



HOW TO SELECT AN EFFECTIVE VAPOR RETARDER/BARRIER GUIDELINE

RAVEN

ENGINEERED FILMS



STRAIGHT TALK ABOUT WATER VAPOR RETARDERS/BARRIERS.

The proper water vapor retarder/barrier, when correctly installed, will provide an effective and economical method of limiting water vapor from traveling upward through a concrete slab-on-grade or below the exterior grade. Without the proper water vapor retarder/barrier, many problems can occur. Excessive moisture will adversely affect moisture-impermeable floor finishes causing breakdown of adhesion, warping or peeling, rotting of carpet, buckling and decay of wood floors, offensive odors and fungi growth.

To avoid these and other problems, it is extremely important to do your homework when choosing an effective vapor retarder/barrier. We have developed this guide to provide information which will help you choose the best vapor retarder/barrier, at the best value.



BUCKLED FLOOR COVERING

THE TRUTH ABOUT VAPOR RETARDERS/BARRIERS.

TRUTH 1 No two water vapor retarders/barriers are created equal. The vapor retarder/barrier you select should be manufactured from high-grade raw materials that are consistent in quality, unlike common construction grades of 4, 6 or 10 mil polyethylene. Construction grade films (known as C&A or visqueen) are typically produced with very low grades of polyethylene resin and a very high percentage of “post consumer” recycled materials. The numerous heat cycles in the reprocessing of recycled materials, combined with the varied types of resin used, cause inconsistencies in physical strength and permeability. While this commodity film serves a purpose in temporary construction and agricultural applications, it is not designed to provide ongoing protection against unwanted moisture. Film characteristics such as low strength and poor resistance to decay should be of major concern.

TRUTH 2 A long-term vapor retarder/barrier must maintain life long integrity by resisting decay, attack by moisture, organisms in the soil and chemicals. As mentioned above, beware of vapor retarders/barriers manufactured with “post consumer” recycled resins (C&A Poly or Visqueen) which can degrade from chemicals in the soil. Paper laminates can degrade from moisture attack.

TRUTH 3 Moisture problems associated with a vapor retarder/barrier installed under the concrete slab-on-grade are often traced to punctured or torn water vapor retarders/barriers. Damage due to construction traffic during installation, can be detrimental to the performance of the vapor retarder/barrier. Physical characteristics such as high puncture resistance and tensile strength, along with low-moisture vapor permeability, are vital attributes of a vapor retarder/barrier. These physical characteristics are well quantified in ASTM E-1745-11 and are outlined in this guide.

TRUTH 4 When specifying a water vapor retarder/barrier, designed for use in under concrete slab applications, insist the supplier meets the most stringent ASTM standard applying to vapor retarders, ASTM E-1745-11 for “Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs”. It assures minimum values are met regarding tensile strength and puncture resistance, along with the maximum allowable water vapor permeance. ASTM E-1745-11 separates these properties into three performance classes: Class A, B & C. (See chart on following page.)

SELECTING AN EFFECTIVE WATER VAPOR RETARDER/BARRIER FOR YOUR PROJECT.

Before you buy or specify a water vapor retarder/barrier, separate what's "nice" to know, from what must be known to make your decision. The process of selecting a vapor retarder/barrier includes two key steps:

STEP 1 Selecting a water vapor retarder/barrier best suited for your application.

(Note: Sites containing a potential risk for gas migration through the slab-on-grade or Brownfield sites; please contact Raven Industries for further information on our underslab gas barriers.)

A vertical wall vapor retarder/barrier may demand a more puncture resistant barrier because of design conditions such as the type of backfill material and the backfill method used. Another condition to consider is the type of compacted sub-grade used on a slab-on-grade or a sub-grade application. If sharp crushed rock is specified because of availability, or design, a more puncture-resistant vapor retarder/barrier will be required in addition to a 1/2" layer of fine compactible fill. Typically, river-run (washed rock) will cause less damage to the retarder/barrier. In general, more demanding conditions such as high foot traffic and stress resulting from the placement of concrete may require a Class A or B (ASTM E-1745-11) vapor retarder. Please refer to the chart qualifying each of our vapor retarders/barriers.

