



Underfloor Insulation

This pamphlet is one in a series that describes residential energy conservation requirements of the Oregon Residential Specialty Code and Structural Specialty Code. Other pamphlets in this series may be downloaded from Oregon Department of Energy web site at <http://egov.oregon.gov/ENERGY/CONS/Codes/cdpub.shtm> or local building departments or from Oregon Building Codes Division.

Prescriptive requirements for underfloor insulation

Table 1101.1(1), Prescriptive Envelope Requirements, lists required floor insulation levels. This table specifies R-30 for standard wood frame construction.

The code specifies required R-values, not products. Any insulation product or combination of insulation products that meets installed R-value requirements installed to their nominal thickness is acceptable. Section drawings or written specifications that accompany the plans must identify floor insulation R-value.

High density R-30 batts, 8 inches thick, are acceptable when installed within a 4 x 8-inch nominal wood post and beam flooring system.

Batt insulation installed within cavities that are deeper than insulation, such as a 14-inch I-beam, must be installed in substantial contact with underside of sub-flooring.

Installation guidelines

Insulation must be installed flush against the warm surface. Batt insulation achieves the stated R-value only when installed at full loft. Support systems keep insulation in

place without compressing it. Support systems include lath nailed to the underside of floor joists, criss-crossed string or wire webbing hung on nails at the bottom of joist systems, and lath laid across furring lumber nailed to foundation post supports or wire hangers. Figure 1 shows support system examples.

Installing deeper batts in post and beam floors may require special measures to keep crawl space vents clear. Baffles can be used to keep vent openings clear. Or vents can be installed lower in the stem wall, so they floor cavities, splitting the batt above and below so they are not blocked by insulation. When plumbing is in plumbing run is usually best.

While actual lumber dimension for a nominal 8-inch thick beam is ~7.5 inches in thickness, this is a better installation than R-25 batt insulation when installed in a similar 4 x 8 post and beam floor system. The wire or string used to attach R-30 batt will cause minimum compression while achieving a tighter fit within the cavity in comparison to R-25 batt insulation.

