

How to move ducts into conditioned space



Overview

Operating an air handler and air conditioning coil in temperatures in excess of 140deg. F makes no sense, and yet this still happens today in many regions of the country where the air handler, coil and ductwork are located in the attic. Although it makes little sense, the reasoning is simple; they are out of the way and don't use up valuable square footage.

There are penalties with this strategy, however. Equipment has to work much harder in an attic environment and as a result is less efficient, increasing energy consumption costs to the homeowner and ultimately compromising durability of the equipment. System maintenance is also impacted as contractors are not eager to go into a hot attic to service HVAC equipment. Just replacing a filter can be a difficult and dangerous process for a homeowner.

Recognizing this, new codes are requiring builders to either condition the attic space (a very costly option) or move air handlers and ducts out of the attic into the conditioned space of the home. Given the size of conventional ductwork, this approach will likely have significant impact on the home's architecture. Voluntarily or by code mandate, in some regions, builders have responded by moving the air handler into the home's floor plan. The challenge remains however, on how to accommodate a large mass of ductwork inside the conditioned building envelope.

The challenge

Bringing ducts into conditioned space is very challenging to implement without incurring high costs and making major architectural compromises. Strategies are varied and depend largely on the number of stories and type of foundation on which the home is constructed. There are two primary house construction features to acknowledge when integrating ducts architecturally: a closet to locate the air handler and chases for locating ducts, both horizontal and vertical. Chases need to be substantial to accommodate large diameter ducts and as a result eat up valuable square footage. Similarly, large bulkheads are unsightly, and both structures are additional cost for no value to the homeowner. Neither solution is appealing to the homeowner who wants as much usable square footage as possible, and clean sight lines around their home.

Builders operating in regions where foundations are predominantly basements have already solved the air handler challenge locating them in the conditioned basement. In slab-on-grade markets, the predominant practice is to locate the air handler in the attic and sacrifice some floor space in the form of a mechanical closet. Many builders are moving air handlers into conditioned space in response to tightening codes, or as an efficiency measure when conducting performance path code compliance. Other builders who haven't yet implemented the change are evaluating the option, comparing it to a conditioned attic approach.

Rheia's compact solution

RHEIA's small diameter duct solution can be integrated into the home's structure with minimal architectural modifications. Any conditioned space installation will require an air handler be located somewhere within the floor plan, as shown in example below. The benefit of a RHEIA system closet is how small it can be. A 30" x 30" closet can accommodate the air handler, return, and distribution

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manifold of a RHEIA system. In a conventional system if the ducts were in the conditioned space, a much larger closet would be needed to accommodate the large supply ductwork.



In some situations, such as a slab-on-grade foundation, a six-inch drop ceiling (a RHEIA 'raceway') is used for routing RHEIA's small diameter ducts. These required drops have a minor architectural impact compared to the large bulkheads that would be needed using conventional ductwork. The alternatives are to condition the attic, or use inverted trusses to hold the ductwork. Both are costly alternatives.



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The RHEIA manifold is designed to integrate within a small closet. The following sections illustrates a typical closet of a slab on grade home with adjacent 6" drop for routing the ductwork. Note the compact and simple central return which also reduces any architectural impact on the home. In certain markets, such as California's Title 24, there is regulatory pressure to bring ducts into conditioned space. RHEIA is a system which provides a complete strategy to exceed those requirements while maintaining current cost levels.