# Evaluation Report CCMC 14024-R
# RadonBlock™

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| **MASTERFORMAT:** | 31 21 13 16 |
| **Evaluation issued:** | 2015-09-30 |
| **Re-evaluation due:** | 2018-09-30 |

## 1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that "RadonBlock™", when used as part of a sub-slab radon gas mitigation system in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code 2010:

- Clause 1.2.1.1.(1)(b), Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
  - Sentence 9.13.4.2.(1), Protection from Soil Gas Ingress

This opinion is based on CCMC's evaluation of the technical evidence in Section 4 provided by the Report Holder.

## 2. Description

The product is a seven-layer co-extruded barrier sheet made from polyethylene and ethylene vinyl alcohol (EVOH) resins that provides resistance to gas and moisture transmission. The product is an under-slab barrier designed to restrict naturally occurring gases such as radon and/or methane from migrating through the ground and concrete slab (see Figure 1).

The product is a 0.51 mm (20 mils) thick sheet and available in 3-m (10 ft.) × 45.7-m (150 in.) rolls. All rolls are folded on heavy-duty cores for ease of handling and installation. The product is available in custom sizes with factory welded seams are available based on minimum volume requirements.

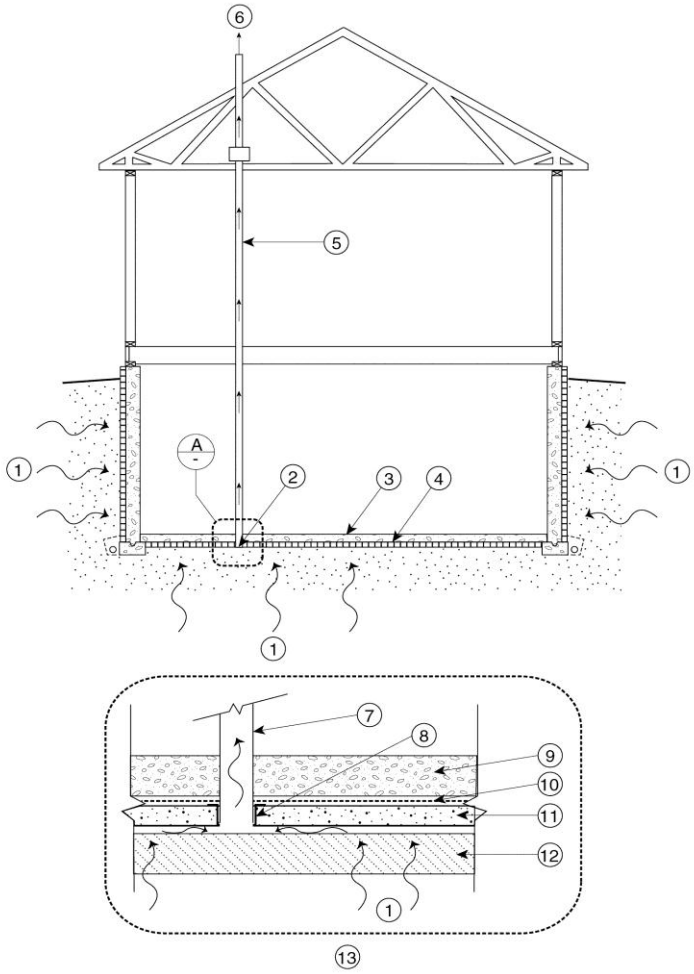


**Figure 1. "RadonBlock™" typical assembly**

**1. radon gas**
**2. vent collar flange**
**3. concrete slab**
**4. air barrier system**
**5. radon exhaust vent pipe**
**6. radon exhaust**
**7. radon exhaust vent pipe**
**8. vent collar flange**
**9. concrete slab**
**10. "RadonBlock™"**
**11. gravel**
**12. undisturbed soil or compacted fill**
**13. Section A**

## 3. Conditions and Limitations

CCMC's compliance opinion in Section 1 is bound by the "RadonBlock™" being used in accordance with the conditions and limitations set out below.

