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21 June 2016

Melanie Morash
Remedial Project Manager
U.S. Environmental Protection Agency
Region 9
75 Hawthorne Street (SFD-7-1)
San Francisco, CA 94105

*RE: Mitigation Plan – Buildings L1, L2, K, and CYW*
*Offsite Operable Unit, Sunnyvale, California*

Dear Ms. Morash:

Locus has prepared an implementation plan for indoor air mitigation at three new school buildings (L1, L2, and K) to be constructed this summer and at one existing building (CYW). To minimize any impact to the school's operations, Locus plans to install the mitigation systems at these buildings in a single mobilization. Locus met with the school on 9 June 2016 regarding early conceptions for mitigation of the new buildings. Locus will engage in further discussions with the school regarding all four buildings, and implementation is contingent on their approval.

<u>Building/Property Identification</u>

*L1, L2, and K*

Buildings L1, L2, and K to be constructed will be one-story classroom buildings. Buildings L1 and L2 will each be 1,992 square feet; Building K will be 4,260 square feet. The plans for the building layouts are attached including sample locations. Building surveys will be conducted once the construction is complete to evaluate potential factors affecting air quality based on building use and final construction. Construction is planned for summer 2016.

*CYW*

CYW is a one-story classroom building with approximately 3,100 square feet. A building layout including sample locations is attached. A building survey was conducted on 10 January 2015, and the school provided campus-wide building HVAC survey information on 2 March 2015. These surveys are also attached.

Description of Potential Vapor Pathways

All four buildings have or will be built with a passively ventilated crawlspace. Based on the plan sheets provided (A3.01 and S1.4) it is unclear whether the 18-inch (typical height) crawlspace for Buildings L1, L2, and K will extend throughout the footprint of the building. Additional construction drawings are needed for clarification. Assuming complete coverage, the crawlspaces of Building L1 and L2 would have a volume of 3,000 cubic feet (cf), and the crawlspace of Building K would have a volume of 6,390 cf. Crawlspaces of Buildings L1, L2, and K will have a 2-inch rat slab.

The existing CYW building crawlspace height is approximately 2-3 ft, which is a volume of approximately 6,200-9,300 cf. The CYW crawlspace has a dirt floor.

Potential vapor intrusion pathways include the crawlspaces and may include utility pathways.

Summary of All Relevant Data

Analytical results for trichloroethylene (TCE) at CYW are shown in the table below; all air samples were collected during 2015 by Locus. Analytical results from all parameters tested by Locus are attached. The attached results also include data from existing portable units (Buildings 'MA' and 'ME') to be replaced by Buildings L1, L2, and K.

| **Sample Location** | **TCE Concentrations (micrograms per cubic meter or µg/m$^3$) from 2015** | | |
|---|---|---|---|
| | **January** | **May** | **December** |
| Indoor Air Sample (Classroom) | 0.36 | 0.59 | 0.39 |
| Crawl-space Air Sample | 1.3 | 0.72 | 1.2 |
| Outdoor Air Sample | non-detect | non-detect | 0.20 |
| **EPA Screening Levels (SL)** | | | |
| Short-term SL | 2.0 | | |
| Long-term SL | 0.48 | | |

Proposed Mitigation Plan – L1, L2, and K

Locus recommends installing sub-slab depressurization systems (SSDS) for Buildings L1, L2, and K.

*Description*

For each building, the SSDS will entail laying a Soil Gas Collector (SGC) (1 inch in height) on the crawlspace floor fill material. The SGC will be routed around the perimeter of the foundation, with branches of SGC extending into smaller areas. A "T-Riser" will be installed in an appropriate location. The SGC will then be slid into the opening of the "T-Riser" and rolled out onto the ground. All openings in the fabric joints, "tees," and ends of branches should be taped.

A 10 mil co-extruded, polyolefin, ASTM E-1745 Class A vapor barrier will then be laid over the SGC. The vapor barrier will be sealed at all seams with caulk followed by tape and to the exterior footing and support posts with caulk and mechanical fasteners, as applicable. The vapor barrier will overlap at least twelve inches at seams. VOCs in sealing materials will be minimized. The SGC will have a single collection point connected to be connected to a vent stack. The 2-inch rat slab will be poured over the sealed membrane. When the soil gas vent stack is ready to be installed, the top of the SGC "T-Riser" will be cut off and a four-inch pipe inserted.

Ideally, the vent stack will be placed inside the buildings, in order to use the indoor temperature to create convective flow of warmed air upward in the vent stack. This is also the school's preference, based on input received during the 9 June meeting. The vent stack could also be installed outdoors, if installing it indoors is not feasible. The vent stack will exhaust at least one foot above the roofline. A screen/mesh not larger than ½ inch will cover the opening of the vent stack. An airflow reading will be taken at the vent stack upon initial installation to ensure the SSDS is providing airflow up and out of the crawlspace. Locus will install and maintain the system. No electricity will be required for the operation of the SSDS.

The systems will be installed in accordance with ASTM E2121-13, Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings.

*Construction Sequence*

The mitigation systems will be installed in parallel with the construction of the new buildings, following the construction sequence below:

- The mitigation installer will meet with the construction contractor to convey final design and specifications of the mitigation system.
- The depressurization SGC and membrane will be laid over the soil of the crawlspace after the footing and foundation walls have been poured and after any trenching and backfilling has been completed. The construction contractor will install the membrane under the direction of the mitigation installer. The rat slab will be poured over the sealed membrane.
- During the framing stage and when plumbing is being installed, the mitigation installer will come on-site to install the vent stack. The vent stack will be installed indoors or outdoors, at the school's discretion.

After implementation and building construction is complete, air sampling will be conducted in order to ensure mitigation effectiveness (described in a subsequent section of this plan). In addition, building surveys will be conducted by Locus to gather information about potential factors affecting air quality of the new buildings. The mitigation will be determined to be effective when the TCE concentration in the air of the occupiable space is at or below the EPA long-term screening level (0.48 µg/m$^3$) under normal occupancy conditions.

*SSDS Specifications*

A generic system diagram is attached. The mitigation installer is licensed by the California State License Board #617021 (General Building Contractor; Warm Air Heating, Ventilating, and Air-Conditioning; Sheet Metal) and is certified and listed by California for radon mitigations as well as the National Environmental Health Association #101023RMT and National Radon Safety Board #NRSB G31163, and is an active member of the American Association of Radon Scientists and Technologists (AARST). The mitigation installer will therefore inspect the buildings and installation process for potential adverse effects. If any are identified they will be brought to Locus' attention to determine whether there exist feasible options to control for adverse effects. Additionally, any constraints on this design identified by the mitigation installer during the walk-throughs will be brought to the attention of EPA for approval of any necessary changes prior to installation.

Specifications for the following system components are attached:

- Soil Gas Collector Mat, Product #05-140-1 from Radon Professional Discount Supply.
- Model VB10 VaporBlock membrane by Raven Engineered Films.
- Caulk for membrane seals: Liquid Nails Product LN-704.
- Tape for membrane seals: Vapor Bond Tape (TVB4) by Raven Engineered Films.
- Fasteners for membrane to foundation walls and piers, as applicable: Vapor Barrier X-mas Tree Fasteners, RandonAway Part Number 67055.

A gas-tight sampling port (1/4" pipe and sampling nipple with brass ball valve) will be installed on the vapor stacks for as needed sampling. The port will also be used to measure flow.

Weather-proof placards will be securely affixed at crawlspace access points and next to the vent stack and will include the following information:

- Locus contact information
- Notification of mitigation system components and purpose, e.g. "TCE Reduction System" and "Do Not Alter"

EPA will have the opportunity to review final language of placards before posting.

*Potential Alternatives (if necessary)*

If the passive SSDSs do not initially meet effectiveness criteria, the potential contributions from indoor air background sources will be evaluated first. If no background sources are identified, the systems will be inspected for: good seals (including cracks in the rat slab), sufficient vapor ventilation rate, and other

adjustments to improve effectiveness. If an SSDS still does not meet effectiveness criteria, alternatives will be implemented and tested. Alternatives or add-ons that may be considered include sealing utility pathways (if present) and the installation of a fan to increase the vapor extraction rate.

The passive systems proposed in this mitigation plan have the capability to be upgraded to an active system. In the event that an active system would be required, the following components would be added to the initial mitigation system (specifications for these components are attached):

- Model RP145 mitigation fan by RadonAway. Alternatives include Model RP260 or SF180, if necessary. Fans are expected to operate at 0.5" WC static pressure.
- Checkpoint IIa alarm by RadonAway, or similar, including audible and visual alarm and silencing capability. Alarm will sound (and light flash) when vacuum is below 0.25" WC.
- Dwyer Series 2000 Magnehelic Manometer, Part #2001, 0-1.0"WC (available add-on for continuous display of vacuum)

If the fan is needed, it would be installed above (downstream of) the vapor stack sampling port. Its exact location would depend on the final system configuration. The audible alarm would be installed under the fan shroud and would sound and include a red light if fan operation fails (vacuum below 0.25" WC). If weather-proof covering is needed, a cover will be selected that allows viewing of the indicator through a window or clear covering. A posted placard near the audible alarm would include instructions and contact information for the school staff to call the Locus technician in the event of an alarm. The school will be informed that the audible alarm (a remote annunciator wired from the alarm unit near the fan) is preferred to be located within the classroom. If effective remote communication systems are feasible at the site, the alarm system may communicate with Locus directly. Depending on the furnace configuration at the property, a carbon monoxide detector may be appropriate for the indoor space, and would be provided to the school if warranted.

Locus can install a system-dedicated magnehelic manometer on the suction pipe to continuously display the vacuum of the depressurization system. However, Locus is not expecting the school to assume operational responsibility. Additionally, although the alarm does not display the vacuum, the alarm is triggered based on measured system vacuum and will notify occupants (audio and visual) in the case of operational failure. If the school would still prefer the magnehelic manometer add-on, it can be located at the location of the suction pipe or elsewhere. Installation of the magnehelic manometer away from the suction pipe will entail running additional conduit for the vacuum tubing from the suction pipe to the magnehelic manometer.

Locus would install and maintain the system. Checking and repairing the fan (including measuring the vacuum in the vent stack and the fan amperage) would be included in the routine inspections described in the next section. Reimbursement of electricity costs or alternate power supply for fan operation would be offered to the school.

Proposed Mitigation Plan – CYW

Locus recommends installing a sub-membrane depressurization system (SMDS) for the CYW building.

*Description*

The SMDS will entail laying evenly spaced perforated pipe (4 inches in diameter and not less than 10 feet in length) on the floor of the crawlspace. A 12 mil high density, cross-laminated polyethylene vapor barrier will then be laid over the perforated pipe. The vapor barrier will be sealed at all seams with caulk followed by tape and to the exterior footing and support posts with caulk and mechanical fasteners. The vapor barrier will overlap at least twelve inches at seams. VOCs in sealing materials will be minimized. Perforated pipe will have a single collection point connected to a suction fan located on the exterior of the building.

The suction fan will exhaust at least one foot above the roofline via an exterior vent stack alongside the exterior of the building. A screen/mesh not larger than ½ inch will cover the opening of the vent stack. A vacuum reading will be taken at the suction pipe upon initial installation to ensure the SMDS is providing a vacuum. Locus will install and maintain the system. Reimbursement of electricity costs is available to the school.

An audible alarm that will sound and include a red light if fan operation fails (vacuum below 0.25" WC) will be installed under the fan shroud. If weather-proof covering is needed, a cover will be selected that allows viewing of the indicator light through a window or clear covering. A posted placard near the audible alarm will include instructions and contact information for the school staff to call the Locus technician in the event of an alarm. Upon solicitation of feedback to this mitigation plan, the school will be informed that the audible alarm (a remote annunciator wired from the alarm unit near the fan) is preferred to be located indoors. If effective remote communication systems are feasible at the site, the alarm system may communicate with Locus directly. Depending on the furnace configuration, a carbon monoxide detector may be appropriate for the indoor space, and will be provided to the school if warranted.

Locus can install a system-dedicated magnehelic manometer on the suction pipe to continuously display the vacuum of the depressurization system. However, Locus is not expecting the school to assume operational responsibility. Additionally, although the alarm does not display the vacuum, the alarm is triggered based on measured system vacuum and will notify occupants (audio and visual) in the case of operational failure. If the school would still prefer the magnehelic manometer add-on, it can be located at the location of the suction pipe or indoors. Installation of the magnehelic manometer indoors will entail running additional conduit for the vacuum tubing from the suction pipe to the magnehelic manometer.

The system will be installed in accordance with ASTM E2121-13, Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings. Installation is expected to take 1 to 3 days depending on the specific site conditions. The occupants are expected to be able to maintain normal activities throughout the installation process.

