

Unsealed Conditioning Equipment Outside Conditioned Space



- HVAC equipment for house in North Carolina installed in a vented crawlspace over top of damp sand; this is **not** recommended for various energy, moisture and interior air quality reasons.



- Leaky return plenum drawing in tracer smoke during the field investigation; the system was negatively pressurized enough to backdraft the combustion air from water heater.

Issue

Unsealed conditioning equipment and ducts located outside the conditioned space in a vented attic, unconditioned crawlspace or basement.

Description of Implementation Error

Conditioning equipment installed in an unconditioned crawlspace (in the example photos) in combination with unsealed returns in the joist spaces.

Risks

Installing conditioning equipment in an unconditioned crawlspace or ventilated attic, in combination with unsealed returns in the joist spaces could result in contaminants and moisture being drawn into the conditioning equipment and distributed to the building. In combination with return plenums in floor joists and wall cavities, it is not uncommon for the space conditioning equipment to be unsealed and draw in air from the surrounding environment. During a field investigation it was found that the unsealed return negatively pressurized the basement enough to backdraft combustion air from the water heater. It should be noted that in this case there was a combustion air makeup supply installed as per the building code, but that this makeup air was not enough to overcome the negative pressurization caused by leaky ductwork.

Required Corrections

Only fully ducted and sealed returns should be used but it is also important that the air conditioning equipment should also be sealed, especially when located in a vented crawlspace or attic. Air sealing should ideally be done with mastic, or (second choice) tape meeting

UL 181A or 181B.¹ Pressure testing of the entire ducting system and conditioning equipment will determine the amount and location of air leakage with a fan and manometer.

References

BSI-039: Five Things²

Built Wrong From the Start³

¹ BSC (May 2009). "Info-603: Duct Sealing". Building Science Corporation, <http://www.buildingscience.com/documents/information-sheets/hvac-plumbing-and-electrical/information-sheet-duct-sealing?topic=doctypes/information-sheets/6-hvac-plumbing-and-electrical/>. Accessed March 22, 2011.

² Lstiburek, Joseph. (April 2010). "BSI-039: Five Things." Building Science Corporation, <http://www.buildingscience.com/documents/insights/bsi-039-five-things/>. Accessed March 22, 2011.

³ Lstiburek, Joseph. (April/May 2004). "Built Wrong from the Start." Fine Homebuilding, <http://www.buildingscience.com/documents/published-articles/pa-built-wrong-from-start/view>. Accessed March 22, 2011.