- Joints in the product must be lapped not less than 300 mm (12 in.) and must be sealed with butyl tape.
- The product must be installed in accordance with the manufacturer's "RadonBlock™ Installation Guidelines," dated July 15, 2015.
- The product must be used in conjunction with the requirements specified in Subsection 9.13.4., Soil Gas Control, of Division B of the NBC 2010.
- A floor-on-ground must be sealed around its perimeter to the inner surfaces of adjacent walls using flexible sealant.
- All penetrations of a floor-on-ground that are required to drain water from the floor surface must be sealed in a manner that prevents the upward flow of air without preventing the downward flow of liquid water.

## 4. Technical Evidence

The Report Holder has submitted technical documentation for CCMC's evaluation. Testing was conducted at laboratories recognized by CCMC. The corresponding technical evidence for this product is summarized below.

## 4.1 Material Requirements

**Table 4.1.1 Results of Testing of Material Properties of the Product**

| Property | | Requirement | Result |
|---|---|---|---|
| **Tensile strength (MPa):** | **machine direction** | Min. 12 | 25 |
| | **transverse direction** | Min. 8 | 22 |
| **Elongation (%):** | **machine direction** | 225 | 711 |
| | **transverse direction** | 350 | 658 |
| **Water vapour permeance (ng/Pa·s·m$^2$)** | | Max. 15 | 0.61 |
| **Impact strength (g)** | | Min. 300 | 2 600 |
| **Outdoor weathering resistance** | | Retain minimum 50% of tensile elongation strength after exposure to accelerated weathering | Pass |

## 4.2 Performance Requirements

### 4.2.1 Radon (Rn) Infiltration Test

During the infiltration test, Rn was continuously introduced into the dosing compartment of the RIBETS (National Research Council (NRC) Rn test facility) for three weeks. The air temperature, relative humidity, air pressure, and Rn concentration were monitored continuously in both the dosing and the receiving compartments during this test period. The variations of Rn concentrations in both the dosing and receiving compartments are summarized in Table 4.2.1.

**Table 4.2.1 Results of Testing for Comparison of Radon Infiltration through "Radon Guard™" and Prescriptive Gravel**

| Assembly | Rn Concentration in Dosing Compartment (Bq/m$^3$) | Rn Concentration in Receiving Compartment (Bq/m$^3$) | Result |
|---|---|---|---|
| **Floor assembly with 6 mil poly** | 5 192 | 342 | The test assembly with the RadonBlock™ and butyl joint tape demonstrated lower permeability to Rn compared to the floor assemblies with the 6 mil poly or the 20 mil poly membranes with conventional sheathing joint tape |
| **Floor assembly with 20 mil poly** | 2 260 | 384 | |
| **Floor assembly with "RadonBlock™"** | 3 362 | 124 | |

### 4.2.2. Sub-slab Depressurization Communication

During sub-slab depressurization communication tests, the in-line Rn exhaust fan was switched on, and it was withdrawing air through sub-slab Rn rough-in PVC pipe from underneath the test membrane samples. The airflow rates through the exhaust stacks and Rn exhaust fan, the pressure in the dosing compartment, the pressure underneath concrete slab, and the pressure underneath the membrane were monitored and recorded at 15-second intervals for 4 hours duration. The average results over the experiment period are presented in Table 4.2.2.

**Table 4.2.2 Comparison of Sub-slab Depressurization Communication for Membrane Tests**

| Assembly | Flow Rate Through Exhaust Fan (L/s) | Pressure Under Concrete Slab (Pa) | Pressure Under Membrane (Pa) | Pressure in Dosing Compartment (Pa) | Pressure in Receiving Compartment (Pa) | Result |
|---|---|---|---|---|---|---|
| **Floor assembly with 6 mil poly** | 26.6 | −1.8 | −3.1 | −30.0 | −0.9 | "RadonBlock™," 6 mil poly, and 20 mil poly membranes produced comparable results during the sub-slab pressure communication tests |
| **Floor assembly with 20 mil poly** | 25.2 | −3.0 | −3.0 | −29.4 | −4.4 | |
| **Floor assembly with "RadonBlock™"** | 28.9 | −0.6 | −3.1 | −29.8 | −2.3 | |

## Report Holder

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