After implementation, air sampling will be conducted in order to ensure mitigation effectiveness (described in a subsequent section of this plan). The mitigation will be determined to be effective if air sample results in the occupiable space are at or below the EPA long-term screening level (0.48 µg/m$^3$) under normal occupancy conditions. Previous sample results from the occupiable space have shown concentrations ranging from 0.36-0.59 µg/m$^3$. Therefore, a concentration reduction of 19% or more in the occupiable space would be considered effective. If concentrations are consistently observed above 0.48 µg/m$^3$ in the crawlspace, and there is a statistically significant difference between the indoor concentrations and the ambient background concentrations, Locus will conduct additional evaluation to determine if further actions are warranted.

*SMDS Specifications*

A generic system diagram is attached. The mitigation installer is licensed by the California State License Board #617021 (General Building Contractor; Warm-Air Heating, Ventilating, and Air-Conditioning; Sheet Metal) and is certified and listed by California for radon mitigations as well as the National Environmental Health Association #101023RMT and National Radon Safety Board #NRSB G31163, and is an active member of the American Association of Radon Scientists and Technologists (AARST). The mitigation installer will therefore inspect the building and installation process for potential adverse effects. If any are identified they will be brought to Locus' attention to determine whether there exist feasible options to control for adverse effects. Additionally, any constraints on this design identified by the mitigation installer during the walk-through will be brought to the attention of EPA for approval of any necessary changes prior to installation.

Specifications for the following system components are attached:

- Model RP145 mitigation fan by RadonAway. Alternatives include Model RP260 or SF180, if necessary. Fans are expected to operate at 0.5" WC static vacuum.
- Model 12WB Dura-Skrim membrane by Raven Engineered Films.
- Caulk for membrane seals: Liquid Nails Product LN-704.
- Tape for membrane seals: Vapor Bond Tape (TVB4) by Raven Engineered Films.
- Fasteners for membrane to foundation walls and piers: Vapor Barrier X-mas Tree Fasteners, RadonAway Part Number 67055.
- Checkpoint IIa alarm by RadonAway, or similar (e.g. Checkpoint IIR with remote alarm), including audible and visual alarm and silencing capability. Alarm will sound (and red light show) when vacuum is below 0.25" WC.
- Dwyer Series 2000 Magnahelic Manometer, Part # 2001, 0-1.0"WC (available add-on for continuous display of vacuum)

A gas-tight sampling port (1/4" pipe and sampling nipple with brass ball valve) will be installed below (upstream of) the fan for as needed vapor stack sampling. The port will also be used to measure vacuum and flow.

Weather-proof placards will be securely affixed at the alarm/fan location and at crawlspace access points and will include the following information:

- Locus contact information
- Notification that the system is to remain on (e.g. "Do Not Turn Off") and instructions to call Locus immediately in the event of an alarm or system off condition
- Instructions on how to silence alarm
- Notification of mitigation system components and purpose, e.g. "TCE Reduction System" and "Do Not Alter"

EPA will have the opportunity to review final language of placards before posting.

*Potential Alternatives (if necessary)*

If the SMDS does not initially meet effectiveness criteria, the potential contributions from indoor air background sources will be evaluated first. If no background sources are identified, the system will be inspected for: good seals (including the membrane itself and membrane seals to penetrations and exterior footing), sufficient fan velocity, and other adjustments to improve effectiveness. If the SMDS still does not meet effectiveness criteria, alternatives will be implemented and tested. Alternatives or add-ons that may be considered include sealing utility pathways, additional perforated piping, and suction fan upgrades.

The mitigation installer will make all efforts to install the membrane in all areas of the crawlspace and issues are not expected at this building. In the case where discrete areas of the crawlspace cannot be covered by a membrane, the loose edge of the membrane will be trenched into the soil several inches. Additionally, an appropriate alternative will be selected among the following, for EPA approval:

- If the SMDS meets effectiveness criteria with no membrane cover over the discrete area, no alternative will be implemented.
- If the SMDS does not fully meet effectiveness criteria, soil-gas dilution (inducing outdoor air ventilation in the crawlspace) and/or crawlspace air pressurization will be evaluated for the building. A qualified ventilation technician will employ vacuum and airflow measurements as needed to evaluate system capacity requirements, energy penalties, and feasibility for the required volume of dilution air needed to achieve effectiveness criteria. Feasibility will also be dependent on the ability to prevent adverse effects including, but not limited to, unintentional soil gas transport to other portions of the building and backdraft of combustion appliances.

<u>Justification</u>

Sub-slab and sub-membrane depressurization systems are proven technologies installed throughout the country for mitigation of VOCs in indoor air[1]. The systems have an even longer record of effectiveness for the purposes of radon mitigation, complete with ASTM standards[1]. The systems will reduce the entry of soil gases into the buildings by effectively sealing pathways of vapor intrusion into the crawlspace

[1] OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, OSWER Publication 9200.2-154, EPA Office of Solid Waste and Emergency Response, June 2015; communication with vapor intrusion mitigation designers.

and providing an alternate ventilation pathway to the atmosphere. Due to implementation of the mitigation system during the new construction process and its likelihood of success, disruption to the school is expected to be minimal.

Implementation Schedule

- Implementation of the mitigation systems will occur after the EPA and owner's approval to proceed and will be carried in parallel with the construction of the new buildings, as described in the Construction Sequence section. The CYW installation will be completed during the same mobilization as the membrane installation at the new buildings.
- Within 30 calendar days of completion of mitigation activities, a final report will be submitted to EPA including copies of as-built drawings and maintenance plans, and copies of documentation provided to the school. Mitigation activities will be considered complete upon determination by sample results that the system is effective.

Operation and Maintenance of Proposed Mitigation - Framework

Following implementation, these operation and maintenance activities are expected:

- Quarterly inspections during the first year of operation and annual inspections thereafter (upon EPA approval), including checking and repairing, as applicable: rodent, trade, or other damage to membrane, seals on membrane, vent stack, fan operation (including vacuum in vent stack and fan amperage), electrical components. Expected length of time per inspection: six hours or less for all four buildings.
- For active systems only: If the fan's audible alarm sounds, the school will call the Locus technician for inspection and repair (contact information will be provided on a posted placard near the audible alarm). If effective remote communication systems are feasible at the site, the alarm may call Locus directly. In all cases, the technician will coordinate with school prior to arriving on-site.
- At the time that the vapor intrusion mitigation is no longer needed to maintain concentrations within the health-protective range (refer to Mitigation Termination Criteria), the school may continue to operate the system at the school's expense, may turn the system off and leave it in place, or may request that the accessible components be disassembled and removed.

Further details on the ongoing operation, maintenance, and monitoring of the mitigation system will be communicated to EPA and the school in an Operation & Maintenance (O&M) Plan.

Post-Mitigation Sampling Plan to Confirm Success of Mitigation

After implementation of the SSDSs and SMDS, air samples will be collected from the crawlspace and occupiable space (see attached building layouts) using passive

samplers. Sampling of indoor, crawlspace, and outdoor air will be conducted 2 weeks following installation, a month following initial sampling, during the first winter and spring of operation, and then the second winter of operation. After that period, annual monitoring will consist of physical inspections of the systems as described above. Where concentrations do not meet effectiveness criteria, the building and mitigation system will be surveyed to evaluate for potential chemical sources. If it is found necessary to improve a mitigation system, the post-mitigation sampling schedule will start after improvements are implemented. If sampling conditions can be arranged such that interior ventilation is minimized in the occupiable space (i.e without active HVAC), effectiveness criteria will be evaluated under those conditions.

Mitigation Termination Criteria

The SSDS and SMDS will be operated until air sample results meet the following criteria without operation of the systems: results in the occupiable space are at or below the EPA long-term screening level (0.48 µg/m$^3$) and results in the crawlspace do not show potential for indoor concentrations to exceed the acceptable risk range. EPA approval will be obtained prior to mitigation termination. The trigger to begin sampling for the evaluation of mitigation termination may be determined based on a combination of factors, such as, standpipe vapor sample results, regional soil gas screening levels, site-specific fate and transport modeling results in the occupiable space are below the EPA long-term screening level (0.48 µg/m$^3$), and local groundwater concentrations.

If you have any questions regarding this correspondence, please call me at (415) 799-9937.

Sincerely,

J. Wesley Hawthorne, PE, PG
Senior Vice President

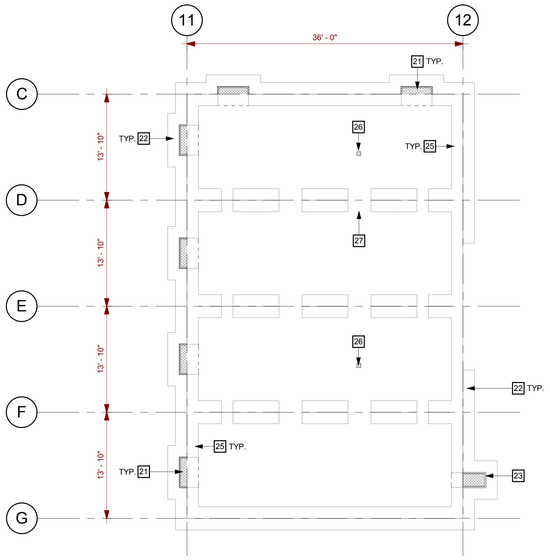
JWH/njl

Attachments:

A. New Buildings L1, L2, and K Layouts with Sample Locations
B. CYW (MB) Building Layout with Sample Locations
C. CYW (MB) Building Survey
D. System Design Diagram – SSDS
E. System Design Diagram – SMDS
F. Specifications for Membranes, Membrane Caulk and Tape and Fasteners. And for active systems: Fan, Alarm, and Magnehelic Manometer
G. Raw Data Package

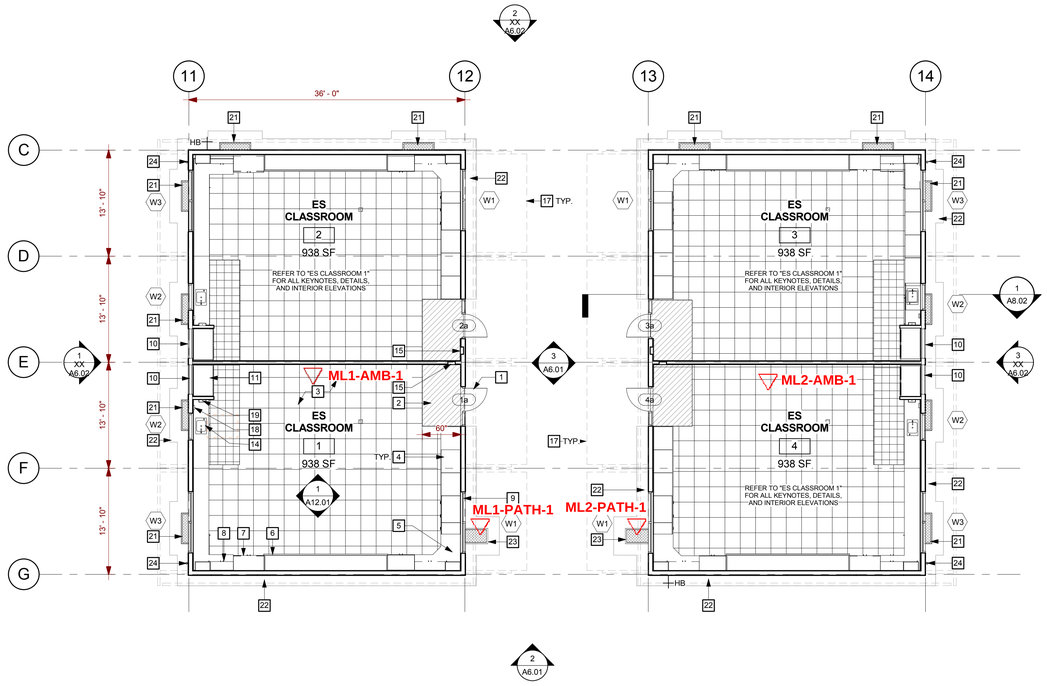
cc: (electronic copies)
Shau-Luen Barker, Philips Semiconductors
Leslie Lundgren, CB&I
Todd Maiden, Reed Smith LLP
Linda Niemeyer, Northrop Grumman Systems Corporation
Heather O'Cleirigh, AMD

