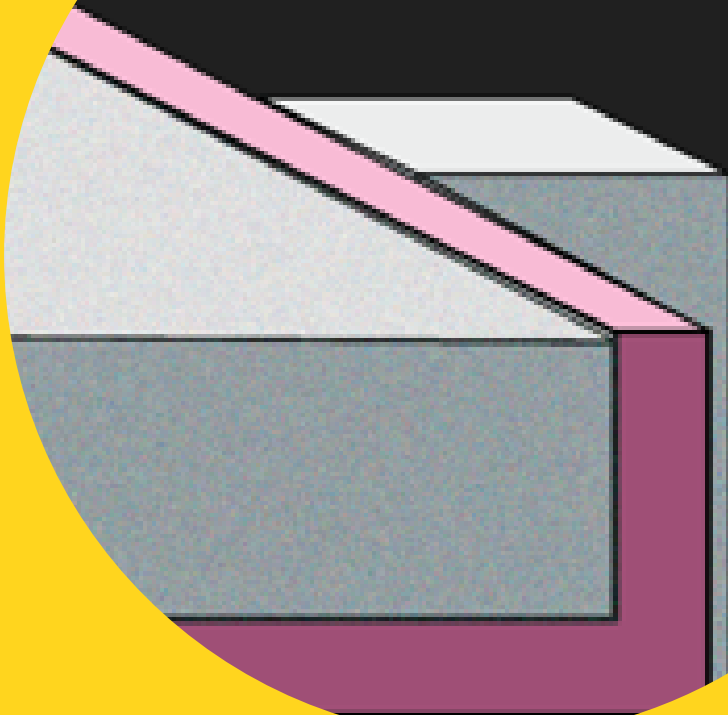




2024 International Energy Conservation Code Residential Slab Edge Insulation

This guide will highlight the requirements for Residential Slab Edge Insulation per the 2024 IECC.



Building
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This guide is based on the
2024 IECC.



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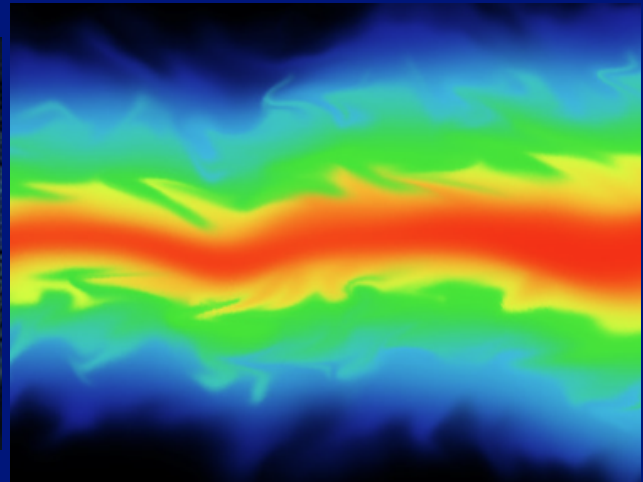
Residential Slab Edge Insulation



Slab Edge Insulation; when is it required, what is it, how does it work and how does it work with a code compliant energy thermal envelope?

We are going to need a foundation with physics and building science to help us understand the role of slab edge insulation.

Starting with physics and the second law of thermodynamics: heat flows from warm to cool. Insulation and the thermal barrier reduce this heat transfer by eliminating Thermal Bridging.



We will now move on to some Building Science concepts. What is Building Science? Building science is the study of how physical principles—such as heat, air, thermal bridging, and moisture transfer—affect building components, systems, and human occupants. Using principles like reducing thermal bridging using insulation is part of how the energy code uses building science to improve energy conservation.



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Thermal Bridging occurs when highly conductive materials, such as metal studs, wood framing, or concrete, penetrate a building's insulation, creating a **short circuit path** that allows heat to escape in winter and enter in summer.

