


# Cleaning Air Ducts After A Fire (or contaminated with soot or smoke)

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# Cleaning Air Ducts After A Fire (or when contaminated with soot or smoke)



Rick MacDonald




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# Disclaimer

This presentation is not intended to be a comprehensive program covering all aspects of this topic. All technicians are encouraged to read and follow all applicable standards, codes and regulations related to this topic.

- ✓ It is the responsibility of each individual contractor to follow local building codes and licensing requirements and to work safely in accordance with OSHA guidelines.
- ✓ It is the contractor's responsibility to take proper precautions on each project to prevent cross contamination. Always take the health and safety of the building occupants into consideration before you conduct any cleaning procedures.
- ✓ All of the following tips are only general tips. They do not cover every situation and it is your responsibility to adapt these tips to the individual system you are working on.
- ✓ The Instructor is not responsible in any way for the work you perform after viewing this slide show. You are responsible for your own work.
- ✓ The views and opinions following are the instructors opinions and not necessarily the official position of the National Air Duct Cleaners Association.

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**TECHNICAL  
NADCA  
CONFERENCE**

**What We'll  
Learn**

- How smoke or soot enters the system (even when off)
- Identifying smoke or soot contaminated ducts
- Cleaning procedures and a practical way to prevent recontamination
- Coatings and Deodorizers

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**TECHNICAL  
NADCA  
CONFERENCE**

**Cleaning Air Ducts  
After A Fire  
(or contaminated  
with soot or smoke)**

-  Smoke and soot from fires
-  Include building materials as well as the homes content
-  Bring many different types of particulate into the smoke

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**Smoke/soot  
from fossil  
fuels**

-  Oil Burner Malfunctions
-  Damaged Heat Exchangers
-  Gas Heating system malfunctions (That's right, gas appliances can produce soot)
-  Blocked chimney flues

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Smoke/soot from fossil fuels

-  Fireplace back up
-  Wood and Pellet fuel burning appliances
-  Vehicle exhausts
-  Candles and Oil Lamps

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Smoke & Soot From A Protein Fire

-  Smoke damage from the extreme charring or burning of a protein rich material- (Roast beef-chicken-turkey or even over boiled peas) and produces little visible smoke.
-  Has an invisible film, penetrates many areas of a home. May require hand cleaning

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Smoke & Soot From Plastics Burning

-  Many articles found in use today are made of plastic so if there is a structure fire most likely plastic is nearby. This soot can be sticky and require extra work cleaning.

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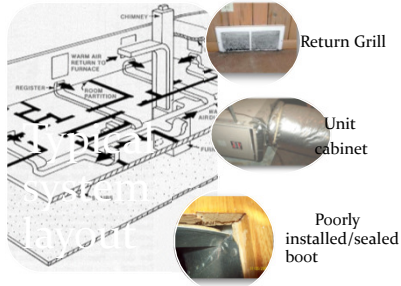
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### Common Points of Entry of Soot into the HVAC System and Ductwork




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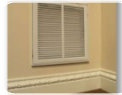
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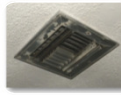
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### Common Entry Points

Soot can contaminate an HVAC system through many points of entry. Improperly installed duct connectors and grille connectors are contributors to soot intrusion into the ductwork.



The most common point of entry would be through the return or cold air duct. When the HVAC system is operational and soot from external sources will be drawn into the system and contaminate the entire system.



Due to building pressurization with the system off, the ducts can still become contaminated.



Soot can contaminate an HVAC system through many points of entry. When fire dampers are braced open. In the event of a fire, smoke and soot will be transferred throughout the HVAC system.



In commercial building, there are outside air intakes and return relief that, in certain circumstances, outside air intake will pressurize the Air Handling Unit (AHU) effectively simulating operation.

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Evidence of Soot Contamination – Supply register/diffuser



Soot staining



Ceiling staining



Soot cobwebs

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Evidence of Soot Contamination - Internal Components


Verification of internal evidence of contamination requires the opening, access and possible removal of some components to verify soot contamination.



Inside return duct



Filter



Supply duct

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Contamination - Internal Components

Often you will have to pull the blower assembly to thoroughly inspect the interior of the Air Handling Unit.



Blower/Fan Assembly



Blower/Fan blades will require cleaning

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
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Evidence of Soot Contamination - Internal Components



Soot contaminated return grill and on system that was not running



There is visible existing dust and soot located on the right side of the coil next to the return.

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Evidence of Soot Contamination - Internal Components



Access to cleaning supply shows liner soot damaged and suitable for cleaning. cess to cleaning supply shows liner soot damaged and suitable for cleaning.

Inspection further up the line where it went horizontal, the liner melted from heat.

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# Cleaning Procedures for Fire Losses

Source Removal Air Duct Cleaning  
Same Stuff Different Day

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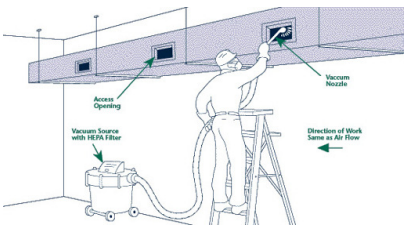
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Contact vacuuming with a HEPA Vac, the fundamental process



Access Opening

Vacuum Nozzle

Vacuum Source with HEPA Filter

Direction of Suck Same as Air Flow

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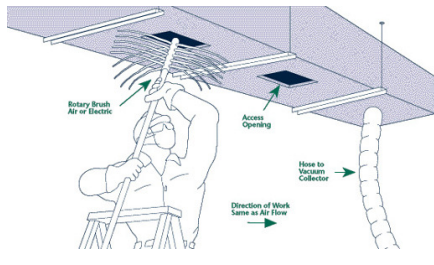
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Brushing in conjunction with negative air.



