

SECTION 23 01 30.51

HVAC AIR DUCT CLEANING

PART 1 GENERAL

1.01 HEALTH AND SAFETY

- A. Safety Standards: cleaning contractors shall comply with all applicable federal, state and local requirements for protecting the safety of the contractors' employees, building occupants, and the environment. In particular, all applicable standards of the Occupational Safety and Health Administration (OSHA) shall be followed when working in accordance with this specification.
- B. Occupant Safety: no processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.
- C. Disposal of Debris: all Debris removed from the HVAC System shall be disposed of in accordance with applicable federal, state and local requirements.

1.02 QUALIFICATION OF THE HVAC SYSTEM CLEANING CONTRACTOR

- A. Membership: the HVAC system cleaning contractor shall be a certified member of the National Air Duct Cleaners Association (NADCA), or shall maintain membership in a nationally recognized non-profit industry organization dedicated to the cleaning of HVAC systems.
- B. Certification: the HVAC system cleaning contractor shall have a minimum of one (1) Air System Cleaning Specialist (ASCS) certified by NADCA on a full time basis, or shall have staff certified by a nationally recognized certification program and organization dedicated to the cleaning of HVAC systems.
- C. Supervisor Qualifications: a person certified as an ASCS by NADCA, or maintaining an equivalent certification by a nationally recognized program and organization, shall be responsible for the total work herein specified.
- D. Experience: the HVAC system cleaning contractor shall submit records of experience in the field of HVAC system cleaning as requested by the Owner. Bids shall only be considered from firms which are regularly engaged in HVAC system maintenance with an emphasis on HVAC system cleaning and decontamination.
- E. Equipment, Materials and Labor: the HVAC system cleaning contractor shall possess and furnish all necessary equipment, materials and labor to adequately perform the specified services.
 - 1. The contractor shall assure that its employees have received safety equipment training, medical surveillance programs, individual health protection measures, and manufacturer's product and material safety data sheets (MSDS) as required for the work by the U. S. Occupational Safety and Health Administration, and as described by this specification.
 - 2. The contractor shall maintain a copy of all current MSDS documentation and safety certifications at the site at all times, as well as comply with all other site documentation requirements of applicable OSHA programs and this specification.
 - 3. Contractor shall submit to the Owner all Material Safety Data Sheets (MSDS) for all chemical products proposed to be used in the cleaning process.

1.03 ACCEPTABLE SUPPLIERS

- A. Ductworks
- B. Monster Vac

PART 2 HVAC SYSTEM CLEANING SPECIFICATIONS AND REQUIREMENTS

2.01 SCOPE OF WORK:

- A. Scope: this section defines the minimum requirements necessary to render HVAC components clean.

- B. The Contractor: shall be responsible for the removal of visible surface contaminants and deposits from within the HVAC system in strict accordance with these specifications.
- C. The HVAC system: includes any interior surface of the facility's air distribution system for conditioned spaces and/or occupied zones. This includes the entire heating, air-conditioning and ventilation system from the points where the air enters the system to the points where the air is discharged from the system. The return air grilles, return air ducts (except ceiling plenums and mechanical room) to the air handling unit (AHU), the interior surfaces of the AHU, mixing box, coil compartment, condensate drain pans, humidifiers and dehumidifiers, supply air ducts, fans, fan housing, fan blades, air wash systems, spray eliminators, turning vanes, filters, filter housings, reheat coils, and supply diffusers are all considered part of the HVAC system.

2.02 IN SUMMARY THE CONTRACTOR SHALL CLEAN

- A. The full length of all supply air ducts
- B. The full length of all return air ducts
- C. The full length of all outside air ducts
- D. All supply and return air registers and diffusers
- E. All vertical shafts
- F. All air handlers including coils, blowers, filter racks, drain pans, and the entire interior of the air handler

PART 3 EXECUTION

3.01 GENERAL HVAC SYSTEM CLEANING REQUIREMENTS

- A. Containment: debris removed during cleaning shall be collected and precautions must be taken to ensure that Debris is not otherwise dispersed outside the HVAC system during the cleaning process.
- B. Particulate Collection: where the Particulate Collection Equipment is exhausting inside the building, HEPA filtration with 99.97% collection efficiency for 0.3-micron size (or greater) particles shall be used. When the Particulate Collection Equipment is exhausting outside the building, Mechanical Cleaning operations shall be undertaken only with Particulate Collection Equipment in place, including adequate filtration to contain Debris removed from the HVAC system. When the Particulate Collection Equipment is exhausting outside the building, precautions shall be taken to locate the equipment down wind and away from all air intakes and other points of entry into the building.
- C. Controlling Odors: all reasonable measures shall be taken to control offensive odors and/or mist vapors during the cleaning process.
- D. Component Cleaning: cleaning methods shall be employed such that all HVAC system components must be Visibly Clean. Upon completion, all components must be returned to those settings recorded just prior to cleaning operations.
- E. Air-Volume Control Devices: dampers and any air-directional mechanical devices inside the HVAC system must have their position marked prior to cleaning and, upon completion, must be restored to their marked position.
- F. Service Openings: the contractor shall utilize service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry, and inspection.
 - 1. Contractor shall utilize the existing service openings already installed in the HVAC system where possible.
 - 2. Other openings shall be created where needed and they must be created so they can be sealed in accordance with industry codes and standards.
 - 3. Closures must not significantly hinder, restrict, or alter the air-flow within the system.
 - 4. Closures must be properly insulated to prevent heat loss/gain or condensation on surfaces within the system.
 - 5. Openings must not compromise the structural integrity of the system.