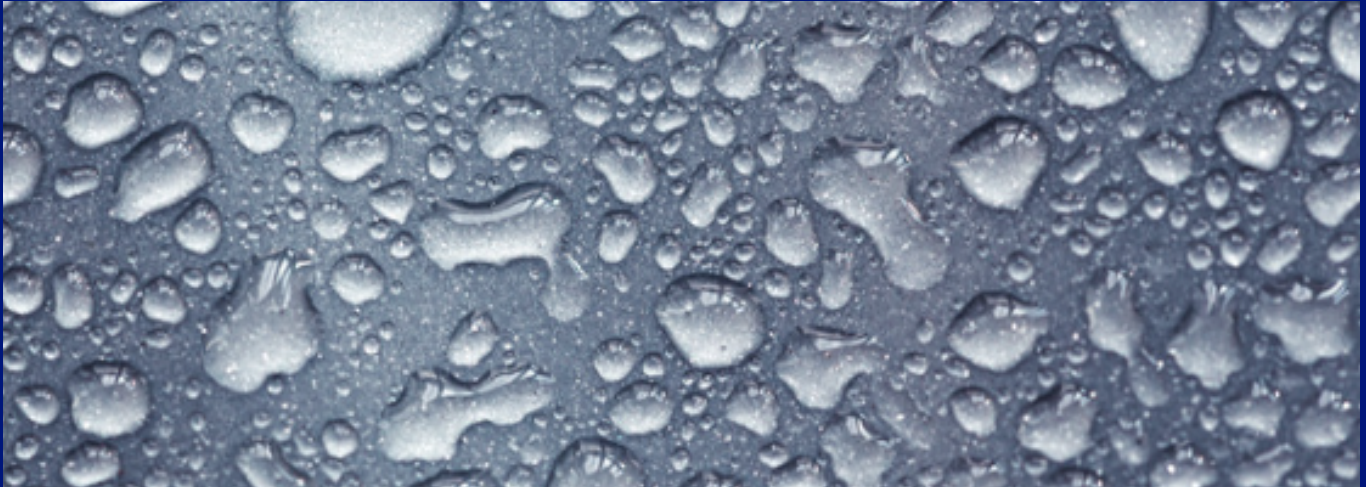


What is Slab Edge Insulation?



Slab Edge Insulation is rigid foam, mineral wool, or ground contact rated insulation materials, placed around the outer perimeter of a concrete slab-on-grade or foundation to act as a thermal break to prevent thermal bridging with the ground. The slab edge insulation can be installed on the interior or exterior of the foundation wall.

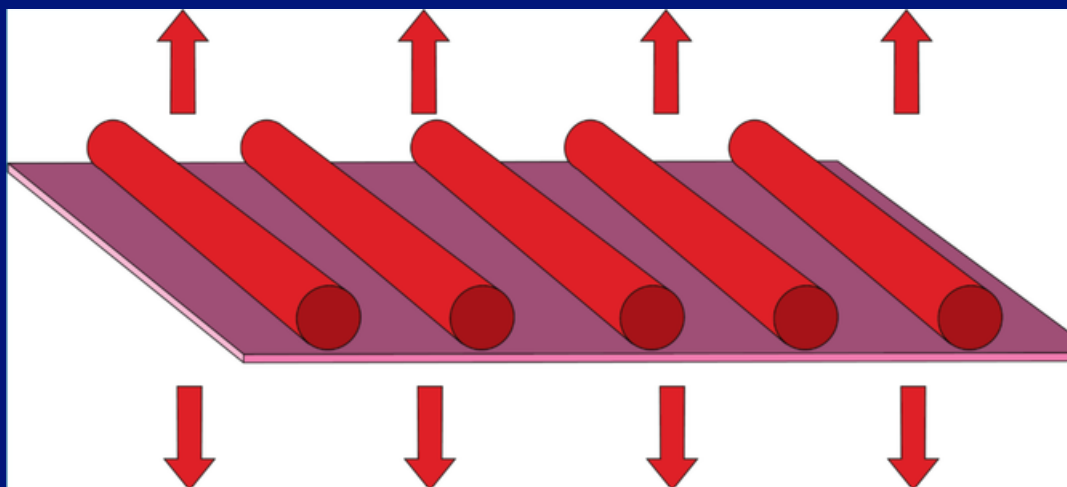
The slab edge insulation also helps with condensation and moisture control. This is accomplished by maintaining the inside temperatures higher than the outside. This causes the dew point to be positioned outside the building rather than inside the wall.



