

SECTION 230130 – HVAC AIR DISTRIBUTION SYSTEM CLEANING

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(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specification and adding any additional specifications that may be required by the project. Also turn off all “Underlines”.)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and all other sections of Division 23.

1.2 SUMMARY

- A. This section includes the requirements for cleaning existing HVAC System components as follows:
 - 1. Air distribution equipment.
 - 2. Air distribution ductwork and plenums.
 - 3. System components.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For an ASCS.
- B. Strategies and procedures plan.
- C. Cleanliness verification report.

1.4 QUALITY ASSURANCE

- A. ASCS Qualifications: A certified member of NADCA.
 - 1. Certification: Employ an ASCS certified by NADCA on a full-time basis.
 - 2. Supervisor Qualifications: Certified as an ASCS by NADCA.
- B. UL Compliance: Comply with UL 181 and UL 181A for fibrous-glass ducts.
- C. Cleaning Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to HVAC air distribution system cleaning including, but not limited to, review of the cleaning strategies and procedures plan.

1.5 WARRANTY/GUARANTEE

- A. See Division 23 Specification Section “Basic Mechanical Requirements – HVAC” for warranty and guarantee requirements.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

- A. Protective Covering: Where duct cleaning is scheduled in occupied spaces cover work services, desks, furniture and equipment with 4 mil polyethylene protective sheeting.

2.2 SERVICE OPENING PATCH MATERIAL

- A. Sheet Metal: Sheet metal used to patch service openings used for the cleaning process shall be galvanized sheet metal with a gauge equal to the duct being patched

2.3 SERVICE OPENING PATCH SEALANT MATERIAL

- A. Sealant Material: Duct Connection Joint Sealant: Where duct patches are required to seal service openings in existing ductwork provide the following material as a patch sealer between the new patch and existing duct surfaces:
 - 1. Non Curing Tape: Permatite, Butyl gray non curing tape of sufficient width to seal the duct joints between the sheet metal patch and the duct work. Material can be purchased from the manufacturer or from Grainger using the either the manufacturers model number DS5285, or the Grainger item number 2EJR3. Seal the external joints as required by these specifications and the ductwork can be placed in service. This material will allow the duct to be patched and the system placed back in operation right away.
 - 2. Final Sealant: Joint and Seam Sealant: One (1) part, nonsag, solvent release curing, polymerized butyl sealant complying with FS TT-S-001657, Type I; formulated with a minimum of 75% solids.

2.4 PATCH EXISTING DUCT INSULATION

- A. Duct Insulation: Where sections of existing duct insulation are removed for new service openings, repair/replace insulation section with materials and finishes matching the existing insulation, Also provide necessary adhesives and sealants for a complete repair/replacement of the insulation section.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine existing HVAC air distribution equipment, ducts, plenums, and system components to determine appropriate methods, tools, and equipment required for performance of the Work.
- B. Perform "Project Evaluation and Recommendation" according to NADCA ACR 2006.
- C. Prepare written report listing conditions detrimental to performance of the Work.
- D. Proceed with work only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare a written plan that includes strategies and step by step procedures. At a minimum, include the following:
 - 1. Supervisor contact information.
 - 2. Work schedule including location, times, and impact on occupied areas.
 - 3. Methods and materials planned for each HVAC component type.
 - 4. Required support from other trades.
 - 5. Equipment and material storage requirements.
 - 6. Exhaust equipment setup locations.
- B. Openings for Inspection and Service: Use the existing openings for inspection and service, as required for proper cleaning, at various points of the existing HVAC system for physical and mechanical entry and for inspection. Where additional access points are required for cleaning the duct systems and/or plenums cut appropriately sized openings to access the interior of the ducts/plenums for the cleaning process. When the cleaning process has been completed, patch and seal the cut openings so they are air tight and repair/replace duct insulation affected by the service openings. Disconnect flexible ducts as needed for inspection and cleaning and reconnect flexible ducts after completion of the cleaning process. Remove and reinstall suspended ceiling structure for inspection and cleaning.
- C. Comply with NADCA ACR 2006, "Guidelines for Constructing Service Openings in HVAC Systems" Section.