STEP 2 Insist the vapor retarder/barrier you're specifying meets ASTM E 1745-11 performance requirements! Ask yourself during the selection process:

- Has the vapor retarder/barrier been tested for resistance to deterioration from contact with soil and still maintains a 0.1 Perm or less (ASTM E 154 Section 13)? In many cases, an engineer will prefer a perm rating that is even lower than the recommended value to maximize protection from moisture transmission.
- Does the vapor retarder/barrier meet the minimum puncture strengths required of an A, B or C classification? Puncture strength is a very critical factor in determining if a vapor retarder/barrier is capable of withstanding installation stress.
- Does the manufacturer provide proper certification of independent testing, correct classification and product labeling identifying class A, B or C?
- Have you determined what classification you will require in order to meet your customer's performance expectations?

VAPOR RETARDER COMPARISON - BASED ON ASTM E-1745-11 REQUIREMENTS

PRODUCT / CLASSIFICATION	WATER VAPOR PERMEANCE (E 154, Section 7 or F 1249), max	TENSILE STRENGTH (E 154, Section 9), min	PUNCTURE RESISTANCE (D 1709, Method B), min	CLASS		
				A	B	C
Class A Requirement	0.10 perms	45.0 lb/in	2200 grams	•		
Class B Requirement	0.10 perms	30.0 lb/in	1700 grams		•	
Class C Requirement	0.10 perms	13.6 lb/in	475 grams			•
Raven VaporBlock® 15	0.0057 perms	78.0 lb/in	3300 grams	•	•	•
Raven VaporBlock® 10	0.0146 perms	52.0 lb/in	2600 grams	•	•	•
Raven VaporBlock® 6	0.090 perms	32.0 lb/in	1500 grams			•

Note: To the best of our knowledge, these are typical property values and are intended as guides only, not as specification limits. RAVEN INDUSTRIES MAKES NO WARRANTIES AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations and disclaims all liability for resulting loss or damage.

RAVEN INDUSTRIES VAPOR RETARDERS/BARRIERS CONTROL MOISTURE MIGRATION IN BUILDING PROJECTS.

When guarding against moisture problems, why use a vapor retarder/barrier that produces watered-down results? Raven vapor retarders/barriers are a time-proven, cost effective means of controlling moisture within the building interior, building components and materials within the structure. Constructed from high-strength polyethylene, Raven vapor retarders/barriers are designed to help insure quality construction and energy savings in building projects.

RAVEN UNDERSLAB BARRIERS CONTROL MOISTURE & GAS MIGRATION IN:

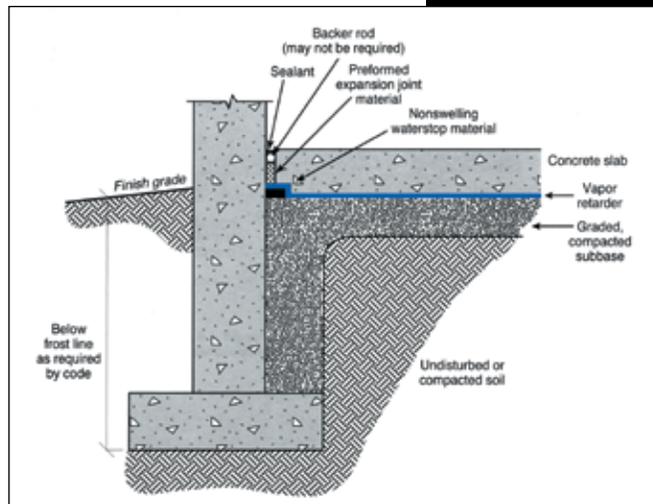
UNDER CONCRETE SLAB (Moisture Vapor Retarder/Barrier)

Raven vapor retarders/barriers protect your building's interior and flooring system from moisture migration through the slab. Developed to meet or exceed the most stringent "Standard for Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs" (ASTM E-1745-11), Raven water vapor retarders/barriers meet or exceed Class A, B or C performance values.