Let's visit the next part of our question, how does slab edge insulation work?

The main purpose of slab edge insulation is to create a thermal break to prevent thermal bridging between the slab and the foundation or the ground.

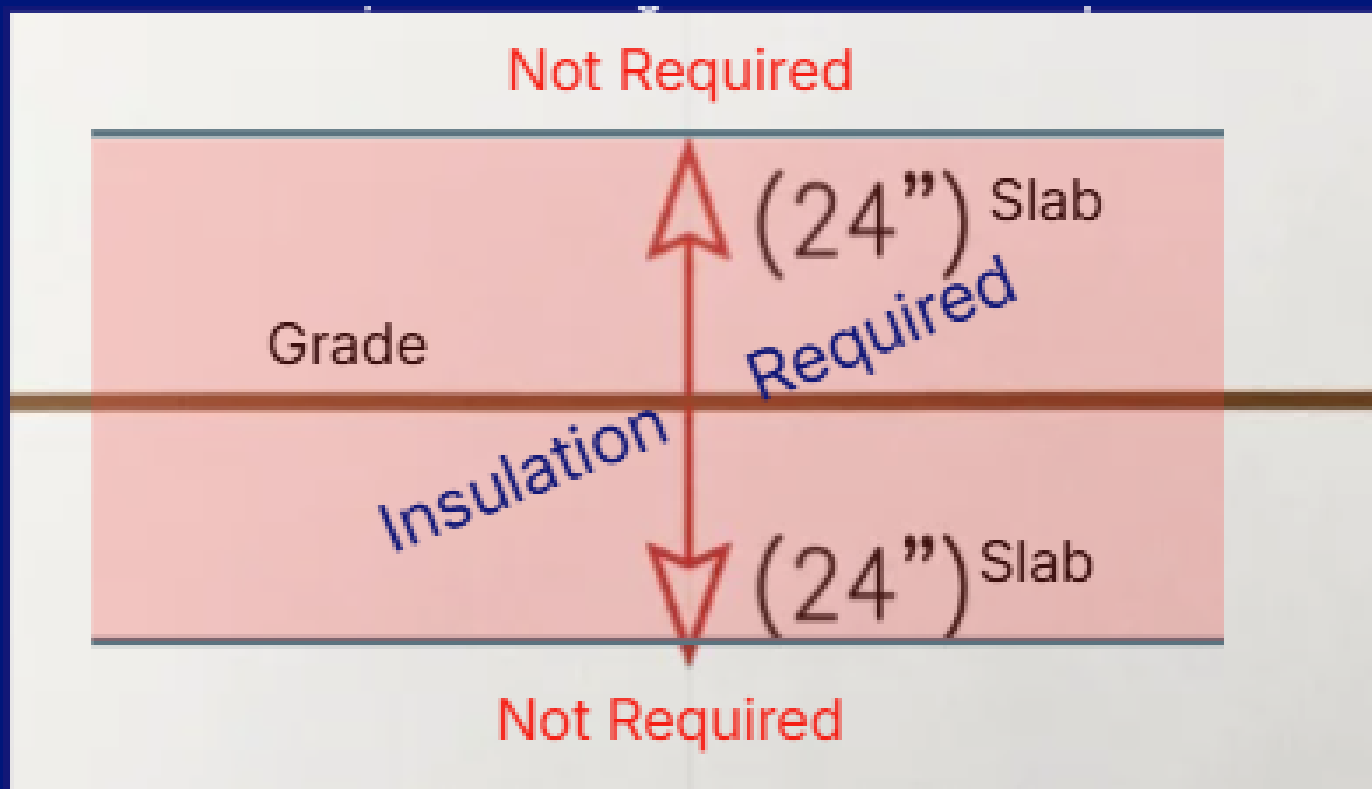




Thermal bridging in a concrete slab floor system turns the slab into a heat sink for the structure that allows heating and cooling energy to transfer from the inside to the outside with little to no resistance.