3.3 CLEANING

- A. Comply with NADCA ACR 2006.
- B. Remove visible surface contaminants and deposits from within the HVAC system.
- C. Systems and Components to Be Cleaned: <edit for project>

1. Air devices for supply and return air.
 2. Air terminal units.
 3. Ductwork:
 - a. Supply air ducts, including turning vanes and reheat coils, to the air-handling unit.
 - b. Return air ducts to the air handling unit.
 - c. Exhaust air ducts.
 4. Air-Handling Units:
 - a. Interior surfaces of the unit casing.
 - b. Coil surfaces compartment.
 - c. Condensate drain pans.
 - d. Fans, fan blades, and fan housings.
 5. Filters and filter housings.
- D. Collect debris removed during cleaning. Ensure that debris is not dispersed outside the HVAC system during the cleaning process.
- E. Particulate Collection and Odor Control:
1. When venting vacuuming system inside the building, use HEPA filtration with 99.97% collection efficiency for 0.3-micron-size (or larger) particles.
 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
 3. For particulate collection equipment, include adequate filtration to contain debris removed. Locate equipment downwind and away from all air intakes and other points of entry into the building.
 4. Control odors and mist vapors during the cleaning and restoration process.
- F. Mark the position of manual volume dampers and air directional mechanical devices inside the system prior to cleaning. Restore them to their marked position on completion of cleaning.
- G. System components shall be cleaned so that all HVAC system components are visibly clean. On completion, all components must be returned to those settings recorded just prior to cleaning operations.
- H. Clean all air distribution devices, registers, grilles, and diffusers.
- I. Clean visible surface contamination deposits according to NADCA ACR 2006 and the following:

1. Clean air handling units, airstream surfaces, components, condensate collectors, and drains.
2. Ensure that a suitable operative drainage system is in place prior to beginning wash-down procedures.
3. Clean evaporator coils, reheat coils, and other airstream components.

J. Duct Systems:

1. Create service openings in the HVAC system as necessary to accommodate cleaning.
2. Mechanically clean duct systems specified to remove all visible contaminants so that the systems are capable of passing the HVAC System Cleanliness Tests (see NADCA ACR 2006).

K. Debris removed from the HVAC system shall be disposed of according to applicable Federal, state, and local requirements.

L. Mechanical Cleaning Methodology:

1. 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 to safely remove these contaminants from the facility. No cleaning method, or combination of methods, shall be used that could potentially damage components of the HVAC system or negatively alter the integrity of the system.
 - a. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 - b. Cleaning methods that require mechanical agitation devices to dislodge debris that is adhered to interior surfaces of HVAC system components shall be equipped to safely remove these devices. Cleaning methods shall not damage the integrity of HVAC system components or damage porous surface materials such as duct and plenum liners.
2. Cleaning Mineral Fiber Insulation Components:
 - a. Fibrous glass thermal or acoustical insulation elements present in equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment while the HVAC system is under constant negative pressure and shall not be permitted to get wet according to NADCA ACR 2006.
 - b. Cleaning methods used shall not cause damage to fibrous glass components and will render the system capable of passing the HVAC System Cleanliness Tests (see NADCA ACR 2006).

- c. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
- d. Fibrous materials that become wet shall be discarded and replaced.

