Insight
The Top Ten Dumb Things To Do In The South

By Joseph Lstiburek, Ph.D., P.Eng.

10 Vented Attics and Vented Crawlspaces My definition of an unvented attic is an attic where there are no vents and where the attic insulation follows the slope of the roof sheathing thereby including the attic space within the conditioned building enclosure.

The rationale for venting attics in the South is to "flush" heat. The dominant heat transfer mechanism in an attic is radiation. Venting attics will not "flush" radiation. The air change in a perfectly built and vented attic (code 1:300 ratio) results in an average air change rate of 3 to 6 ach. At this attic air change rate there is approximately a 2 to 3 percent reduction in heat transfer to the conditioned space through the vented attic as compared to an unvented attic insulated to the same level. This assumes an airtight ceiling and no ductwork in the attic and certainly not leaky ductwork in the attic. The moment ductwork (assumed airtight in this instance and insulated at R-6) is installed in a vented attic, the balance changes. There is approximately a 5 to 7 percent increase in heat transfer to the conditioned space as compared to my version of an unvented attic. This is due to conductive heat gains through the surface of the ductwork and air handler now located in a "hostile" location (a hot, vented attic), rather than inside a 75°F conditioned space (the "house"). The moment leaky ductwork is installed in a vented attic there is approximately a 25 percent increase in heat transfer to the conditioned space. Of course this does not happen if you have airtight ducts and an airtight ceiling (then the penalty for venting the attic is only 5 to 7 percent as previously noted).

Now, if you locate the ducts within the conditioned space and also build an airtight ceiling, this is approximately 2 to 3 percent more efficient than my version of an unvented attic. I never said that this wasn't the most energy efficient way to do it. Of course when is the last time you saw ductwork below an attic ceiling coupled with an airtight attic ceiling? Builders put things in attics because they don't leave any room in the house for the ductwork and air handler. If they continue to do this, then venting attics is a dumb idea.

So much for the energy concerns. Now lets talk moisture. What? Are you all crazy? The air outside is hot, humid and disgusting. And you want to bring this into an attic where it can diffuse through the vapor barrier-less attic insulation and get to the cold, air conditioned ceiling? What were we thinking! Before it gets there it will see those cold R-6 insulated ducts, fittings, etc. and drip all over. Give me a break. Venting attics in the South was dreamed up by some disgruntled Yankee pissed about the Civil War and wanting to get even. Be sure when insulating at the roofline in humid climates to follow moisture control principles as you would with any insulated wall so that the roof assembly is self-drying (Unvented Roof Systems: www.buildingscience.com/docu-ments/reports/rr-0108-unvented-roof-systems).

Let's now talk about durability of shingles and shingle temperature. Venting or non-venting a roof has about a 5 percent impact on shingle temperature and roof sheathing temperature and even less on shingle durability. The color of the shingle is more important than venting or non-venting. And temperature is less important than the shingle getting a sunburn. The biggest impact on shingle durability is ultra-violet light. UV is more critical than temperature. The best roof for hot, humid climates for all applications (including unvented attics) is a concrete or clay tile roof. Period.

Crawlspaces are real simple to understand and deal with. When you vent crawlspaces you bring in hot, humid air and cause moisture and mold problems. The ground surface is typically colder than the dew point temperature of the exterior air. The underside of crawlspace floor insulation is radiation coupled to the ground surface and is very close to the same temperature of the ground. Moisture droplets can be seen all over the top surface of typical polyethylene ground covers as well as hanging from the bottom surface of the crawlspace floor

insulation. Gee, I wonder how all the water got through the poly ground cover? It must have leaked through the walls. Give me another break. Now, when the moisture is in the insulation where do you think it wants to go? Where is the air conditioning? Moisture moves to the cold surface. Venting crawlspaces made sense only when you had no air conditioning and no insulation and no crawlspace walls.

Interested in unvented design strategies? It will take a while to change common practice as builders and contractors learn to adopt new approaches. Be sure to consult local experts and code officials before attempting unvented attics or crawlspaces on your own. Many design details that cannot be covered here are important to achieve best performance. See Houses That Work (www.buildingsciencecon-sulting.com/designsthatwork/index.html) for more information.