So, when is slab edge insulation required?

Slab edge insulation is required when the concrete slab is located anywhere within 24" of grade, above or below. If the concrete slab is outside of these dimensions, then slab edge insulation is not required. See the illustration below the pink area is where insulation is required.



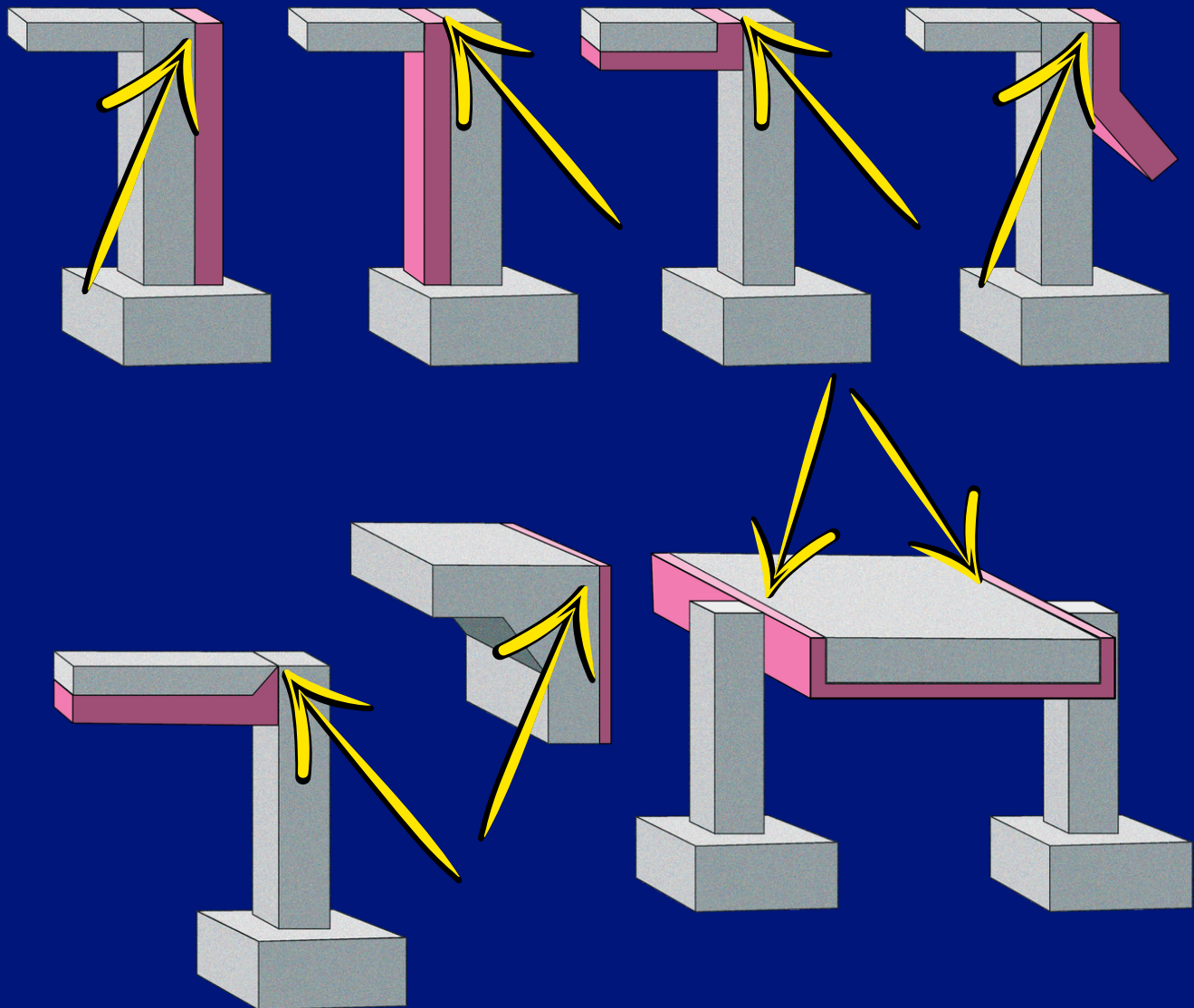
How does slab edge insulation complete a code compliant thermal barrier?

