

# Air Duct Cleaning Related to Fire and Water Restoration Projects



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Presenter



Rick MacDonald ASCS, CVI

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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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### What We'll Learn

- ACR Section 4 Review
- Overview of IICRC Standards
  - Categories of Water
- Issues when dealing with smoke/soot
- NAIMA North American Insulation Manufacturers Association
- Getting Paid

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### ACR Section 4 Review

- ACR Section 4, 4.22 Flooding/Water Damage
  - Refers to IICRC 5000
  - If it is worthy of salvage, it shall be thoroughly cleaned.
- ACR Section 4, Fire/Smoke Damage
  - If it can't be cleaned replace
  - Consider friability and odors
  - If after cleaning any component surface showing damage shall be restored to an acceptable condition or replaced

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### IICRC

- The IICRC is the Institute of Inspection Cleaning and Restoration Certification, a non-profit organization for the Inspection, Cleaning, and Restoration Industries
- The IICRC is an accredited Standards Developing Organization (SDO) by the American National Standards Institute (ANSI).
- ANSI/IICRC 5000 Standard for Professional Water Damage Restoration
- BSR/IICRC 5700 (IN DEVELOPMENT) Standard for Professional Fire and Smoke Damage Restoration

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S500  
3 Categories of Water

• **Category 1**

- Water originates from a sanitary water source and does not pose substantial risk from dermal, ingestion, or inhalation exposure. Examples of Category 1 water sources can include, but are not limited to: broken water supply lines; tub or sink overflows with no contaminants; appliance malfunctions involving water-supply lines; melting ice or snow; falling rainwater; broken toilet tanks, and toilet bowls that do not contain contaminants or additives




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**The 3 Categories of Water from S500**



S500  
3 Categories of Water

• **Category 2**

- Category 2 water contains significant contamination and has the potential to cause discomfort or sickness if contacted or consumed by humans. Category 2 water can contain potentially unsafe levels of microorganisms or nutrients for microorganisms, as well as other organic or inorganic matter (chemical or biological). Examples of category 2 water can include but are not limited to: discharge from dishwashers or washing machines; overflows from washing machines; overflows from toilet bowls on the room side of the trap with some urine but no feces; seepage due to hydrostatic pressure; broken aquariums and punctured water beds.
  - There is no doubt that soapy drain water from a washing machine or dishwasher is category 2 water, but there is no immediate risk that the water is contaminated with microbes.
  - Soap kills microbes, that is why we use soap.

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**The 3 Categories of Water from S500**

Category 2???



S500  
3 Categories of Water




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S500  
3 Categories of Water

### The 3 Categories of Water from S500

Category 3???



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S500  
3 Categories of Water

### The 3 Categories of Water from S500 Things to keep in mind

Category 1 water can deteriorate to Category 2 or 3. Category 1 water that flows into an uncontaminated building does not constitute an immediate change in the category. However, Category 1 water that flows into a contaminated building can constitute an immediate change in the category. Once microorganisms become wet from the water intrusion, depending upon the length of time that they remain wet and the temperature, they can begin to grow in numbers and can change the category of the water. Odors can indicate that Category 1 water has deteriorated.

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S500  
3 Categories of Water

### The 3 Categories of Water from S500

- **Category 3**
  - Category 3 water is grossly contaminated and can contain pathogenic, toxigenic or other harmful agents and can cause significant adverse reactions to humans if contacted or consumed. Examples of Category 3 water can include but are not limited to: sewage; waste line backflows that originate from beyond any trap regardless of visible content or color; all forms of flooding from seawater, rising water from rivers or streams; and other contaminated water entering or affecting the indoor environment, such as wind-driven rain from hurricanes, tropical storms, or other weather-related events. Category 3 water can carry trace levels of regulated or hazardous materials (e.g., pesticides, or toxic organic substances).
    - All forms of ground water leaking into a basement are considered as Category 3 water because it is presumed to be filtered through dirt that has had fertilizer, herbicide, or insecticide put on it.

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S500  
3 Categories of Water

### The 3 Categories of Water from S500 Things to keep in mind

Category 2 water can deteriorate to Category 3. Once microorganisms become wet from the water intrusion, depending upon the length of time that they remain wet and the temperature, they can begin to grow in numbers and can change the category of the water.



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S500  
3 Categories of Water

### The 3 Categories of Water from S500 Things to keep in mind

Regulated, hazardous materials, and mold:

If a regulated or hazardous material is part of a water damage restoration project, then a specialized expert may be necessary to assist in damage assessment. Restorers shall comply with applicable federal, state, provincial and local laws and regulations. Regulated materials posing potential or recognized health risks can include, but are not limited to arsenic, mercury, lead, asbestos, polychlorinated biphenyls (PCBs), ethylene glycol, pesticides, fuels, solvents, caustic chemicals and radiological residues. For situations involving visible or suspected mold, refer to the current version of ANSI/IICRC S520 Standard for Professional Mold Remediation. Qualified persons shall abate regulated materials or should remediate mold prior to restorative drying.

You may want to consult with an Industrial Hygienist.

