



Post-Installation System Verification Checklist

Vapor Intrusion Mitigation Team | December 2020

Vapor Intrusion Mitigation System

Post-Installation Verification Checklist

The purpose of this checklist is to provide the user with a selection of tools to verify that the appropriate system components for the vapor intrusion mitigation system (VIMS) were installed and the system is operating as designed. This information applies to the four most common active mitigation systems (SSD, SSV, SMD, and CSV) and passive systems that are described in the associated Fact Sheets and Technology Information Sheets. The user of this checklist should review the VIMS design or as-built documentation prior to completing this checklist.

This document was prepared in consideration of multiple types of VIMS. Not all the information presented below is necessary to document system operation for all types of systems on all types of buildings. The user should be able to identify which criteria below best represent effective operation for their specific mitigation system and which criteria will validate the conceptual site model for the VIMS that was implemented. Timing on when to collect post-installation verification data may vary and more than one event may be reasonable. See the [Post-Installation Verification Fact Sheet](#) for additional information on timing a post-installation verification site visit.

Instructions for Use: Major system components are grouped below for this checklist, and one or more of these groups may not apply to a particular VIMS design. Those groups can be marked as Not Applicable by selecting the 'X' box to the right of the group.

Design elements within these groups that **will** apply should be selected by checking the appropriate box included for this checklist as:

Yes—the design element was considered and documented

No—this item was not considered and may be relevant to the overall system performance, applicable guidance, and/or best practices

NA—not applicable to the system design or operation

This checklist is intended to serve as a guide for design considerations and as documentation for VIMS installation. This list can be modified for a specific project or program if needed or can be used as shown. The list should be submitted along with the final project as-builts and/or installation oversight verification documentation and reporting.

A downloadable version of this checklist as a fillable form is available by clicking [here](#).

1. Site Information

Address inspected: _____

Date of inspection: _____

Inspector(s): _____

Inspector's company name:

Building contact: _____

Building contact phone number: _____

Note: As-built drawings & performance criteria are needed when conducting inspections of vapor intrusion mitigation systems.

2. Building Type

- ☐ Existing building
- ☐ New construction

3. Type of System

Active

- ☐ Sub-slab depressurization (SSD)
- ☐ Sub-slab venting (SSV)
- ☐ Sub-membrane depressurization (SMD)
- ☐ Crawlspace ventilation (CSV)

Passive

- ☐ VIMS membrane or floor coating only
- ☐ Passive sub-slab venting only
- ☐ Passive venting and membrane/sealant

4. System Design Components and Installation Documentation

4.1 Site Conditions/Conceptual Site Model

- Contaminant concentrations at the site have been reviewed and compared to generic or building-specific screening levels. The level of applied effort (flow and vacuums) should be proportional to the magnitude of the concentrations. In large buildings, the VIMS target treatment area may not include the entire footprint, but should allow for adequate capture of vapors to mitigate the potential for unacceptable risk to the occupants of the building.

☐ Yes ☐ No ☐ NA

- Slab conditions should be verified/inspected for cracks/voids/utility penetrations/potential preferential pathways (if known/observed) and identified on a diagram, sealed to the extent practical, and visually inspected during post-installation verification event.

☐ Yes ☐ No ☐ NA

4.2 Extraction Point(s)

☐ **Not applicable**

- Suction point location, diameter, and sealing are documented.

☐ Yes ☐ No ☐ NA

- Pipe and manifold location, materials, diameter, slope, and sealing are documented.

☐ Yes ☐ No ☐ NA

- Sample port, shutoff valve, and access have been identified.

☐ Yes ☐ No ☐ NA

- U-tube manometer (or similar vacuum gauge) is installed and target vacuum level is clearly marked

☐ Yes ☐ No ☐ NA

4.3 Collection Piping

☐ **Not applicable**

- As-built collection piping diagrams have been provided.

☐ Yes ☐ No ☐ NA

- Riser pipe is located in an interior wall where possible and does not penetrate firewalls or shear walls.

☐ Yes ☐ No ☐ NA

- Fire collars are installed on pipes where firewalls are penetrated.

☐ Yes ☐ No ☐ NA

- Vent piping system was designed by a qualified individual with VIMS design experience.

☐ Yes ☐ No ☐ NA

- All vent stack piping is identified as solid, rigid pipe.

☐ Yes ☐ No ☐ NA

- All pipe joints and connections are permanently sealed.

☐ Yes ☐ No ☐ NA

- Foundation penetration sleeves are installed as approved by the structural engineer.

☐ Yes ☐ No ☐ NA

- All exhaust pipes are supported and secured in a permanent manner consistent with building codes.

☐ Yes ☐ No ☐ NA

- Horizontal piping runs are sloped to ensure that condensation drains into the ground beneath the slab.

☐ Yes ☐ No ☐ NA

- Vertical piping runs drain naturally or can be verified to be free of water or moisture.

