

TIP SHEET - Hot Roofs: The Benefits, Pitfalls, and Mistakes

What is a "Hot Roof"? This style of roofing involves any roof where insulation (*Typically closed cell Spray Foam*) is applied directly to the underside of roof framing and sheathing - completely insulating the underside of the roof. The roof surface (when hit by sunlight) is much hotter - *thus the name "Hot Roof"*.

What are the Benefits of a "Hot Roof"?

- **Very Efficient** and complete home insulation
Foam can provide more insulation per inch and completely thermally seals a home
- **Quick / Easy Installation**
In open attics, it is simply sprayed on the framing
- **Reduction of Ice Dams**
Heat losses that help cause ice dams are stopped with the foam – thus less ice dams
- **Condensation cannot get to the roof framing**
Closed cell foam is a vapor barrier and prevents moisture from even reaching the framing



Spray foam is applied directly to the underside of the roof making a "Hot Roof" – No ventilation is installed

What are the Potential Problems with "Hot Roofs"?

- Most Asphalt shingles **cannot handle the heat of a "Hot Roof"**. There are special roof shingles (*These are designed to handle the increased heat generated by "Hot Roofs"*) which are **RATED** and **WARRANTIED** by the manufacturer for installation on un-ventilated and insulated roofs.

*We have seen 85-90% of Hot Roof installations with the **wrong type of asphalt shingles installed on them, with serious overheating, shingle damage, and premature failures of the roof shingles.** Typically, we see hot roofs with the wrong asphalt shingle roofs installed on them loose 25% to 50% of their expected shingle life! (We have inspected well over 100+ "Hot Roofs" and have seen them at many stages of their lives - **and their failures**)*



OVERHEATED AND DAMAGED ASPHALT ROOFING SHINGLES INSTALLED OVER HOT ROOFS

Note: We often see "ventilation" installed on foamed hot roofs. When foam FILLS the rafter cavities, NO AIR WILL MOVE and any "ventilation" installed WILL BE BLOCKED BY THE FOAM.

It's Common Sense!... *If air doesn't move: THERE IS NO VENTILATION!*

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Potential Problems (continued)

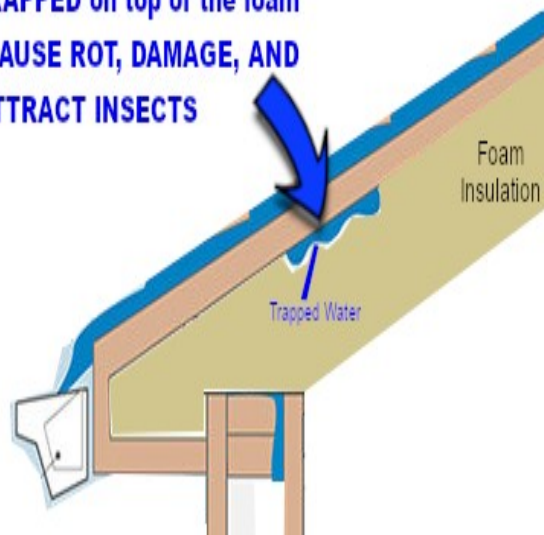
- **Leaks.** When flashings, penetrations, ice dams, or damage causes leaks in a Hot Roof, **the water that penetrates is often "stuck" above the foam insulation** - and **the framing can rot, attract insects, grow mold, and become damaged** - often with no external signs or symptoms until a complete failure happens (e.g. rotted out framing failing). THESE ISSUES ARE ESPECIALLY IMPORTANT TO HOMES WITH OSB ("Oriented Strand Board") ROOF SHEATHING - SINCE OSB WEAKENS AND FAILS MUCH MORE QUICKLY IF WATER IS TRAPPED AGAINST IT.

While Ice Shield waterproof membranes may help with this – **LEAKS TYPICALLY EVENTUALLY HAPPEN** – even with ice shield installed. **(High Temperature Ice Shield is typically needed for hot roofs)**

- **Lack of framing access:** When you completely cover the roof rafters, trusses, and roof sheathing, you lose access to the framing for future inspections. Cracks, bows, sheathing warps and pops, truss issues and other problems are all now hidden and cannot be inspected for. Leaks, Stains, or insect activity also becomes impossible to determine in areas that are "foamed in".

I always suggest to clients that every framing member be completely inspected, and any defects, under-framing, or other issues be corrected before any insulation is applied to it. Even these precautions cannot prevent future framing issues - they only lessen the preventable ones.

