

Insulation Requirements per the 2018 International Energy Conservation Code & the 2018 Pa. Alternative Energy Code for Residential Buildings

As per the Pennsylvania Uniform Construction Code we now fall under the guidelines of the 2018 codes. Some significant changes have been brought about some are as follows:

- 1) R-20 or 13+5 is required in exterior walls.
- 2) R-10 for 24" is required for slabs.
- 3) R-49 is required in ceilings, but R-38 may be used in a roof/ceiling assembly (cathedral) when the design does not allow a higher "R" value.
- 4) "RES CHECK" may still be used to show lower values taking into consideration the "fenestration and solar heat gain coefficients" of all windows, glazed doors and skylights.

Please refer to some of these areas on the attached pages any other questions please contact the Building Inspector.

PA302.4 Walls between conditioned and unconditioned spaces. Walls between conditioned and unconditioned spaces may be insulated to $R-20$. This includes walls between conditioned space and garages, and walls and ceilings of stairwells leading to unconditioned basements.

PA302.5 Mass walls. Mass walls, for the purposes of this chapter, shall be considered above-grade walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs.

PA302.6 Floors. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking.

PA302.7 Basement walls. *Exterior walls* associated with conditioned basements shall be insulated from the top of the *basement wall* down to 10 feet (3048 mm) below *grade* or to the *basement floor*, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections PA301.

PA302.8 Slab-on-grade floors. Slab-on-grade floors with a floor surface less than 12 inches (305 mm) below grade shall be insulated in accordance with Table PA301. The insulation can be installed on either the exterior or interior of the foundation wall.

Exterior Insulation: Exterior insulation shall be installed from the top of the slab and extend below grade the distance listed in Table PA301 by any combination of vertical insulation or horizontal insulation extending away from the building. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil. Insulation shall also meet PA 111.1.

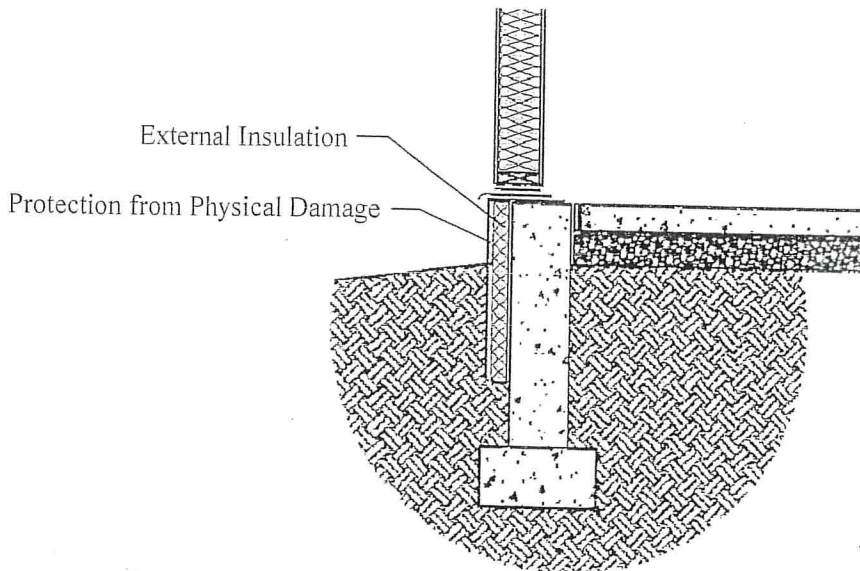


Figure PA 302.8 (1)
Exterior Slab Insulation

Interior Insulation: Interior insulation shall be installed from the bottom of the slab and extend the distance provided in Table PA301 by any combination of vertical insulation or horizontal insulation extending under the slab. The slab edge shall be separated from the foundation wall by a continuous ½ inch thermal break as per Figure PA302.8.(2) A thermal break shall be created by a material suitable for ground contact, which includes, but is not limited to, asphalt impregnated fiber board or extruded polystyrene. Slab-edge insulation is not required in jurisdictions designated by the code official as having a very heavy termite infestation.

