



## **Procedure and standards followed for HVAC system care & air duct cleaning**

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*Healthy Duct Property Services, Healthy Duct, LLC*  
*NADCA #1217933 ASCS and VSMR Certified*

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Before commencing work, assess HVAC system condition to determine appropriate engineering controls, safety measures, tools, equipment and cleaning products and methods required to complete the work.

1. Perform HVAC system assessment by ASCS, Certified Ventilation Inspector (CVI), or equivalent.
2. Microbial testing or sampling. If testing services were required, the use of technicians trained and acceptable would be employed. Healthy Duct Property Services retains May's Indoor Air Investigations, LLC as its indoor air quality expert (IAQ).

**B. Work Plans:**

1. Product Data and Safety Data Sheets: Product data listing general use and specific chemical cleaning products and coatings used while performing the work, along with Safety Data Sheets for chemical products used to perform the work.
2. Safety Plan: Define responsibilities of each Healthy Duct Property Services technician designated involved with executing work plan throughout project.

### **1.2 PROTECTION OF IN-PLACE CONDITIONS**

- A. Protect existing structures, surfaces, and systems from damage resulting from duct cleaning work. This includes but is not limited to rigid floor protection and .3 mil plastic covering workspace and adjacent desks, cabinets, etc.
- B. Any immediate concerns will be reported to customer or agent.

### **1.3 HVAC SYSTEM PREPARATION**

**A. Service Openings:**

1. Access duct cleaning work through existing or new service openings, allowing safe access and thorough cleaning throughout specified components.
2. Work through service openings sized to allow mechanical tool entry and visual inspection, as required for cleaning activities.
3. Where possible, work through existing service openings.
4. Where new service openings are required, install openings as follows:

- a. Do not degrade structural, thermal, or functional system integrity, and comply with applicable SMACNA duct construction methods.
  - b. Install service openings complying with applicable UL and SMACNA standards, federal, state, and local code requirements, and requirements of Authorities Having Jurisdiction.
  - c. Where required, install duct access doors and service panels fabricated with materials complying with SMACNA and UL 723.
  - d. Where required, install tapes and mastics complying with UL 181A/B.
  - e. Where required, install closure panels fabricated from equivalent material and same or heavier gage.
  - f. Mechanically fasten closure panels over service openings with screws or rivets at perimeter, maximum [4 inches] [100 mm] spacing.
  - g. Fabricate closure panel to overlap duct opening perimeter, minimum [1 inch] [25 mm] .
  - h. Insulate closure panels to match adjacent duct interior and exterior surfaces.
  - i. Seal rigid fibrous glass duct systems in accordance with NAIMA recommended practices.
  - 1) Install closure techniques: UL Standard 181 or UL Standard 181A.
  - j. Close service openings installed in rigid fibrous glass ductwork and metal ductwork with fibrous glass liner with no exposed fibrous glass edges exposed to airstream.
5. Install service openings that can be reopened for future inspection or remediation.
- a. Mark outside of duct and report service opening locations to Owner in project closeout documents.
6. Flexible duct.
- a. Disconnect flexible duct at both ends as required for inspection and cleaning.
  - b. Reconnect flexible duct ends in accordance with SMACNA standards.

#### 1.4 CLEANING EQUIPMENT MAINTENANCE AND USE

- A. Maintain equipment employed in work performance in good working order, consistent with equipment manufacturer's written instructions and applicable jurisdictional requirements.
- B. Clean and inspect equipment before bringing to work site.
- C. Do not introduce contaminants from cleaning equipment into indoor environment or HVAC system.
- D. Service equipment to limit possible HVAC system contamination from insufficient service equipment cleaning, and unsafe operating conditions for service personnel and building occupants.
- E. Perform activities requiring opening contaminated vacuum collection equipment on-site, including servicing or filter maintenance, in appropriate containment area or outside building.
- F. Clean and seal collection devices, vacuums and other tools and devices before relocating to different building areas, moving equipment through occupied spaces, and before removing equipment from building.

