

HEATLOK®



RADON ABATEMENT FROM THE GROUND UP

The solution for
a dry, comfortable,
and durable basement!



CLOSED-CELL



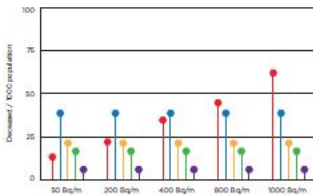
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What Is Radon?

Radon, a colorless, odorless, radioactive gas, is the second leading cause of lung cancer. Heavier than air, radon can accumulate in basements, increasing the risk of exposure to the homeowner. This is a guide to building a radon barrier around the basement using Heatlok HFO closed cell spray foam.

Radon can infiltrate in several places, especially cracks or openings in the floor slab, cracks in the foundation wall, or sumps. The Environmental Protection Agency (EPA) and The American Lung Association recommend testing for radon in your home.

Risk From Exposure To Radon*



- Lifelong exposure to radon, non smoker
- All accident related deaths
- Bush pilot
- Ascending Mount Everest
- Poisoning

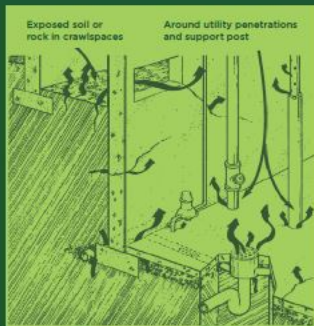
Bq = becquerels, unit of measurement for radon gas

*Source: Radon - Reduction Guide for Canadians, Health Canada

Here are the EPA's recommendations for reducing radon infiltration in basements:

- ⑥ Install a membrane or sealing product under the floor slab
- ⑥ Seal the joint between the foundation wall and the floor slab
- ⑥ Seal all openings in the foundation wall and floor slab
- ⑥ Seal all posts and load-bearing walls to the floor slab and membrane
- ⑥ Install floor drains that prevent gas infiltration
- ⑥ Install sealed lid on sumps

Potential Radon Infiltration



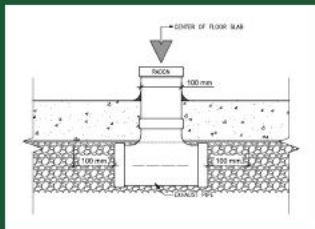
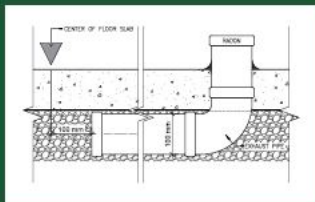
Source: Radon - Reduction Guide for Canadians, Health Canada

How To Build A Radon-Free Basement

These are the 6 steps to build a radon-proof basement in a new building:

1 Install A Depressurization Pipe

A perforated pipe 4 inches in diameter must be installed in 3/4 inch gravel net and run to the center of the surface of the floor slab. This pipe is installed preventatively and will be connected to an exhaust fan if, after the work is completed, a test shows a radon concentration over 200 Bq/m³.



Source: CNBC 2010

2 Install An Air Barrier

Heatlok HFO is an ICC compliant air barrier product, in accordance with standard ASTM 2178, and provides perfect air-tightness under the foundation slab, as well as being insulating. Heatlok HFO is radon gas resistant, as demonstrated by ISO/ICC 17025-OL tests⁴, and is 11 times more efficient than a 6-mil polyethylene membrane at 1.25" (32mm). The minimum thickness to apply is 1.25" (32mm) to meet insulation, air-tightness and vapor barrier requirements.

3 Seal The Joints

The perfect continuity of Heatlok HFO seals the foundation wall joint to the foundation, leaving no seams in the basement insulation anywhere: wall, slab, rim joist. The product is sprayed on-site and molds perfectly to the building structure. The continuity between the airtight slab and the wall is perfect. The installation of Heatlok HFO requires no sealant, tape, or cutting of materials, so there are no compatibility issues between materials.