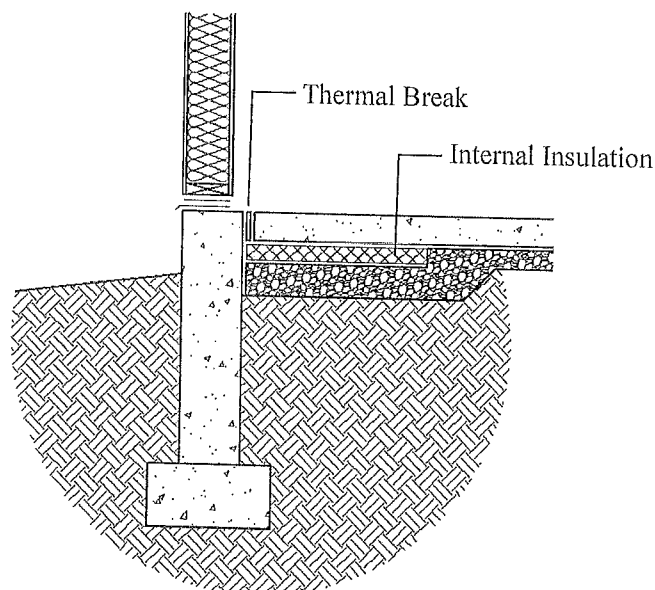


Figure PA 302.8 (2)
Interior Slab Insulation

PA302.9 Crawl space walls. As an alternative to insulating floors over crawl spaces, insulation of crawl space walls shall be permitted when the crawl space is not vented to the outside. Crawl space wall insulation shall be permanently fastened to the wall and extend downward from the floor to the finished *grade* level and then vertically and/or horizontally for at least an additional 24 inches (610 mm). Exposed earth in unvented crawl space foundations shall be covered with a continuous Class I vapor retarder. All joints of the vapor retarder shall overlap by 6 inches (152 mm) and be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches (152 mm) up the stem wall and shall be attached to the stem wall.

PA302.10 Masonry veneer. Insulation shall not be required on the horizontal portion of the foundation that supports a masonry veneer.

PA302.11 Thermally isolated sunroom insulation. The minimum ceiling insulation *R*-values shall be R-24. The minimum wall *R*-value shall be R-13. New wall(s) separating the sunroom from *conditioned space* shall meet the *building thermal envelope* requirements.

PA303 Fenestration.

PA303.1 U-factor. An area-weighted average of fenestration products shall be permitted to satisfy the *U*-factor requirements.

General guidelines for foundations

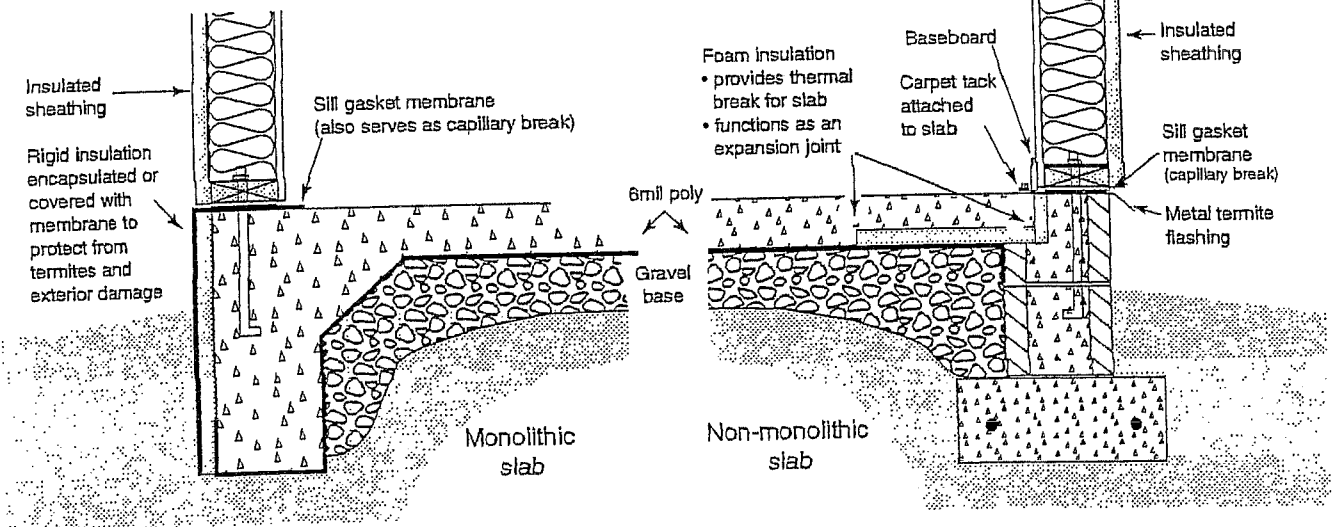
The bottom level of a home, whether slab-on-grade, floor over a crawl space, or underground basement, is susceptible to moisture and deterioration problems due to contact with the earth. The best approaches for preventing these problems will depend on the local climate and style of construction, but the same general rules apply to all foundation systems:

