

7c. Where the HVAC meets the home

Seal it, duct it and secure it

Seal the gap around the supply boots

Many small problems arise between the junction of a heating/cooling system and the building's envelope. These can add up to a large problem. Supply ducts bring conditioned air to a "boot" into which a diffuser grill is placed. It is important that the gap between the boot and the surface through which it delivers conditioned air is caulked and sealed to deliver all of the conditioned air to the space and reduce the home's air leakage.

Return duct vs. a framed-in cavity

The builder and HVAC contractor should consult and review plans prior to construction so that the HVAC contractor can design and install the best and most efficient return duct as well as an efficient overall system. The return duct is the responsibility of the HVAC contractor. The builder can frame around a metal return air duct that will allow the air to flow quietly and reduce duct leakage.

Also, it is important that the area of the return vent be large enough for the size of the system. A good rule-of-thumb is 1 1/2 to 2 square feet per ton of cooling.



A supply boot is caulked to the floor to reduce leakage.



A home-made return air "duct." Note the unsealed electrical penetrations at the top that can pull down attic air into the return

When possible, keep the ducts in the conditioned part of the house

When designing a small, uncomplicated home, it is possible to install the ducts to be directly connected to the conditioned space. Larger, more complicated homes create more challenges and fewer opportunities for the ducts to be in the conditioned space. Even though the ducts are "in the home," they still need to be insulated and vapor tight.

If ducts are in a crawl space, it is important that this space be high enough for visits by technicians, pest control businesses and others. If the space is restricted, the ducts are vulnerable to damage.

If the ducts are in the attic, they are exposed to very high temperatures in the summer and low temperatures in the winter. Consider running metal ducts, attached with mastic, covered with duct insulation and vapor-sealed, 1 or 2 inches above the ceiling's joists. The metal ducts, connected with sheet metal screws and sealed with mastic, create a duct system that is rigid and self-supporting.

When the attic gets insulated, extra insulation can be placed against the sides of the ducts to increase the relatively thin duct insulation. Leave the tops of the ducts exposed or mark their locations to prevent damage. Check with local code officials prior to this option. The Arkansas Mechanical Code states that ducts must be "securely supported." There is not a good reason to suspend them and a much better reason to increase the modest level of duct insulation.

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Suspended flex ducts droop between supports. The supports can restrict the air flow.



Suspended ducts are vulnerable to attic temperatures.



Metal ducts, sealed with mastic, are placed 2 inches above the rafters.



Insulation is piled up against the ducts to provide extra protection from the attic's temperatures.

Seal, weather-strip and secure indoor furnace doors

When a gas furnace or other combustion appliance is located inside the home (as opposed to the garage), it is important to isolate it from the conditioned space. The closet walls should be insulated. The door to the furnace closet not only needs to be securely shut, but also should be carefully weather-stripped all around, with a tight threshold on the bottom of the door. These measures will prevent the hot, humid summer air from being drawn down those combustion air pipes and into the house, and the home's conditioned air will not be burned in the furnace in the winter.

Secure this door with a good doorknob and latch so that the weather-stripping will be effectively compressed and the door will not open as freely as a kitchen cabinet door.

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The furnace door should be securely sealed and weather-stripped and the walls of the furnace closet should be insulated. The arrow points to 1-inch gap where hot, humid summer air can be pulled into the return. In the winter, conditioned air is drawn through the same gap to feed air to the furnace.