The code sections that address slab edge insulation are sections R402.2.10 through R402.2.10.2 and table R402.1.3. These sections are included in the Thermal Barrier requirements of residential construction. The R-value of insulation and the depth of the insulation from the slab edge are garnered from table R402.1.3 based on the climate zone of the project. The climate zones in Colorado are 4 – 7. An example of this is an unheated slab on grade in Arvada, Colorado is in climate zone 5. The requirements from Table R402.1.3 state that a minimum of R-10 continuous insulation be installed 3 feet down from the top of the slab edge or to the top of the footing, around the whole slab/foundation.

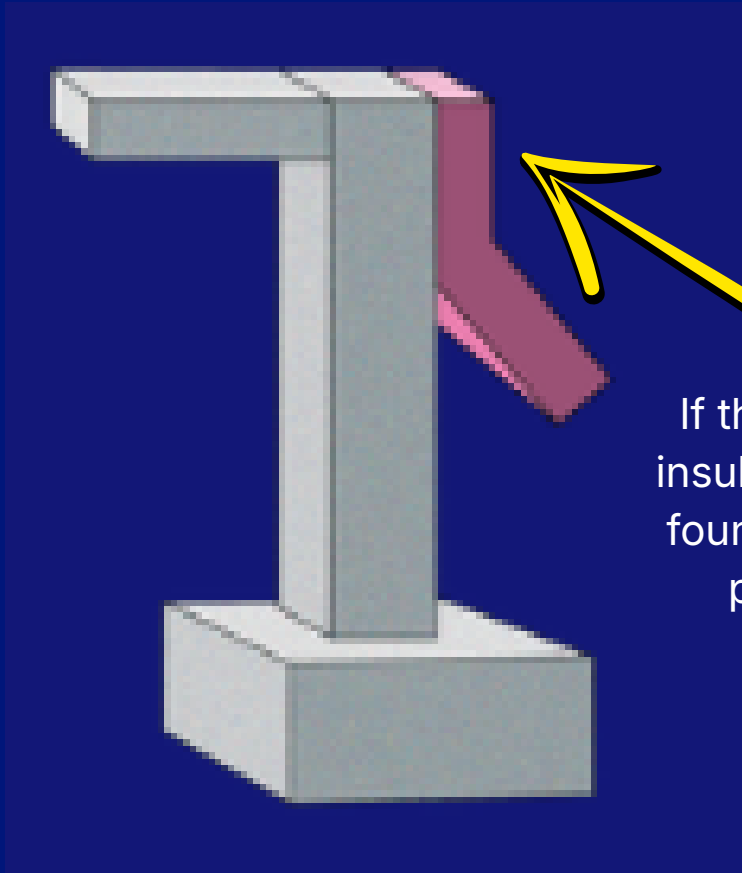
TABLE R402.1.3 INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT

Climate Zone	4 EXCEPT MARINE	5 AND MARINE	6	7 AND 8
Unheated slab R-value and depth	10ci, 3 ft	10ci, 3 ft	10ci, 4 ft	10ci, 4 ft
Heated slab R-value and depth	R-10ci, 3 ft and R-5 full slab	R-10ci, 3 ft and R-5 full slab	R-10ci, 4 ft and R-5 full slab	R-10ci, 4 ft and R-5 full slab

The nice thing about slab-edge insulation is the flexibility to install it based on the right configuration for the project needs. The following images show the code compliant installation methods for an un-heated slab.



