

SECTION 23 05 30

HVAC AIR DUCT CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section includes requirements for cleaning the existing heating, ventilating and air conditioning ducts and louvers related to this project. Included are the following topics:

1.2 RELATED WORK

- A. Section 01 33 23, Shop Drawings, Product Data and Samples
- B. Section 01 91 01 or 01 91 02, Commissioning Process
- C. Section 08 90 00, Louvers and Vents
- D. Section 23 05 11, Common Work Results for HVAC Systems
- E. Section 23 05 93 , Testing, Adjusting, and Balancing for HVAC
- F. Section 23 31 00, HVAC Ducts and Casings
- G. Section 23 33 00, Air Duct Accessories

1.3 REFERENCE

- A. Applicable provisions Section 23 05 11, Common Work Results for HVAC Systems govern work under this Section.

1.4 REFERENCE STANDARDS

- A. NADCA 1992-01 Mechanical Cleaning of Non-Porous Air Conveyance System Components National Air Duct Cleaners Association
- B. NADCA Understanding Microbial contamination in HVAC Systems
- C. NAIMA Cleaning Fibrous Glass Insulated Air Duct Systems

1.5 QUALITY ASSURANCE

- A. Contractor shall be a Regular Member in good standing of NADCA (National Air Duct Cleaners Association). Maintain membership for the entire duration of the project. Maintain a staff of at least one Certified Air System Cleaning Specialist (ASCS). If membership of the firm, or any certification of any staff performing work is terminated or expires during the duration of the project, contact DFD immediately.

1.6 SHOP DRAWINGS

- A. Shop Drawings and Submittals: Submit per Section 01 33 23.
- B. Include manufacturer's data and/or Contractor data for the following:
- C. List of equipment to be used.
- D. Product description and MSDS sheets for cleaners, biocides and encapsulants.
- E. Access doors.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Use products which conform to NFPA 90A, possessing a flame spread rating of not over 25 and a smoke developed rating no higher than 50.

2.2 CLEANERS, BIOCIDES AND ENCAPSULANTS

- A. Manufacturer: H.B. Fuller/Foster, Porter, or approved equal.
- B. Cleaners, biocides and encapsulants shall be waterbase products specifically designed for application to HVAC duct interiors and capable of being applied with airless spray equipment. Biocides and encapsulants must be colored differently than substrate to be coated.
- C. Biocidal agents to be formulated for long term fungicidal activity with no loss on aging. Biocidal agents must be registered with the U.S. Environmental Protection Agency for use on the interior of HVAC duct systems.
- D. Cured biocides and encapsulants must provide tough washable elastic protective finish able to withstand light impact or abrasion without breaking down over time or releasing fibers.

2.3 EQUIPMENT

- A. Particulate Collection Equipment: Fan/filter unit sized to create sufficient quantity of negative pressure for capture and filtration of air and contaminants dislodged during duct cleaning. Equipment to include prefiltration and HEPA final filtration with 99.97% collection efficiency for 0.3 micron size particles.
- B. Portable pressure washers to be capable of 500 psig to 1000 psig operation.
- C. Power brush systems designed specifically for duct cleaning.

PART 3 - EXECUTION

3.1 GENERAL

- A. Use products and equipment in accordance with manufacturers instructions.

3.2 CLEANING

- A. Clean ductwork systems and associated turning vanes, dampers, 10 feet from connections to air handling units fans, coils, drain pans, plenums and dampers; other equipment shown on the drawings.
- B. Clean air in intake louvers in all mechanical room where air handling equipment is being replaced.

<u>System/Component</u>	<u>Action</u>
Supply Duct Systems	Remove Liner, Clean, Encapsulant
Return Duct Systems	Clean

Transfer Duct Systems	Clean
Exhaust/Relief Duct Systems	Clean
Outside Air/Mixed Air Duct Systems	Clean
Air Handling Units	Clean
Makeup Air Units	Clean
Exhaust Fans	Clean
Relief Fans	Clean
Wall Louvers	Washed and Cleaned
Louver Screens	Washed and Cleaned