UNDER CONCRETE SLAB (Gas and Moisture Retarder/Barrier)

In addition to protection from moisture migration, Raven manufactures gas/moisture barriers designed to resist radon, methane and a broad range of harmful VOCs from migrating through the concrete slab. These barriers are typically used in conjunction with a passive or active control system extending across the entire building including floors and crawl spaces. These barriers meet the requirements of ASTM E-1745-11 Class A, B or C.

ALL RAVEN VAPOR
RETARDERS MEET
OR EXCEED ASTM
E-1745 REQUIRE-
MENTS
FOR WATER VAPOR
RETARDERS USED
IN CONTACT WITH
SOIL OR GRANULAR
FILL UNDER
CONCRETE SLABS.



CONCRETE SLAB ON GRADE:
OPTIMUM RELATIONSHIP OF VAPOR
RETARDER/BARRIER COMPONENTS

The original diagram on this page was reprinted with permission by the Portland Cement Association. Reference: Kanare, Howard M., Concrete Floors and Moisture, EB119, Portland Cement Association, Skokie, Illinois, and National Ready Mixed Concrete Association, Silver Spring, Maryland, USA, 2008, 176 pages.

RAVEN VAPOR/GAS BARRIERS.

VAPORBLOCK® 6, 10 & 15 UNDERSLAB VAPOR RETARDER/BARRIER

-  Part # VB 6 (6 mil Blue)
-    Part # VB 10 (10 mil Blue)
-    Part # VB 15 (15 mil Blue/White)

VaporBlock® 6, 10 & 15 are high performance underslab vapor retarders/barriers designed to retard moisture migration through concrete slabs-on-grade. **VaporBlock®** is made from state-of-the-art polyethylene resins that provide superior physical and performance properties that far exceed ASTM E-1745-11 (Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs) Class A, B and C requirements. See chart listing requirements and results on page 3.



- RESISTS ATTACK BY ORGANISMS IN THE CONTACTING SOIL.
- GREATLY REDUCES DAMAGING MOISTURE MIGRATION THROUGH WALLS AND UNDER CONCRETE SLABS.
- RESISTS TEARING AND PUNCTURE DURING THE INSTALLATION PHASES.
- AVAILABLE IN CONVENIENT SIZES ALLOWING FOR FAST AND EASY INSTALLATION & MINIMIZES FIELD SEAMS.
- MEETS OR EXCEEDS ASTM E 1745 PERFORMANCE CLASSES.
- EXCELLENT "PERM RATINGS".

VAPORBLOCK® PLUS™ 20 UNDERSLAB MOISTURE AND GAS BARRIER

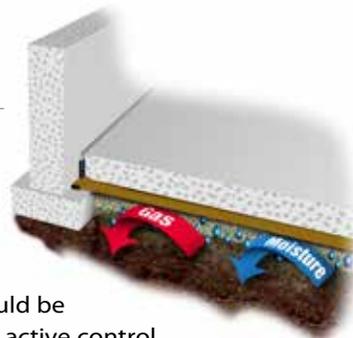
-    Part # VBP 20 (20 mil White/Gold)

VaporBlock® Plus™ is a seven-layer co-extruded barrier made from state-of-the-art polyethylene and barrier resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission. **VaporBlock Plus** is a highly resilient underslab / vertical wall barrier designed to restrict naturally occurring gases and is more than 50 times less permeable than typical high performance polyethylene vapor retarders against methane, radon and other harmful VOCs.

VaporBlock Plus can be installed as part of a passive or active control system extending across the entire building including floors, walls and crawl spaces. When installed as a passive

system it is recommended to include a ventilated system with sump(s) that could be converted to an active control system with properly designed ventilation fans.

VaporBlock Plus works to protect your flooring and other moisture-sensitive furnishings in the building's interior from moisture and water vapor migration, greatly reducing condensation, mold and degradation.