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Water in the Ductwork

### Water In Ductwork and What Should Be Taken Into Consideration

- Where did the water come from?
- Where did it go?
- What type of ductwork is present?
- Inside the system

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Water In The Ductwork

Water In Ductwork and What Should Be Taken Into Consideration

- The first step is to identify the source of water and make sure it is controlled.
- The water should be drained from the system and components and dried.
- If the water is Category 2 or 3 and directly entered the system, it may not be practical or possible to decontaminate the system or ductwork.

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Water In The Ductwork

Water In Ductwork and What Should Be Taken Into Consideration

- Why not decontaminate category 2 or 3 inside ductwork?



- Can you properly clean inside these connections?

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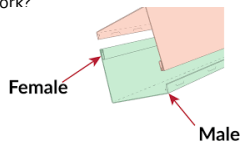
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Water In The Ductwork

Water In Ductwork and What Should Be Taken Into Consideration

- Why not decontaminate category 2 or 3 inside ductwork?



- Can you properly clean inside these connections?

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### Water In The Ductwork

#### Water In Ductwork and What Should Be Taken Into Consideration

- When sections of internally lined ductwork, duct board or flexible ductwork are affected by water damage, it is often more effective to replace rather than dry or remediate. When such ductwork is affected with microbial contamination, it should be removed and replaced with new materials.

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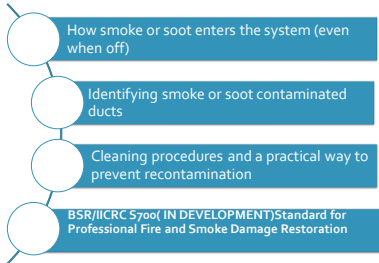
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### Smoke/Soot




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### Cleaning Air Ducts After a Fire (or contaminated with soot or 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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### AC Coil over oil furnace Melted drain pan



Close up

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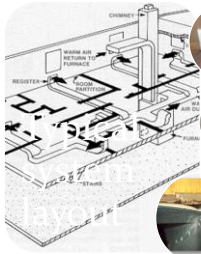
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### Common Points of Entry of Soot and Water into the HVAC System and Ductwork



Return Grill



Unit cabinet



Poorly installed/sealed boot

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### Common Entry Points

Soot and water 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 closed. 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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Evidence of Soot 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

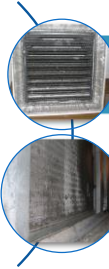
Blower/Fan blades will require cleaning



Seven horizontal lines for notes.



Evidence of Soot Contamination Internal Components



Soot contaminated return grill 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.



Seven horizontal lines for notes.



Evidence of Soot Contamination Internal Components



Access to cleaning supply shows the plastic lining soot contaminated but suitable for cleaning.

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



Seven horizontal lines for notes.



# Cleaning Procedures for Water and Fire Losses

## Source Removal Air Duct Cleaning

### Same Stuff Different Day

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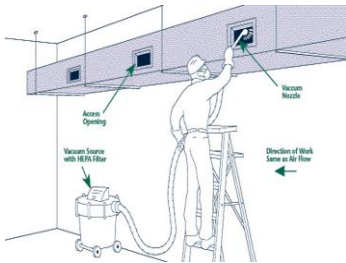
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Contact vacuuming with a HEPA Vac, the fundamental process



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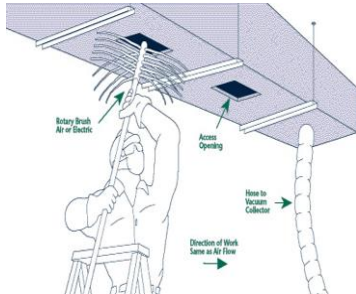
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Brushing in conjunction with negative air.



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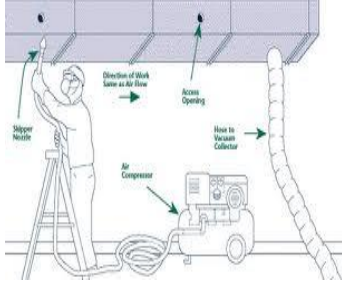
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Compressed air sweeping in conjunction with negative air.



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



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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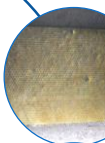
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A worst-case scenario may present only 2 choices:



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



Outright replacement instead of cleaning may be required



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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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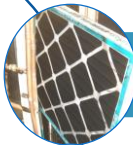
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Special Conditions  
(Obstacles)  
Presented by Fire  
Losses



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 must be replaced.

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Post Cleaning  
Protection

FLOAT

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

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## HVAC Chemical Use for Fire/Soot

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Chemicals you may find available for Fire/Soot- but are they correct?

- Includes
  - Cleaners
  - Deodorizers
  - Coatings
- Always remember
  - Useful and complimentary
  - Never a replacement for source removal
  - Not utilized on all projects

*Every fire is different*

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Antimicrobials?

- 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 for Fire/Soot

- 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
  - Same debate: absorbing or masking
- Ozone
  - Extreme cases

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### Presenter Contact Information

- Rick MacDonald
- Armstrong Duct, Vent, Hearth & Home
- Manchester, NH
- rmac@armstrongne.com

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### Title of Presentation




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Thank you  
for  
Participating!



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