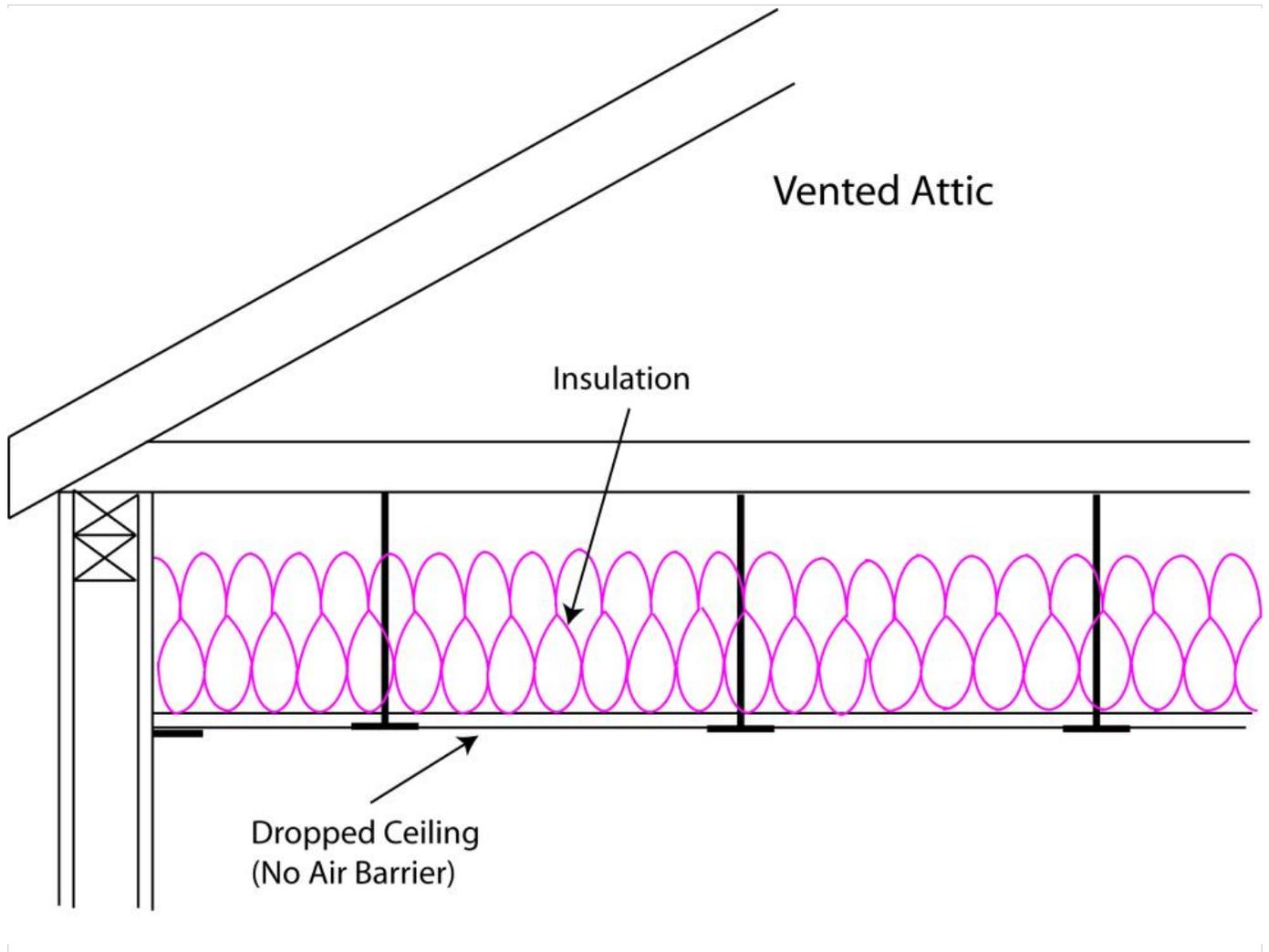




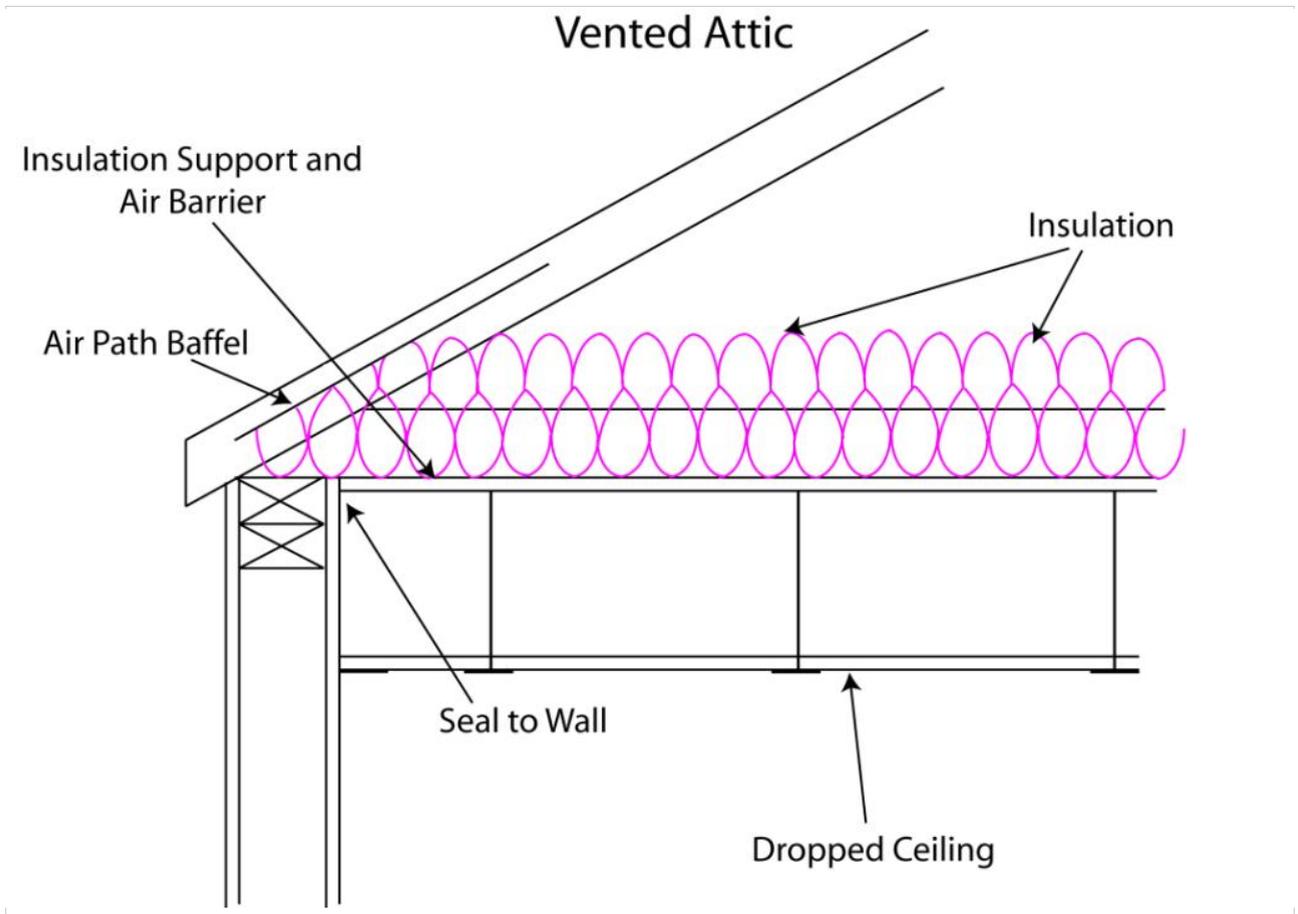
## Commercial Air Barrier Requirements for Insulated Ceilings - Code Notes

[2009 IECC, 2009 IBC, 90.1-2007]



Sometimes, insulation is proposed to be installed on top of the dropped ceiling tile in commercial buildings in an attempt to meet the provisions of the International Energy Conservation Code (IECC). Alternately, insulation is proposed to be suspended from the bottom cord of a truss with a dropped ceiling suspended below.

