



# **Healthy Duct**

**Property Services**

## **HVAC Assessment, Cleaning & Restoration**

**Procedure and standards followed for HVAC care at  
8 Lincoln Street  
North Easton, MA**

Completed June 24, 2021  
for  
**Douglas A. King Builders, Inc.**

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*Health Duct Property Services is owned and operated by Max Assist, Inc.  
NADCA #1217933 ASCS and VSMR Certified*

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### **PART 1 - EXECUTION**

1. 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.
2. Perform HVAC system assessment by ASCS, Certified Ventilation Inspector (CVI), or equivalent.
3. No microbial testing or sampling was required. 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 Tony Fernandes.

### 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 waste water 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 removed 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.