

Hydronic Heating Systems for Dwelling Unit

Guideline

Guideline ESP- 04

Purpose

This guideline has been developed to help improve consistency with the installation, education and enforcement of a hydronic heating system within a Part 9 residential dwelling unit, including information on the permit documentation required, installation requirements for the insulation, minimum R-Values, continuity of the insulation over pad and strip footings, sealing of penetrations, and the sealing of the air barrier below that system.



Code Reference

National Building Code 2019 Alberta Edition Division B Article 9.33.4.1., Article 9.25.2.3., Article 9.25.3.6. & Article 9.36.2.8 & Article 9.36.3.4.

2015 Illustrated Users Guide – NBC 2015 Part 9 of Division B Housing and Small Buildings 9.33.4.2.

Alberta Municipal Affairs STANDATA 19-BCV-005 “*Insulation Below a Heated floor*”

CAN/CSA-B214-16 “Installation Code for Hydronic Heating Systems”



Summary

The requirements of this Guideline are applicable to, and provide clarity towards the options available for ensuring compliance to the National Building Code 2019 Alberta Edition, when installing hydronic heating systems located within a residential dwelling unit.



Interpretation

This Guideline provides clarity and direction from Rocky View County on their interpretation of hydronic heating systems and the requirement for insulation below and around a heated floor within a dwelling unit. We have also provided some additional information on common questions, and practices for hydronic floor heating system installations. Where a floor is heated, insulation should be installed in the following method(s):

- 1) Minimum R-Values for Insulation
 - a) Heated Floor Separating Conditioned Space from the Ground - STANDATA 19-BCV-005 “*Insulation Below a Heated Floor*” provides a variance from the National Building Code 2019 Alberta Edition minimum requirements, and permits a heated floor separating conditioned space from the ground to be provided with the minimum R-Values noted below. This variance is applicable to heated floors only and is applicable throughout the entire floor area.

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- A minimum **R-5** under slab insulation where the floor is **below frost line**, or
- A minimum **R-7.5** under slab insulation where the floor is **above the frost line**.

b) Other Heated Floor – Where a floor is heated, but the floor does not separate conditioned space from the ground, such as a main floor over a heated basement, the floor shall provide the minimum R-Values as required under the referenced design standard. An example of this is the CAN/CSA-B214 standard that requires:

Location of Pipe	R – Value Required under CAN/CSA B214
Interior floors (within joist cavity)	R-12
Interior floors (embedded in concrete)	Floor system R-Value must be higher than the concrete slab, but not less than R-3

- 2) Who can Design a Hydronic Heating System – A hydronic heating system must be designed by:
- a) Registered Engineering Professional licensed to practice in Alberta, or
 - b) An individual with one of the following qualifications:
 - A Certified Hydronics Designer, as certified by the Canadian Hydronics Council, or
 - A Residential Hydronics Design Technician, as certified by the Heating, Refrigeration and Air Conditioning Institute of Canada.
- 3) Application Documentation Required – The design and installation of a hydronic heating system is required to comply with applicable regulations or good engineering practice noted in the National Building Code 2019 Alberta Edition Division B Sentence 9.33.4.1.(1). The applicable regulation referenced for the design should be indicated on the plans. Where a hydronic heating system is being installed within a dwelling unit, the qualified designer must provide along with the applicable design regulation referenced for the design, the following documentation noted below, to Rocky View County at the time of permit application.
- a) Primary Hydronic Heating System (Provides the main source of heat for the house/floor)
 - The Schematic Arrangement of the system and the equipment specifications including, but not limited to, boilers, pumps, expansion tanks, zone controls, mixing valves and other components such as supplementary baseboard and/or fan-coil units, water heater, etc. connecting to the system,
 - Boiler room layout, venting, and combustion air provisions for all gas appliances,
 - Piping specifications, spacing, sizes, maximum loop lengths and pipe support details. Floor plans showing a general layout of the piping loops required for each room or space and the location of the main headers, if applicable,
 - Locations, sizes and specifications for all heat terminal units, such as baseboard heaters, radiators, fan-coil units, etc., if applicable,
 - Cross sections through typical floor assemblies to show piping loop locations and the type of insulation to be provided,
 - System operating parameters including supply and return water temperatures, design flow rates and heat output coefficient of individual piping loops, and
 - Room by room heat loss calculations.

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b) Secondary Hydronic Heating System (Provides a source of heat secondary to the primary heating system ie in-floor heating for convenience)

- Floor plans showing a general layout of the piping loops required for each room or space and the location of the main headers, if applicable,
- Piping specifications, spacing, sizes, maximum loop lengths and pipe support details,
- Specifications for the boiler or Heat Exchanger supplying system, and
- Pressure test – Prior to pouring slab, recorded and kept on site.

c) Fan Coil Units

- Specifications for the fan coil unit being installed,
- Specification for the boiler supplying the system, and
- Room by room heat loss calculations.

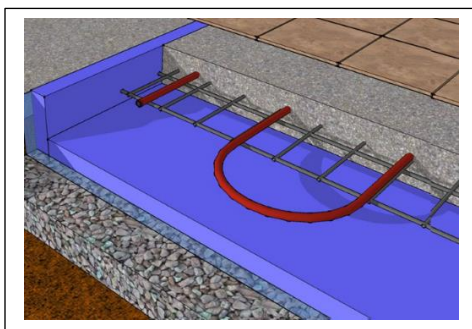
4) Insulation – Insulation installed for hydronic heating systems must have documentation provided to Rocky View County **PRIOR** to installation, confirming the product has been approved for use through:

a) CCMC Approval designation, or

b) Evaluation Report done by a recognized accredited testing agency, indicating compliance to the appropriate standard identified in the Alberta Building Code Div. B Article 9.25.2.2., or

c) Alternative Solution completed by a registered Alberta Professional Engineer which provides empirical data supporting how the product meets the minimum R-Value(s) required for its intended location.

5) Insulation Required – Insulation installed under a heated floor separating the ground from conditioned space shall be installed under the floors full bottom surface, including the edges. Insulation must extend over internal strip footings and pad footings to ensure continuity of the insulation is maintained throughout the floor area.



Insulation required along the full bottom surface and along the edges.

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Insulation required to cover the full bottom surface, including overtop of all pad footings and strip footings.

6) Air Barrier

a) Provided by the Insulation - Where the insulation provides the air barrier separation between the ground and the conditioned space, all penetrations through the insulation must be sealed. Penetrations created by the teleposts, radon vent, plumbing vents, and the joint between the insulation and the exterior walls etc. must all be sealed with a flexible sealant either at this level, or between the penetration and the concrete floor.

b) Provided by Polyethylene Sheet – Where a layer of polyethylene is installed under the insulation which acts as the air barrier, this sheet material must be overlapped by not less than 300 mm at the joints. To ensure a continuous air barrier, the penetrations through the air barrier (poly) can be sealed with flexible sealant either at this layer, or between the penetration and the concrete floor. Note: Further requirements for radon control may be required.

7. Radon Requirements – Requirements for rough-in installations for radon mitigation can be found at the link provided below.



Additional Information

Rocky View County Guideline “Hydronic Heating Systems for Garage or Accessory Building”
<https://www.rockyview.ca/BuildingPlanning/BuildingPermits/FormsDocuments.aspx>



Reference

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- March, 2020

Last Review Date

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