9 Buildings That Suck (ducts in attics, crawlspaces, etc.)

This is a no brainer. Negative air pressures in buildings in hot, humid climates induce infiltration of hot, humid air. Period. Leaky ducts in vented attics and vented crawlspaces lead to negative air pressures.

8 Lined Ducts

You can never clean them. When they are wet and dirty they grow bad stuff. They get wet and dirty. When they are wet and dirty and when they grow bad stuff the only thing you can do is throw them out. At least you can clean and decontaminate the metal ducts.

You don't need lined ducts for acoustical reasons. The acoustical argument to justify lined ducts is only used by engineers and others who don't know how to design acoustically. Put them inside and you don't need to insulate them much, especially if you control the interior humidity. Of course you need to know how to do that.

When was the last time you ever saw an engineer figure out how to handle the latent load? I'll let you in on a little secret. You can't do it when you mix ventilation with sensible cooling. Engineers love to complicate things. Lets get this one really neat system to do everything. Get out of town. Can't do it anymore with one integrated system. You need two systems. One to handle the ventilation and its associated preconditioning requirements. The other to handle the space temperature. When you handle the ventilation, you handle the latent load. The rule is always deliver neutral temperature, dry ventilation air. And not worry about other moisture loads. If you keep the rain out, there won't be any. Now keeping the rain out may be a problem (*see # 5*).

7 Vinyl Wallpaper

This is a vapor barrier on the wrong side of the wall. It should be put on the outside of buildings, not on the inside in the South.

6 Carpets in Schools or on Slabs

If a carpet is dry, at the same temperature as the occupied space, and cleaned it is great. Especially if it has a vapor permeable backing. Now, it allows the concrete floor slab to "breathe" into the occupied space (vinyl floor coverings don't breathe, just like vinyl wall coverings). I like carpets that are dry, have no (or a "very small") temperature gradient across them and are cleaned. In schools which are slab on grade, forget it. The carpet is regularly colder than the air, especially when the a/c is turned off and you get the thermal lag. Now you have a higher relative humidity in the carpet than in the air. Now you get mold and dust mites. When was the last time you saw a school with a decent housekeeping budget? They can't afford to pay the teachers! Of course there is always money to pay the 16 levels of administrators. When carpet is maintained and in a building which is operated correctly (HVAC system-wise), it is one of the best floor coverings around. But, if you aren't going to use carpet properly, you are better off not using it at all.

5 Brick

I love brick. I also hate brick. Let me tell you when I hate it. I hate it when it does not have a drainage plane behind it that is also an exterior vapor barrier. Wet brick exposed to the sun is like a moisture capacitor which discharges to the cold side. The cold side is the interior air conditioned space. I love brick when there is a vapor barrier acting as a drainage plane between the brick and the rest of the wall assembly. Most brick in the South is installed without functioning drainage planes and effective vapor barriers. If you are not going to use it right don't use it. When it is used

right, it is the best exterior cladding system around (just don't paint it).

4

Stucco I love stucco. I also hate stucco. Sound familiar, see Brick above. Stucco over moisture sensitive materials such as wood framing and steel studs needs a drainage layer and a drainage gap. With traditional stucco this requires two layers behind the stucco rendering—a "bond break" and a "drainage plane." With "synthetic stucco" this requires a "water managed" system that drains.

3

Through-The-Wall AC/HP Units or Unit Ventilators Supplying Make-Up Air They can't handle part load conditions. Most systems that use them are inherently destined to be negative pressure systems (meaning the building conditioned space operates negative). I like them when they only do cooling and supply no outside air.

2

ASHRAE Standard 62 (20 cfm of outdoor air per person) Dilution is not the solution to indoor pollution in the south. A bunch of cowardly Yankees refused to target the real issue of source control in many buildings due to the related issue of material off-gassing. Too many manufacturers of building products would get pissed off. What? You want me to actually tell you what I put in my product? And then tell me I can't put it in? No way! Hey, why don't we increase air change and flush out the nasties? Everyone wins! You get to sell more energy. You get to sell more and bigger equipment. Every existing system is now obsolete and now you have to make it bigger. Engineers get to charge more. Contractors really win. And you can continue to put the bad stuff in the products and sell them. Of course, no true Southerners were in that meeting. In the South there is more bad stuff in the outside air than there is bad stuff in the inside air. It's the charm of the South.

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Northerners Coming South to Design Buildings.

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