- G. Locate fuel-powered equipment to prevent combustion emissions and air exhaust emissions from entering building envelope.
  - 1. Monitor and manage equipment operation and location to prevent introduction of combustion emissions into occupied space.
- H. Furnish HEPA-filtered equipment with minimum collection efficiency of 99.97 percent at 0.3 micron particle size, when vacuum collection equipment exhausts within building envelope. Healthy Duct Property Services employs a Nikro 5000CFM HEPA negative and machine and air mover.

## 1.5 CLEANING - GENERAL

- A. Perform HVAC system cleaning in accordance with ACR, The NADCA Standard.
- B. Remove visible non-adhered substances.
  - 1. Clean HVAC components employing agitation device to dislodge contaminants from HVAC component airside surfaces, and then capturing contaminants with vacuum collection device.
    - a. Acceptable methods include those that do not damage integrity of ductwork and other system components, and does not damage porous surface materials including internal insulation and duct lining.
  - 2. Clean HVAC components using source removal mechanical cleaning methods designed to extract contaminants from within HVAC system components and safely remove contaminants from facility.
  - 3. Select source removal methods rendering HVAC system components visibly clean and capable of passing cleanliness verification methods as described in ACR, The NADCA Standard.
  - 4. Do not employ cleaning method, or combination of methods, that can damage HVAC system components or negatively alter system integrity.
  - 5. Do not damage HVAC system and components with wet cleaning, power washing, steam cleaning and other wet process cleaning.
- C. Apply cleaning materials in accordance with manufacturer's instructions.
  - 1. Do not apply cleaning agents or water to electrical, fibrous glass or other porous HVAC system components.
- D. Capture removed contamination and cleaning materials and legally dispose.
- E. Verify HVAC system surface and component cleanliness in accordance with ACR, The NADCA Standard.
- F. Particulate Collection:
  - 1. Employ contaminant removal methods incorporating vacuum collection devices operated continuously during cleaning.
    - a. Connect vacuum collection device to component being cleaned through service opening.
    - b. Employ vacuum collection device of sufficient capacity to maintain areas being cleaned under negative pressure, containing debris and preventing contaminant migration to adjacent areas.

2. When possible, discharge ducted exhaust air from vacuum collection devices outdoors, keeping discharge air clear of outdoor air intakes, operable windows, and other locations allowing outdoor air entry.
  - a. Do not violate outdoor environmental standards, codes or regulations.
  - b. Do not discharge unfiltered air from vacuum collection devices outdoors.
3. When necessary to exhaust vacuum collection devices indoors, including hand-held and wet-vacuum machines, keep discharge air in work area, and provide machine air discharge HEPA filtration, rated at 99.97 percent collection efficiency for 0.3 micron particles and larger.

#### 1.6 AIR HANDLING UNIT (AHU) CLEANING

- A. Clean supply, **[return]** **[relief]**, and **[exhaust]** fans and blowers.
  1. Clean blowers, fan housings, ducted plenums, scrolls, blades, or vanes, shafts, baffles, dampers and drive assemblies.
  2. Remove visible non-adhered substances in accordance with ACR, The NADCA Standard.
- B. Clean air handling unit (AHU) internal surfaces, components and condensate pans, and drains.
- C. Clean heat transfer coils, fans, condensate pans, drains and similar non-porous surfaces in conjunction with mechanical methods as described in ACR, The NADCA Standard.
- D. Control water spray and extraction are sufficient to collect debris and prevent water damage to HVAC components and surrounding equipment.
- E. Capture, contain, test and dispose of wastewater generated while performing wet cleaning in accordance with applicable federal, state, and local regulations, and requirements of Authorities Having Jurisdiction.
- F. After cleaning, verify HVAC system component cleanliness in accordance ACR, The NADCA Standard.

