Building America Case Study

Duct In Conditioned Space in a Dropped Ceiling or Fur-down

Gainesville, Florida

PROJECT INFORMATION

Project Name: Belmont

Location: Gainesville, FL

Partners:

Tommy Williams Homes; Florida H.E.R.O.

Building America Partnership for Improved Residential Construction, *bapirc.org*

Building Component: HVAC

Application: New; single and/or multifamily

Year Tested: 2011

Applicable Climate Zone(s): All

PERFORMANCE DATA

[of the measure alone, not whole house]

Cost of energy efficiency measure (including labor): $0.40/ft^2

Projected energy savings: 6.5% overall based on Building America 2010 Benchmark

Projected energy cost savings: $165/year compared to Building America 2010 Benchmark

Forced-air distribution systems (duct systems) typically are installed out of sight for aesthetic reasons, most often in unconditioned areas such as attics or crawlspaces. Any leakage of air to or from the duct system in unconditioned space not only loses energy, but impacts home and equipment durability and indoor air quality. An obvious solution is to bring the duct system into the interior of the house, either by sealing the area where the ducts are installed (attic or crawlspace) or by building an interior cavity or chase above the ceiling plane (raised ceiling or fur-up chase) or below the ceiling plane (dropped ceiling or fur-down) for the duct system. In this project, U.S. Department of Energy team Building America Partnership for Improved Residential Construction partnered with Tommy Williams Homes to implement an inexpensive, quick, and effective method of building a fur-down chase.

An interior duct system is built inside a home's thermal and air barrier. A dropped ceiling or fur-down chase places the duct system below the ceiling plane of the house in a framed chase. Sealing the top plane of the chase from the attic above is the most difficult and important part of this procedure. If poorly executed, the chase will leak air toward the attic, defeating the main purpose of the technique, which is to eliminate duct leakage to the outside.

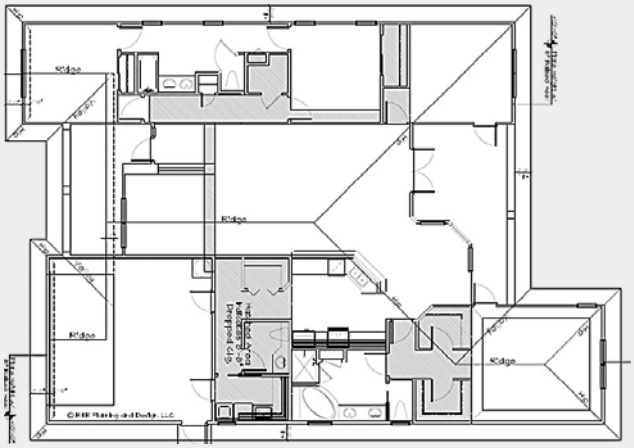
By designing the chase's path to avoid intersecting load-bearing walls, sealing of the chase's top plane, or ceiling, is fairly easy. Non-load-bearing walls need to be constructed to leave a gap of ¾ in. between the top plate of the wall and the bottom chord of the attic trusses. This space allows the chase's ceiling drywall to extend beyond the borders of the chase.

Building America SM U.S. Department of Energy

Step-by-Step Guide for Installing a Fur-Down Chase

1: Lay out chase path on floor plan (at right, shaded area), avoiding load-bearing walls as much as possible. This is best done during the home's design phase. Size the chase using information derived from the HVAC designers Manual J and D calculations.

2: Install sheetrock at the top of the chase path as indicated in the design plan. By keeping the top plate of the non-load bearing interior walls ¾ in. from the bottom chord of the roof trusses, the chase ceiling drywall can be slipped through this space.



3: Install the supply ductwork under the drywall. Use rigid ducts whenever possible.

4: Install the rest of the framing of the chase.

5: Install drywall over the chase and the rest of the house, finishing the chase's construction.

For more Information, see the Building America report, *Measure Guideline: Summary of Interior Ducts in New Construction, Including an Efficient, Affordable Method to Install Fur-Down Ducts,* at: *buildingamerica.gov*

Image credit: All images were created by the BA-PIRC team.

Lessons Learned

- Team meetings need to be held on site after the home has been "dried in" to clearly communicate the requirements to all subcontractors.
- The jobsite supervisor must be vigilant to ensure the system is implemented properly.
- There are additional costs for framing and drywall. A more expensive duct system (ductboard versus flex-duct) may be required because of space limitations).
- Payback is impacted by other efficiency improvements, depending on the expense of the method employed. Therefore, cost benefits are seldom the sole motivation for implementation.

Looking Ahead

DOE Zero Energy Ready Homes require that all ducts are inside conditioned space for energy savings and comfort. This method represents one of the easier and less expensive methods of constructing a functioning interior duct system. Significant cost savings are associated with this method compared to a foam-sealed attic, and labor savings are also significant compared to a raised ceiling or fur-up chase system. Therefore, the BA-PIRC team expects that this method of interior duct construction will gain in popularity in the future.

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

For more information, visit:
buildingamerica.gov

The U.S. Department of Energy's Building America program is engineering the American home for energy performance, durability, quality, affordability, and comfort.

DOE/GO-102014-4466 • September 2014