



Tackling Exposed and Exterior Ductwork


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Presenters



David Monson
Armstrong Duct & Vent



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.




What We'll Learn

- Identify exposed and exterior ductwork
- Understand methodologies for cleaning
- Recognize potential hazards
- How to access, open and close exterior ductwork




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To Begin With, Let's Tell The Truth

- Rooftop Air Handling Units and Ductwork Is Stupid!
- In the Northeast the building insulation requirements are R-19 walls and R-38 roofs (attics).
- Exterior ductwork insulation requirement is R-8. Most RTUs still only have 1" insulation (R-4.2).
- Let's take a 5 Ton unit serving a 3,000 square foot space:
 - This unit needs to circulate 2,000 CFM of air, 120,000 CFH.
 - The volume of 3,000 square feet is 24,000 cubic feet.
- The entire volume of interior air will pass through the anemic insulation on the roof 5 times an hour!
 - It's kind of like opening windows when trying to control temperature.



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Ideas That Govern Building Design Considerations

- The modern building design and construction industry is governed by the idea of FIRST COST, expressed on cost per square foot of occupied space to construct.
- In some circumstances it has expressed itself in cost per cubic foot of occupied space to construct.
 - Ever wonder why so much stuff is jammed above suspended ceilings?
- The building owner is governed thereafter and to the end of the life of the building by LIFE CYCLE COST.
 - The architects, engineers, and general contractors are long gone by the time the full impact of that hits.



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Exterior Ductwork Is Quite Obvious



- What it is, is readily apparent. What to do with it raises all the questions.



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Exterior Duct Construction

- The great granddaddy of guidance docs for duct construction is the SMACNA HVAC Duct Construction Standards
- For those who look to standards, guidelines and codes for prescriptive formulas the section on exterior components will be a disappointment.
- There are no prescriptions. There are "deliberations" and "commentaries" instead.



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SMACNA STANDARD; EXTERIOR COMPONENTS

- Things to consider are: waterproofing, durability, weather resistance, corrosion, and maintenance.
- Ducts must be sealed watertight and be resistant to solar radiation.
- Appropriate products for the environment need to be selected.
- "Each installation of roof-mounted HVAC unit or roof supported duct involves customized design requirements."
- "All penetrations into ducts should be watertight."
- "Horizontal ducts should be pitched and provided with drainage outlets".
- "If airtight, waterproof flexible insulation jackets are applied on positive pressure ducts, the installation should accommodate some duct leakage; ducts are not completely airtight."



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Types of Rooftop Ducts

- There are 2 main types of rooftop ductwork: Externally Insulated and Internally Insulated.
- Each of these types has variations.





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Crappy Old Style Rooftop External Duct Insulation



- This is a fiberglass material denser than ductwrap, but not as dense as ductboard.
- It was covered with fiberglass lagging cloth.
- The lagging cloth was saturated and covered in a brushable/rollable mastic. The mastic was painted after curing.
- It didn't hold up very well, but it is still out there.



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Roof Membrane Covered External Duct Insulation



White membrane covered duct on the left, black rubber membrane covered duct on the right.



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Alumagard Covered External Duct Insulation





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Externally Insulated Roof Duct With A Doghouse Over It



- This may look like sheet metal duct coming off of the side of the RTU, but its not.
- It is a sheet metal shroud covering the tops and sides of externally insulated duct underneath fondly referred to as a "doghouse".
- It must be removed to access the duct.
- Pigeons love to roost in doghouses.



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Externally Insulated Duct With Some Sort of Roofing Over It?????



- Did they pay attention to the part about shedding water?
- What do you think that ductwork looks like on the inside?
- How do you remove this covering to access the ductwork underneath?
- You must work with your customer and figure out a plan together.
- Make one access to ductwork, figure out the cost, and assess it to the project.



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Internally Insulated Rooftop Duct



- It has the same duct construction instructions as internally insulated ductwork indoors; glued over 90%, pins every 12", sealed cut edges.
- But it may be (should be) 2" thick.





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Internally Insulated Duct With Weatherproofing On The Seams



- Just how weather proof are these seams?



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Internally Insulated Duct With Weatherproofing On The Seams



- Water stains all over the inside of that duct.
- Did they pay attention to the UV resistant portion of the instruction?



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Internally Insulated Rooftop Duct

- It could also be double wall duct.
- This could affect cutting of access.