- ❑ Keep all untreated wood materials away from the earth.
- ❑ Provide rain drainage, such as gutters, to conduct rain water away from the house in non-arid climates.
- ❑ Slope the earth away from the house for at least five feet at a minimum 5% grade (3 inches in 5 feet).
- ❑ Provide a water managed foundation drainage system at the bottom of the footing when the foundation floor (interior grade) is below the exterior grade.
- ❑ Insulate between the conditioned and unconditioned portions of the foundation system. In termite-prone areas, extra care should be taken to prevent termites from tunneling through the insulation.

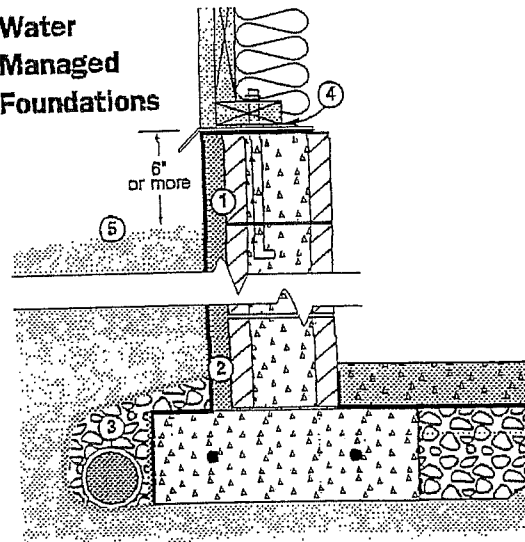
Methods of insulating slab-on-grade floors

Slabs lose energy primarily due to heat conducted outward and through the perimeter of the slab. Insulating the exterior edge of the slab in most sections of the country can reduce winter heating bills by 10% to 20%. Slab insulation is recommended in many localities by the Model Energy Code or state energy codes.

Insulation approaches to termite-resistant, slab-on-grade foundations



Water Managed Foundations



1. Damp-proof below-grade portion of foundation wall - this is to seal the wall against ground moisture penetration.
2. Install drainage plane material or gravel against foundation wall - this relieves hydrostatic pressure and channels water to the drain.
3. Cover perforated drain pipe with gravel and cover with filter fabric. Locate drain beside footing, not on top - this creates an underground gutter.
4. Add sill gasket membrane - this serves as a capillary break to reduce wicking of water from the concrete and provides air sealing.
5. When backfilling foundation wall, slope earth away from house 5%.

Wood and Insulation Sizes

Nominal Size	Actual Size	**	R-Value "Fanfold"	Actual Thickness
2x3	1 ½ x 2 ½		(R-1.5)	3/8"
			R-13	3 ½"
2x4	1 ½ x 3 ½		R-15	3 ½"
			R-19	6 ¾"
2x6	1 ½ x 5 ½		R-25	8"
2x8	1 ½ x 7 ¼		R-30	9 ¾"
2x10	1 ½ x 9 ¼		R-38	13 ½"
2x12	1 ½ x 11 1/8		R-21C	5 ½"
			R-30C	8 ¼"
			R-38C	10"

The following are just a few of the available materials which may be used, there are many manufactured named products which may be used meeting ASTM standards:

Owens Corning Foamboard (Polystyrene Insulation)