The yellow arrows show the installation of the insulation starts at the top of the slab and extends down the code required depth or to the top of the footing. The reason for the insulation extending down is to slow the loss of heat to the colder ground or foundation system due to convection and thermal conductance. The loss of heat above the slab is regulated by the rest of the thermal envelope which is continuous with the slab edge insulation.

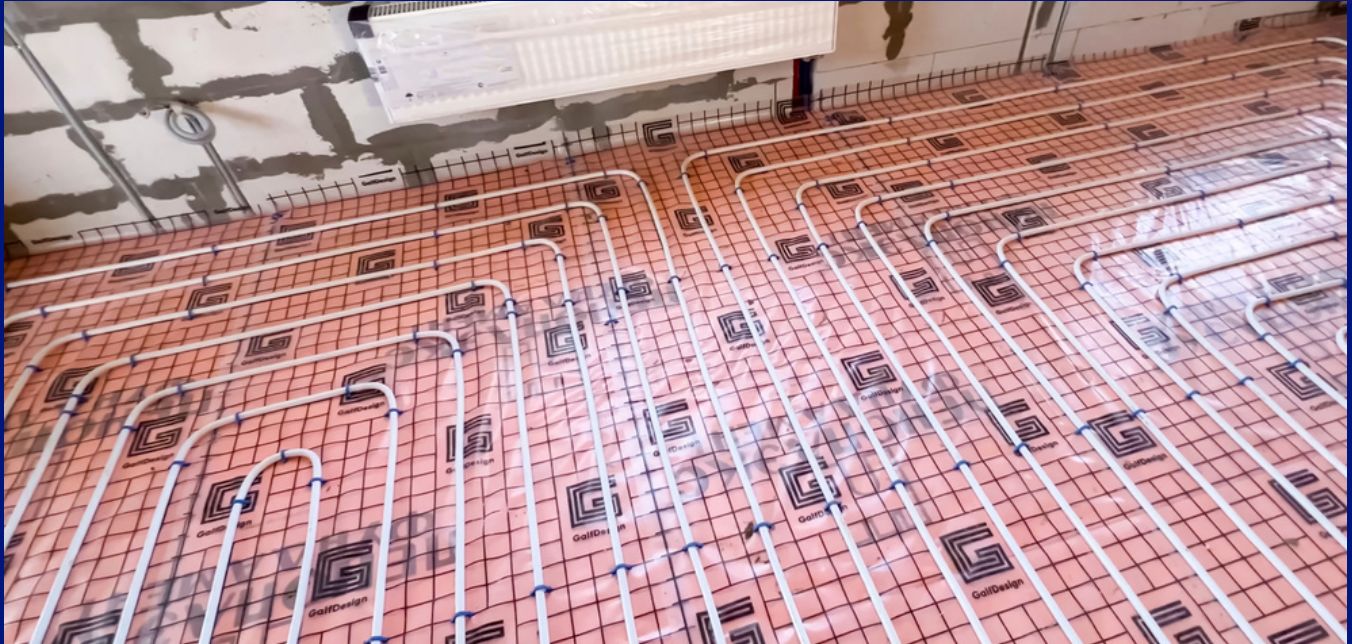


If the installation method has the insulation extending away from the foundation, the insulation must be protected by pavement or a minimum of 10" of dirt per R402.10.2.1.

Insulation that is installed on the exterior of the foundation must be protected from the environment and physical damage. The insulation must be rated for ground contact including water absorption.



