but not limited to, the following:

1. Include procedures related to the IAQ Management Plan During Construction on the agenda during every pre-construction meeting and during every regularly scheduled Project meeting.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 INDOOR AIR QUALITY MANAGEMENT PLAN DURING CONSTRUCTION

A. General: Comply with SMACNA IAQ Guideline for Occupied Buildings under Construction.

1. Include measures to protect the ventilation system components and air pathways against contamination during construction. The Plan must include cleaning procedures to be employed prior to the building being occupied, in the event that ventilation system components and air pathways are not adequately protected.
2. Indicate the location, type, amount, sequence, and timing of the various control measures, including emergency procedures, and the labor, materials, and the time required to implement them.

B. Develop Indoor Air Quality Management Plan Incorporating Each of the Following Control Measures:

1. HVAC protection.
2. Contaminant source control.
3. Interruption of moisture/pollutant pathway.
4. Housekeeping.
5. The location, type, amount, sequence and timing of the various control measures, including emergency procedures, and the labor, materials and time required to implement them
6. Scheduling of events to protect indoor air quality by:

- a. Permitting adequate airing-out of new materials,

- b. Sequencing the installation of finish materials,
 - c. Proper curing of concrete before covering,
 - d. Installation during unoccupied periods,
 - e. Avoidance of building occupancy while construction-related pollutants are still present.
7. Reducing volatile organic compounds by utilizing low VOC products.
 8. Reducing products of combustion by venting vehicles, construction equipment, generator, and heaters to the exterior.
- C. Designate a representative with daily responsibility for IAQ issues:
1. Include procedures related to the IAQ Management Plan During Construction on the agenda during every pre-construction meeting and during every regularly scheduled meeting.
- D. Store building materials in a weather- tight, clean area protected from dust, debris and moisture damage.
- E. Keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the work. Identify the storage, disposal and Housekeeping practices to be applied to building supplies and waste materials to protect building systems from contamination.
- F. Provide 100 percent outside air continuously during installation of materials and finishes, beginning after the building is substantially enclosed. Where a supply air system is already installed, it must have filters in place before work begins.
- G. The permanent HVAC system may be used to move both supply and return air provided the following conditions are met:
1. Replace all construction-related filtration media used on permanent HVAC equipment at substantial completion of the work.
 2. Confirm that all air filters, casing, coils, fans and ducts are clean, before TAB, and air quality testing.
 3. Permanent return air ducts must be inspected and/or cleaned to comply with minimum requirements of General Specifications for the Cleaning of HVAC Systems published by the National Air Duct Cleaning Association www.nadca.com.
 4. Coordinate duct testing and cleaning procedures with the commissioning requirements set forth in Chapter 5, Division 01, Section 01815-019115 to ensure that they may be witnessed and documented by the commissioning authority.
- H. Provide the Owner a building clean, dry and free of debris.
- I. If Owner authorizes the use of permanent heating, cooling, and ventilating systems during construction period the Contractor shall install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.

1. Replace all air filters immediately prior to occupancy and again prior to building air flush-out. Replacement air filters shall have a MERV 13 according to ASHRAE 52.2.

3.2 SUBSTANTIAL COMPLETION INDOOR AIR QUALITY MANAGEMENT PLAN

A. Credit EQ 3.1: Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."

1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period the Contractor shall install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
2. Replace all air filters immediately prior to occupancy.

B. Credit EQ 3.2: Comply with one of the following requirements:

1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. (4 300 000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent.
2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. (1 070 000 L) of outdoor air per sq. ft. (sq. m) of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. (1.52 L/s per sq. m) of outside air or 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 14000 cu. ft./sq. ft. (4 300 000 L/sq. m) of outside air has been delivered to the space.
3. Air-Quality Testing:
 - a. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air," and as additionally detailed in the USGBC's "LEED-NC: Reference Guide."
 - b. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
 - 1) Formaldehyde: 50 ppb.
 - 2) Particulates (PM10): 50 micrograms/cu. m.
 - 3) Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
 - 4) 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.
 - 5) Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.
 - c. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved.

Repeat procedure until all requirements have been met. When retesting noncomplying building areas, take samples from same locations as in the first test.

- d. Air-sample testing shall be conducted as follows:
- 1) All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
 - 2) Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Nonfixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
 - 3) Number of sampling locations will vary depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. (2300 sq. m) or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.
 - 4) Air samples shall be collected between 3 and 6 feet (0.9 and 1.8 m) from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

END OF SECTION 01 3560