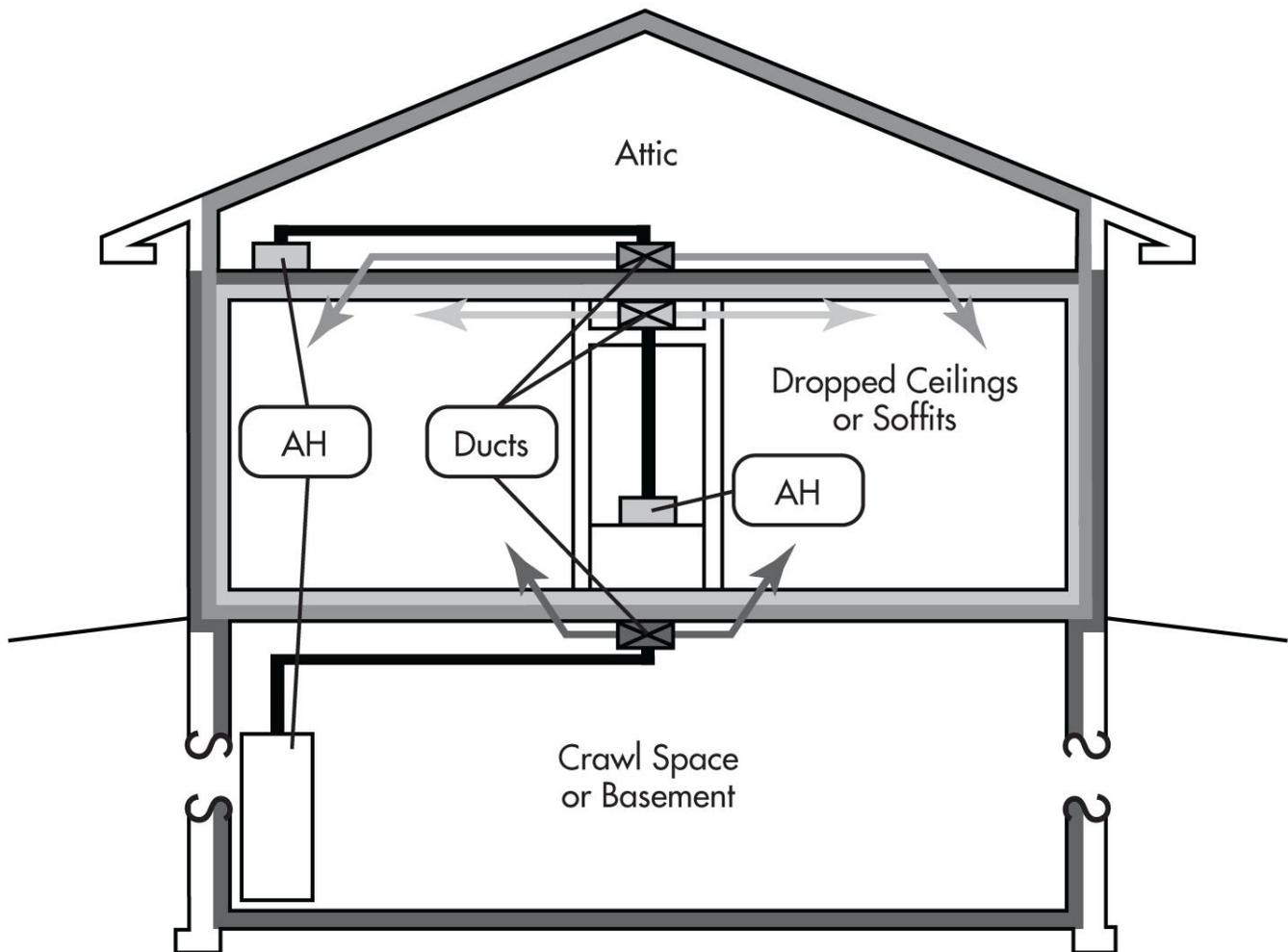




Ducts in Conditioned Spaces - Code Notes

[2009 IECC and 2009 IRC]

Background



Air handler (AH) and all ducts within conditioned space.