Water that leaks through the roof will become TRAPPED on top of the foam and CAN CAUSE ROT, DAMAGE, AND ATTRACT INSECTS



Hot Roofs Can Potentially TRAP WATER



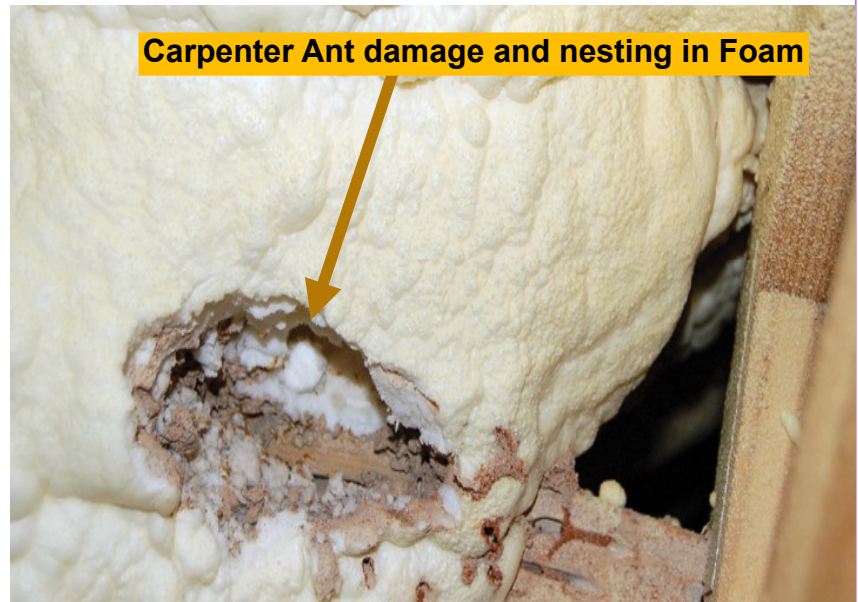
Spray foam insulation covers and prevents access to the roof framing and sheathing.





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Potential Problems (continued)

- **ANTS!** Carpenter ants spend their lives looking for nice soft rotted moist wood to hollow out and nest in. Ants will nest in anything that is soft, and when water does leak into the framing system - *and gets trapped against the wood framing* - a perfect storm of **moist rotting wood** (Which ants can smell at a distance) and **easily carved out soft foam next to it** is created. When [Carpenter Ants find this rot](#) they will often expand their nest into the foam - sometimes creating huge nests!

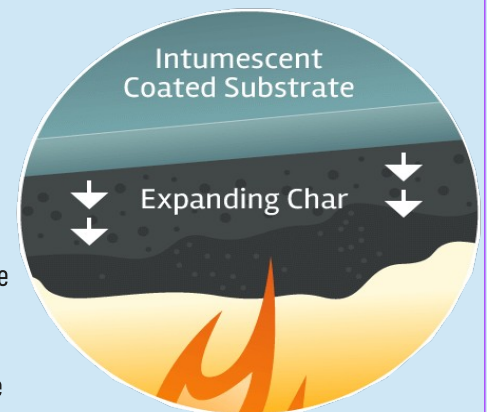


Signs that ants may be nesting in foam insulation include:

-  **Insulation falling** - If ants are burrowing through the foam, you may see white to tan insulation falling (*Pieces of the foam*).
-  **Piles of material** – Under areas where ants nest, you will often find piles of material containing wood shavings, foam bits, and dead insect pieces.
- **Foam insulation is COMBUSTIBLE:** The foam itself **can burn**, and **it needs to be completely coated in a special intumescent coating** ([JLC online](#)) OR with sheetrock- a coating that "puffs up" when exposed to heat and forms a heat barrier - to help prevent ignition of the foam. We often find this coating missing, poorly applied or incomplete. Most foam products need to be protected from heat and flame (*see the warnings on foam boards*) and are a potential fire hazard without this protection. Many people say "Well... it's protected in the attic / crawlspace and because of that it does not need protection." Well, Guess What? Fires DO happen in Attics and Crawlspace - so **NEARLY ALL spray or rigid foam NEEDS PROTECTION!**

How does Intumescent paint actually help prevent fires?