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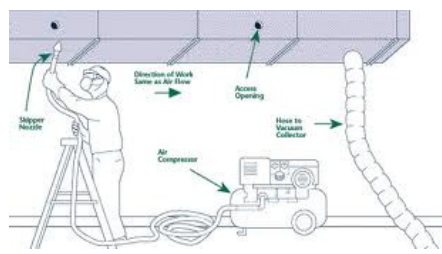
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Compressed air sweeping in conjunction with negative air.



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Thanks to our friends at NAIMA for some of the simplest and best communicating illustrations of the Air Duct Cleaning process.

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Special Conditions (Obstacles) Presented by Fire Losses

Contamination is not like what is normally encountered in general maintenance cleaning situations.

Smoke film residue, depending upon what burned, may not come off with dry cleaning techniques.

Special techniques, products, and tools may be required to accomplish the goal of satisfactory decontamination.

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Special Conditions (Obstacles) Presented by Fire Losses



A dry-chem sponge and paper towels used for spray and wipe on fire loss ducts after an especially aggressive air duct cleaning was performed with the usual dry collection source removal air duct cleaning techniques.



The duct materials upon which the smoke residue is deposited can present problems.

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A worst case scenario may present only 2 choices:



Outright replacement instead of cleaning.



Heavy spray coating after aggressive cleaning. That still may not be adequate, and replacement might be necessary

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Special Conditions (Obstacles) Presented by Fire Losses



Hot smoke rising into ceiling vents can melt the plastic of flex ducts.



Even after the filter soot deposits were "squeezed" through the AC coil like Play-Doh.

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Special Conditions (Obstacles) Presented by Fire Losses



Extraordinary amounts of soot from smoke can make cleaning problems.



The motor windings section of the blower motor was filled with soot. Surface cleaning may not capture the accumulations on the windings. Hot windings could cause persistent odors due to heated smoke residue.

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Special Conditions (Obstacles) Presented by Fire Losses



Galvanized steel ducts that have had flames from fire come in direct contact with the metal will fail.



Failure will result in severely rusted ducts over time because the bond between the zinc and the steel breaks down from the heat exposure. Ducts in this condition have to be replaced.

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Post Cleaning Protection

Applying a filter media over the registers/diffusers and grills will keep any "float" from re-entering the ductwork and prevent a "call back"

Post Cleaning Protection

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HVAC Chemical Use for Fire/Soot

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Tools in the Chemical Toolbox for Fire/Soot

Includes  
Cleaners  
Deodorizers  
Coatings

Always remember  
Useful and complimentary tools  
Never a replacement for source removal  
Not utilized on all projects  
Every fire is different

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If needed, what chemical to use????

- System/Power shut down?
  - How soon?
  - How much contamination captured/settled
- Bare metal or Fiberglass lined or Ductboard or Flex
- Nature of contamination
  - Dry = possible no liquid cleaning
  - Wet = prepare to wet clean
  - Troublesome actors
    - Plastic/Electronics
    - Softwood Wildfire
    - Preexisting Filth
    - Firefighting Foam

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Cleaning

- Coil Cleaner
  - Neutral pH Range
    - Pitting affects water shedding
  - Alkaline pH
    - To cut oily contaminants if necessary
- Surface Cleaner
  - Alkaline Degreasers
    - Oily, Greasy, "Wet" Contamination
  - Enzyme Cleaners
    - Protein Fire
  - Peroxide Cleaners
    - H<sub>2</sub>O<sub>2</sub> content 8-10%,pH Neutral Range
    - Protein Fire
    - Softwood Wildfire

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If needed, what chemical to use????  
Antimicrobials?  
("-Cide")

- Products intended to kill microorganisms
- Why no disinfectants/sanitizers?
  - 1<sup>st</sup>: No EPA-registered products with kill (disinfect or sanitize) claims for the HVAC use site
  - Soot is not a microorganism

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**Coatings and Inhibitors**

- Lockdowns/ Knockdowns
  - Fogged or Sprayed
    - Irregular or unpredictable coverage
- Resurfacing Coatings
  - Tangible contiguous barrier to isolate non-removable particulate and odor reservoirs from airstream
  - Repair non-impacted adjacent liner
  - Viscosity Variable
    - Independent of solids content
    - Low
      - Ideal for repair, prone to sag
    - High
      - Bridging ability, sag resistant
  - Spray or hand apply
    - Cannot be fogged

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**Deodorizing**

- Often used as a "final" treatment
- Best understood by examining how product works
  - Fundamental distinction – are you absorbing the odor, or just masking it
    - Perfume/Masking Scent
- Sprayed or fogged
  - Follow the smoke from the source, then fog beyond it
- Gel block
  - 30-40 days
  - Same debate: absorbing or masking
- Ozone
  - Extreme cases

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Cleaning Air Ducts After A Fire (or when contaminated with soot or smoke)

**Presenter Contact Information**

- Rick MacDonald
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Thank you for Participating!



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