Conditioned Attic



Traditional Construction



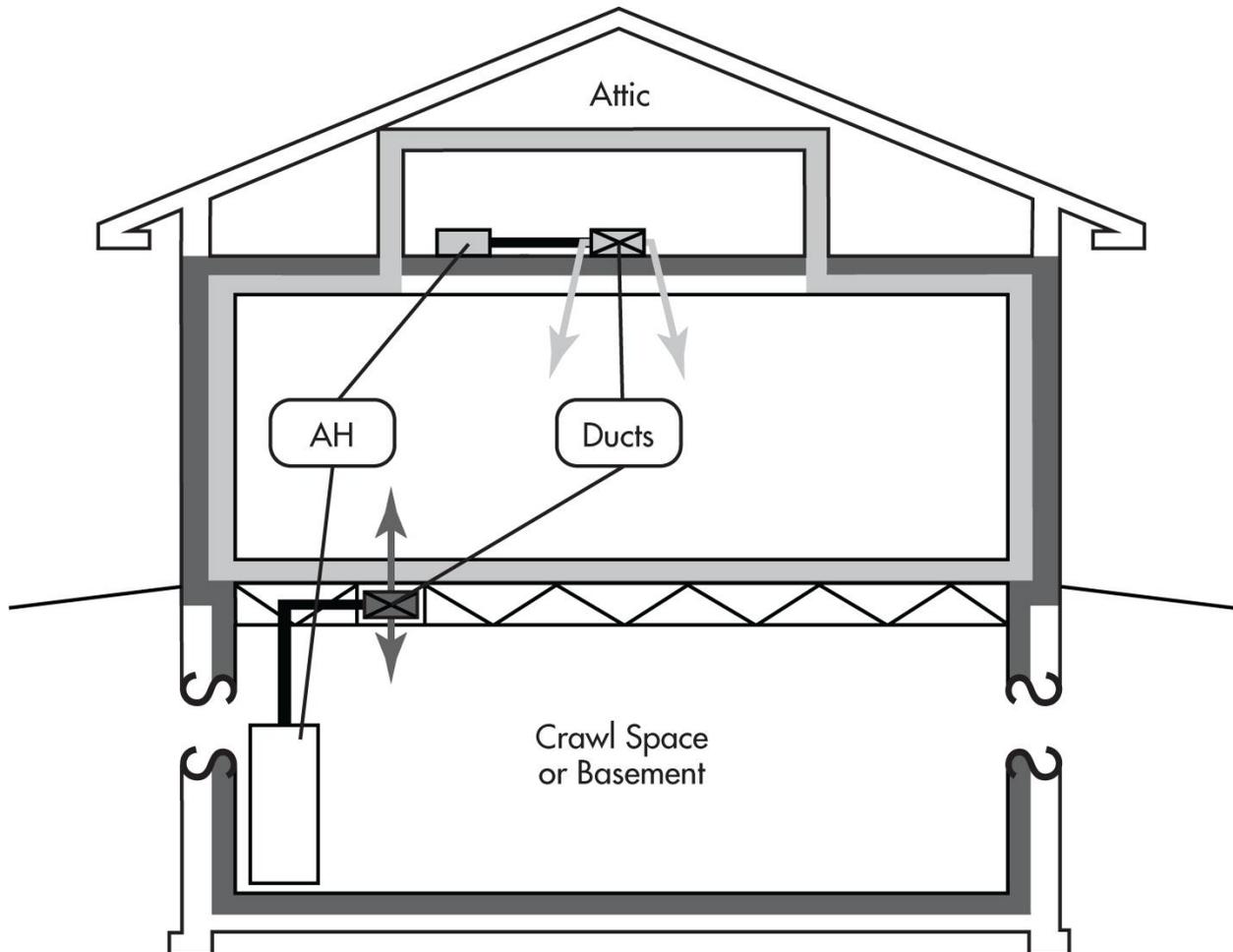
Conditioned Crawl Space or Basement

Locating ducts within conditioned space reduces heat gain and loss loads by 25-45%; it means smaller equipment and lower energy bills. Where located inside conditioned space (inside both the air barrier and the building thermal envelope), residential HVAC duct leakage and thermal losses and gains do not contribute to either heating or cooling loads. Both the 2009 IRC and 2009 IECC have requirements for this construction strategy. The 2009 IECC defines *Conditioned Space* as an area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent *conditioned space*. Various studies (including Building Science Corporation, Nov



2003) have identified compelling reasons for locating all HVAC ducts and air handlers within this conditioned space.

- Reduced equipment costs # smaller capacity equipment needed to meet reduced loads
- Reduced duct system costs # smaller equipment with lower air volume
- Reduced installation costs # short, straight, and un-insulated ducts with no tightness testing
- Reduced operating cost # reduced loads met by lower capacity equipment
- Improved indoor air quality # pressure imbalances draw pollutants and moisture into the house



Air handler (AH) and all ducts within conditioned space.

■ Insulated Attic Truss
or Inverted Soffits

■ Open Web Floor
Trusses

Plan Review

Ensure the drawings show air handler and all ducts completely inside the building thermal envelope and equipment capacities match documented load requirements.

Field Inspection (2009 IRC)



Verify air handler and ducts are installed and sealed in compliance with the approved construction documents. Verify capacities of equipment being installed match the approved construction documents.

Code Citations*

2009 IRC M1601 Duct Construction

Duct systems must first be designed to coordinate with the overall design drawings, then fabricated and installed in accordance with all construction documents. "Duct systems serving heating, cooling, and ventilation equipment shall be fabricated in accordance with the provisions of this section and ACCA Manual D or other approved methods."

2009 IRC N1103.2.1 Ducts and 2009 IECC 403.2.1 Insulation (Prescriptive)

Ducts completely inside conditioned space do not require insulation. "Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6. Exception: Ducts or portions thereof located completely inside the building thermal envelope."

2009 IECC 403.2.2 Sealing and 2009 IRC M1601.4 Duct Construction Installation

Duct tightness test is not required if the air handler and all ducts are located within conditioned space. "All ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.4.1 of the IRC. Duct tightness shall be verified by either of the following: 1. Post-construction 2. Rough-in test. Exception: Duct tightness test is not required if the air handler and all ducts are located within conditioned space."

2009 IECC 403.2 Ducts and 2009 IRC N1103.2.3 Insulation

Building framing cavities may be used as return ducts. "Building framing cavities shall not be used as supply ducts."

More Information

[Conditioned Attics Overview](#)

[Duct Losses Hurt Forced Air Heating System Performance](#)

[Building Science Corp - RR-0401: Conditioned Crawl Space Construction, Performance and Codes](#)

[Builder Online - Closing the Crawl](#)

www.ductsinside.org

[Does the Energy Code Allow an Unvented Crawlspace?](#)

[DOE Technology Factsheet - Crawlspace Insulation](#)

References

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*Copyright, 2009, [International Code Council](#), Inc. Falls Church, Virginia. 2009 International Energy



Conservation Code. Reproduced with permission. All rights reserved.

Figure source: www.ductsinside.org