Intumescent paint is a fire-resistant coating that swells up when exposed to high heat. The paint contains ingredients like a blowing agent and a char-forming substance. When heated, these chemicals react and expand the paint significantly, sometimes up to 100 times its original thickness. This expansion creates a thick, foamy layer that acts as an insulator. It blocks heat from reaching the underlying material, slowing down the fire's progress. As the heat intensifies, the foamy layer hardens into a carbonaceous char. This char layer is a poor conductor of heat, providing further protection. Overall, intumescent paint buys valuable time in a fire by delaying the structural damage and spread of flames. This allows for safe evacuation and for firefighters to contain the blaze.



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A quick comparison of Open Cell foam vs. Closed Cell foam:

Insulation:

Closed Cell: Winner - Closed cell foam has a higher R-value (resistance to heat flow) per inch, typically around 6.0 per inch compared to 3.5 per inch for open cell. This translates to better overall insulation, keeping your home warmer in winter and cooler in summer.

Cost:

Open Cell: Winner - Open cell foam is generally less expensive due to its lower material cost and easier application process (it expands more).

Moisture Resistance:

Closed Cell: Winner - Closed cell acts as a vapor barrier, preventing moisture from passing through. This is crucial in preventing condensation and mold growth, especially in humid climates. Open cell foam absorbs moisture and requires an additional vapor barrier in some applications.

Weight:

Open Cell: Winner - Open cell foam is much lighter due to its open cell structure. This can be an advantage for applications where weight is a concern, such as attics.

Soundproofing:

Open Cell: Winner - Open cell foam excels at sound absorption due to its open cells that trap sound waves. Closed cell foam offers some soundproofing but not to the same extent.

Moisture Permeability:

Open Cell: Winner - Open cell allows air and moisture to pass through, promoting better ventilation within a structure. Closed cell foam traps air and moisture, potentially requiring additional ventilation.

Applications:

- **Closed Cell:** Ideal for attics, basements, crawlspaces, and exterior walls where a *vapor barrier* and *high R-value* are needed.
- **Open Cell:** Well-suited for un-ventilated attics, cathedral ceilings, and interior walls where soundproofing and breath-ability are priorities. **MUST HAVE FULL COMPLETE VAPOR BARRIER INSTALLED**

In summary:

- Choose closed cell foam for superior insulation, vapor barrier properties, and some soundproofing, despite the higher cost and weight. *(I personally PREFER closed cell foam over open cell)*
- Opt for open cell foam for affordability, moisture permeability, and excellent soundproofing, but be aware of its *lower R-value* and *lack of inherent vapor barrier*.

How Can I tell if my spray foam insulation is Open Cell or Closed Cell:

Visual Inspection:

- **Closed Cell:** This type of foam has a smoother, somewhat shiny surface, and it's firmer. You can try pressing your fingernail into it - it should leave a slight indentation but not break through.
- **Open Cell:** This foam has a rougher, lumpy, popcorn-like texture. It's much softer and easier to dent. You should be able to push your finger into it and leave a noticeable indentation.

Other clues:

- **Documentation:** If you have any paperwork related to the insulation installation, it might specify the type of spray foam used.
- **Contractor:** If you can get in touch with the contractor who installed the insulation, they should be able to tell you what type they used.
- **R-Value:** This number indicates the insulation's resistance to heat flow. Closed cell foam typically has a higher R-value per inch than open cell foam (around 6.0 vs 3.5). If you know the overall R-value of your insulation and the thickness, this might be a clue (though not definitive).

Destructive Test (not recommended):

If you have a small leftover piece of the foam, you can try snapping it in half. Closed cell foam will be more brittle and snap cleanly, while open cell foam will tear. However, this is not ideal as it destroys the insulation material. Also – placing a sample of each in water, then after 1-2 hours the open cell foam will be HEAVY due to all the water it absorbs (it may also sink).

If you're unsure or can't easily perform a visual inspection, it's best to consult with a qualified insulation contractor. They can help identify the type of foam and advise you on any maintenance or upgrades needed.

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Here are some links to more resources on Hot Roofs:

- [The Down Low on Hot Roofs](#)
- [HOT ROOF VS. COLD ROOF: TO VENT OR NOT TO VENT?](#)
- [Hot roof design problems - InspectAPedia](#)

And some links to more resources on Intumescent Paints:

- [Different Types Of Intumescent Coatings And Their Benefits](#)  Tremco Construction Products Group, Asia Pacific
- [New High Performance Fire Resistance Coating Applications](#)  International Code Council - ICC
- [Which Spray Foam Is Right For You?](#) Department of Energy (.gov)

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