☐ Yes ☐ No ☐ NA

4.4 Piping Completion Specifications

(These are minimum values; further distance or greater height may be required where exhaust concentrations are high. Review the primary wind flow direction from nearby weather stations.)

☐ **Not applicable**

- As-built collection piping diagrams have been provided.

☐ Yes ☐ No ☐ NA

- Pipes are completed with an exhaust stack and are an appropriate height above the roof.

☐ Yes ☐ No ☐ NA

- Point(s) of discharge are an appropriate distance away from any air intake location, opening (door, chimney flue, window, vent, etc.), or occupied spaces, including adjacent structures.

☐ Yes ☐ No ☐ NA

- To reduce the risk of vent stack blockage, confirm that the point of discharge from vent stack pipes is vertical and upward, outside the structure. Consider wire mesh to deter birds and small animals

☐ Yes ☐ No ☐ NA

4.5 Blower/Fan

☐ **Not applicable**

- Blower/fan number, location, size, model number, and performance specifications are documented.

☐ Yes ☐ No ☐ NA

- Blower/fan is securely mounted with discharge locations far from building intake locations.

☐ Yes ☐ No ☐ NA

- Electrical components and wiring were installed by a licensed electrician in accordance with applicable building codes.

☐ Yes ☐ No ☐ NA

- Intrinsically safe or explosion-proof components installed where specified in the project plans.

☐ Yes ☐ No ☐ NA

- Diagnostic testing and results are documented and summarized to meet design criteria.

☐ Yes ☐ No ☐ NA

- Audible and/or visual low vacuum alarm is installed, tested, and separately powered (e.g., battery).

☐ Yes ☐ No ☐ NA

- Controller system (where present): model number, location, OM&M manual are documented.

☐ Yes ☐ No ☐ NA

- Telemetry system (where present): model number, location, OM&M manual are documented.

☐ Yes ☐ No ☐ NA

4.6 Monitoring Probes

☐ **Not applicable**

- Sub-slab vapor probes, if needed, are installed in accordance with design (appropriate number and location(s)).

☐ Yes ☐ No ☐ NA

- Surface completion provides a seal to the subsurface and a leak check test was passed.

☐ Yes ☐ No ☐ NA

- Probes and surface completions are level to grade to minimize trip hazard.

☐ Yes ☐ No ☐ NA

4.7 Post-Installation Diagnostic Testing

☐ **Not applicable**

- System flow and vacuum are documented in vent pipe(s) and data meet design criteria.

☐ Yes ☐ No ☐ NA

- Pressure field extension (PFE) testing is documented to meet design criteria across targeted areas.

☐ Yes ☐ No ☐ NA

- Additional diagnostics were performed as appropriate where data do not meet expectations.

☐ Yes ☐ No ☐ NA

- Effluent concentrations were measured and calculated discharge meets design criteria/permit limits, if needed.

☐ Yes ☐ No ☐ NA

- Nonsealed combustion appliances were checked for back drafting/CO₂ levels.

☐ Yes ☐ No ☐ NA

4.8 System Monitors and Labeling

☐ **Not applicable**

- System labels are placed on the mitigation system, riser piping, electrical panel breaker and junction box, and other prominent locations, including the exterior venting locations.

☐ Yes ☐ No ☐ NA

- Description of signage and locations is provided.

signage contains language indicating that the mitigation vent may contain volatile organic compounds

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- figure provided, if needed, identifying locations of signs
- name and contact information for operator clearly visible with instructions to notify operator in the event of alarm conditions, damage to any system component, power failure, etc.

☐ Yes ☐ No ☐ NA

- Documentation states that a notice has or will be provided to tenants that will be occupying the structure.

☐ Yes ☐ No ☐ NA

4.9 System Design and Specification

☐ **Not applicable**

- Mitigation system design has been reviewed by a vapor intrusion mitigation specialist, professional engineer, or professional with demonstrated mitigation design experience.

☐ Yes ☐ No ☐ NA

- ☐ Yes ☐ No ☐ NA
 - ☐ As-built project plans and specifications have been prepared and reviewed by the designer.
- ☐ Yes ☐ No ☐ NA
 - ☐ Electrical one-line diagrams have been prepared and reviewed by a licensed electrician.
- ☐ Yes ☐ No ☐ NA
 - ☐ Dewatering has been considered and, if necessary, incorporated into the design.
- ☐ Yes ☐ No ☐ NA
 - ☐ Engineer or design firm is identified.
- ☐ Yes ☐ No ☐ NA
 - ☐ Building/fire codes: Document states that mitigation systems is designed and installed to conform to applicable building and fire codes and to maintain the function and operation of existing equipment and building features, including doors, windows, access panels, etc.
- ☐ Yes ☐ No ☐ NA
 - ☐ Permits: Documentation is provided that the system passed required permit inspections.