# Attachment A
# New Buildings L1, L2, and K Layouts with Sample Locations

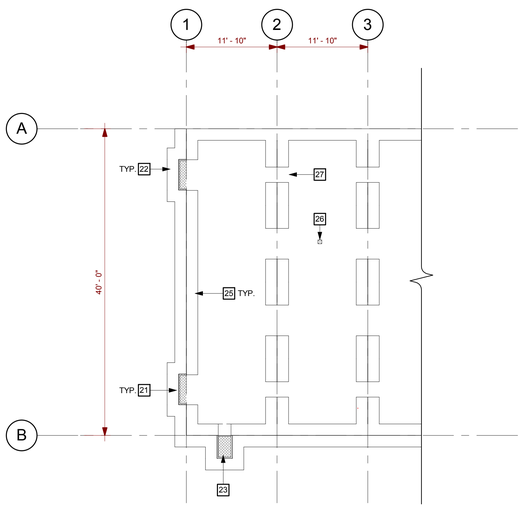



NOTE:
CONTRACTOR TO REFER TO MODULAR DRAWINGS FOR FOUNDATION CRITERIA AND DETAILS

## 4 BUILDING L1, L2 - FLOOR PLAN
SCALE: 1/8" = 1'-0"

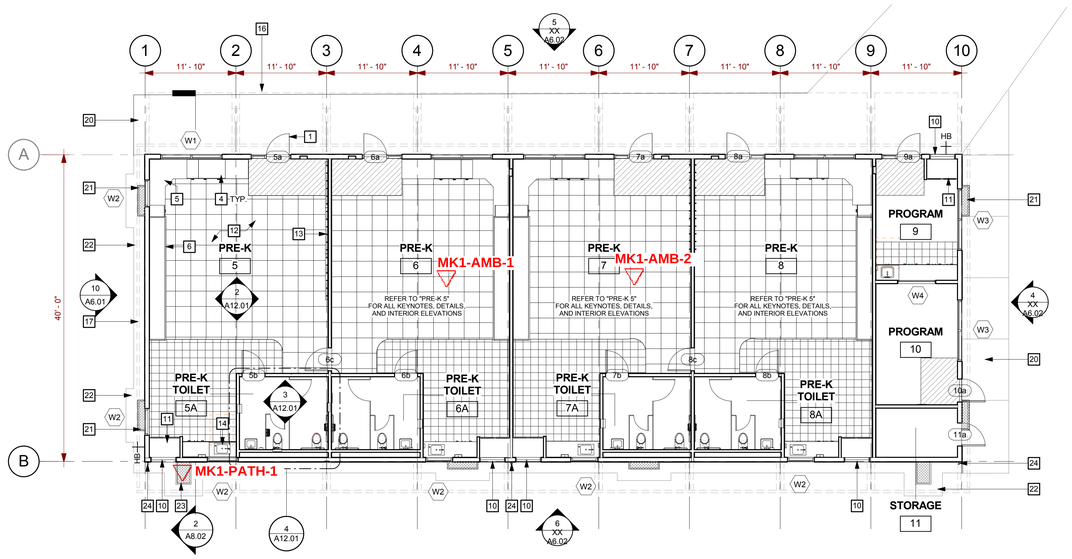



## 1 BUILDING L1, L2 - FLOOR PLAN
SCALE: 1/8" = 1'-0"




NOTE:
CONTRACTOR TO REFER TO MODULAR DRAWINGS FOR FOUNDATION CRITERIA AND DETAILS

## 5 BUILDING K - FLOOR PLAN
SCALE: 1/8" = 1'-0"




## 2 BUILDING K - FLOOR PLAN
SCALE: 1/8" = 1'-0"

## GENERAL SHEET NOTES

A REFER TO ELECTRICAL DRAWINGS FOR EXTENT OF ELECTRICAL WORK.

B PROVIDE WALL BLOCKING AT ALL TOILET FIXTURE AND ACCESSORY MOUNTING LOCATIONS. SEE TYPICAL BACKING AND BLOCKING DETAILS. ALL ACCESSORIES TO BE MOUNTED AT ACCESSIBLE HEIGHT AND/OR PER CODE.

C FOR INTERIOR FINISHES NOT SHOWN, REFER TO INTERIOR ELEVATIONS & FINISH SCHEDULE

D WATER SUPPLY AND DRAIN PIPES ACCESSIBLE UNDER LAVATORIES SHALL BE INSULATED OR OTHERWISE COVERED. THERE SHALL BE NO SHARP OR ABRASIVE OBJECTS OR SURFACES UNDER LAVATORIES, TYP.

E CABINET ELEVATIONS SHOWN IN THE INTERIOR ELEVATIONS ARE FOR REFERENCE ONLY. ACTUAL DESIGN CRITERIA AND SIZES ARE DESIGNATED IN THE CASEWORK SCHEDULE USING THE WOODWORK INSTITUTES 'CABINET DESIGN SERIES (CDS)' NUMBERING SYSTEM. WHERE INDIVIDUAL CASEWORK DESIGN REQUIREMENTS DO NOT FIT WITHIN THE CDS NUMBERING SYSTEM, CABINETS ARE DETAILED SEPERATELY AS REFERENCED IN THE CASEWORK SCHEDULE.

F MANUAL ROLLER SHADES ARE TO BE LOCATED AT ALL EXTERIOR WINDOWS. SHADES TO BE ANCHORED INTO BLOCKING OR FRAMING BEHIND THE WALL FINISH. VISIBLE BLOCKING OR ANCHORAGE TO WINDOW FRAMES IS NOT PERMITTED. CONTRACTOR TO COORDINATE ALL INSTALLATION AND ANCHORAGE REQUIREMENTS PRIOR TO ORDERING.

## NEW FLOOR PLAN KEYNOTES

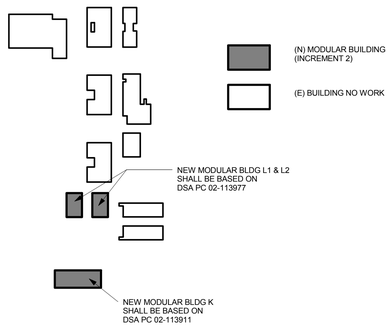
1 ALUMINUM STOREFRONT SYSTEM W/ DOOR, SIDELIGHTS, & TRANSOM, SEE WINDOW SCHEDULE.
2 WALK-OFF CARPET @ DOOR, SEE FINISH SCHEDULE.
3 CARPET TILE FLOORING, SEE INTERIOR FINISH SCHEDULE.
4 PREFINISHED CASEWORK SEE INTERIOR ELEVATIONS AND CASEWORK SCHEDULE.
5 TEACHER'S DESK.
6 TEACHING WALL UNIT, SEE DETAIL 6/A11.01.
7 IPAD CHARGING CART STORAGE CABINET, SEE CASEWORK SCHEDULE & S.E.D.
8 UPPER CABINETS W/ DOORS SEE INTERIOR ELEVATIONS AND CASEWORK SCHEDULE.
9 ALUMINUM-FRAMED WINDOW, SEE WINDOW SCHEDULE.
10 LOUVERED WALL VENT @ HVAC UNIT, TYP. CLEAR ANODIZED.
11 HVAC UNIT IN FULL-HEIGHT CABINET
12 VCT FLOORING, TYP. PATTERN AS SHOWN. SEE INTERIOR FINISH SCHEDULE.
13 COAT HOOKS SEE INTERIOR ELEVATIONS FOR LOCATIONS.
14 ACCESSIBLE SINK WITH BUBBLER & ACCESSIBLE CABINET UNDERNEATH
15 SEMI-RECESSED FIRE EXTINGUISHER CABINET, PROVIDE MIN. 2A10BC EXTINGUISHER. SEE DETAIL 13/A9.01.
16 LINE OF MTL SHADE AWNING BELOW, TYP.
17 LINE OF STEEL AWNING, TYP.
18 SOAP DISPENSER SEE DETAIL 5/A9.02.
19 PAPER TOWEL DISPENSER, SEE DETAIL 5/A9.02.
20 CONCRETE WALK, SEE INCREMENT 1 DRAWINGS
21 BELOW GRADE FOUNDATION VENT GRILLE, 12"X48", TYP.
22 PERIMETER CONCRETE APRON, SEE LANDSCAPE & CIVIL
23 FOUNDATION ACCESS/VENT GRILLE, 24"X36", TYP.
24 DOWNSPOUT, CONNECT TO EXISTING DOWNSPOUT
25 CONCRETE STEM WALL, TYP. SEE SECTION, FOUNDATION DESIGN TO CONFIRM WITH RECOMMENDATIONS OF GEOTECH REPORT.
26 AREA DRAIN, WHERE OCCURS. COORDINATE DRAIN LOCATION WITH INCREMENT 1 CIVIL DRAWINGS.
27 DRAINAGE GAPS AT CONCRETE STEM WALLS, TYP.

## GRAPHIC KEY

F.E.C. SEMI RECESSED FIRE EXTINGUISHER CABINET.
F.E.C. SURFACE MOUNTED FIRE EXTINGUISHER CABINET.
FIRE EXTINGUISHER CABINETS.
HB HOSE BIB

AIR SAMPLE LOCATION

## BUILDING KEY





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fax: (408)-300-5121


PROJECT
SAN MIGUEL NEW CLASSROOMS & CANOPY MODERNIZATION - INCREMENT 2

SUNNYVALE SCHOOL DISTRICT

CONSULTANT

STAMP
LICENSED ARCHITECT JOHN P. DIFFENDERFER NO. C-25840 STATE OF CALIFORNIA

STATE
DSA FILE NUMBER 43-54
IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APPL #
AC _____ FLS _____ SS_____
DATE

REVISIONS

| No. | Description | Date |
|---|---|---|
| 1 | | |

MILESTONES

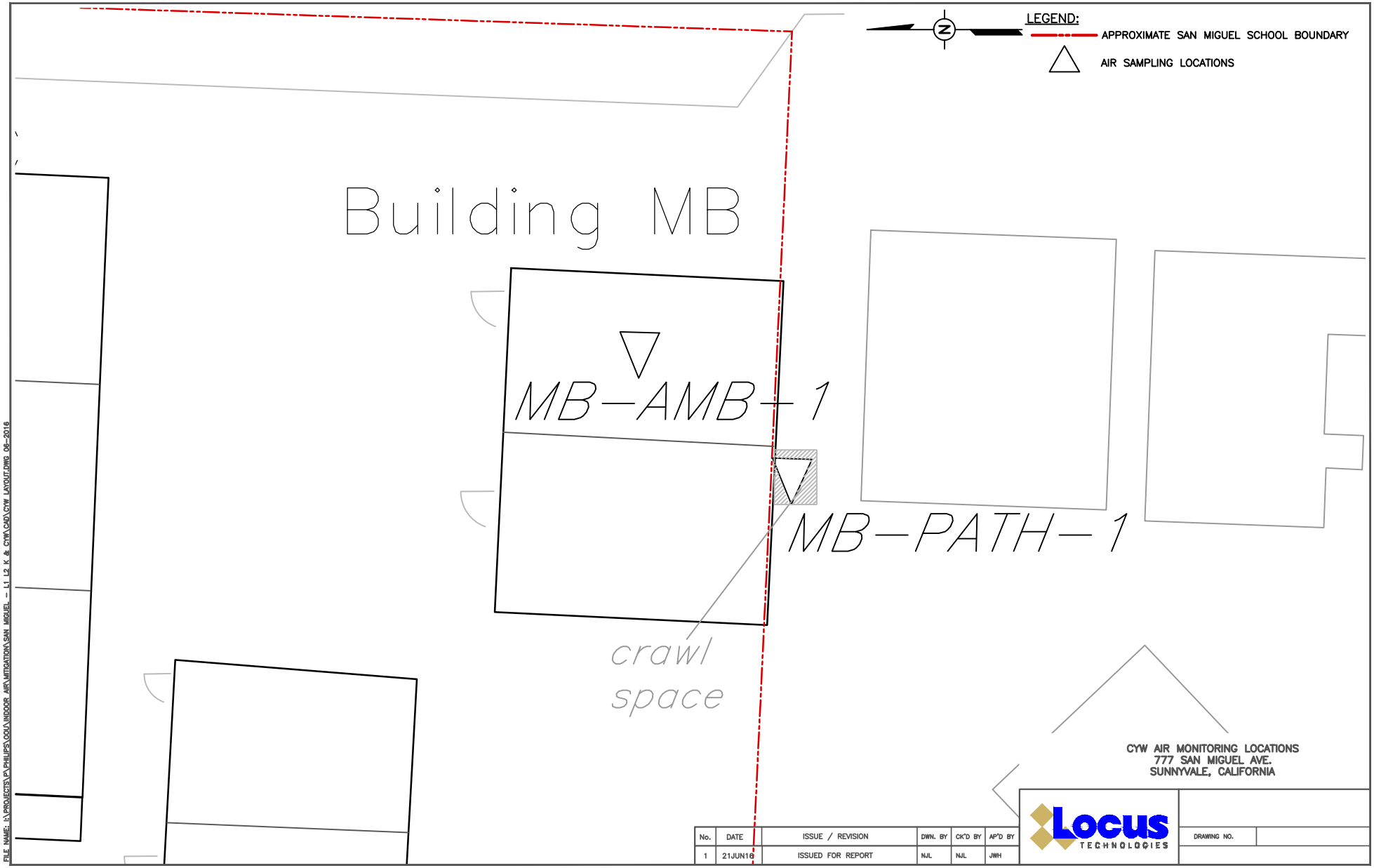
DSA SUB 04/04/2016

SHEET
NEW FLOOR PLAN

DATE 04/04/2016
JOB # 2015052
SHEET # A3.01


4/4/2016 1:03:53 PM
C:\Users\lmanalac\Documents\2015052- San Miguel Inc 2 - N Classroom Bldgs (CENTRAL)_lmanalac.rvt