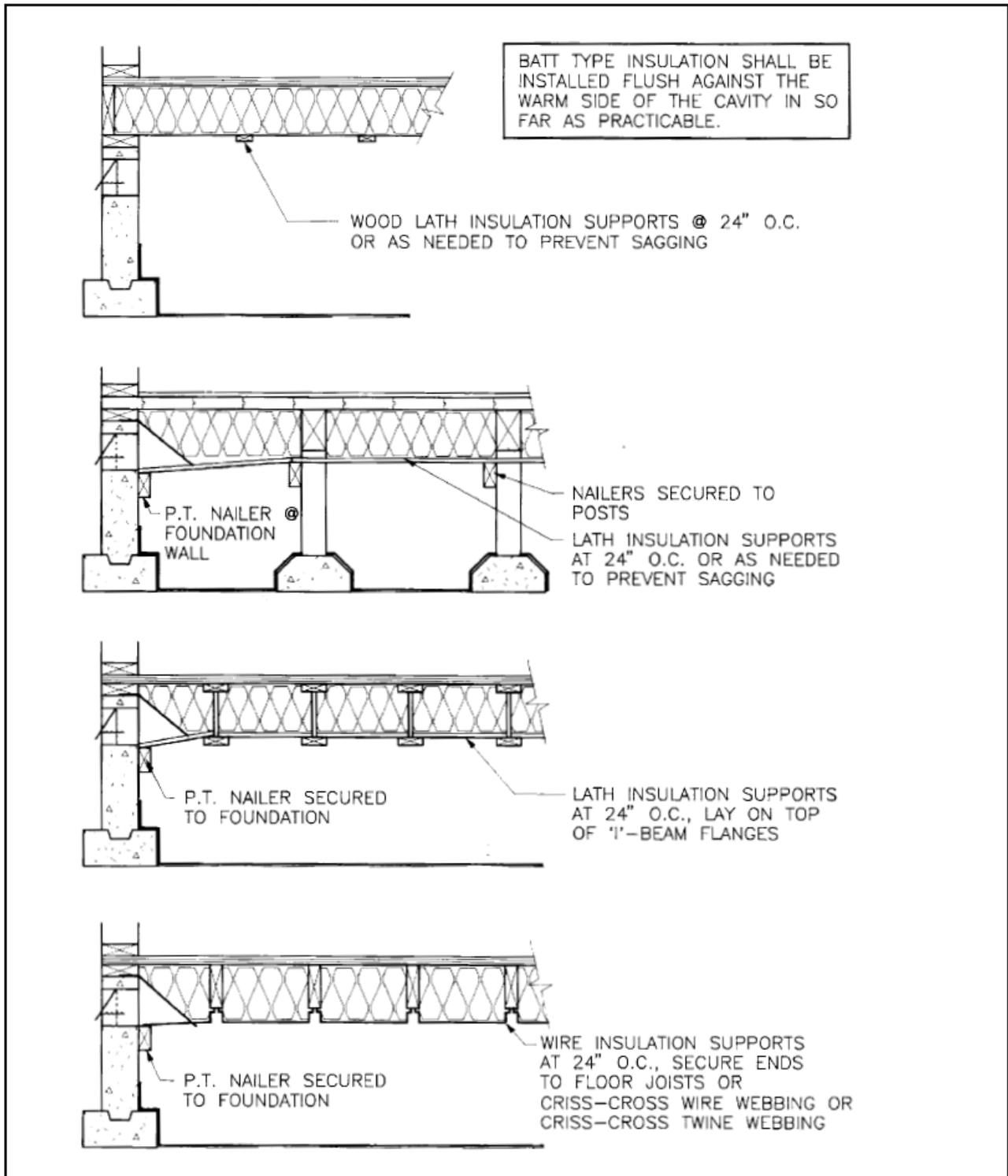
Floor vapor retarders

A one perm vapor retarder is required on the warm side of insulation to protect it from indoor moisture sources. The floor vapor retarder is **NOT** the same as the crawl space ground moisture barrier. The ground moisture barrier protects insulation and framing from moisture sources in the ground.

In joist and panel floor systems, glue in exterior grade plywood and strand board floor panels is rated at one perm or less, so the subfloor panel doubles as the vapor retarder. When the vapor retarder is part of the subfloor, unfaced batts can be used.



Figure 1:
Floor insulation suspension system examples



Two-by decking floor systems requires an independent vapor retarder. Often the vapor retarder requirement is met by laying asphalt-impregnated kraft paper or other rated building paper above decking and below finish floor underlayment.

Foam core panels do not require separate vapor retarders.

Floor vapor retarders should be shown on the plan section drawing or identified in written specifications accompanying the plans.

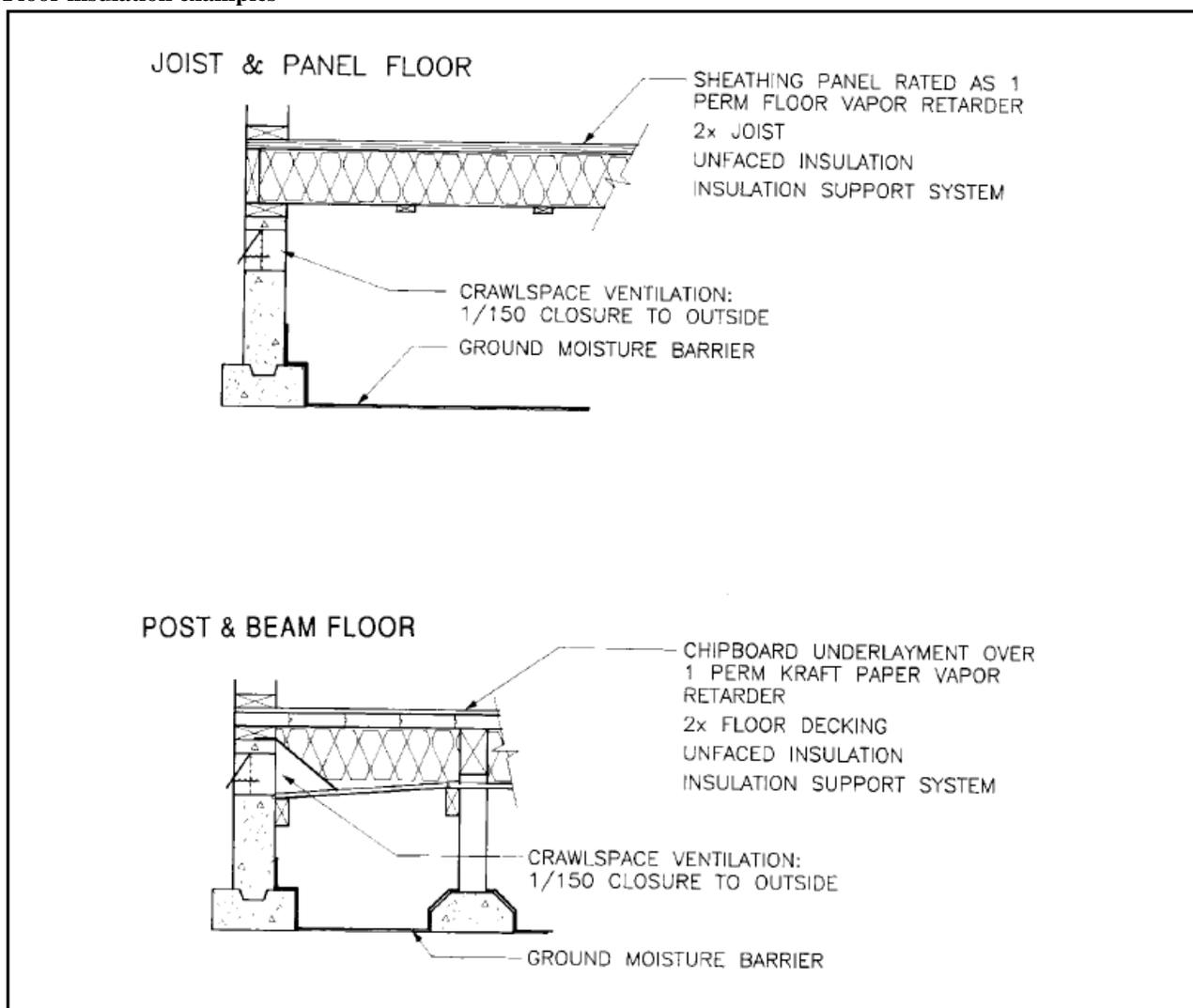
Crawl space ventilation and ground cover

