PASSIVE VAPOR INTRUSION BARRIERS FACT SHEET

Types of Passive Barriers

Passive barriers use one or more layers of materials installed below a building slab to physically block or divert the entry of vapors into a building. Although the use of passive barriers in new construction is more common, passive barriers may be installed within existing buildings when site conditions allow. This document provides a general technical overview of several common types of passive barrier technologies used to mitigate buildings at sites with vapor intrusion risks. Most passive barrier technologies fall under two categories known as composite membranes (CM) and single-sheet membranes (SSM). Passive barriers are generally used in conjunction with passive venting systems to enhance their ability to prevent vapors from entering and accumulating beneath a building. When a passive barrier is used in conjunction with a passive venting system, the collective system is referred to as a passive vapor intrusion mitigation system (VIMS). In some cases, passive barriers are used in conjunction with active venting systems or other building control technologies.

Regardless of the specific passive barrier type, there are a few important general considerations to remember when designing passive barriers:

- Thickness and installation procedures differentiate passive barriers from common vapor barriers. "Vapor barrier" is the term most associated with thin plastic membranes (e.g., 6–15 millimeters thick) that are used to mitigate moisture transmission through concrete. Vapor barriers used in standard construction practices are not typically designed to mitigate chemical vapor transmission (DNREC-SIRB 2007).
- Additional considerations must be taken if the geotechnical report indicates that settling may occur underneath the building. Soil settlement will compromise the integrity of a passive barrier at seams and terminations by no longer providing support for the barrier. Manufacturers of barriers often provide modifications to barriers to mechanically bond (anchor) the barrier to the concrete slab to manage these types of unique conditions.

Technical overviews of CMs and SSMs are provided in the **Composite Membranes Technology Information Sheet** and the **Single-Sheet Membranes Technology Information Sheet**, respectively. More information about passive venting systems can be found within the **Sub-Slab Ventilation Technology Information Sheet**. Additional information about active venting systems can be found within the **Active Vapor Intrusion Mitigation Systems Fact Sheet** and supporting technology information sheets.

Best Practices

Selection of Passive Barrier Technologies

Not all passive barrier system manufacturers provide performance data for their individual products or passive barrier technologies. Users should inquire with the passive barrier system manufacturer to request performance data and assess the appropriateness of individual products or systems for their project.

Pre-system Installation

Passive VIMS documentation should include drawings prepared by a qualified environmental professional, a site-specific quality assurance/quality control (QA/QC) plan consistent with manufacturer recommendations that addresses barrier inspection procedures and methods to prevent damage to the barrier during and after placement, and if required, an ongoing monitoring plan. The **Vapor Intrusion Mitigation System Construction Quality Assurance Fact Sheet** provides best practices for conducting construction quality assurance (CQA) of active and passive mitigation systems. The **Vapor Intrusion Mitigation System Operation, Maintenance, and Monitoring Checklist** provides recommendations of items to include in an operation, maintenance, and monitoring plan.

A properly trained or certified VIMS installation contractor should be selected. Manufacturers can provide lists of contractors who are certified to install their passive barrier systems. Each member of the contractor's crew should be trained in the proper procedures for successful installation of the passive barrier technology.

Installation Oversight

A qualified environmental professional properly trained and authorized by the manufacturer in the application and inspection of the passive VIMS should be selected and appointed as QA/QC inspector by the appropriate party. Ideally, the inspector should always be present during the installation of the VIMS; however, this is usually not feasible. Typically, the more oversight the inspector can perform, the smoother the installation process will go because the inspector can identify improper installation procedures to allow the installer to correct the issue prior to the passive barrier being permanently covered. During installation, the inspector should confirm all aspects of proper installation of the VIMS.

System Installation Inspections

- QA/QC tests are commonly conducted during installation, including smoke, vacuum, and/or leak tests to confirm proper installation and material quality.
- Any deficient area of the installation should be properly documented and called to the attention of the applicator to address.
- Site inspectors should confirm and document required repairs.
- Site inspectors should prepare a final report verifying the VIMS installation.

Post-System Installation

After installation, a passive VIMS should be properly inspected and commissioned for use. The **Vapor Intrusion Mitigation Systems Post-Installation Verification Fact Sheet** and associated checklist describe best practices for ensuring a passive barrier system is functioning as intended.

REFERENCES

DNREC-SIRB. 2007. *Policy Concerning the Investigation, Risk Determination and Remediation for Vapor Intrusion Pathway*. Delaware Department of Natural Resources & Environmental Control, Site Investigation and Restoration Branch.