# Attachment B
# CYW (MB) Building Layout with Sample Locations




| No. | DATE | ISSUE / REVISION | DWN. BY | CK'D BY | AP'D BY |
|---|---|---|---|---|---|
| 1 | 21JUN16 | ISSUED FOR REPORT | NJL | NJL | JWH |

FILE NAME: I:\PROJECTS\CA\PHILIPS\OGUA\INDOOR AIR\MITIGATION\SAN MIGUEL - L1 L2 K & CYW\CAD\CYW LAYOUT.DWG 06-2016

# Attachment C
# CYW (MB) Building Survey

# Non-Residential Survey Form

**Date:** 1/10/15 **Site:** San Miguel **EPA Building Number #:** MB

## PART 1: General Information

**Business Name:** California Spring World

**Address:** 777 San Miguel
Sunnyvale, CA

**Tenant Information** (if applicable)

Contact Name: Christina Ballantyne Interviewed: ☐ Yes ☐ No

Phone: 408-522-8278 Email: christina.ballantyne@sesd.org

**Owner/Landlord Information** **Consent Access** ☐ Yes ☐ No Date: _____

Name: _____ Interviewed: ☐ Yes ☐ No

Phone: _____ Email: _____

**Building/Business Type** (Check appropriate boxes)

☒ School/Day-Care ☐ Retail Store ☐ Office Space ☐ Warehouse ☐ Manufacturing

☐ Single level Office/Warehouse ☐ Multi-story ☐ Strip-mall ☐ Multi-tenant ☐ Warehouse

Other ☐ _____

**Building Occupancy**

Typical Days/Hours of occupancy 6am 6pm M-F

Typical Days/Hours of ventilation system operation 24/7

**Building Characteristics**

Year/Decade Built: _____ Number of Stories: 1

Approximate Building Area (square feet): Total 3,000 First Floor 3,000

Is there an attached warehouse/shop space? No describe its use: _____

**Foundation Type** (Check appropriate boxes)

☐ Slab-on-Grade ☐ Slab-above-Grade (elevated/cap-slab on fill) ☒ Crawl Space ☐ Basement ☐ None

Describe Portable

## Non-Residential Survey Form

**Date:** _____ **Site:** _____ **EPA Building Number #:** MB

# PART 2: Factors Impacting Indoor Air Quality and Sampling

**Questions**

Describe renovation, painting, or significant cleaning activities that have occurred over the last 6 months (what was done, what area, and when):
remodeling months ago after major leaks reported

Describe any open combustion in the building. (smoking/incense/candles/cooking/burning)

_____

Have site chemicals of concern been used or stored in the building or adjacent warehouse/shop?

☐ Yes ☐ No

Please list the general types of chemicals portable unit

Have any significant amounts of volatile chemicals been used recently? ☐ Yes ☐ No

Please list the chemicals_____

Describe any instance of water/groundwater present in the basement/crawlspace (including sumps):

_____

**Observations**

What is the temperature relative to outside? _____

What pathways to the subsurface were observed? None

Were windows/doors/roll-up doors kept open? No

Is there evidence of significant negative pressure? _____

Do parts of the indoor environment appear stagnant? _____

Describe any strong odors. New materials from portables

**Building Construction**

Building Construction Materials?

☐ Concrete ☐ Concrete Block ☐ Steel ☐ Wood ☐ Other _____

Does the building have an at-grade or below-grade garage? _____

Does the building have an attached mechanical room? _____

Is the building slab constructed with post-tension concrete? _____

What are the ceiling heights? ~9 ft

# Non-Residential Survey Form

**Date:** _____ **Site:** _____ **EPA Building Number #:** MB

**Pathway Analysis**

Does the building have a basement or sub-surface structures that are/have:

☐ Unfinished ☒ Exposed soil ☐ Damp or flooded ☐ Unsealed utility lines ☐ Other _____

Are there utilities that penetrate the slab that may be conduits for soil vapor? _____

Are these:

Connected to subsurface vaults? _____

Connected to utilities closer to potential VI sources? _____

In areas where pressure differential would cause air to flow through them? _____

Is there non-ventilated space in the building (maintenance /electrical / server rooms)? _____

Is this space occupied? _____ At what frequency/duration? _____

Are there potential pathways in this space? _____ ,

Are there significant heat sources or other systems that may generate a significant negative pressure near the floor/slab? NO

Are there elevators in the building? NO

If the elevators are hydraulic plunger how deep does the piston penetrate below the slab? N/A

Are there significant utilities penetrating the floor/slab? _____

What is the condition of the foundation/slab? _____

Was the building constructed with a subslab system or barrier? _____

Are there floor drains? _____

If the foundation design specifications and/or as-built drawings are available attach.

**Other Information** (that may be of importance in understanding the indoor air quality)

_____

~~[illegible]~~

_____

**Potential Sampling Locations**

General notes on potential sample locations and type. Tentative sampling date(s) and preferred times.

Ambient & pathway → southside room

_____

_____

**On a separate page, draw/attach the general floor plan of the building and denote potential locations of sample collection. Indicate locations of doors, windows, ventilation system components, indoor air contaminant sources and field instrument readings.**

## Non-Residential Survey Form

**Date:** _____ **Site:** _____ **EPA Building Number #:** _____

## PART 3: Inventory of Potential Indoor Chemical Sources:

Instructions: List items/products in the building or the attached warehouse/shop that may contain site compounds of concern. These should be removed prior to sampling. Also, list items/products that that give off significant volatiles. These may interfere with chemical analysis. Include chemicals that may be tracked into the house from an occupant. This could be chemical usage at work or in an attached workshop/garage. A portable instrument, such as a photo-ionization detector (PID) can be used to help locate volatile chemicals.

Examples of products that may contain trichloroethene (TCE): gun cleaner, rubber cement, solvent degreasers, spot removers, correction fluid, electrical motor cleaner (also be aware that older products are more likely to contain TCE).

| Potential chemical source | Location of Product Source | Photograph, ingredients, PID reading? |
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**Systems Present**

San Miguel Info.

What types of systems are used for heating, cooling and ventilation? Check all that apply.

☐Air Handler(s) ☒ Package Units ☒Window/Wall systems ☒Radiant heating (electric or water/steam)

☐Evaporative Coolers ☒Heat pump ☐Built-up ☐None Comments _____

Do the systems present provide make-up/fresh air? (Y/N) Some - not all wings A, B, K + staff Rm not equipped w/ fresh air intake

Have the systems been evaluated for

ASHRAE Standard 62 compliance? _____

When was the system last tested and balanced? 10/28/14 (provide report if available)

Report is 72 pages long - (if you want it let me know) not attached at this time

Is the ventilation system automated (building automation system)? yes

If yes is the data recorded or can it be recorded? yes

Note that the ventilation settings should be evaluated in the automation system and verified manually where possible.

**System operations**

For each of the ventilation systems describe how is outdoor air supplied?

- Economizers: yes
  - Are economizers opening and closing properly? yes
  - minimum and maximum settings cfm or % 20% min 100% max
- Manual adjustable outdoor air intakes NO
  - Settings _____
- Fixed outdoor air intakes? NO
- Potential outdoor air intake not installed? NO
- Outdoor air intake not easily installed (e.g., split system, radiant heating) yes

How frequently are the ventilation systems serviced? Quarterly (every 3 mo.)

Are filters in good condition (*i.e.* not restricting airflow)? yes

Days and hours of operation for each ventilation system Mon-Fri 7-3pm

Do any of the ventilation systems operate during nights and weekends? NO reduced settings? _____

Are the temperature / ventilation settings locked or routinely adjusted by the occupants? locked

What are the temperature settings? (note if seasonally variable) Days 72°-74° F Nights off Weekends off

If there is an economizer, does the system control outdoor air supply using: (check all that apply)

☒ Outdoor air temperature/enthalpy ☒ $CO_2$ concentration ☐ Other _____

Is there power exhaust? yes

Is the power exhaust setting dependent on ☒ economizer damper position ☐ Static pressure

Does the system use variable air volume distribution (VAV)? NO

Can airflow be detected at indoor intakes and exhausts? Yes

**Other Ventilation Issues impacting vapor intrusion potential.**

Does the ventilation system have any underground components? NO

Is ventilation being supplied or returned under a false floor above the building slab? NO

Are ducting components routed through a basement, crawlspace, or utility vault area? NO

Is a boiler or heater present in a basement or crawlspace? NO describe _____

**Outdoor air intakes**

Where are the outdoor air intakes located? Roofs + Exterior Walls

Are any outdoor air intakes physically obstructed?
NO

Are any intakes near sources of chemicals / sewer vents?
NO

Are there carbon filters present in the ventilation system? NO

What make and model of filters are present and how often are they changed?

Clarcor Pleated filters - KPSTD 1
filters changed every 3 months + 6 months
(wall mounts = 3 mo) (RTU's = 6 mo)

**Ventilation zones and settings**

| Zone/ Room | System Type | Supply Air Total cfm (range if VAV) | Supply Air % outdoor (range) | Ducted y/n | Return Air cfm | Ducted y/n |
|---|---|---|---|---|---|---|
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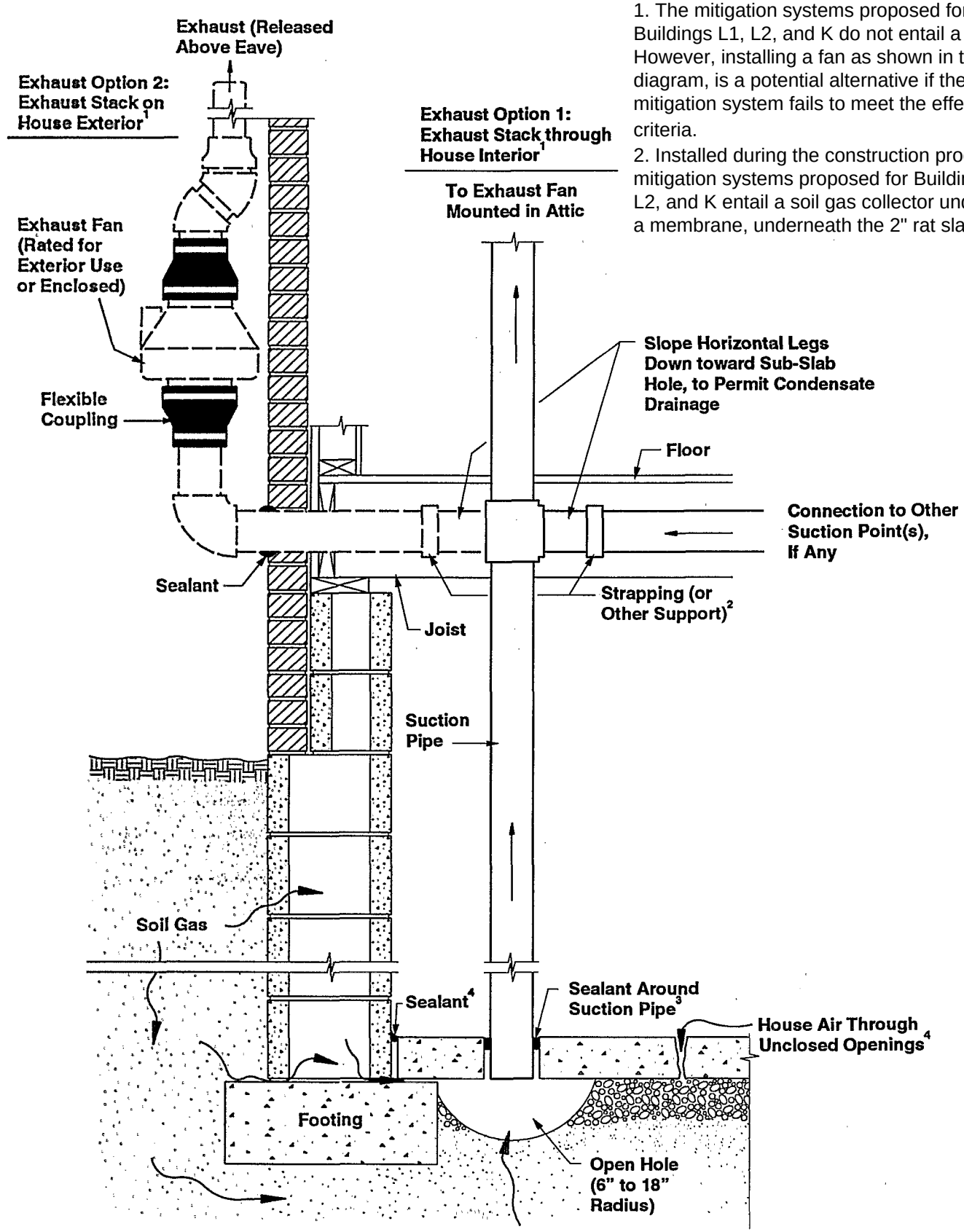
# Attachment D
# System Design Diagram - SSDS

**Notes:**

1. The mitigation systems proposed for Buildings L1, L2, and K do not entail a fan. However, installing a fan as shown in the diagram, is a potential alternative if the passive mitigation system fails to meet the effectiveness criteria.
2. Installed during the construction process, the mitigation systems proposed for Buildings L1, L2, and K entail a soil gas collector underneath a membrane, underneath the 2" rat slab.