#### 1.7 AIR DUCT SYSTEMS:

- A. Clean airside surfaces of ducts to remove non-adhered substances.
- B. Access air duct interiors through service openings in system that are large enough to accommodate mechanical cleaning procedures and allow for cleanliness verification.
- C. Use mechanical agitation methods to remove non-adhered substances.
- D. Capture dislodged substances with vacuum collection device.
- E. Do not employ cleaning methods that damage HVAC components.
- F. Mark position of dampers and air-directional mechanical devices inside HVAC system prior to cleaning.
- G. When cleaning is complete, restore dampers and devices to their marked positions.

- H. After cleaning, verify cleanliness of HVAC system surfaces and components in accordance with ACR, The NADCA Standard.
- 1.8 AHU COILS
- A. Perform visual coil and drain pan inspection to determine whether Type 1 dry cleaning, or Type 2 wet cleaning is required.
  - B. Employ cleaning methods rendering coil visibly clean in accordance with ACR, The NADCA Standard.
  - C. Isolate coil from duct system during cleaning process. Do not allow removed particles to migrate to, or redeposit on, unintended areas.
  - D. Apply coil cleaning products in accordance with manufacturer's published data and labeling.
  - E. Clean and flush condensate drain pan and drain line. Verify proper drainage operation before and after cleaning.
  - F. Apply cleaning methods and products that do not cause damage to, or erosion of, coil surface or fins.
- 1.9 TYPE 1 DRY CLEANING METHOD
- A. Operate HEPA-filtered negative air machines that discharge continuously during Type 1 cleaning process.
  - B. Mechanically remove non-adhered substances and debris in accordance with ACR, The NADCA Standard.
- 1.10 TYPE 2 WET CLEANING METHOD
- A. Employ Type 2 wet cleaning method when visual inspection reveals suspect microbial matter on coil or drain pan. Access both upstream and downstream sides of each coil section for cleaning.
  - B. Employ engineering controls required for coil cleaning in accordance with ACR, The NADCA Standard.
  - C. Verify cleanliness after cleaning has been performed as described in ACR, The NADCA Standard.
  - D. Perform Type 2 cleaning if adhered substances still remain on the coil or the coil is impacted after Type 1 cleaning has been completed and post-cleaning inspection has been performed.
  - E. After cleaning, verify cleanliness of HVAC coils in accordance ACR, The NADCA Standard.
  - F. Isolate coil from duct system during cleaning process. Do not allow removed particles to migrate to, or redeposit on, unintended areas.
  - G. Apply coil cleaning products in accordance with manufacturer's published data and labeling.
  - H. Clean and flush coil [, condensate drain pan and drain line. Verify proper drainage operation before and after cleaning].

- I. Apply cleaning methods and products that do not cause damage to, or erosion of, coil surface or fins.
- J. Type 1 Dry Cleaning Method:
  - 1. Operate negative air machines with HEPA-filtered discharge continuously during Type 1 cleaning process.
  - 2. Mechanically remove non-adhered substances and debris in accordance with ACR, The NADCA Standard.
- K. After cleaning, verify cleanliness of HVAC coils in accordance ACR, The NADCA Standard.
- L. Negative Duct Pressurization:
  - 1. Throughout cleaning process, keep HVAC system and associated air ducts at negative differential pressure, relative to indoor non-work area.
  - 2. Maintain negative pressure differential between portion of HVAC duct system being cleaned and surrounding indoor occupant spaces.
  - 3. Continuously monitor and verify correct pressure differential.
  - 4. When performing vacuum collection, employ negative air machine drawing air from equipment being cleaned.
  - 5. When negative air machine is not fitted with HEPA filtration, duct exhaust air from negative air machine to outdoor location, keeping discharge air clear of outdoor air intakes, operable windows, and other locations where outdoor air enters building.
    - a. Do not violate outdoor environmental standards, codes or regulations by releasing debris.
    - b. Do not discharge unfiltered air from vacuum collection devices outdoors. M.