- C. Visually inspect systems and site prior to cleaning. Document and report damaged system components to Owner's Construction Representative prior to cleaning. Mark damper and other component positions prior to cleaning and reset after cleaning to original position. Establish a specific, coordinated plan detailing how each area of the building will be protected during the various phases of work.
- D. Protect building occupants, components and furnishings from cleaning activities. Use polyethylene sheeting covers and barriers where cleaning will disperse debris outside the HVAC systems. Install critical barriers within the building, at inlets/outlets and within the system to prevent migration of dust and debris to clean areas.
- E. Use particulate collection equipment to remove and capture debris. Connect to system downstream of cleaning operations. Wherever possible, duct exhaust to the exterior of the building. Avoid discharge near air intakes and points of entry. Arrange source of makeup air to flow from clean area to work area negatively pressurizing work area. Take measures to control offensive odors and vapors during the cleaning process.
- F. Clean systems using mechanical cleaning methods, such as vacuum cleaning, compressed air sweeping and mechanical brushing, designed to extract contaminants from within the HVAC system and safely remove contaminants from the facility. No cleaning methods are to be used which damage components of the system or negatively alter the integrity of the system.
- G. Clean fibrous glass thermal or acoustical insulation with HEPA vacuuming equipment. Document locations of damage, deterioration, delamination, mold, fungus growth or excessive moisture which cannot be restored by cleaning or resurfacing with repair coating. Report locations and conditions to Architect/Engineer and Owner's Project Representative for determination of removal and/or replacement.

- H. Where fibrous glass thermal or acoustical insulation is to be removed, scrape and brush metal clean. Remove loose fasteners, weld pins where required for cleaning work and sheet metal covers associated with insulation. Patch and seal fastener openings.
- I. Clean coils to restore pressure drop to within 10% of design rating. Where design rating is unknown, coils must be cleaned free of foreign material and chemical residue. Cleaning methods used must not bend, erode or damage coil surfaces, fins or tubes. Clean coil drain pans and drain. Make drain fully operational. Where wet methods are used, thoroughly rinse coils and drains pans with clean water to remove latent residues. Provide temporary drain pans below coils without drain pans to capture water.
- J. Where systems and equipment containing filters are cleaned, obtain replacement filters from building occupant and replace existing filters.
- K. Verification of HVAC system cleanliness will be performed after cleaning and prior to application of biocides and encapsulants. The Contractor shall notify the COR in advance of verification. Verification will consist of inspection by the Contractor, Commissioning Agent and COR. If surfaces are visibly clean, no contaminants are evident through visual inspection and coils are within 10% of design pressure drop, the HVAC system shall be considered clean. However the Owner reserves the right to further verify system cleanliness through third party gravimetric or wipe testing analysis per NADCA standards.

3.3 BIOCIDES AND ENCAPSULANTS

- A. Biocides and encapsulants are to be applied only after cleaning and verification have been completed and surfaces are dry. System fans are to remain off and critical barriers maintained to prevent migration of biocides and encapsulants from the HVAC systems.
- B. Apply biocides to the following surfaces which are suspected of or have been tested and verified for microbial contamination:
 - C. Plenums and ductwork around and 5' downstream of cooling coils and humidifiers.
 - D. Cooling coil drain pans.
 - E. Outdoor air intake drain pans.
- F. Apply encapsulants to the following surfaces where microbial contamination is not suspected:
 - G. Damaged fibrous glass thermal or acoustical insulation.
 - H. Sheet metal where thermal or acoustical insulation has been removed.
- I. Biocides and encapsulants to be directly sprayed (not fogged), brushed or rolled onto surfaces to achieve a continuous film of thickness recommended by manufacturer. Increase application rate on porous or rough surfaces. Protect

coils, fan blades, bearings, damper linkages and seals, fire/smoke dampers, humidifiers, airflow sensors, pressure sensors, temperature sensors and humidity sensors during application of biocides and encapsulants. Clean any overspray from these components immediately. Allow products to fully cure prior to using HVAC systems. Operate systems during unoccupied hours flushing with fresh air to purge system prior to occupied use.

3.4 CLEANING REPORT

- A. Provide a report describing pre-cleaning inspection and damage, systems cleaned, methods and materials used, problems encountered, final verification and any remaining problems noted. Submit three copies to Owner's Construction Representative.

END OF SECTION 23 05 30