ADAPTED FROM: Henschel, D. Bruce. October 1993. Radon Reduction Techniques for Existing Detached Houses: Technical Guidance (Third Edition) for Active Soil Depressurization Systems, EPA Office of Research and Development, EPA/626/R-93/011.

# Attachment E
# System Design Diagram - SMDS

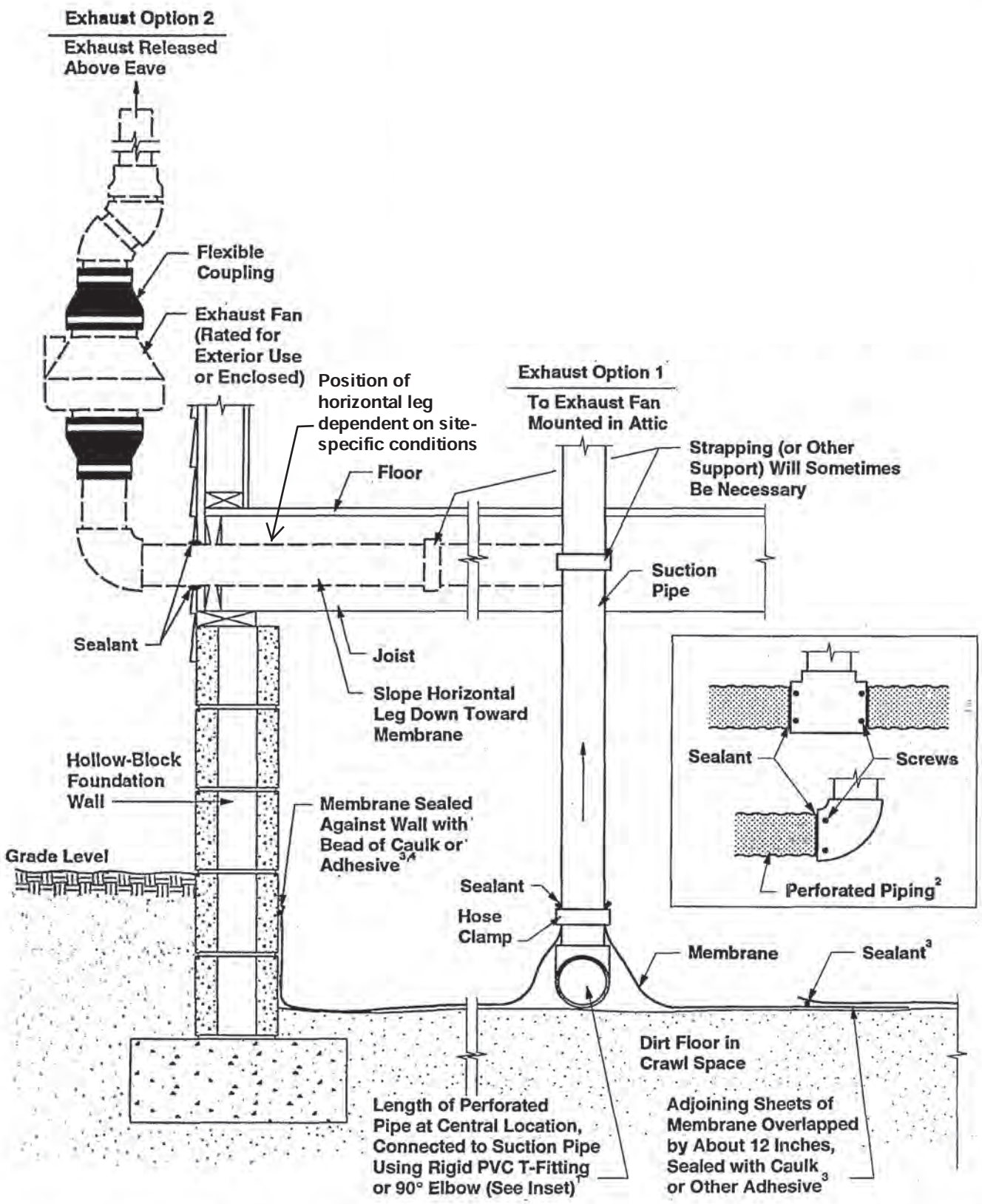



**Figure 7.** Sub-membrane depressurization (SMD) for the case where suction is drawn on perforated piping beneath the membrane (DTD analogue).

ADAPTED FROM Henschel, D. Bruce. October 1993. Radon Reduction Techniques for Existing Detached Houses: Technical Guidance (Third Edition) for Active Soil Depressurization Systems, EPA Office of Research and Development, EPA/626/R-93/011.

# Attachment F
# Specifications

# VAPORBLOCK® VB6 & VB10

High Performance Underslab Vapor Barrier

RAVEN ENGINEERED FILMS

## Product Description

VaporBlock® is a high performance, underslab vapor barrier designed to retard moisture migration through concrete slabs and concrete walls to protect your structure from:

- MOLD: VaporBlock® reduces moisture condensation within a structure, impeding the growth of molds, mildews, and fungi.
- MOISTURE: VaporBlock® protects flooring materials by maintaining moisture levels well below the requirements of ASTM E-1745-11.
- RADON: VaporBlock® is used as a component of radon mitigation systems to protect indoor air quality and occupant health.

VaporBlock® is one of the most effective underslab vapor barriers on the market today! Benefits include:

- Low moisture vapor permeability
- Superior puncture resistance
- High tensile tear strength
- Resistance to decay and degradation

VaporBlock® is manufactured to strict conformance specifications under our ISO 9001-2008 Certified Management System to consistently exceed ASTM standards and project expectations. Raven's accredited lab ensures VaporBlock® meets the highest possible quality standards across multiple industries. VaporBlock® is supported with independent testing. Results are available upon request, as required under ASTM E-1745-11. VaporBlock® is readily available through nation-wide distribution:

- Available in 6, 10 and 15 mil for optimal project flexibility (VB15 on seperate data sheet)
- Larger roll sizes equal lower installation costs

Raven Industries manufactures VaporBlock® and controls all aspects from start to finish assuring the final product meets our high performance standards. Raven is a publicly-traded company, with over 50 years of stability and service excellence to stand behind our products with a future of innovation and growth.

VaporBlock® UNDERSLAB VAPOR RETARDER

Vapor Barrier - Commercial

| Product | Part # |
|---|---|
| VAPORBLOCK 6 | VB6 |
| VAPORBLOCK 10 | VB10 |

## APPLICATIONS

- Underslab Vapor Retarder/Barrier
- Foundation Wall Vapor Retarder
- Radon Retarder

Note: All instructions on architectural or structural drawings should be reviewed and followed. Detailed installation instructions accompany each roll of VaporBlock and can also be located on our website.

ASTM E-1643 also provides general installation information for vapor retarders. All VaporBlock series materials can be installed with print or color facing up or down and will provide the same performance.

ASTM E-1745-11, "Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs".

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# VAPORBLOCK® VB6 & VB10

High Performance Underslab Vapor Barrier

| | | VAPORBLOCK VB6 | VAPORBLOCK VB10 | ASTM E 1745-11 Class A, B & C[1] |
|---|---|---|---|---|
| PROPERTIES | TEST METHOD | Imperial | Imperial | Imperial |
| APPEARANCE | | Blue | Blue | - |
| THICKNESS, NOMINAL | | 6 mil | 10 mil | - |
| ROLL SIZE | | 15 ft x 200 ft | 15 ft x 200 ft | - |
| WEIGHT | | 29 lbs/MSF | 49 lbs/MSF | - |
| CLASSIFICATION | ASTM E1745-11 | CLASS C | CLASS A, B & C | Class A, B, or C |
| TENSILE STRENGTH AVERAGE MD & TD (NEW MATERIAL)<br>(AFTER EXPOSURE) | ASTM E154 Section 9, (D882) | 32 lbs/in<br>25 lbs/in | 52 lbs/in<br>53 lbs/in | Class A = 45 lbs/in<br>Class B = 30 lbs/in<br>Class C = 13.6 lbs/in<br>Minimum |
| PUNCTURE RESISTANCE | ASTM D1709 Method B | >1500 g | >2600 g | Class A = 2200 g<br>Class B = 1700 g<br>Class C = 475 g<br>Minimum |
| PERMEANCE (NEW MATERIAL)<br>(AFTER CONDITIONING) | ASTM E154 Section 7 ASTM E96 Procedure B<br>ASTM E154 Section 8, E96<br>Section 11, E96<br>Section 12, E96<br>Section 13, E96 | 0.090 *Perms<br>0.105<br>0.124<br>0.097<br>0.099 | 0.0146 *Perms<br>0.0153<br>0.0151<br>0.0160<br>0.0181 | Class A, B, & C<br>0.1 *Perms Maximum |
| WVTR | ASTM E96 Procedure B | 0.080 grain/hr-ft$^2$ | 0.0084 grain/hr-ft$^2$ | - |
| MAXIMUM USE TEMPERATURE | | 180° F | 180° F | - |
| MINIMUM USE TEMPERATURE | | -70° F | -70° F | - |

* grains/(ft$^2$·hr·in Hg)  [1] Referencing ASTM E1745-11, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

VaporBlock® UNDERSLAB VAPOR BARRIER

VaporBlock® can be identified as blue in color printed with the VaporBlock® logo and the conformance information listing ASTM E-1745, classifications.

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. Chemical resistance, odor transmission, longevity as well as other performance criteria is not implied or given and actual testing must be performed for applicability in specific applications and/or conditions. 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. Limited Warranty available at www.RavenEFD.com

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**www.ravenefd.com**
3/14 EFD 1485

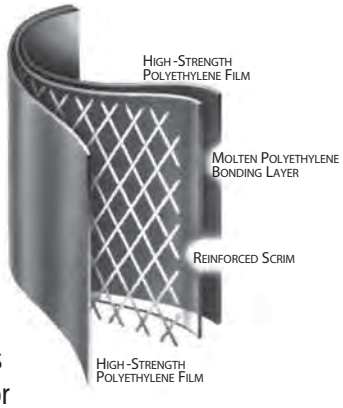
Scan QR Code to download current technical data sheets via the Raven website.

# DURA♦SKRIM® 8BB, 8WB, 12BB & 12WB

Four-Layer Reinforced Extrusion Laminate

RAVEN ENGINEERED FILMS

## Product Description




DURA♦SKRIM® 8BB, 8WB, 12BB and 12WB consist of two sheets of high-strength polyethylene film laminated together with a third layer of molten polyethylene. The white outer layer (DURA♦SKRIM 8WB and 12WB) contains UV inhibitors and thermal stabilizers and the black outer layer(s) contains carbon black to enhance outdoor life. The white outer layer is also designed to reduce heat build up and condensation. A heavy scrim reinforcement placed between these plies greatly enhances tear resistance and increases service life. DURA♦SKRIM's heavy-duty diamond reinforcement responds to tears immediately by surrounding and stopping the tear.

## Product Use

DURA♦SKRIM® 8 and 12 are used in more demanding applications requiring high tear resistance. Please inquire about DURA♦SKRIM® R8BV and R12BV for long-term applications up to 5 years, meeting GRI-GM22 Standard Specifications for scrim reinforced geomembranes used in exposed, temporary applications.

