

INSULATION BELOW A HEATED FLOOR

PURPOSE

This variance has been developed to address issues with providing adequate insulation value below a heated floor in contact with the ground.

DISCUSSION

The objective of insulation below a heated floor in contact with the ground is to reduce the environmental impact due to heat transmission to the ground from the heated floor. Under Section 9.36. of the National Building Code – 2019 Alberta Edition(NBC(AE)), this objective is achieved however this code provision impacts the viability of hydronic heating systems in floors in contact with the ground. Hydronic heat is an energy efficient method for heating a home that uses tubing to run a hot liquid in the floor, along base board heaters or through radiators to heat your home. Also referred to as radiant heating, this type of system has become increasingly popular in Alberta for homeowners who want added comfort and control in their heating zones, savings through lower heating bills, and a decrease in their environmental impact by making smart green building choices.

There is sufficient evidence that indicates that the current under slab-insulation code provisions are excessive and jeopardize the availability of hydronic heating as an option for Albertans.

The hydronic heating industry from across Canada has also indicated that the current slab-insulation provision is more than what is needed for meeting energy efficiency objectives. Alberta Municipal Affairs supports this conclusion and is consulting with the National Research Council (NRC) to recommend an appropriate insulation rating that will allow for hydronic heating installations while also supporting Alberta's energy efficiency goals. This province-wide variance will allow an alternative solution to the provisions under Section 9.36. for use in installations below heated floors in contact with the ground.

It is important to note that this variance will not remove the insulation requirement from Section 9.36. of NBC(AE), but the variance will allow, as an alternative, less than the 100 mm (4 inches) of under-slab insulation where hydronic or radiant heating is installed in the province.

Background information

The use of under-slab insulation listed in **CSA B214 Installation Code for Hydronic Heating Systems** includes a minimum RSI 0.88 (R-5) insulation beneath a heated slab. The research indicated installation of insulation beyond that of RSI 0.88 (R-5) provided negligible improvement in thermal performance of the slab.

Unless stated otherwise, all Code references in this STANDATA are to Division B of the National Building Code-2019 Alberta Edition

Issue of this STANDATA is authorized by
the Provincial Building Administrator

[Original Signed]
Paul Chang

The logo for the province of Alberta, featuring the word "Alberta" in a stylized, cursive font with a small blue square at the end of the word.

- For insulation values from RSI .88 (R-5) to RSI 2.82 (R-16), there is an estimated energy cost savings of \$50 per year with less than a 1.27% difference in transmission losses. At an added insulation cost of 50% of the actual cost of the radiant heating system for the slab.
- The design standard CSA-B214 Installation Code for Hydronic Heating Systems requires at least RSI 0.88 (R-5) insulation below a heated slab and at slab edges.
- The impact of the slab insulation is greatest in comfort and energy consumption reduction when the first RSI 0.88 (R-5) is added below the slab, as the slab thermal performance increase from approximately RSI 0.2 (R-1.14) to RSI 0.88 (R-5) which is a 4X (400%) increase in thermal performance.
- Industry practice is typically to install 38 mm (1.5 inch) RSI 1.32 (R 7.5) insulation below heated floors in contact with the ground.
- The National Energy Code for Buildings 2017 requires RSI 1.32 (R 7.5) insulation below heated floors in contact with the ground.

CODE REFERENCES

Article 9.36.2.8. Objective and Functional Statements

(1) [F92-OE1.1]

Division A, Article 3.2.1.1. Functional Statements

1) The objectives of this Code are achieved by measures, such as those described in the acceptable solutions in Division B, that are intended to allow the building or its elements to perform the following functions (see Note A-3.2.1.1.(1).:

F92 To limit the amount of uncontrolled thermal transfer through the building envelope.

Division A, Article 2.2.1.1. Objectives

OE Environment

An objective of this Code is to limit the probability that, as a result of the design or construction of the building or facility, the environment will be affected in an unacceptable manner.

OE1 Resources

An objective of this Code is to limit the probability that, as a result of the design or construction of the building or facility, resources will be used in a manner that will have an unacceptable effect on the environment. The risks of unacceptable effect on the environment due to use of resources addressed in this Code are those caused by -

OE1.1 – excessive use of energy

VARIANCE

This variance provides approximately equivalent or greater safety performance with respect to persons and property as that provided for by the Safety Codes Act.

1. A minimum RSI 0.88 (R-5) under slab insulation is in compliance when installed for a heated floor in contact with the ground where the floor is fully below frost line.
2. A minimum RSI 1.32 (R 7.5) under slab insulation is in compliance when installed for a heated floor in contact with the ground where the floor is above the frost line.

This VARIANCE is applicable throughout the province of Alberta.