



Underfloor Insulation

This pamphlet is one in a series that describes residential energy conservation requirements of the Oregon Residential Specialty Code and the Structural Specialty Code for Group R buildings three stories and less in height. Other pamphlets in this series may be obtained from Oregon Dept of Energy at www.oregon.gov/energy/ or local building departments or from Oregon Building Codes Division.

Prescriptive requirements for underfloor insulation

Table 1104.1(1), Prescriptive Compliance Paths for Residential Buildings, lists required floor insulation levels. Path 1 is the “Base Path 1.” The floor insulation requirement in Path 1 is R-25. Floor insulation options for other prescriptive paths range from R-21 to R-30.

The energy code specifies required R-values, not products. Any insulation product or combination of insulation products that meets installed R-value requirements is acceptable. If a prescriptive path is used for code compliance, only R- and U-factors in that prescriptive path may be used. R- and U-factors in one path may not be mixed with R- and U-factors in other paths. R- and U-factor standards may be exceeded. Section drawings or written specifications that accompany the plans must identify floor insulation R-value.

R-25 floor insulation options

Standard density R-25 batts 7-1/2 to 8 inches thick are typically used to meet the underfloor requirement. 8-1/4 inch foam core floor panels meet or exceed R-25.

R-21 floor insulation options

High density 5-1/2-inch R-21 batts, doubled R-11 batts or foam core panels 6-1/2 inches or thicker meet the R-21 floor insulation requirement.

R-30 floor insulation options

Standard density R-30 batts 9-1/2 inches thick, high density batts 8-1/2 inches thick or 8-1/2-inch foam core floor panels may achieve R-30.

Installation guidelines

Insulation must be installed flush against the warm surface. Batt s achieve 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.

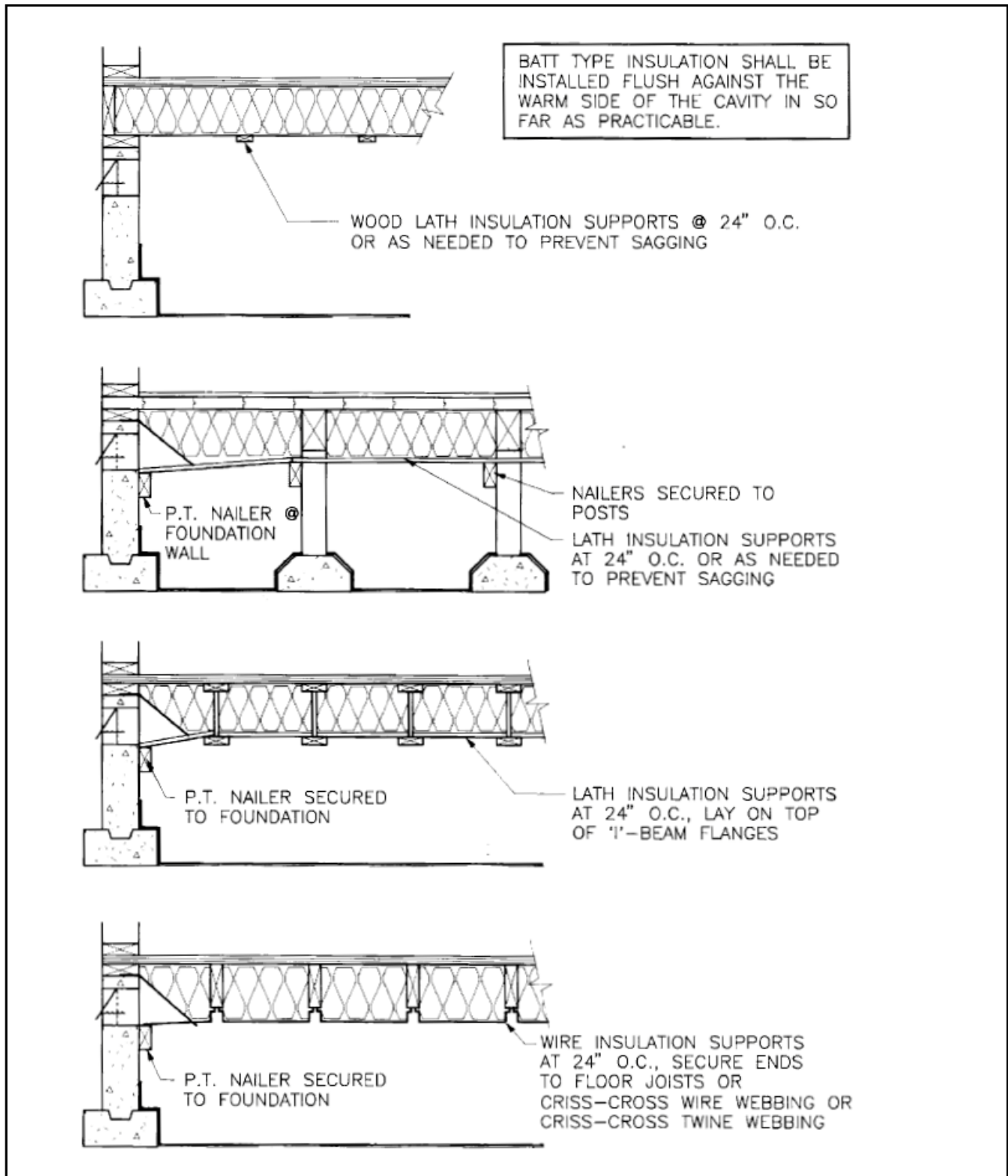
Installing deeper batts in post and beam floors may require special measures to keep crawl space vents clear. Baffles can be used to keep vent openings clear. Or vents can be installed lower in the stem wall, so they floor cavities, splitting the batt above and below so they are not blocked by insulation.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