4 Seal All Openings

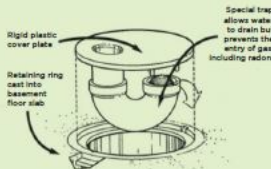
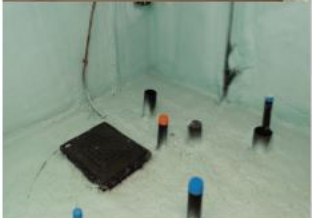
Heatlok HFO seals openings and posts, leaving no room for error. The product seals and expands 30 times its initial volume in 5 seconds.

5 Install Floor Drains

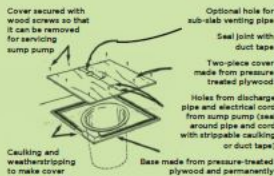
Radon can use water as a vehicle for infiltration. It is therefore important to install floor drains that are specifically designed to prevent gas infiltration.

6 Install A Sealed Lid On Sumps

Sumps can communicate directly with the gravel. It is therefore important to use specifically designed sealed lids.



Source: Radon - Reduction Guide for Canadians, Health Canada



Source: Health Canada - Radon Reduction Guide for Canadians

Protection Requirements

The basement can often be a risky area: high humidity, floods, mold, etc. With the new energy requirements of The International Residential Code (IRC), it is recommended to insulate under the basement concrete slab. Where required, The insulation must have a minimum value of R-5 full surface or R-7.5 for 4 feet (1.2 metre) around the perimeter. In addition, IRC recommends the installation of protection against soil gases (Appendix F, IRC), mainly radon. Heatlok HFO provides superior insulation, a perfect air barrier system, and a vapor barrier all in one single application. It also prevents soil gases, mainly radon, from entering the building. In short, the occupants are warm, comfortable and protected from radon.

With an R value of R-7.4/inch, Heatlok HFO Pro, applied 1.25" (32 mm) thick, provides R-7.5 insulation under the entire surface of the slab, exceeding Building Code requirements. Due to its high compression strength (35 psi), Heatlok HFO Pro can be sprayed directly on crushed stone and provides continuous insulation with no joints.

Reference Article for Radon NBCC-2010
S4.3.13(e)-A S4.3.1 - 9.3.1.4 - 9.22.3 - 9.36.2.9

During construction, workers can move with wheelbarrows and equipment without damaging Heatlok HFO: it will not crack or break. The entire basement can be sprayed in a single step. Application is very quick and generates no waste. No scraps, no wasted materials.

The EPA recommends the safe threshold for radon gas in buildings. In addition to its high insulation factor, Heatlok HFO acts as an air and vapor barrier. 1.25" (32 mm) of product exceeds the air barrier material requirements by 500 times, creating an air barrier system. The product is tested in accordance with Standard ASTM 2178 and ASTM 283. When applied, the product adheres and expands 30 times its initial volume in 5 seconds.

TABLE R403.3(1)

MINIMUM FOOTING DEPTH AND INSULATION REQUIREMENTS FOR FROST-PROTECTED FOOTINGS IN HEATED BUILDINGS

AIR FREEZING INDEX ("F - DAYS)	MINIMUM FOOTING DEPTH, D (INCHES)	VERTICAL INSULATION R-VALUE	HORIZONTAL INSULATION R-VALUE	
			ALONG WALLS	AT CORNERS
1,500 OR LESS	12	4.5	NOT REQUIRED	NOT REQUIRED
2,000	14	5.6	NOT REQUIRED	NOT REQUIRED
2,500	16	6.7	1.7	4.9
3,000	16	7.8	6.5	8.6
3,500	16	9.0	8.0	11.2
4,000	16	10.1	10.5	13.1

Benefits of Using Heatlok HFO

Heatlok HFO, used under the slab, on the foundation walls and on the rim joists, provides a continuous, seamless, air-tight, from the insulation below the basement slab right up to the ground floor.

Thermal Break

The NBC now requires a thermal break between the foundation wall and the slab (minimum value of R-4). The continuity of the polyurethane foam between the slab and the wall surface creates the thermal break by itself.

Insulation Performance

With 1.25" (32 mm) below the slab (R-7.5) and 2' (64 mm) on the foundation walls, the required minimum values of R-5 below the slab and R-17 are exceeded: R-17.5 for the full wall assembly assembly without any thermal bridge.