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Understand Methodologies For Cleaning

- You are out in the sun, put on sunscreen, SPF 50 or more.
- Wear sunglasses, especially on white roofs. It really sucks being "snow blind" and walking off the edge of a roof.
- After gaining access to the duct interior, clean according to the NADCA Standard ACR2021.
 - Inside the duct it is the same surfaces we clean anywhere else.
 - Once inside the duct, there are no special tools or methods just because it is located on a roof.



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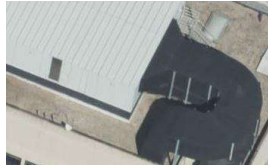
Special Considerations

- **DO NO DAMAGE TO THE ROOF!**
- Most of the flat rooftops we will be working on with exterior ductwork will have roofs covered with special membrane materials.
- Membrane roofs come with warranties with all sorts of conditions that would void warranties, like abuse, etc.
 - Malls are notorious for making you sign agreements that if any roof damage requiring repair occurs during the month that you worked on the roof you will agree to pay a prorated share of the repair along with the other contractors.
- If you accidentally make a hole in a roof because you dropped something sharp, cover the hole with duct tape to seal it and mark it and report it to the customer for repair. It is less costly for a roofing company to repair a membrane roof than a water damage from a hidden undisclosed leak.



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Recognize Potential Hazards



- The ductwork coming out of this penthouse on a roof is so large I would automatically clean it by crawling inside.....
- But!!!!!!



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Recognize Potential Hazards



- The fact that it is on top of a 10-story building makes me think I might want to take some precautions first.
- **FALL HAZARD!**



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Recognize Potential Hazards



- In fact, being on a flat roof like this working engages the OSHA fall protection requirements.
- When I went on the roof of this building to get information for a job proposal the customer informed me that the regional OSHA office was right across the street and the last time a contractor worked on the roof without fall protection they got whacked for a huge fine!



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Recognize Potential Hazards



- How good are the disclaimers in your contracts?
- Has this rusted through?



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Recognize Potential Hazards



- It is common to see puddles of water on top of roof top duct.
- No one knows what it looks like inside until you cut an access. (Ewww!)
- Thanks to Daniel Friedman (whoever he is) for posting these online.



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Recognize Potential Hazards

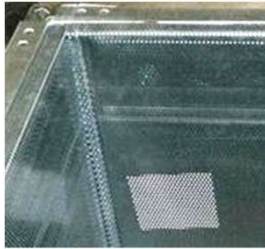


- The picture on the left is a rooftop duct that used to have the crappy external insulation with fiberglass lagging. That is gone off the top now.
- It, also, used to have a puddle sitting on top for a very long time.
- The picture on the right shows that the puddle is now on the inside of the duct. The white spots on top of the duct are daylight shining through all the pinholes in the rusted duct top.



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Recognize Potential Hazards

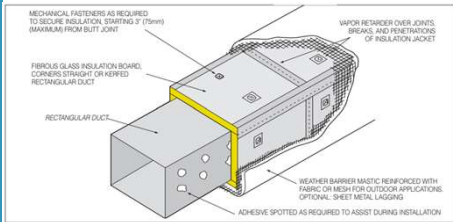


- If the exposed rooftop ductwork is double wall with perforated lining, how do I clean that?
- If I successfully clean the interior surface, what about the contaminants that may be impregnated in the fiberglass behind the perf plate?



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How To Access, Open, and Close Exterior Ductwork



Basic Exterior Externally Insulated Duct Construction Diagram.



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How To Access, Open, and Close Exterior Ductwork

- To access the duct to cut a normal service access you have to:
 - Cut through the weatherproof coating,
 - Cut through and temporarily remove the insulation,
 - Cut your duct access and do your work,
 - Close and seal the duct access,
 - Restore the insulation,
 - Restore the weatherproof coating.



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Demonstration Ducts

- A mock duct showing the stages of application of external insulation and Alumagard.
- It shows the bare sheet metal, the stick pins applied, the insulation put on, and the weatherproof covering.



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Demonstration Ducts

- A mock duct covered with insulation and rubber roofing membrane.
- We will be cutting an opening through this duct work.

Title of Presentation





Title of
Presentation

Presenter Contact Information

- David M. Monson
- Operations Manager, Armstrong Duct & Vent
- operations@armstrongne.com
- 603-627-7016

Thank you
for
Participating!