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 only 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



Decking floor systems need 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.

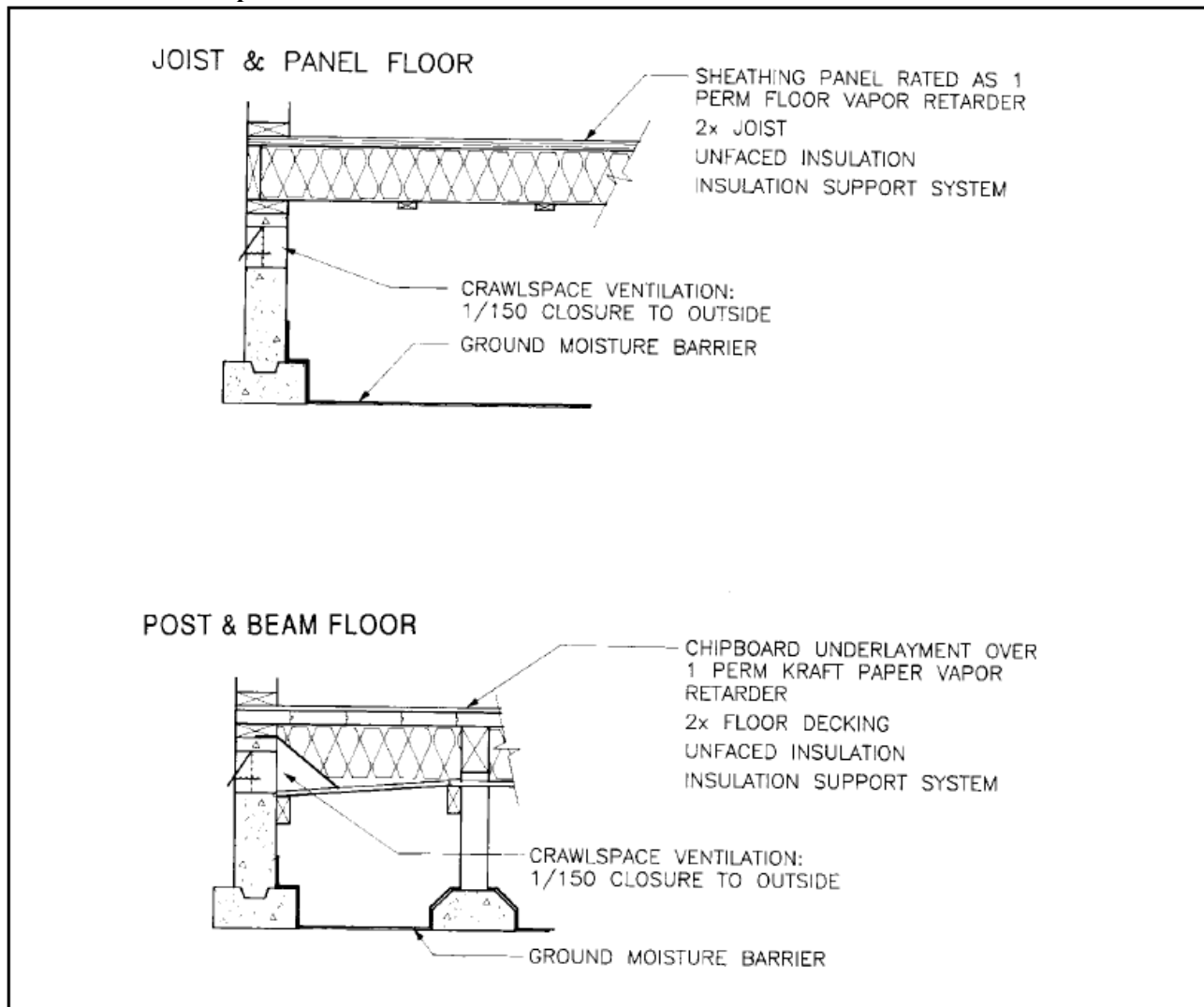
Crawl space ventilation and ground cover