## Size & Packaging

DURA♦SKRIM® 8BB, 8WB, are available in a variety of widths up to 125,000 square feet and up to 80,000 square feet in 12BB and 12WB. All panels are accordion folded and tightly rolled on a heavy-duty core for ease of handling and time-saving installation.

DURA♦SKRIM®

Temporary Rain Shed Cover

| Product | Part # |
|---|---|
| DURA♦SKRIM 8BB | R8BBR |
| DURA♦SKRIM 8WB | R8WBK |
| DURA♦SKRIM 12BB | R12BBR |
| DURA♦SKRIM 12WB | R12WBK |

## APPLICATIONS

- Cargo Coverings
- Interim Landfill Covers
- Daily Landfill Covers
- Temporary Erosion Control
- Divider Curtains
- Remediation Covers or Liners
- Pit/Pond Liners
- Underslab Vapor Retarders
- Temporary Earthen Liners
- Temporary Rainshed Covers

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# DURA•SKRIM® 8BB, 8WB,12BB & 12WB

Four-Layer Reinforced Extrusion Laminate

| | | DURA•SKRIM 8BB & 8WB | | DURA•SKRIM 12BB & 12WB | |
|---|---|---|---|---|---|
| **PROPERTIES** | **TEST METHOD** | Imperial | Metric | Imperial | Metric |
| **Appearance** | | Black/Black or White/Black | | Black/Black or White/Black | |
| **Thickness, Nominal** | | 8 mil | 0.20 mm | 12 mil | 0.30 mm |
| **Weight** | | 38 lbs/MSF<br>5.5 oz/yd$^2$ | 185 g/m$^2$ | 55 lbs/MSF<br>7.9 oz./yd$^2$ | 269 g/m$^2$ |
| **Construction** | | Extrusion laminated with scrim reinforcement | | | |
| **1" Tensile Strength** | ASTM D7003 | 62 lbf/in | 108 N/cm | 76 lbf/in | 133 N/cm |
| **Elongation at Film Break** | ASTM D7003 | 500 % | 500 % | 578 % | 578 % |
| **Elongation at Scrim Break** | ASTM D7003 | 20 % | 20 % | 14 % | 14 % |
| **Grab Tensile** | ASTM D7004 | 84 lbf | 374 N | 100 lbf | 445 N |
| ***Tongue Tear** | ASTM D5884 | 39 lbf | 173 N | 54 lbf | 240 N |
| **CBR Puncture Resistance** | ASTM D6241 | 208 lbf | 925 N | 276 lbf | 1228 N |
| **Mullen Burst** | ASTM D751 | 80 psi | 552 kPa | 107 psi | 738 kPa |
| **Trapezoid Tear** | ASTM D4533 | 50 lbf | 222 N | 59 lbf | 262 N |
| **Maximum Use Temperature** | | 180° F | 82° C | 180° F | 82° C |
| **Minimum Use Temperature** | | -70° F | -57° C | -70° F | -57° C |
| **WVTR** | ASTM E96<br>Procedure B | 0.271<br>grains/(100in$^2$·day) | 0.274<br>g/(m$^2$·day) | 0.023<br>grains/(100in$^2$·day) | 0.35<br>g/(m$^2$·day) |
| **Perm Rating** | ASTM E96<br>Procedure B | 0.039 Perms<br>grains/(ft$^2$·hr·in Hg) | 0.026 Perms<br>g/(24hr·m$^2$·mm Hg) | 0.51 Perms<br>grains/(ft$^2$·hr·in Hg) | 0.34 Perms<br>g/(24hr·m$^2$·mm Hg) |

* Test are an average of machine and transverse directions.

DURA•SKRIM®

DURA♦SKRIM® 8BB, 8WB, 12BB and 12WB are four-layer reinforced extrusion laminates. The black outer layers consist of a high-strength polyethylene film containing carbon black. The white sides contain UV and thermal stabilizers. DURA♦SKRIM® 8 and 12 mil are reinforced with a heavy-duty scrim laid in a diagonal pattern with an additional machine direction scrim every 3" across the width. The individual plies are laminated together with molten polyethylene.

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. Chemical resistance, odor transmission, longevity as well as other performance criteria is not implied or given and actual testing must be performed for applicability in specific applications and/or conditions. 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. Limited Warranty available at www.RavenEFD.com

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Email: **efdsales@ravenind.com**
**www.ravenefd.com**

072815 EFD 1076

Scan QR Code to download current technical data sheets via the Raven website.

## Soil Gas Collector™ Mat Specifications

| PROPERTIES | METHOD | VALUE |
|---|---|---|
| **Soil Gas Collector Core** | | |
| Core material | Plastic | Polystyrene |
| Compressive strength | ASTM D-1621 (Modified) | 4300 PSF |
| Geometry | Cuspated | Waffle like |
| Core configuration | Standard | Double sided |
| Core width | Standard | 3/4 inch |
| Core depth | Standard | 5/8 inch |
| **Soil Gas Collector Fabric** | | |
| Weight | ASTM D-1910 | 4 |
| Tensile strength | ASTM D-1682-64 | 145 |
| Elongation at break (96) | ASTM D-1682-64 | 115 |
| Mullen burst strength (PSD) | ASTM D-75 1 | 170 |
| Puncture strength | ASTM D-75 1 | 5 |
| A.O.S. (Equivalent sieve) | COE CW-02215 | 70/100 |
| Modulas at 10% elongation (Lbs) | ASTM D-1682-64 | 785 |
| Trap tears (Lbs) | ASTM D-2263 | 75 |
| Coefficient of permeability (Cm/sec) | ASTM D-737 | 0.03 |
| Permittivity (Sec-1) | ASTM D4491-85 | 0.8 |
| Accelerated weathering strength (Fed) | STD #191-5804 | 80 |
| **Soil Gas Collector Binding Method** | | |
| External binder | Standard | Sewn |
| Type stitching | Standard | Lock stitch |
| Type thread | Standard | HB92 nylon |
| Tensile strength | Standard | 11 Lbs |
| Thread gage | Standard | 2 IOx4denier |
| Chemically impervious | Standard | MI natural |

LIQUID NAILS® ADHESIVE

# PROJECTS

## Construction Adhesive

**LN-704/LNP-704** **Interior**

## *A proven, high-quality, waterproof adhesive that creates a strong durable bond.*

100% SATISFACTION GUARANTEED!

### *PRODUCT DESCRIPTION*

LIQUID NAILS® Projects Construction Adhesive, LN-704 offers water clean-up when wet, develops strength rapidly, and has excellent water resistance and long-term holding power when set. Projects Construction Adhesive is certified by the GREENGUARD Environmental Institute to meet their Children and Schools standard for indoor air quality. LN-704 meets all air quality regulations.

***RECOMMENDED FOR*** interior installations and all common building materials, including:

- Paneling
- Molding
- Drywall
- Plywood/hardboard
- Foamboard
- Styrofoam® Brand Insulation
- InsulPink® Foam Insulation Board
- Medium density fiberboard
- Corkboard
- Foamback tub surrounds
- Furring strips
- Masonry/concrete
- Ceramic tile repairs
- Foamular® Rigid Foam Insulation

Foamular and InsulPink are registered trademarks of Owens-Corning Fiberglas Technology, Inc.
Styrofoam is a registered trademark of the Dow Chemical Company.

***NOT RECOMMENDED FOR*** exterior use or for application of ceiling tile, finished floors, mirrors, plastic & vinyl, marble & granite, or foamboard to foamboard. LN-704 should not be used in basement applications.

*Please research all installation instructions and read entire label for safety, health & environmental information prior to use.*

*Look for other LIQUID NAILS products which are right for your specific project.*

### *PRODUCT ADVANTAGES*

- Safer for indoor use
- High-strength bond
- Very low odor
- Easy water clean-up
- Bridges gaps up to 3/8"
- No harmful fumes
- Up to 30 minutes open time
- Non-staining
- Will not attack foam insulation
- VOC compliant

Children & Schools GREENGUARD® Indoor Air Quality Certified

Read Label and Material Safety Data Sheet Prior to Use.
See other cautions on last page.

LIQUID NAILS® ADHESIVE

# PROJECTS

## Construction Adhesive

### SURFACE PREPARATION

Surfaces must be clean, dry, and structurally sound. Cut and pre-fit materials prior to installation.

### APPLYING THE PRODUCT

Insert tube into caulking gun. Cut nozzle to desired bead size marked on nozzle. Puncture inner seal with nail or wire. Apply adhesive in temperature of 60°F or higher. Press material into place. Lift off for 2-4 minutes, then press back into place. Material should not be applied to skinned adhesive. Do not apply to moist concrete or masonry.
**Note:** One surface must be porous.

**Bonding material to furring strips or studs:** Apply a zigzag 1/4" bead of adhesive to each strip or stud to be covered by material. Position materials so edges meet at stud center. Press firmly into place. Finishing nails required at top and bottom.

**Bonding foamboard, foamback tub surrounds, paneling, corkboard, brick veneer, etc. to flat surfaces:** Cover entire substrate with 1/4" vertical zig-zag bead a maximum of 12" apart and within 1-1/2" of all edges.

### CLEAN-UP

Use water for wet adhesive. Use mineral spirits or adhesive remover for dry adhesive.

### DISPOSAL

Place **empty** containers in normal refuse for disposal. Remove residual product from the container, allow product to dry, and dispose of in conjunction with normal household waste. Contact your sanitation department or household hazardous waste coordinator for information concerning possible re-use of unused caulks and sealants. EAD-C8

### LIMITED WARRANTY

AkzoNobel warrants satisfaction with this product when handled and applied according to label instructions. If this product is not as warranted, please call 1-800-634-0015 for refund or product replacement details. This warranty excludes labor or the cost of labor and is given as the exclusive warranty and remedy. **No warranty of merchantability, fitness for purpose or other warranty, express or implied, is made.** AkzoNobel shall not be liable for any special, incidental or consequential damages. Some states do not allow the exclusion of incidental or consequential damages, so the limitations may not apply. This warranty gives specific legal rights. You may also have other rights that vary from state to state.

**WARNING! CAUSES EYE, SKIN AND RESPIRATORY TRACT IRRITATION. MAY BE HARMFUL IF SWALLOWED. USE ONLY WITH ADEQUATE VENTILATION. KEEP OUT OF THE REACH OF CHILDREN. This product contains a chemical known to the state of California to cause cancer and birth defects, or other reproductive harm.** Contains Crystalline Silica. If sanding, wear a dust mask to avoid breathing of sanding dust. Avoid contact with eyes and skin. **FIRST AID:** For skin contact, wash thoroughly with soap and water. If any product remains, gently rub with petroleum jelly, vegetable or mineral/baby oil then wash again with soap and water. Repeat as needed. Remove contaminated clothing. For eye contact, flush immediately with plenty of water for at least 15 minutes. **Get medical attention.** If swallowed, **get medical attention immediately.** If inhalation causes discomfort, remove to fresh air. If discomfort persists or any breathing difficulty occurs, get medical attention. ***For emergency information, customer service, MSDS or additional safety and chronic hazard information, call 1-800-634-0015.*** **KEEP FROM FREEZING.** MAC11-0705

### LN-704 TECHNICAL INFORMATION

**Base**: Latex emulsion
**Color**: Off-white
**Appearance**: Smooth gunnable paste
**Application Temperature**:
40° to 100° F (5° to 38° C)
**Service Temperature**: up to 120° F (49° C)
**Adhesion**: Excellent to most common building materials
**Bridging Ability**: Good; bridges gaps to 1/4" (.64cm)
**Shear Strength**:
24 hours – 300 psi
48 hours – 350 psi
28 days – 400 psi
**R.T. Static Load in Shear**:
10 lbs. No failure in 72 hours.
**Tensile Strength**:
24 hours – 60 psi avg.
7 days – 75 psi avg.
**Durability**: Resistant to oxidation, 20 year life
**Flexibility**: Good
**Water Resistance**: Good
**Aging**: Good
**Freeze-Thaw Stable**: Passes 5 cycles
**Bleed**: None
**Staining**: None
**Odor**: Mild Acrylic
**Working Time**: 30 minutes
**Weight Per Gallon**: 12.18 pounds (5.8 kg)
**Viscosity**: 400,000 CPS
**Volatiles**: 38%
**Solids**: 62%
**Flammability**: Nonflammable
**Flash Point**: Exceeds 200°F (93°C)
**Coverage**: Using full round 1/4" (.64 cm) bead: 10.5 oz. (310 ml) - 32 lineal feet (10 lineal meters)
**Shelf Life**: 12 months from date of purchase
**MAX VOC**: 14 g/L

Akzo Nobel Paints LLC
15885 West Sprague Rd.
Strongsville, OH 44136
www.liquidnails.com
Customer Service 1-800-634-0015

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# ACCESSORIES

SEAMING TAPES & OTHER ACCESSORIES FOR PLASTIC SHEETING

**From tie-down fasteners to field seaming tape, Raven Industries has the accessories you need to maximize your film's versatility and minimize installation time on the job.**

## ACCESSORY TAPES AND EPOXY

### VaporBond Tape (TVB4)

This white single-sided tape combines a heavy-duty, weather-resistant polyethylene backing with an aggressive rubber adhesive. VaporBond Tape offers excellent seaming capabilities for our materials with an "Easy Tear" feature to reduce installation time. TVB4 has a WVTR of 0.18 perms per ASTM D3833. Typical applications include vapor retarders, covers and liners.
Available in 4" x 210' roll.

