

**BUILDING AMERICA  
ENERGY PERFORMANCE BRIEF****Improving Existing Homes:  
Insulating and Air Sealing  
Cantilevered Floors**

If the cantilevered floor over this porch isn't properly air sealed and insulated, the room above will feel cold and drafty in the wintertime (Photo Source: Pine Mountain Builders).

**When to Do This**

When heat loss at cantilevered floors is causing comfort or moisture problems. When re-siding the home.

**Durability & Health**

When cantilevered floors are not properly air sealed and insulated, floor and exterior wall surfaces can be cold. Warm indoor air can condense on these cold surfaces causing moisture problems.

A cantilevered floor is a floor that sticks out past the foundation or supporting wall below. It may be a first- or second-story bump-out, a bay window, or a room over an open porch.

In older homes, cantilevered floors often lack proper air sealing and insulation. Floor joist bays that extend from the house out under the cantilevered floor are often left open by the builder, allowing outside air to flow through the home and conditioned air to escape.

If you have cantilevered floors in your home, you should make sure they have been properly air sealed and insulated. If you have a basement, you may be able to check a first-floor cantilever by peering into joist bays, if they are accessible. Otherwise, you will need to remove the exterior soffit covering under the cantilevered floor to view the area between the floor joists. Sometimes cantilevered floors are insulated but not air sealed. Air barriers must be in place to stop air from blowing through the insulation, which renders the insulation ineffective.

Blocking material (rigid foam, OSB, plywood, or drywall) should be installed across any open floor joist bays to form an air barrier between the cantilever and the rest of the house. Plywood subflooring above the cantilever should be caulked at the edges and seams. The cantilever floor cavity must be filled with insulation that completely touches the underside of the floor. Insulating foam sheathing can be installed on the underside of the cantilever.



Some contractors use the "drill and fill" method to insulate a cantilevered floor, by drilling through the bottom covering and blowing in cellulose or fiberglass insulation, then patching the holes as shown in this photo. This method does not address air flow, because the contractor doesn't open up the cantilever flooring to see if joist cavities have been blocked off between the house and the cantilever. Insulation works by trapping dead air. If the air is moving, the insulation doesn't insulate, it just filters the flowing air (Photo Source: PNNL).



Left: This cantilevered floor (viewed from the inside) does not yet have air sealing or insulation installed. (Photo source: Energy Services Group).

Right: Blocking material has been installed in the cantilever on this home and insulation is now being installed. (Photo Source: MaGrann Associates).

## 2009 IECC

Table 402.4.2 and 2012 IECC  
Table R402.4.1.1

Floors (including above-garage and cantilevered floors): Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of insulation.

## References

Natural Resources Canada. 2009. *How to Insulate Inside the Basement*, <http://oee.nrcan.gc.ca/residential/personal/new-home-improvement/choosing/insulation-sealing/basement/khi-inbasement.cfm?attr=4#top>

Advanced Energy. 2002. *Cantilevers, Technical Bulletin F2*, [http://www.advancedenergy.org/buildings/knowledge\\_library/framing/cantilevers.pdf](http://www.advancedenergy.org/buildings/knowledge_library/framing/cantilevers.pdf)

ENERGY STAR. 2008. *Thermal Bypass Checklist Guide*. [http://www.energystar.gov/ia/partners/bldrs\\_lenders\\_raters/downloads/TBC\\_Guide\\_062507.pdf](http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/TBC_Guide_062507.pdf)

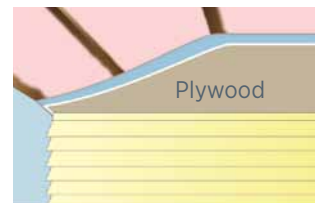
## For More Information

[www.buildingamerica.gov](http://www.buildingamerica.gov)  
EERE Information Center  
1-877-EERE-INF (1-877-337-3463)  
[eere.energy.gov/informationcenter](http://eere.energy.gov/informationcenter)

U.S. DEPARTMENT OF  
**ENERGY** | Energy Efficiency &  
Renewable Energy

## How to Air Seal and Insulate a Cantilevered Floor

- 1 Remove the exterior sheathing and any existing insulation.
- 2 Create an air barrier between the house and the cantilever by cutting a rectangle of rigid foam to fit into each floor joist bay cavity. Make a backstop for the foam by tacking furring strips to the joists at plane with the foundation or house wall.
- 3 Insert rigid foam pieces into each joist bay, nail in place and caulk to air seal all four edges.
- 4 Caulk the subfloor to the floor joists at the perimeter of the cantilevered floor and at any seams in the subfloor. Seal any wiring or piping holes through perimeter joists or subfloor with caulk or spray foam.
- 5 Install unfaced batt insulation in each floor joist bay. Use a thickness that will completely fill the cavity; it must be in contact with the top and bottom air barrier (i.e., the subfloor and rigid sheathing below) with no compressions or voids. Alternatively, spray foam each cavity with open- or closed-cell spray foam to the desired R-value.
- 6 Cover bottom of cantilever area with rigid foam insulation. Caulk the rigid foam to the joists at the edges. Tape foam at seams.
- 7 Cover rigid foam with siding or with  $\frac{3}{8}$ -inch exterior plywood that is pressure-treated, painted, or primed on all exposed sides.
- 8 If you have plumbing pipes in the cantilevered floor (not recommended) and live in a cold or very cold climate, ensure adequate insulation on the exterior side of pipes to prevent freezing pipes. One option is to box in the pipes with a rigid foam box that is caulked to the subfloor to allow warmth from the house to reach the pipes.



These floor joist bays have been properly air sealed with caulked rigid foam insulation.