Ventilation requirements in other parts of Residential Code and Structural Code require ventilation of crawl spaces to avoid moisture damage to the floor and insulation.

One square foot of net free vent area is required for each 150 square feet of crawl space area. Vent placement must assure good cross-ventilation.

A ground cover is also required. See the pamphlet *Moisture Control Measures in the Oregon Residential Energy Code* for details.

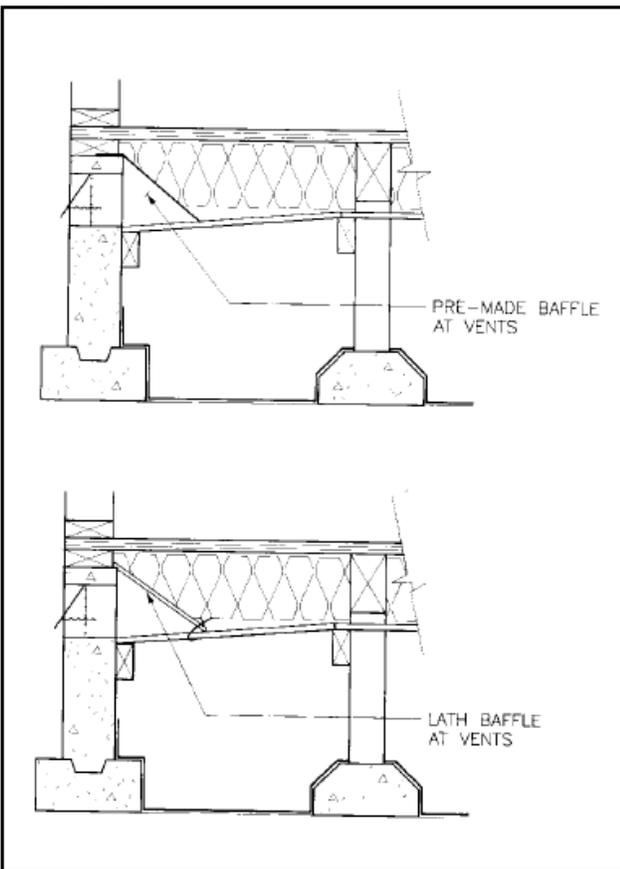
Figure 2:
Floor insulation examples



Perimeter crawl space insulation vs. underfloor insulation

Perimeter crawl space insulation is not allowed. Perimeter systems have been found to be thermally inferior to underfloor systems and to pose potential indoor air quality and health and safety problems. Underfloor systems avoid these problems. There is an alternative system described in Interpretive Ruling 96-12 that mitigates these concerns.

Figure 3:
Keeping air vents free of floor insulation



Impact of underfloor insulation on crawl space utilities

If possible, plumbing runs should be on the warm side of floor insulation. If this is not possible, plumbing insulation is good insurance against pipe freezing when the temperature dips below zero. Higher levels of floor insulation make this doubly important. Pipes near foundation vents are usually required to be protected in accordance with plumbing code.

Information presented in this publication supports the Oregon Residential Specialty Code. This publication does not include all code requirements. Refer to the code and check with your code official for additional requirements. If information in this publication conflicts with code or your local officials, follow requirements of code and your local officials.

For more information about the residential energy code, call the Building Codes Division at (503) 378-4133 or the Oregon Dept of Energy (503) 378-4040 in Salem or toll-free, 1-800-221-8035.

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Building Codes Division



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