#### Microbial Agents:

- 1. Apply antimicrobial agents only when active biological growth is reasonably suspected, or where unacceptable levels of biological contamination have been verified through testing.
- 2. Apply antimicrobial agents after removal of surface deposits and debris.
- 3. Apply antimicrobial agents in accordance with antimicrobial agent manufacturer's written recommendations and associated EPA registration listing.

#### 1.11 FIELD QUALITY CONTROL

- A. Inspect work to verify cleanliness immediately after HVAC system component cleaning and prior to placing system in operation.
- B. Do not apply treatment, coating, or antimicrobial agent to cleaned HVAC system components until the work has been inspected and determined to be acceptable.
- C. Visual Inspection:
  - 1. Perform visual inspection of porous and non-porous HVAC system component surfaces. Verify HVAC system components are visibly clean as defined in ACR, The NADCA Standard.
  - 2. If no contaminants are evident through visual inspection, HVAC system components are considered clean and acceptable.

3. If contaminants are evident through visual inspection, repeat cleaning system areas where contaminants are visible.

D. Surface Comparison Test for Porous Surfaces Only:

1. If visual inspection of porous surfaces is inconclusive or disputed, then perform Surface Comparison Test in accordance with ACR, The NADCA Standard.
  - a. Attach vacuum brush to operating contact vacuum.
  - b. Employ contact vacuum with HEPA-filtered discharge, capable of achieving minimum 80 inches w.g. static lift and fitted with 2.5-inch diameter round nylon brush attached to 1.5-inch diameter vacuum hose.
  - c. Pass brush over surface test area four times.
  - d. Visually compare tested and untested surfaces to determine whether visible surface characteristics are detectable.
2. When surface comparison test is complete, HVAC component surface is considered acceptably clean if there is no visually detectable difference between tested and untested surface characteristics.

E. NADCA Vacuum Test for Non-Porous Surfaces Only:

1. When required, perform Vacuum Test in presence of Property Manager, and in accordance with ACR, The NADCA Standard.
2. Apply NADCA Vacuum Test template to ducted airside of component's surface.
3. Attach closed-face vacuum cassette with filter media to calibrated air sampling pump and pass closed-face of filter cassette over two 2 cm x 25 cm openings marked on template.
4. The cassette shall be moved at a rate not greater than 5 cm per second (5 seconds per slot in each direction). When sampling is complete, prepare filter cassette and weigh it to determine total amount of debris collected.
5. Surface is considered acceptably clean, when net weight of debris collected on filter cassette is less than 0.75 mg/100 cm<sup>2</sup>.

1.12 SYSTEM STARTUP

- A. Install closures over services access openings before allowing system restart for normal facility operation.
- B. When system is placed in operation, remove temporary filter elements after minimum 24 hours operation.

1.13 DISPOSAL OF JOB SITE DUCT CLEANING WASTE

- A. Seal HVAC system debris and remove contaminated materials in containers before removal from work area.
- B. Handle materials classified as hazardous by governmental agencies in accordance with applicable federal, state, and local, regulations and codes.
- C. Dispose of debris removed from HVAC system in accordance with applicable federal, state, and local requirements.

## ADDITIONAL TERMS AND CONDITIONS

**Professional Conduct.** At the completion of the project, Contractor will remove all waste materials and rubbish from the site, together with tools, construction equipment, machinery and surplus materials. Contractor shall supervise and direct the work at Customer's property, using reasonable skill and attention. Contractor shall be solely responsible for the construction means, methods, technique, sequences, and procedures for all work performed at Customer's property pursuant to this Agreement. Customer shall not interfere with Contractor's work forces. Extra materials left over upon completion shall be deemed Contractor's property.

**Delays.** Contractor's failure to perform any term or condition of this Agreement as a result of conditions beyond its control do not constitute abandonment and are not included in calculating time frames for performance by Contractor. Contractor and Customer(s) have determined that a definite completion date is not of the essence to this Agreement.

