Ducts in Conditioned Space

Ducts and air handlers should be placed in conditioned spaces when possible. Ducts typically lose substantial amounts of energy from both conduction and leakage; keeping them in a conditioned space minimizes the

impact of these losses. Ducts inside a conditioned space must be properly sealed, but are not required to be insulated.

Several strategies for placing ducts in conditioned spaces follow.

1. Place ducts in a chase designed to run through a central corridor below the attic or on top of the ceiling through the attic. If the chase runs through the attic, it must fit within the roof truss design and be covered with insulation.
2. If ducts are in an attic, insulate and seal the underside of the roof sheathing to create a conditioned attic (non-vented roof assembly). Code requirements have been added to Section R806.4 of the International Residential Code® (IRC) in recent years. For more information, see the 2007 Supplement to the IRC or Unvented Attic Assemblies - Code Notes .
3. If ducts are in a crawlspace, insulate and seal the exterior crawlspace walls so the crawlspace becomes a conditioned space, like a miniature basement. This strategy requires treating the crawlspace much like a living space with conditioned air supply, moisture control, and air returns to the HVAC system.
4. If ducts are in basements, the basement can be converted into a conditioned space, though it is important that the basement have wall insulation to minimize the heat loss.

Note that for combustion equipment located inside living space, the IRC requires adequate combustion air be supplied to the equipment so that it can operate safely and properly. For a modern, tightly built home, intake air to the furnace should be supplied from the outdoors.

Code Citations*

IECC 2000 and 2003, Section 502.1.1 Moisture Control

The design shall not create conditions of accelerated deterioration from moisture condensation. Frame walls, floors and ceilings not ventilated to allow moisture to escape shall be provided with an approved vapor retarder having a maximum permeance rating of 1.0 perm when tested in accordance with Procedure A of ASTM E 96. The vapor retarder shall be installed on the warm-in-winter side of the thermal insulation.

There are exceptions to this requirement, such as where moisture or its freezing will not damage the materials, hot and humid climates, or where other approved means to avoid condensation in unventilated framed wall, floor, roof and ceiling cavities are provided.

Additional Information

The Building America teams have developed detailed design guidance on this topic.

Details for Mechanically Vented Crawlspaces - Code Notes

Unvented Attic Assemblies - Code Notes

A Builder"s Guide to Placement of Ducts and HVAC Equipment in Conditioned Spaces

---

* 2003 IECC Reference and link

PNNL-SA-57198