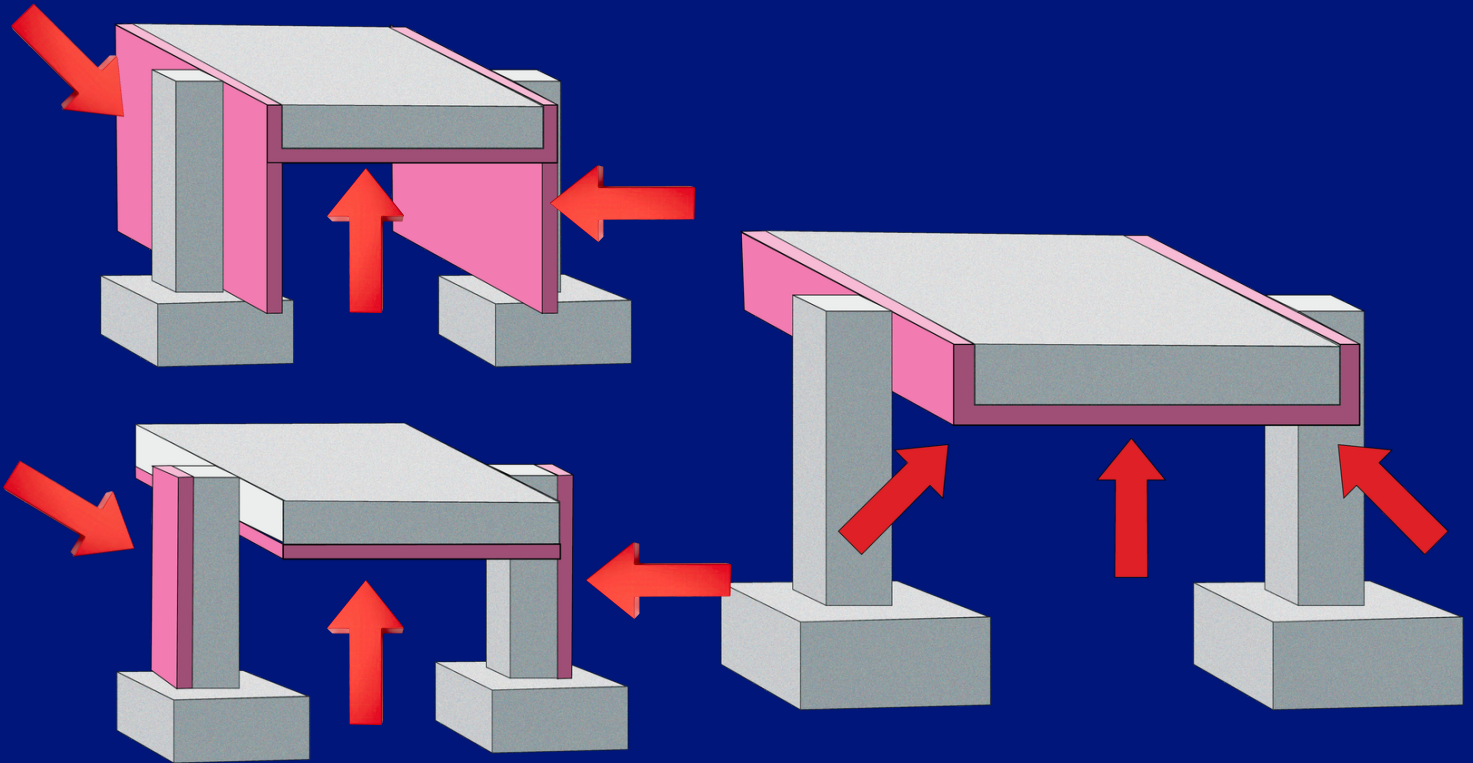
The use of slab edge insulation is required for both heated and unheated slab on grade construction per table R402.1.3. Heated slabs have additional specific requirements including the use of footnote c.



The best way to describe a heated slab is a concrete slab that is an integral part of the heat dispersal system. This means that an integrated heating element is embedded in the slab or underneath the slab. The heating elements are typically electrical or hot water tubing systems. This turns the slab into a radiant portion of the heating system.

The code requires that a minimum R-5 continuous insulation be installed under the entirety of the heated slab in addition to a minimum R-5 continuous slab edge insulation or the required continuous insulation R-value from table R402.1.3.

The following images show code acceptable heated slab on grade, slab edge and continuous insulation installations.



Please remember to check with the local building department or Authority Having Jurisdiction (AHJ), to ascertain any amendments or supplements to the adopted codes that may affect the slab edge insulation requirements.