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



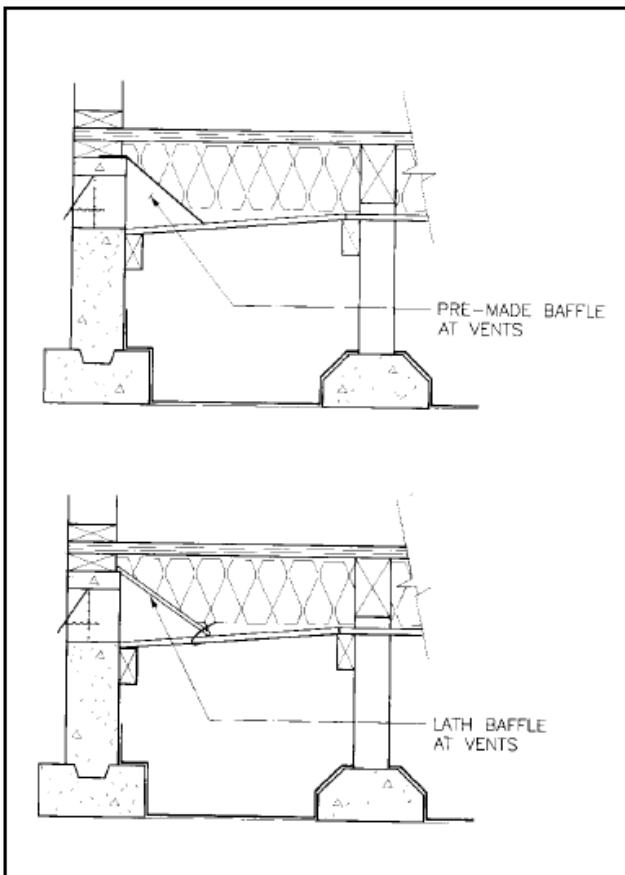
Perimeter crawl space insulation vs. underfloor insulation

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 ongoing interest in developing an alternative system that mitigates these concerns.

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.

Figure 3:
Keeping air vents free of floor insulation



Information presented in this publication supports the Oregon Residential Specialty Code, or Chapter 13 of the Oregon Structural 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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