Mechanical Code Treatment of Return Air Plenums and Air Handler Closets in HVAC Change Outs

Background: Mechanical system sizing, design, and installation strongly influence whole house control of air, heat, and moisture movement. The Florida residential mechanical and energy codes have progressively incorporated HVAC building science principles for new construction. These include system sizing (Manuals J, D, and S), sealed return plenums, air handler closet clearances, duct assembly specifications, disallowance of building cavities for air distribution, and passive return air pathways. Requiring these for new construction but not for replacement systems represents a double standard for performance requirements.

In 2012, the Florida energy code incorporated two of those to mechanical work done in *existing homes*: the code now requires equipment sizing (Manual J) and sealing of accessible ducts. From field studies conducted in 2012 under U.S. Department of Energy funding, it is unclear, however, if the duct sealing requirement is being interpreted to include return air plenums formed by open framing, unsealed drywall/plywood, etc. because these are not considered to be constructed of standard "duct materials" (e.g. flex duct, duct board, etc). The same neglect occurs when an interior closet functions as a return plenum. In field studies conducted in 2009-2011 under the same DOE funding, unsealed returns and air handler closets were identified as a root cause of excessive duct leakage in many existing homes.

FSEC already has U.S. DOE funding to monitor overall improvement associated with HVAC change outs as part of deep retrofit improvement packages in a limited number of local homes (≤10). If commission funding were immediately available, we could capitalize on this upcoming field work opportunity and add on a line of inquiry specifically associated with Florida residential code issues. FSEC staff could quantify the performance improvement (testing and analysis) as well as the burden on contractors and occupants of creating a sealed, dedicated return plenums and sealed air handler closets (where applicable) in the existing homes slated for retrofit in the DOE study. Commission funding would cover additional FSEC staff time for extra on-site testing and documentation, analysis, and reporting.

If commission funding is not immediately available, it is recommended that a survey of Florida code officials be carried out to understand their interpretation of the new duct tightening requirement. Additionally, it is recommended that a survey of contractors be performed to quantify the labor, cost, and time needed to create a dedicated, sealed return plenum and sealed air handler closet during HVAC change outs in typical pre-code Florida homes. Finally, a field study is recommended to characterize performance improvements in existing homes that result (in terms of duct air tightness and whole house pressure differentials) when complete air distribution system airtightening is performed during equipment change-out.

References

McIlvaine, J.; Sutherland, K.; Martin, E. (2013). *Energy Retrofit Field Study and Best Practices in a Hot-Humid Climate*. Cocoa, FL: FSEC. Accessed 2013: http://www.fsec.ucf.edu/en/publications/pdf/FSEC-RR-404-13.pdf.

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