UNDERSLAB VAPOR / GAS BARRIERS INSTALLATION GUIDELINES

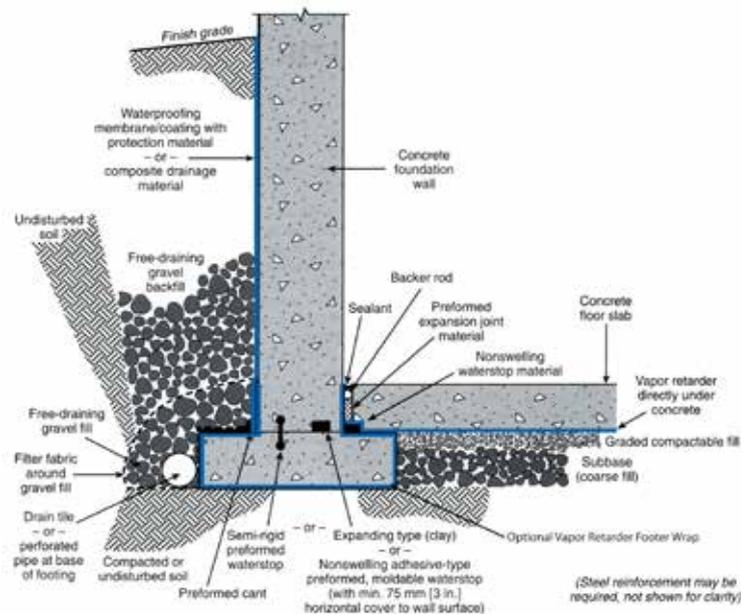
Visit our website for current technical data sheets as well as detailed installation guidelines at www.vaporblock.com and click on the appropriate link under the left menu.

Note: Please refer to ASTM E 1643 (Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs) and the

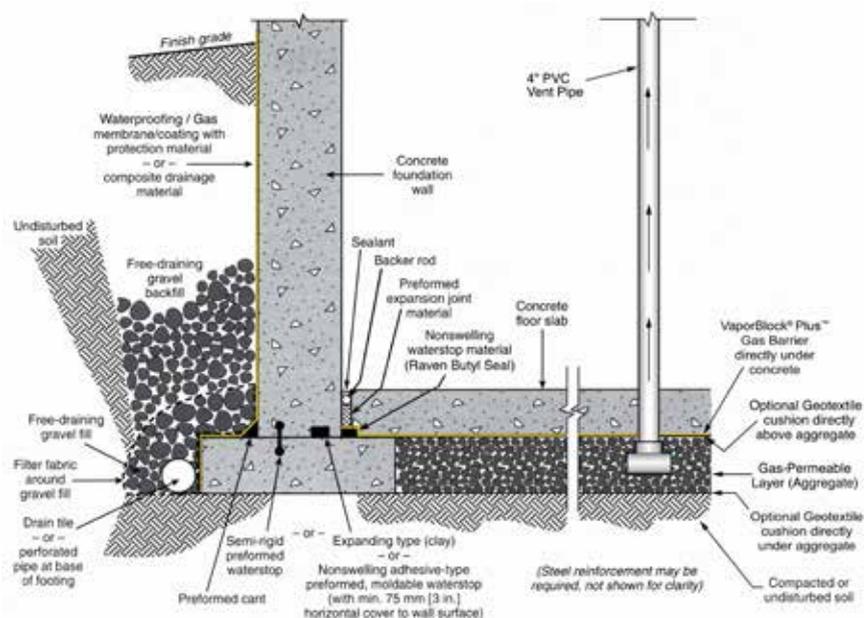
appendixes that accompany this standard to provide additional installation information.

Please follow all architectural drawings/instructions and conform to all applicable local, state and federal regulations and laws pertaining to residential and commercial building construction.

UNDERSLAB VAPOR RETARDER/BARRIER



UNDERSLAB MOISTURE AND GAS BARRIER



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Reference: Kanare, Howard M., Concrete Floors and Moisture, EB119, Portland Cement Association, Skokie, Illinois, and National Ready Mixed Concrete Association, Silver Spring, Maryland, USA, 2008, 176 pages.



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