### R25B Tape (R25B)

R25B Tape is a single sided aggressive synthetic elastomeric adhesive that bonds instantly to properly prepared polyethylene and polypropylene. The black polymer backing and adhesive is specially formulated to provide years of performance even in direct sunlight. A poly release liner provides for ease of installation.
Available in 4" x 100' roll.

### VaporSeal™ Tape (TVSP4/TVSP12)

VaporSeal™ Tape is a patented single-sided 7-layer gas barrier tape with a release liner for ease of installation. The backing contains a layer of highly impermeable EVOH designed to block migration of radon, methane and VOC's. An aggressive acrylic adhesive provides outstanding adhesion to polyethylene over a wide temperature range. Typical uses include joining, repairing and sealing gas/moisture barriers.
Available in 4" x 160' and 12" x 50' rolls.

### Butyl Seal Tape (TP2BR)

Butyl seal is a double-sided reinforced aggressive black butyl rubber tape used to join panels of polyethylene and polypropylene together by overlapping the edges and applying Butyl Seal in between. It is also used to adhere to concrete walls and footings when properly prepared. Butyl Seal is non-hardening and flexible.
Available in 2" x 50' roll.

### VaporBoot Tape (TBOOT)

VaporBoot Tape is a single-sided elastomeric butyl tape used to complete pipe boot installations (sealing the boot to the pipe). The 100% stretchable Butyl adhesive features excellent adhesion values and 3-D stretching that can be easily molded to multiple surfaces without any creases and folds.
Available in 2" x 16.4' roll.

### POUR-N-SEAL™ (PNS1G)

POUR-N-SEAL™ is a gray two part medium viscosity high strength epoxy used to seal around multiple pipe penetrations in tight areas where pipe boots are not practical, when installing VaporBlock moisture and gas barriers. (Adhesive backed 1" weather stripping foam required—sold separately).

## ADDITIONAL ACCESSORIES

### VaporBoot\VaporBoot G System (VBOOT\VBOOTGOS)

The VaporBoot System is designed to assist in securing pipe and other penetrations that run vertically through the vapor retarder material. The VaporBoot System offers a quick solution and is delivered to the jobsite in a complete package. VaporBoots are produced from high performance VaporBlock® and VaporBlock® G™ material.

**Package Contents:**
25 - VaporBoots (18" x 18", w/precut center marker)
1 - roll of VaporBoot Tape

### VaporBoot Plus Preformed Pipe Boots (VBPBT)

VaporBoot Plus Preformed Pipe Boots are produced from heavy 40 mil co-extruded polyethylene and barrier resins for excellent strength and durability. The preformed boots are stepped to fit 1" to 4" wide pipe penetrations. VaporBoot Plus Preformed Pipe Boots are available in quantities of 12 per box.

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# ACCESSORIES

SEAMING TAPES & OTHER ACCESSORIES FOR PLASTIC SHEETING

## ADDITIONAL ACCESSORIES (CONTINUED)

### Dura♦Skrim® Reinforced Sandbags

Dura♦Skrim reinforced sandbags are used to secure large covers and liners to prevent wind damage. Stock bags are produced with strong Dura♦Skrim 8 & 12 mil reinforced polyethylene. These 15" wide x 24" long bags are designed to hold 35 lbs. Sandbags are also available in other Raven reinforced materials with minimum order requirements.
11.8" Cable Ties are also available.

### Dura-Clip™ (CLIP11)

These full size clips are 11" long and fit most commercial scaffolding. Dura-Clips will securely fasten your poly sheeting to scaffolding, reducing wind whip and increasing the life of your enclosure. Clips are normally placed about every 3' onto the enclosure.

### Tie-Down Buttons (BUTI) & Tarp Grabbers (BUTEZ)

Tie-Down Buttons & Tarp Grabbers help keep plastic sheeting securely in place. Tie-Down Buttons are designed to eliminate traditional grommets in plastic sheeting up to 10 mil thick and are reusable plastic fittings that are easy to install in any position. Tarp Grabbers are up to 4 times stronger than a brass grommet and are typically used in heavier plastic sheeting from 10 mil to 30 mil thick. Great for equipment covers, large storage covers and truck tarps.

### Raven Welding Rod

Raven Welding Rod is used for field seaming, repairs and detail work, such as installing pipe boots. Packaged in 25 lb spools, it is available in 4mm and 5mm sizes to fit most brands of extrusion guns. Raven Welding Rod is made from a thermally UV stabilized LLDPE resin and is available in both black and white to correspond with the color of geomembranes being utilized.

## TAPE ACCESSORY PROPERTIES

| PROPERTIES | VaporBond Tape (TVB4) | VaporSeal™ Tape (TVSP4) | VaporBoot Tape (TBOOT) | R25B Tape (R25B) | Butyl Seal Tape (TP2BR) |
|---|---|---|---|---|---|
| BACKING | 6.7 mil Polyethylene | 2 mil LDPE | 30 mil EPDM | 8 mil Multipolymer | NA |
| ADHESIVE | 3.3 mil Rubber Based Pressure-Sensitive | 7 mil Acrylic Adhesive Pressure-Sensitive | 20 mil Butyl Rubber | 17 mil Synthetic Elastomeric | 40 mil Butyl Rubber |
| COLOR | White | Silver | Black | Black | Black |
| TYPE | Single Sided | Single Sided | Single Sided | Single Sided | Double Sided |
| SIZE | 4" x 210' | 4" x 160' / 12" x 50' | 2" x 16.4' | 4" x 100' | 2" x 50' |
| ROLLS PER CASE | 12 | 12 / 4 | 64 | 6 | 20 |
| WEIGHT PER CASE | 45 lbs | 50 lbs / 18 lbs | 45 lbs | 33 lbs | 55 lbs |
| ADHESION VALUES | 35 oz. / in. (to steel) | 80 oz. / in. (to steel) | 145 oz. / in. (to steel) | 144 oz. / in. (to steel) | 88 oz. / in. (to steel) |
| PERMS | 0.89 g/(24h*100 $in^2$) | 0.014 g/(24h*100 $in^2$) | N/A | <0.005 g/(24h*100 $in^2$) | 0.82 g/(24h*100 $in^2$) |
| SERVICE TEMP. | -40° F to +180° F | -40° F to +190° F | +14° F to +122° F | +20° F to +180° F | 0° F to +170° F |
| MIN. APPLICATION TEMP. | 50° F | 50° F | 14° F | 35° F | 35° F |
| IDEAL STORAGE TEMP./HUMIDITY | 70° F w/ 40-50 % | 60°-80° F w/ 40-60 % | 70° F w/ 70 % | 70° F w/ 40-50 % | 70° F w/ 40-50 % |

Scan QR Code to download current technical data sheets via the Raven website.

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. Chemical resistance, odor transmission, longevity as well as other performance criteria is not implied or given and actual testing must be performed for applicability in specific applications and/or conditions. 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. Limited Warranty available at wwww.RavenEFD.com

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www.ravenefd.com

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# Vapor Barrier X-mas Tree Fasteners - 1000/bag

SKU: 67063

Be the first to review this product

White. Securely affix barrier to wall. 1000/bag.

NOTICE

## Log In to Purchase

RadonAway is a B2B business only. You must be an approved RadonAway customer to purchase products through this website. If you are an existing RadonAway customer and need a website login, click here. If you are a professional and would like to become a RadonAway customer, click here.

Add to Wishlist

Add to Compare Share

## Product Categories

- Radon Fans +
- HRVs / ERVs +
- Radon System Components +
- Mitigation Tools & Diagnostic Aids +
- Sealing Products +
- Crawlspace Moisture and Radon Control +
- Sump Pumps & Accessories +
- Pipe Accessories +
- Radon System Accessories +
- Radon in Water Removal Systems +
- Radon Testing +
- Spruce Inline Ventilation +
- Canada Fulfillment +
- Air Purifiers

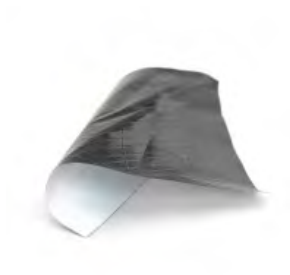
1-2 day shipping in most of US Read more...

Five year manufacturer's warranty on

Details | Additional Info | Reviews | Conditions of Sale

Tree Fast.250"x.80"(1,000/Bag)

## Related



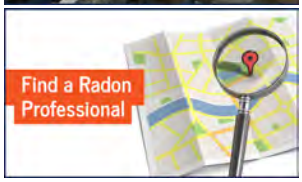
Dura-Skrim 24' x 50' x 12 mil. White/Black
Add to Wishlist

Vapor Barrier X-mas Tree Fasteners - 100/bag
Add to Wishlist

RadonAway fans

Free technical support for our customers

Contact Us



RadonAway®
The world's leading radon fan manufacturer

# RP Series

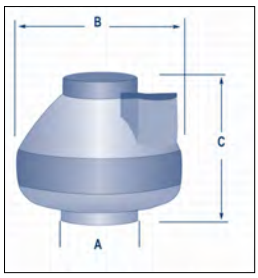
## Radon Mitigation Fan

All RadonAway® fans are specifically designed for radon mitigation. RP Series Fans provide superb performance, run ultra-quiet and are attractive. They are ideal for most sub-slab radon mitigation systems.

## Features

- Energy efficient
- Ultra-quiet operation
- Meets all electrical code requirements
- Water-hardened motorized impeller
- Seams sealed to inhibit radon leakage (RP140 & RP145 double snap sealed)
- ETL Listed - for indoor or outdoor use
- Thermally protected motor
- Rated for commercial and residential use

| MODEL | P/N | FAN DUCT DIAMETER | WATTS | MAX. PRESSURE"WC | TYPICAL CFM vs. STATIC PRESSURE WC | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 0" | .5" | 1.0" | 1.5" | 2.0" |
| RP140 | 23029-1 | 4" | 15-21 | 0.8 | 135 | 70 | - | - | - |
| RP145 | 23030-1 | 4" | 41-72 | 2.1 | 166 | 126 | 82 | 41 | 3 |
| RP260 | 23032-1 | 6" | 50-75 | 1.6 | 272 | 176 | 89 | 13 | - |
| RP265 | 23033-1 | 6" | 91-129 | 2.3 | 334 | 247 | 176 | 116 | 52 |
| RP380 | 28208 | 8" | 95-152 | 2.3 | 497 | 353 | 220 | 130 | 38 |




| Model | A | B | C |
|---|---|---|---|
| RP140 | 4.5" | 9.7" | 8.5" |
| RP145 | 4.5" | 9.7" | 8.5" |
| RP260 | 6" | 11.75" | 8.6" |
| RP265 | 6" | 11.75" | 8.6" |
| RP380 | 8" | 13.41" | 10.53" |

Made in USA with US and imported parts

ETL Listed

All RadonAway inline radon fans are covered by our 5-year, hassle-free warranty

**For Further Information Contact**

8/15
P/N 02008

RadonAway™
The world's leading radon fan manufacturer

# SF180

## Radon Mitigation Fan

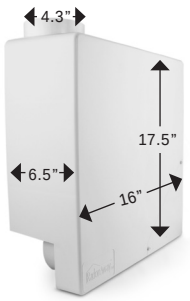
All RadonAway™ fans are specifically designed for radon mitigation. The SF180 fan provides superb performance, runs ultra-quietly and is a low-profile, attractive alternative to a traditional round radon fan.

## Features

- Stay-white (non-yellowing) exterior
- Built-in moisture/condensate management
- Seams sealed under negative pressure
  (to inhibit radon leakage)
- Interchangeable with other fan models
- Mountable on 3″ or 4″ pipes
- Inlet/Outlet: 4.3″ OD
  (4″ PVC Sched 40 size compatible)
- Designed to conceal electrical disconnect
- Quiet operation
  (Mounting method limits vibration transfer)

| MODEL | FAN DUCT DIAMETER | WATTS | MAX.PRESSURE "WC | TYPICAL CFM vs. STATIC PRESSURE WC | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 0" | .5" | 1.0" | 1.5" | 2.0" |
| SF180 | 3" or 4"* | 53-71 | 2.1 | 149 | 127 | 96 | 61 | - |

*Exterior Switch Kit and PVC offset coupling sold separately, call for details.