**Additional Work.** Contractor is not obligated to correct or repair pre-existing structural deficiencies or problems resulting from existing conditions to the property, or the work of others. For example, unless otherwise specified in the Agreement, Contractor is not responsible for correction to landscaping or other property damaged in the normal course of work by digging or other operations. Contractor is not responsible for any drywall, painting, patchwork, or repair work on fixtures, or structural or other damage that may occur or be necessary in order to complete the scope of work or any other damage that may occur as a result of the original plumbing, sewer or HVAC system, or other problems related to the premises. Unless otherwise specified in the Agreement, Contractor is not responsible for any leveling of tubs, shower bases, or floors; repair of damage occurring from appliance moving/relocating; any sheet metal work, pipe insulation, or ditch compaction; correction or repairs to sewer lines, or repairs necessitated by equipment getting stuck in the line, to include, but not limited to, cutting into drywall, concrete, or roof or gutter repairs.

**Performance or Condition of Existing HVAC Equipment.** Contractor is not responsible for the performance, functionality, or compatibility of existing equipment, ductwork, duct board, controls, or other equipment/materials that are not repaired or replaced during a job installation and that Customer agrees to keep in place. In the event that an existing piece of equipment prevents the proper start up or operation of the new equipment or system, Customer assumes all responsibility for any additional service charges that may be incurred.

**HVAC Existing Attic Access Stairs.** In the event Customer's existing stairs/attic access cannot be safely utilized for the removal and installation of equipment, an alternate method or access may be required. Contractor is not responsible for (a) the replacement or repair of steps, stairs or panels that must be removed to complete removal or installation work; and/or (b) any property damage resulting from the removal of access steps, stairs or panels.

**Contractor's Right to Cancel:** If Contractor determines that this Agreement cannot be performed as intended due, for example, to incorrect pricing, unforeseen structural defects, or pre-existing conditions to Customer's property, Contractor may cancel this Agreement within thirty (30) days of its execution, notify Customer(s) of such cancellation in writing, and return all monies paid by Customer(s).

**No Set-Offs or Retentions:** Upon substantial completion of Contractor's work under this Agreement, Customer(s) shall pay all amounts due under this Agreement without any right of set-off or retention. Substantial completion is defined as the job being materially completed, functional as intended. If after paying all amounts due under this Agreement, Customer(s) alleges that Contractor's work is defective in any respect, Contractor, without waiving any of its rights, shall cause an inspection of the work and perform any remedial work to the extent the Customer(s) is entitled to under this Agreement or Contractor's warranty at no cost to customer(s).

**Customer's Representations:** Customer(s) represents and warrants that (a) Customer(s) owns the premises where the products and services are being provided by Contractor; (b) Customer(s) will provide Contractor with reasonable access to the premises, including access to electrical outlets as may be required by Contractor; and



(c) Customer(s) shall be responsible for the preparation, moving, and reinstalling of all items as required by Contractor under this Agreement.

**Contractor's Responsibility:** Contractor shall not be responsible for (a) any damages arising in whole or in part from strikes, fires, accidents, floods, governmental actions, or any other causes beyond control of Contractor; (b) any incidental or consequential damages including, without limitation, lost profits or reduction in value of Customer's property arising from Contractor's delay in performing under this Agreement or due to Contractor's breach of this Agreement; and (c) unintentional damage to flooring, window treatments, landscaping, driveways, sidewalks, telephone installations, collateral or incidental damage to interior walls and personal property, it being understood that Customer(s) is responsible at Customer's cost for all preparations, protection, and/or moving of such items prior to Contractor's commencement of work.

**Condensation, Mold and Related Matters:** Customer(s) agrees to indemnify and hold Contractor and its employees, agents, and subcontractors harmless from any claims as to the identification, detection, abatement, encapsulation, or removal of mold, asbestos, lead- based products, or other hazardous substances inside or outside of the property at which work is performed. Contractor does not provide mold testing or remediation services.