Price-Quality Ratio

Another benefit of insulating the basement in a single step, namely application below the slab, on the foundation wall and on the rim joists, is the cost savings. Application is very quick and the product cost will be lower per square foot, since the applicator's travel time and prep are offset by the volume to install, compared with a conventional insulation system that involves multiple steps, several materials, plus more labour, which leaves more room for error. When a similar installation is done with the use of insulation panel + polyethylene + sealant + glue and tape the overall performance and the quality of the job depends of the level of workmanship. In a single step with Heatlok HFO, we create a durable and perfectly sealed structural envelope during and after the work. All plumbing pipes and vents, sumps and drains in the slab and walls are sealed in one operation, without any complication regarding compatibility of materials. Adhesion to the concrete wall is perfect; there is no possible air space for condensation and mold to penetrate. Heatlok HFO delivers an insulation and moisture control system, and a vapor barrier, all in one step, quickly and effectively. The durability, adhesion and quality of the product are confirmed by a CMHC study, with everything remaining intact in the long term.

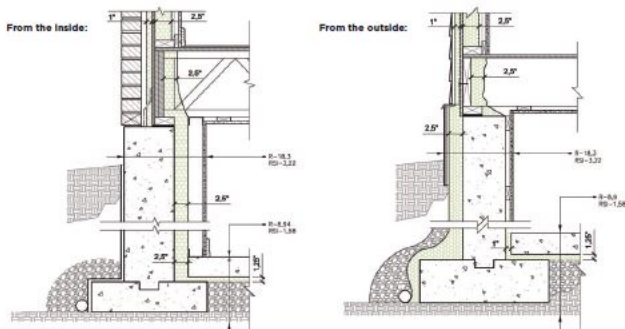
Resistance to Radon Gas

In addition, Heatlok HFO has been tested for its resistance to radon gas by recognized independent laboratories. Tests consisted in comparing Heatlok HFO's performance with a 6-mil polyethylene sheet.



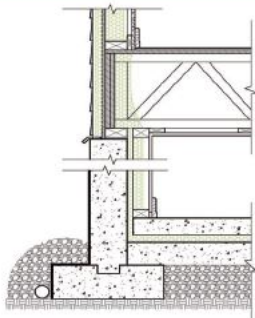
New Construction

Preventing radon gas infiltration in new construction is even simpler.

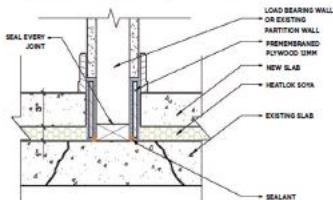


Renovation

A simple solution to prevent radon infiltration in existing buildings. Spray Heatlok HFO on the existing slab, the foundation wall, and the rim joist, and then pour a new slab. It is important to verify the floor/ceiling height, since this will add approximately 4" to the floor thickness.



Detail for sealing a bearing wall or an existing divider.



The Solution for Lasting Comfort

The basement is a high-humidity area prone to mold and mildew development. According to independent laboratory testing (ASTM C 1338), mold will not grow in Heatlok HFO, as it is not a nutrient source for bacteria. The product is water and humidity resistant. Numerous studies have shown that it is the ideal insulation for Class 1 flood zones. The spray polyurethane foam may remain in place even after a flood. The foam does not degrade and, once dry, Heatlok HFO recovers all of its physical properties.

In short, the installation of Heatlok HFO under the slab and on foundation walls saves time and materials, while providing lasting superior-quality insulation and airtightness at a competitive price.

Introduced on the market in 2017, Heatlok HFO High Lift and Heatlok HFO Pro are produced in the United States and are 12.5% post-consumer recycled products. To date, Demilec has recycled more than 360 million 591-mL plastic bottles. Heatlok HFO is suitable for application on all building types. Its installation generates no waste, no jobsite trash. There is no packaging. The product is sold in liquid form in returnable or recycled containers.

References

1. Passive Radon Control System for New Construction. (May 1995). United States Environmental Protection Agency.
2. Building Radon Out. A Step-by-Step Guide On How To Build Radon-Resistant Homes. (April 2001). United States Environmental Protection Agency.
3. 2015 International Residential Code, Appendix F.