Made in USA with US and imported parts

ETL Listed

All RadonAway inline radon fans are covered by our 5-year, hassle-free warranty

For Further Information Contact

9/13
P/N 02022

**INSTALLATION & OPERATING INSTRUCTIONS**
**Instruction P/N IN015 Rev E**
**FOR *CHECKPOINT IIa*™ P/N 28001-2 & 28001-3**
**RADON SYSTEM ALARM**

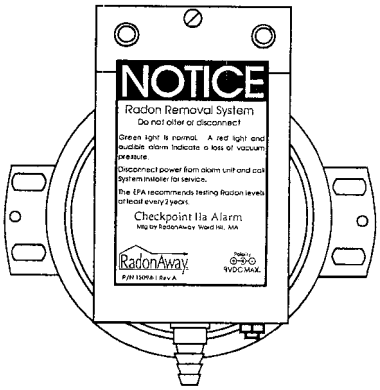
**INSTALLATION INSTRUCTIONS**
(WALL MOUNTING)

Select a suitable wall location near a vertical section of the suction pipe. The unit should be mounted about four or five feet above the floor and as close to the suction pipe as possible. Keep in mind that with the plug-in transformer provided, the unit must also be within six feet of a 120V receptacle. **NOTE: The Checkpoint IIa is calibrated for vertical mounting, horizontal mounting will affect switchpoint calibration.**

Drill two ¼" holes 4" apart horizontally where the unit is to be mounted.

Install the two ¼" wall anchors provided.

Hang the CHECKPOINT IIa from the two mouting holes located on the mounting bracket. Tighten the mounting screws so the unit fits snugly and securely against the wall.




Drill a 5/16" hole into the side of the vent pipe about 6" higher than the top of the unit.

Insert the vinyl tubing provided about 1" inside the suction pipe.

Cut a suitable length of vinyl tubing and attach it to the pressure switch connector on the CHECKPOINT IIa.

**CALIBRATION AND OPERATION.**

The CHECKPOINT IIa units are calibrated and sealed at the factory to alarm when the vacuum pressure falls below the factory setting and should not normally require field calibration. Factory Settings are:
**28001-2 -.25" WC Vacuum**
**28001-3 -.10" WC Vacuum**

**To Verify Operation:**

With the exhaust fan off or the pressure tubing disconnected and the CHECKPOINT IIa plugged in, both the red indicator light and the audible alarm should be on.

Turn the fan system on or connect the pressure tubing to the fan piping. The red light and the audible alarm should go off. The green light should come on.

Now turn the fan off. The red light and audible alarm should come on in about two or three seconds and the green light should go out.

**WARRANTY INFORMATION**

Subject to applicable consumer protection legislation, RadonAway warrants that the CHECKPOINT IIa will be free from defective material and workmanship for a period of (1) year from the date of purchase. Warranty is contingent on installation in accordance with the instructions provided. This warranty does not apply where repairs or alterations have been made or attempted by others; or the unit has been abused or misused. Warranty does not include damage in shipment unless the damage is due to the negligence of RadonAway. All other warranties, expressed or written, are not valid. To make a claim under these limited warranties, you must return the defective item to RadonAway with a copy of the purchase receipt. RadonAway is not responsible for installation or removal cost associated with this warranty. In no case is RadonAway liable beyond the repair or replacement of the defective product FOB RadonAway.

**THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THERE IS NO WARRANTY OF MERCHANTIBILITY. ALL OTHER WARRANTIES, EXPRESSED OR WRITTEN, ARE NOT VALID.**

For service under these warranties, contact RadonAway for a Return Material Authorization (RMA) number and shipping information. **No returns can be accepted without an RMA.** If factory return is required, the customer assumes all shipping costs to and from factory.

Manufactured by:
RadonAway
Ward Hill, MA
(978)-521-3703

# Series 2000 Magnehelic® Differential Pressure Gage

### *Indicate Positive, Negative or Differential, Accurate within 2%*

View All Product Images

SHARE

Select the **SERIES 2000** Magnehelic® Gage for high accuracy--guaranteed within 2% of full scale--and for the wide choice of 81 models available to suit your needs precisely. Using Dwyer's simple, frictionless Magnehelic® gage movement, it quickly indicates low air or non-corrosive gas pressures--either positive, negative (vacuum) or differential. The design resists shock, vibration and over-pressures.

**Note:** May be used with Hydrogen. Order a Buna-N diaphragm. Pressures must be less than 35 psi.

Please see **SERIES AT22000** for ATEX approved.

## Product Applications

- Filter Monitoring • Air Velocity with Dwyer Pitot Tube • Blower Vacuum Monitoring
- Fan Pressure Indication • Duct, Room or Building Pressures
- Clean Room Positive Pressure Indication

Ordering | Specifications | Features | Options | Literature | Approvals | Drawings | Accessories | Videos | Model Chart | FAQ | Related Products | Apps | Photo Downloads

## Specifications

| | |
|---|---|
| **Service:** | Air and non-combustible, compatible gases. (Natural Gas option available.) |
| **Note:** | May be used with hydrogen. Order a Buna-N diaphragm. Pressures must be less than 35 psi. |
| **Wetted Materials:** | Consult factory. |
| **Housing:** | Die cast aluminum case and bezel, with acrylic cover, Exterior finish is coated gray to withstand 168 hour salt spray corrosion test. |
| **Accuracy:** | ±2% of FS (±3% on -0, -100PA, -125PA, -10MM and ±4% on -00, -60PA, -6MM ranges), throughout range at 70˚F (21.1˚C). |
| **Pressure Limits:** | -20 in Hg. to 15 psig.† (-0.677 bar to 1.034 bar); MP option; 35 psig (2.41 bar), HP option; 80 psig (5.52 bar). |
| **Overpressure:** | Relief plug opens at approximately 25 psig (1.72 bar), standard gages only. See Overpressure Protection note on Catalog page. |
| **Temperature Limits:** | 20 to 140˚F (-6.67 to 60˚C). -20˚F (-28˚C) with low temperature option. |
| **Size:** | 4" (101.6 mm) diameter dial face. |
| **Mounting Orientation:** | Diaphragm in vertical position. Consult factory for other position |

| | |
|---|---|
| | orientations. |
| **Process Connections:** | 1/8" female NPT duplicate high and low pressure taps - one pair side and one pair back. |
| **Weight:** | 1 lb 2 oz (510 g); MP & HP 2 lb 2 oz (963 g). |
| **Standard Accessories:** | Two 1/8" NPT plugs for duplicate pressure taps, two 1/8" pipe thread to rubber tubing adapters and three flush mounting adapterswith screws. (Mounting and snap ring retainer substituted for three adapters in MP & HP gage accessories.) |
| **Agency Approval:** | Meets the technical requirements of EU Directive 2011/65/EU (RoHS II). Note: -SP models not RoHS approved. |
| | Note: For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Options Page. |

# Attachment G
# Raw Data Package

# RAW DATA PACKAGE
# CYW ('MB' LOCATION IDS)
# PORTABLES TO BE REMOVED AND REPLACED ('MA' AND 'ME' LOCATIONS)

| Parameter Name | | | 1,1,1-Trichloroethane (TCA) | 1,1,2-Trichlorotrifluoroethane (CFC 113) | 1,1-Dichloroethane (1,1-DCA) | 1,1-Dichloroethene (1,1-DCE) | cis-1,2-Dichloroethene | Tetrachloroethene (PCE) | trans-1,2-Dichloroethene | Trichloroethene (TCE) |
|---|---|---|---|---|---|---|---|---|---|---|
| Report Units | | | µg/m3 | µg/m3 | µg/m3 | µg/m3 | µg/m3 | µg/m3 | µg/m3 | µg/m3 |
| Location ID | Date Sampled | Sample Purpose | Report Result | Report Result | Report Result | Report Result | Report Result | Report Result | Report Result | Report Result |
| MA-AMB-1 | 01/26/2015 | REG | ND 0.17 | ND 1.2 | ND 0.13 | ND 0.063 | ND 0.12 | ND 0.21 | ND 0.63 | ND 0.17 |
| MA-AMB-1 | 01/26/2015 | FD | ND 0.17 | ND 1.2 | ND 0.12 | ND 0.061 | ND 0.12 | ND 0.21 | ND 0.61 | ND 0.16 |
| MA-AMB-1 | 04/14/2015 | REG | ND 0.19 | 0.42 | ND 0.10 | ND 0.083 | ND 0.10 | ND 0.091 | ND 0.10 | ND 0.068 |
| MA-AMB-1 | 04/14/2015 | FD | ND 0.19 | 0.41 | ND 0.10 | ND 0.083 | ND 0.10 | ND 0.091 | ND 0.10 | ND 0.068 |
| MA-AMB-1 | 12/16/2015 | REG | ND 0.20 | 0.53 | ND 0.10 | ND 0.087 | ND 0.11 | ND 0.096 | ND 0.11 | 0.071 |
| MA-AMB-1 | 12/16/2015 | FD | ND 0.20 | 0.52 | ND 0.10 | ND 0.087 | ND 0.11 | 0.10 | ND 0.11 | 0.079 |
| MB-AMB-1 | 01/26/2015 | REG | ND 0.18 | ND 1.2 | ND 0.13 | ND 0.064 | ND 0.13 | ND 0.22 | ND 0.64 | 0.36 |
| MB-AMB-1 | 05/02/2015 | REG | ND 0.19 | 0.41 | ND 0.10 | ND 0.085 | ND 0.10 | ND 0.093 | ND 0.11 | 0.59 |
| MB-AMB-1 | 12/16/2015 | REG | ND 0.20 | 0.48 | ND 0.10 | ND 0.087 | ND 0.11 | ND 0.096 | ND 0.11 | 0.39 |
| MB-PATH-1 | 01/26/2015 | REG | ND 0.16 | ND 1.2 | ND 0.12 | ND 0.060 | ND 0.12 | ND 0.21 | ND 0.60 | 1.3 |
| MB-PATH-1 | 05/02/2015 | REG | ND 0.20 | 0.46 | ND 0.11 | ND 0.088 | ND 0.11 | ND 0.097 | ND 0.11 | 0.72 |
| MB-PATH-1 | 12/16/2015 | REG | ND 0.21 | 0.64 | ND 0.11 | ND 0.091 | ND 0.11 | 0.10 | ND 0.12 | 1.2 |
| ME-AMB-1 | 01/26/2015 | REG | ND 0.16 | ND 1.2 | ND 0.12 | ND 0.060 | ND 0.12 | ND 0.21 | ND 0.60 | ND 0.16 |
| ME-AMB-1 | 04/14/2015 | REG | 0.58 | 0.40 | ND 0.10 | ND 0.083 | ND 0.10 | ND 0.091 | ND 0.10 | 0.073 |
| ME-AMB-1 | 12/16/2015 | REG | 0.26 | 0.52 | ND 0.10 | ND 0.087 | ND 0.11 | 0.096 | ND 0.11 | 0.14 |
| ME-OUT-1 | 01/26/2015 | REG | ND 0.17 | ND 1.2 | ND 0.13 | ND 0.062 | ND 0.12 | ND 0.21 | ND 0.62 | ND 0.17 |
| ME-OUT-1 | 04/14/2015 | REG | ND 0.20 | 0.60 | ND 0.11 | ND 0.088 | ND 0.11 | ND 0.097 | ND 0.11 | ND 0.072 |
| ME-OUT-1 | 05/02/2015 | REG | ND 0.20 | 0.46 | ND 0.11 | ND 0.088 | ND 0.11 | ND 0.097 | ND 0.11 | ND 0.072 |
| ME-OUT-1 | 12/16/2015 | REG | ND 0.21 | 0.60 | ND 0.12 | ND 0.095 | ND 0.12 | ND 0.10 | ND 0.12 | 0.20 |
| ME-PATH-1 | 01/26/2015 | REG | ND 0.17 | ND 1.2 | ND 0.13 | ND 0.062 | ND 0.12 | ND 0.21 | ND 0.62 | 0.19 |
| ME-PATH-1 | 04/14/2015 | REG | ND 0.20 | 0.53 | ND 0.11 | ND 0.088 | ND 0.11 | ND 0.096 | ND 0.11 | ND 0.072 |
| ME-PATH-1 | 12/16/2015 | REG | ND 0.21 | 0.60 | ND 0.12 | ND 0.095 | ND 0.12 | 0.11 | ND 0.12 | 0.25 |

ND = non-detect