Neither of these installations is allowed by the commercial provisions of the 2009 IECC or ASHRAE 90.1 because they do not include an approved air barrier to prevent air movement from the conditioned space through the insulation to the unconditioned space. This technique allows the insulation to be easily disturbed.



The 2009 IECC requires openings in the building envelope to be sealed to prevent air leakage into and out of the space, including an air barrier at insulation installations. The building envelope is defined as the building assembly that surrounds the space that is heated or cooled (conditioned space). The building envelope is comprised of insulation, and a pressure boundary that prevents the flow of air through the insulation. Air movement through insulation (wind washing) diminishes its rated R-value. It is essential that the barrier be able to prevent air movement across itself when subjected to a pressure differential.

For example, gypsum board, with taped joints installed on the bottom cord of the truss, is considered to be an effective air barrier. Other approved air barrier systems can be used instead of gypsum board as long as they can be completely sealed and are sealed to the wall system. The air barrier must also meet the flame spread and smoke-developed index in the 2009 IBC Section 719.1.

Another common installation for commercial buildings is insulation between wood or metal joists or trusses directly underneath, and in contact with, the roof sheathing, which is allowed by the energy code.

## Plan Review:

For insulation installed on top of an insulation support and an air barrier at bottom of attic truss or floor joists:

1. verify that the insulation installation detail for the roof and ceiling assembly includes an approved air barrier between the insulation and the conditioned building
2. verify that an appropriate sealing method (tape, for example) is specified for all joints of the gypsum board, if used as the air barrier
3. verify that the air barrier meets the flame spread and smoke-developed index requirements from the IBC, if other than gypsum board; also verify that the plan notes call for sealing all of the joints and penetrations in the air barrier.



For insulation installed under the roof sheathing between wood or metal truss system:

1. verify that the plan detail shows the insulation in contact with the roof sheathing
2. verify that the method of insulation support is specified in the plan detail
3. verify that air sealing and an air barrier are specified for the roof assembly.

## Field Inspection:

For insulation installed on top of the insulation support and air barrier at bottom of an attic truss or floor joists:

1. verify that the insulation support (such as gypsum board) has been installed under the insulation, and that all of the joints and penetrations from plumbing, HVAC, and electrical systems are sealed
2. for air barriers other than gypsum board, verify that the product meets the flame spread and smoke-developed index
3. verify that all holes, seams, or other penetrations are sealed using products that are designed to adhere to the air barrier to form a permanent seal
4. verify that the air barrier is sealed to the exterior walls of the building.

For insulation installed under the roof sheathing between a wood or metal truss system

1. verify that the insulation is installed in contact with the roof sheathing
2. verify that the insulation is properly and securely supported, and is allowed to "fluff" to its full thickness
3. verify that the insulation fills the truss or rafter cavities horizontally from one member to another
4. verify that all holes and penetrations in the roof assembly are sealed.

## Code Citations\*

### **IECC 2006, Section 402.2.8 and IECC 2009, Section 402.2.9 Crawlspace walls**

As an alternative to insulating floors over crawlspaces, crawlspace walls shall be permitted to be insulated when the crawlspace is not vented to the outside [excerpt].

### **IECC 2009, Section 502.4.3 Sealing the Building Envelope (Commercial)**

Openings and penetrations in the building envelope shall be sealed with caulking materials or closed with gasketing systems compatible with the construction materials and location. Joints and seams shall be sealed in the same manner or taped or covered with a moisture-vapor-permeable wrapping material. Sealing materials spanning joints between construction materials shall allow for expansion and contraction of the construction materials.

### **2009 IBC Section 719.1 General**

Insulating materials, including facings such as vapor retarders and vapor-permeable membranes, similar coverings, and all layers of single and multilayer reflective foil insulations, shall comply with the requirements of this section. Where a flame-spread index or a smoke-developed index is specified in this section, such index shall be determined in accordance with ASTM E 84 or UL 273.



Any material that is subject to an increase in flame-spread index or smoke-developed index beyond the limits herein established through the effects of age, moisture, or other atmospheric conditions shall not be permitted.

#### **ASHRAE 90.1-2007, Section 5.8.1.8 Location of Roof Insulation**

The roof insulation shall not be installed on a suspended ceiling with removable ceiling panels.

#### **References**

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