1/2	R-3
3/4	R-4
1"	R-5
1 ½	R-7.5
2"	R-10
3"	R-15
4"	R-20

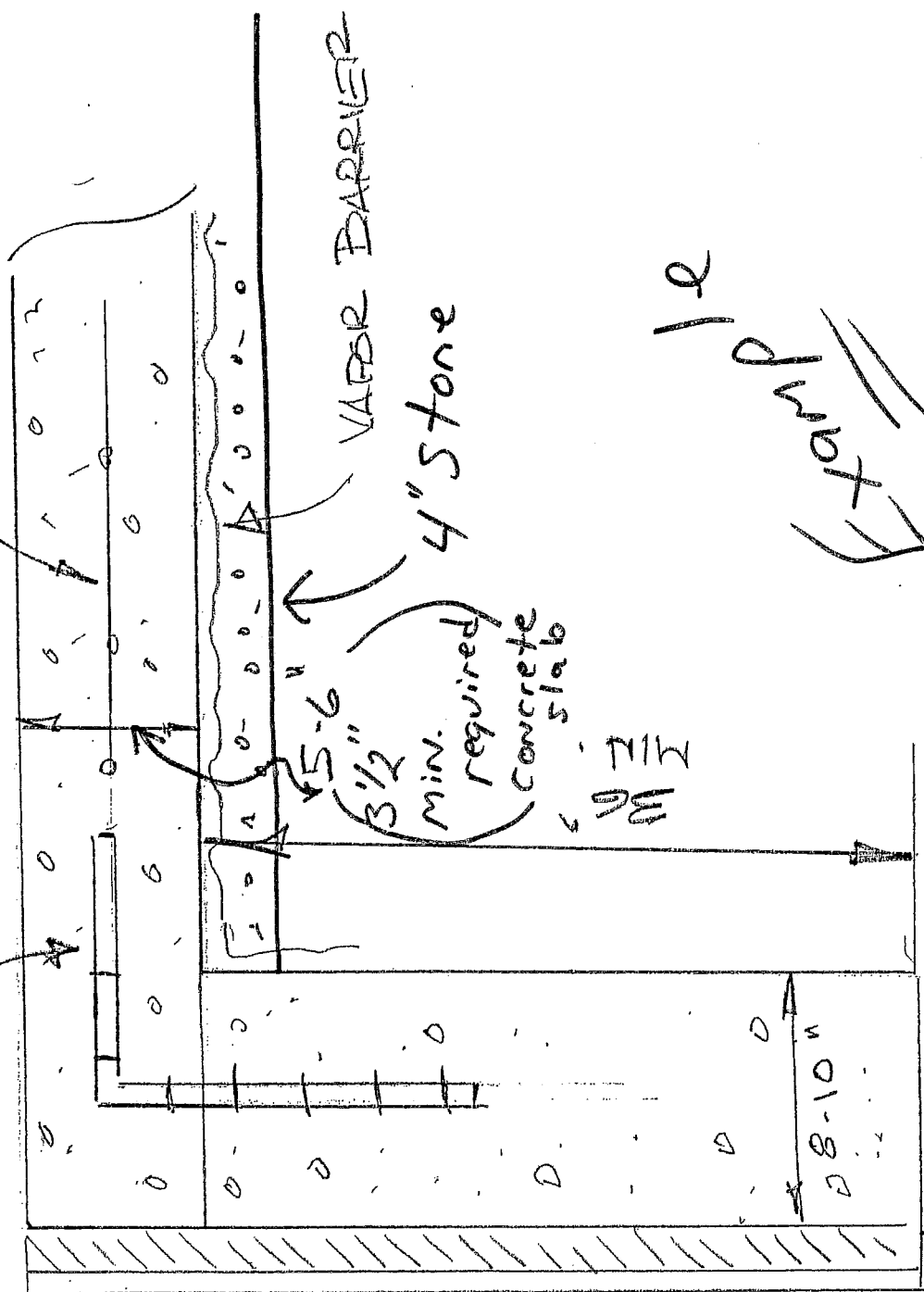
Dow Insulating Sheathing (Structural Foamboard)

1/2	R-3.3
5/8	R-4.1
3/4	R-5.0
1"	R-6.5
1 3/8	R-9.1
1 ½	R-10
1 7/8	R-12

(An additional R-2.8 can be obtained when used with an air space)

REINFORCING WIRE
optional

PIE BAR



6 1/2" MIN.

GROUND LEVEL

insulation protective MEMBRANE 10" below grade

VAPOR BARRIER 4" Stone

5-6" (3 1/2" MIN. required) concrete slab

Example

INSULATION

24" Vertical poured foundation from top w/ capped slab

Falls under mono-slab requirement

SLAB

TABLE