6. Construction techniques used in the creation of openings should conform to requirements of applicable building and fire codes, and applicable NFPA, AMACNA and NADCA Standards.
 7. Cutting service openings into flexible duct is not permitted. Flexible duct shall be disconnected at the ends as needed for proper cleaning and inspection.
 8. Rigid fiber glass duct board duct systems shall be resealed in accordance with NAIMA recommended practices. Only closure techniques which comply with UL Standard 181 or UL Standard 181a are suitable for fiber glass duct system closures.
 9. All service openings capable of being re-opened for future inspection or remediation shall be clearly marked and shall have their location reported to the Owner in project report documents.
- G. Ceiling sections (tile): The contractor may remove and reinstall ceiling sections to gain access to HVAC systems during the cleaning process.
- H. Air distribution devices (registers, grilles & diffusers): The contractor shall clean all air distribution devices.
- I. Air handling units, terminal units (VAV, Dual duct boxes, etc.), blowers and fans: The contractor shall insure that supply and return fans and blowers are thoroughly cleaned. Areas to be cleaned include blowers, fan housings, plenums (except ceiling supply and return plenums), scrolls, blades, or vanes, shafts, baffles, dampers and drive assemblies. All visible surface contamination deposits shall be removed. Contractor shall:
1. Clean all air handling unit (AHU) internal surfaces, components and condensate collectors and drains.
 2. Assure that a suitable operative drainage system is in place prior to beginning wash down procedures.
 3. Clean all coils and related components, including evaporator fins.
- J. Duct Systems: Contractor Shall:
1. Create service openings in the system as necessary in order to accommodate cleaning of otherwise inaccessible areas.
 2. Mechanically clean all duct systems to remove all visible contaminants, such that the systems are capable of passing Cleaning Verification Testing.

3.02 MECHANICAL CLEANING METHODOLOGY

- A. Source Removal Cleaning Methods: The HVAC system shall be cleaned using Source Removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and safely remove contaminants from the facility. It is the contractor's responsibility to select Source Removal methods which will render the HVAC system Visibly Clean and capable of passing cleaning verification methods. No cleaning method, or combination of methods, shall be used which could potentially damage components of the HVAC system or negatively alter the integrity of the system.
1. All methods used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment are assured.
 2. All vacuum devices exhausting air inside the building shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.
 3. All vacuum devices exhausting air outside the facility shall be equipped with Particulate Collection including adequate filtration to contain Debris removed from the HVAC system. Such devices shall exhaust in a manner that will not allow contaminants to re-enter the facility. Release of debris outdoors must not violate any outdoor environmental standard, codes or regulations.
 4. All methods require mechanical agitation devices to dislodge debris adhered to interior HVAC system surfaces, such that debris may be safely conveyed to vacuum collection devices. Acceptable methods will include those which will not potentially damage the integrity of the ductwork, nor damage porous surface materials such as liners inside the ductwork or system components.

B. Methods of Cleaning Fibrous Glass Insulated Components:

1. Fibrous glass thermal or acoustical insulation elements present in any equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment, while the HVAC system is under constant negative pressure, and not permitted to get wet in accordance with applicable NADCA and NAIMA standards and recommendations.
2. Cleaning methods used shall not cause damage to fibrous glass components and will render the system capable of passing Cleaning Verification Tests.

C. Damaged Fibrous Glass Material:

1. If there is any evidence of damage, deterioration, delaminating, friable material, mold or fungus growth, or moisture such that fibrous glass materials cannot be restored by cleaning or resurfacing with an acceptable insulation repair coating, they shall be identified for replacement.
2. When requested or specified, Contractor must be capable of remediating exposed damaged insulation in air handlers and/or ductwork requiring replacement.
3. Replacement Material: In the event fiber glass materials must be replaced, all materials shall conform to applicable industry codes and standards, including those of UL and SMACNA.
4. Replacement of damaged insulation is NOT covered by this specification.

D. Cleaning of coils

1. Any cleaning method may be used which will render the Coil Visible Clean. The drain for the condensate drain pan shall be operational. Cleaning methods shall not cause any appreciable damage to, displacement of, inhibit heat transfer, or erosion of the coil surface or fins, and shall conform to coil manufacturer recommendations when available. Coils shall be thoroughly rinsed with clean water to remove any latent residues.

E. Biocidal Agents and Coatings

1. Biocidal agents shall only be applied if active fungal growth is reasonably suspected, or where unacceptable levels of fungal contamination have been verified through testing.
2. Application of any biocide agent used to control the growth of fungal or bacteriological contaminants shall be performed after the removal of surface deposits and debris.
3. Only biocide agents registered by the U.S. Environmental Protection Agency (EPA) shall be used.
4. Biocidal agents shall be applied in strict accordance with manufacturer's instructions.
5. Biocidal coating products for both porous and non-porous surfaces shall be EPA registered water soluble solutions with supporting efficacy data and MSDS records.
6. Biocidal coatings shall be applied according to manufacturer's instructions. Coatings shall be sprayed directly onto interior ductwork surfaces, rather than "fogged" downstream onto surfaces. A continuous film must be achieved on the surface to be treated by the coating application. Application of any Biocidal coatings shall be in strict accordance with manufacturer's minimum surface application rate standards for effectiveness.
7. Inspection of Work Performed.

F. Contractor is to leave open all cleaning access points until they have been inspected by a representative of Denver Public School. The contractor can call for an inspection at any time.

G. Only after each opening has been inspected can the contractor seal up the cleaning access points.

H. The interior of the supply, return and outside air ducts must be visibly clean and pass inspection in order to satisfactorily complete the contract.

I. All air handlers need to be inspected before the access panels and doors are closed. All components of the air handlers must pass inspection in order to satisfactorily complete the project.

END OF SECTION 23 01 30.51