M. Cleaning AHU and Reheat Coils:

- 1. Measure and record static pressure differential across each coil before and after the cleaning process.
- 2. See NADCA ACR 2006, "Coil Surface Cleaning" Section. Type 1, or Type 1 and Type 2, cleaning methods shall be used to render the coil visibly clean and capable of passing Coil Cleaning Verification (see applicable NADCA ACR 2006).
- 3. Coil drain pans shall be subject to NADCA ACR 2006, "Non-Porous Surfaces Cleaning Verification." Ensure that condensate drain pans are operational.
- 4. Electric resistance coils shall be de energized, locked out, and tagged before cleaning.
- 5. Cleaning methods shall not cause any appreciable damage to, cause displacement of, inhibit heat transfer, or cause erosion of the coil surface or fins, and shall comply with coil manufacturer's written recommendations when available.
- 6. Rinse thoroughly with clean water to remove any latent residues.
- 7. AHU Coils: In MER's if 60 psi steam is available the contractor shall use steam to clean the coils.

N. Antimicrobial Agents and Coatings: <edit for project> <Delete if steam is used to clean coils>

- 1. Apply antimicrobial agents and coatings if active fungal growth is reasonably suspected or where unacceptable levels of fungal contamination have been verified. Apply antimicrobial agents and coatings according to manufacturer's written recommendations and EPA registration listing after the removal of surface deposits and debris.
- 2. When used, antimicrobial treatments and coatings shall be applied after the system is rendered clean.
- 3. Apply antimicrobial agents and coatings directly onto surfaces of interior ductwork.
- 4. Sanitizing agent products shall be registered by the EPA as specifically intended for use in HVAC systems and ductwork.

3.4 CLEANLINESS VERIFICATION

- A. Verify cleanliness according to NADCA ACR 2006, "Verification of HVAC System Cleanliness" Section.

- B. Verify HVAC system cleanliness after mechanical cleaning and before applying any treatment or introducing any treatment-related substance to the HVAC system, including biocidal agents and coatings.
- C. Perform visual inspection for cleanliness. If no contaminants are evident through visual inspection, the HVAC system shall be considered clean. If visible contaminants are evident through visual inspection, those portions of the system where contaminants are visible shall be cleaned again and subjected to reinspection for cleanliness.
- D. Additional Verification:
 - 1. Perform surface comparison testing or NADCA vacuum test.
 - 2. Conduct NADCA vacuum gravimetric test analysis for nonporous surfaces.
- E. Verification of Coil Cleaning:
 - 1. Measure static pressure differential across each coil.
 - 2. Coil will be considered clean if cleaning restored the coil static pressure differential within 10% of <Insert inches wg>, the differential measured when the coil was first installed.
 - 3. Coil will be considered clean if the coil is free of foreign matter and chemical residue, based on a thorough visual inspection.
- F. Prepare a written cleanliness verification report. At a minimum, include the following:
 - 1. Written documentation of the success of the cleaning.
 - 2. Site inspection reports, initialed by supervisor, including notation on areas of inspection, as verified through visual inspection.
 - 3. Surface comparison test results if required.
 - 4. Gravimetric analysis (nonporous surfaces only).
 - 5. System areas found to be damaged.
- G. Photographic Documentation: Comply with requirements in Section "Photographic Documentation."

3.5 RESTORATION

- A. Restore and repair HVAC air distribution equipment, ducts, plenums, and components according to NADCA ACR 2006, "Restoration and Repair of Mechanical Systems" Section.
- B. Restore service openings capable of future reopening. Comply with requirements in Division 23 Specification Section "HVAC Duct Systems and Accessories." Include location of service openings in Project closeout report.
- C. Replace damaged insulation according to Division 23 Specification Section "Insulation for HVAC Pipe and Duct Systems."

- D. Ensure that closures do not hinder or alter airflow.
- E. New closure materials, including insulation, shall match opened materials and shall have removable closure panels fitted with gaskets and fasteners.
- F. Protective Covering: Where duct cleaning process has been completed in each occupied space, carefully remove the protective sheeting so as not to damage the existing equipment and furniture. Clean any dust or dirt in the space as a result of the duct cleaning process and/or from removing ceiling tiles using brooms, mops and/or vacuum cleaner.

END OF SECTION 230130