4.10 Sumps

- ☐ **Not applicable**
 - ☐ Floor drains are designed to allow water to flow into sumps while sealing out soil gases from entering the indoor air space from the sub-floor area (e.g., Drainjer-style drain).
- ☐ Yes ☐ No ☐ NA

5. New Construction

- ☐ **Not applicable**

5.1 Aggregate Layer

- ☐ **Not applicable**
 - ☐ Delivered sub-slab aggregate grain size gradation matches project design specifications (geotechnical, SSD).
- ☐ Yes ☐ No ☐ NA
 - ☐ Aggregate is uniformly compacted and rolled flat and is free of protrusions or debris that may be a puncture hazard.
- ☐ Yes ☐ No ☐ NA
 - ☐ Aggregate thickness was measured and documented to meet project specifications.

5.2 Engineered Plenums (e.g., drainage mats)

- ☐ **Not applicable**
 - ☐ Engineered plenums were supplied and documented to meet project specifications.
 - ☐ Yes ☐ No ☐ NA
 - ☐ Plenum was uniformly laid flat across target treatment area to meet project specifications.
- ☐ Yes ☐ No ☐ NA

5.3 Collection and Manifold Piping

☐ **Not applicable**

- Delivered vapor collection piping matches project design specifications.

☐ Yes ☐ No ☐ NA

- Vapor collection piping is laid and pipe joints and connections are permanently sealed.

☐ Yes ☐ No ☐ NA

- Solid piping is used in areas adjacent to utilities or trenches or where short circuiting may occur

☐ Yes ☐ No ☐ NA

5.4 Membrane Installation Documentation

☐ **Not applicable**

- Membrane manufacturer installation requirements are provided.

☐ Yes ☐ No ☐ NA

- System was installed by a certified installation vendor, if required by the manufacturer.

☐ Yes ☐ No ☐ NA

- Mitigation system as-built drawings are provided.

☐ Yes ☐ No ☐ NA

- Photographic log is provided for seals/repairs at the following locations:

- along foundation edge
- around foundation penetrations
- along vertical exterior walls
- around elevator shafts
- coupon/smoke testing repairs

☐ Yes ☐ No ☐ NA

- **Trench Dams:** Utility trench dams were installed in all utility trenches leading to the building.

☐ Yes ☐ No ☐ NA

- **Conduit Seals:** Conduit seals were installed in all electrical conduits that extend below the membrane.

☐ Yes ☐ No ☐ NA

5.5 Membrane Design and Specification

☐ **Not applicable**

- Membrane selection and/or thickness was considered for potential contaminant concentrations in the subsurface (i.e., chemical compatibility).

☐ Yes ☐ No ☐ NA

- Sub-slab screening levels protective of diffusive transport across the slab have been calculated and monitoring is specified to document sub-slab concentrations after the membrane is placed. Contingencies are in place to modify the system (i.e., potentially activate a passive system) if diffusive transport may become an issue.

☐ Yes ☐ No ☐ NA

- Documentation provides details for areas that require specialized completion, including all penetrations and terminations.

☐ Yes ☐ No ☐ NA

- Drains that perforate the barrier are designed to allow water to flow into sumps and

floor drains while sealing out soil gases from entering the indoor air space from the sub-floor area (e.g., Drainjer-style drain).

☐ Yes ☐ No ☐ NA

- Membrane selection and/or thickness was considered for potential contaminant concentrations in the subsurface (i.e., chemical compatibility).

☐ Yes ☐ No ☐ NA

5.6 Quality Assurance/Quality Control Installation Plan Requirements Identified in the Design Document

☐ Not applicable

- Products and materials installed meet the project design specifications.

☐ Yes ☐ No ☐ NA

- Material Safety Data Sheets (MSDS) for potential background contaminants (e.g., adhesives, glues, etc.) were reviewed.

☐ Yes ☐ No ☐ NA

- Installation was conducted in accordance with manufacturer's specifications (e.g., weather, curing time).

☐ Yes ☐ No ☐ NA

- Estimated quantities of the product to be used are provided.

☐ Yes ☐ No ☐ NA

- Engineer of record or barrier manufacturer identifies steps to document the effectiveness of the mitigation system.

- Coupon sampling
- Smoke testing
 - Locations are appropriate to assess integrity of complete area of barrier.
 - Assessment of barrier integrity is based on visual observation of where smoke has migrated and/or where membrane repairs were made.

☐ Yes ☐ No ☐ NA

- On-site installation oversight and documentation by the design firm is noted.

☐ Yes ☐ No ☐ NA

- Documentation is present verifying that the installation and repairs have been completed per project specifications and manufacturer's installation instructions.

☐ Yes ☐ No ☐ NA

- Verification sampling was performed in accordance with the system design plan.
 - Field sampling procedures specified were followed.
 - The correct number and locations of verification samples were collected.
 - Verification samples were collected at the appropriate frequency.
 - Verification samples were analyzed using the appropriate analytical method.
 - Results of the verification samples indicate that the VIMS is effectively mitigating the vapor intrusion risk present at the site.
 - Deviations in the verification sampling plan, if needed, are documented with rationale for the change.

☐ Yes ☐ No ☐ NA

Click [here](#) to view a PDF version of this Checklist.