**Manufacturer's Warranties/Service Calls:** Customer understands that manufacturers of products and appliances provide factory warranties governing repair and replacement of those items. Any warranties offered by the manufacturer of the products purchased shall be provided to Customer(s). Customer understands it is Customer's responsibility to refer to each specific manufacturer's warranty guidelines and that it may be necessary for Customer as the owner to register the equipment with the manufacturer and maintain it according to the manufacturer's specifications. Contractor will provide a one-year labor warranty for each installation and will perform all service and repairs covered under that labor warranty. Contractor shall have no liability concerning any manufacturer's warranty. The manufacture date of products and equipment are not guaranteed to be the current year. Customer shall pay for all service calls not otherwise covered under the terms of a service contract or deemed a warranty claim under Contractor's workmanship warranty regardless of whether Contractor performs any work (including equipment and labor that is under the warranty period).

**Miscellaneous:** No waiver of any breach of this Agreement shall be construed as a waiver of any prior, concurrent, or subsequent breach hereof. The section headings contained in this Agreement are inserted for convenience only and shall not affect in any way the meaning or interpretation of this Agreement. In construing this Agreement, the gender and number of words used may be changed to meet the context. This Agreement shall be governed by and construed in accordance with the laws of the state in which it is performed, except as may be preempted by federal law. Any part of this Agreement contrary to the law of this state shall not invalidate other parts of this Agreement. If a provision of this Agreement is held to be invalid or unenforceable, this Agreement shall continue in full force and effect and shall be construed as if the invalid or unenforceable provision was omitted.

**Arbitration of Disputes:** Contractor and Customer(s) agree that any and all disputes, claims, or controversies (hereafter referred to as a "Claim") arising under or relating to this Agreement and any related documents, loans, security instruments, accounts, or notes, including by way of example and not as a limitation: (i) the relationships resulting from this Agreement and the transactions arising as a result thereof; (ii) the terms of this Agreement; or (iii) the validity of this Agreement or the validity or enforceability of this arbitration provision may, at the election of either party, be subject to binding arbitration to be determined by one arbitrator, in accordance with and pursuant to the then prevailing Construction Industry Arbitration Rules of the American Arbitration Association ("AAA"), to be held and arbitrated in the county where the work under this Agreement occurred. Customer(s) agrees that Customer(s) will not assert a Claim on behalf of, or as a member of, any group or class. The findings of the arbitrator shall be final and binding on all parties to this Agreement. Each party shall be responsible for its own fees and costs, unless otherwise determined by the arbitrator. This agreement to arbitrate, and any award, finding, or verdict of or from the arbitration, will be specifically enforceable under the prevailing law of any court having jurisdiction. The party asserting a Claim shall file a notice of the demand for arbitration with the other party to this Agreement and with AAA. The demand for

arbitration shall be made within a reasonable time after the Claim in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations. Any arbitration proceeding brought under this Agreement, and any award, finding, or verdict of or from such proceeding shall remain confidential between the parties and shall not be made public. Both Contractor and Customer(s) are hereby potentially agreeing to choose arbitration, rather than litigation or some other means of dispute resolution, to address any grievances or alleged grievances. The parties believe this may allow for a faster and more cost-effective method of addressing a Claim. By entering into this Agreement and this arbitration provision, both parties may be potentially giving up their constitutional right to have any dispute decided in a court of law before a jury, and instead are potentially accepting the use of arbitration.

**BUYER'S RIGHT TO CANCEL:** This is a home solicitation sale, and if you do not want the goods or services, you may cancel this agreement by providing written notice to the seller in person, by telegram, or by mail. This notice must indicate that you do not want the goods or services and must be delivered or postmarked before midnight of the third business day after you sign this agreement. If you cancel this agreement, the seller may not keep all or part of any cash downpayment.