INTERIM REMEDIAL MEASURES WORK PLAN

Simchah 325 Yonkers, LLC
323-325 Yonkers Avenue
Yonkers, NY 10701

Brownfield Cleanup Program Site No. C360184

November 2022
(Version 2)

ENVIRO-SCIENCES (OF DELAWARE), INC.
781 ROUTE 15 SOUTH 2ND FLOOR
LAKE HOPATCONG, NJ 07849
(973) 398-8183 • FAX (973) 398-8037

Qualified Environmental Professional:

I, Irving D. Cohen, CEP, FACFEI, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the NYSDEC DER Technical Guidance for Site Investigation and Remediation (DER-10).

Irving D. Cohen, CEP, FACFEI
President & Chief Executive Officer

Date: November 4, 2022

Interim Remedial Measures Workplan
Simchah 325 Yonkers, LLC
323-325 Yonkers Avenue
Yonkers, NY 10701
BCP Site No. C360184

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

Enviro-Sciences (of Delaware), Inc. (ESI) was retained by Simchah 325 Yonkers, LLC to complete an Interim Remedial Measures (IRM) Work Plan for the property located at 323-325 Yonkers Avenue, Yonkers, NY 10701 (Site). The Site was accepted into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP), under a NYSDEC Brownfield Cleanup Agreement (BCA) dated May 20, 2020, for Site No. C360184.

1.1 Purpose

This IRM Work Plan was prepared in accordance with the NYSDOH document "Final Document for Evaluation Soil Vapor Intrusion in the State of New York", (October 2006, Rev. May 2017). Due to elevated levels of VOCs detected in both indoor air and sub-slab soil vapor samples related to past operations at the dry cleaners located at the Site, the NYSDEC and New York State Department of Health (NYSDOH) requested (May 24, 2022 letter) the installation of an active Sub-Slab Depressurization System (SSDS). beneath the slab of the dry-cleaning space to prevent exposure to building tenants. The objective of this IRM Work Plan is to outline the proposed design and installation of an active SSDS.

The investigative protocols used for this assessment were based, in part, upon the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006, and the subsequent updates, as well as good environmental engineering practice.

2.0 SITE DESCRIPTION

2.1 Location and Description

The Site totals approximately 0.23 acres and is improved with one (1) two-story, slab-on-grade building, located on the north side of Yonkers Avenue, in a mixed commercial and residential area of Yonkers, New York (**Figures 1 and 2**). The Site is currently occupied by Marin's dry cleaner, Dunwoodie Deli Buffet, and The Church of Pentecost U.S.A, Inc. Additionally, the portions of the exterior of the Site are improved with asphalt-paved parking areas and concrete walkways.

2.2 Surrounding Area

The Site is located in a mixed residential and commercial area and is bordered by the Fairways at Dunwoodie Golf Course to the north, an adjoining gas station and convenience store to the east followed by a vacant former auto repair shop, wooded land and Tibbets Creek, Yonkers Avenue followed by Planet Fitness to the south, and the Fairways at Dunwoodie Golf Course to the west.

The nearest school to the Site is St Ann's private school, located at 40 Brewster Ave, Yonkers, NY 10701, approximately 0.6 miles to the northeast of the Site. There are no daycares identified within a one-mile radius of the Site. No other sensitive populations such as medical or senior citizen facilities were identified within a one-mile radius of the Site. The nearest hospital is Saint Joseph's Medical Center, located at 127 S Broadway, Yonkers, NY 10701, approximately two miles to the west/southwest of the Site.

2.3 Geology and Hydrogeology

According to information obtained from the United States Geological Survey (USGS) the Site is underlain by Pleistocene glacial till deposits. Based on a review of the United States Department of Agriculture (USDA) Soil Survey, the majority of the soils in the vicinity of the Site are classified as the Charlton-Chatfield complex, which is indicative of coarse-loamy melt-out till derived from granite, gneiss, and/or schist. The soil recovered in the borings advanced during the October 2019 Remedial Investigation generally consisted of a layer of fill followed by brown sand and silt.

The Site is relatively flat with the regional topographic gradient sloping toward the east/southeast. Groundwater has been encountered between 8 and 16 feet bgs throughout the Site during previous investigations and has been measured to flow towards the east/southeast. The closest surface water body is Tibbets Creek, which is located 150 feet to the east of the Site.

3.0 SITE BACKGROUND

A Phase II Subsurface Investigation (Phase II) was conducted at the Site in September/October of 2018 in order to evaluate potential impacts related to the on-site dry-cleaning operations, the potential heating oil USTs to the west of the retail building, the oil-water separator (OWS), and the gasoline filling and auto service operations.

The groundwater sample analytical results indicated that tetrachloroethene (PCE) was detected in a groundwater sample near the dry cleaner tenant space at a concentration greater than the New York State Department of Environmental Conservation (NYSDEC) Ambient Water Quality Standards (AWQS). Additionally, petroleum-related compounds were detected in groundwater samples near the auto repair shop and/or filling station operations at concentrations greater than their corresponding NYSDEC AWQS. No Semi-Volatile Organic Compounds (SVOCs) were detected at concentrations greater than the applicable groundwater criteria in the groundwater samples analyzed.

PCE was detected at concentrations greater than the New York State Department of Health (NYSDOH) screening levels in the soil vapor and indoor air. Based on the levels detected, the NYSDOH Matrix B guidance table recommends that mitigation be conducted to minimize current or potential exposures associated with soil vapor intrusion.

Since exceedances of petroleum-related Volatile Organic Compounds (VOCs) were detected in groundwater at the Site, the release was reported to the NYSDEC and Spill No. 18-07608 was issued. Furthermore, since exceedances of dry-cleaner solvent VOCs were

detected in groundwater throughout the Site, the release was reported to the NYSDEC and the Site was issued DEC site #360184.

On January 17, 2019, the NYSDEC issued a letter requiring the development and submission of a Remedial Investigation Work Plan (RIWP) to delineate impacted groundwater related to the on-site petroleum release. The on-site petroleum release is being investigated separately under spill number 18- 07608.

On November 27, 2018, an additional round of sampling was conducted to delineate the extent of the PCE vapor contamination at the Site. Soil vapor and indoor/ambient air samples collected during the supplemental investigation indicated the need for vapor intrusion mitigation (i.e., SSDS) for the dry-cleaning tenant space and tenant space immediately east of the dry-cleaner tenant space.

On December 16, 2020, a total of six vapor samples were collected, five throughout the interior space of the Site, and one on the exterior of the adjacent convenience store to evaluate if vapor from the BCP Site release is presenting a vapor concern at the adjacent building. Indoor air samples were collected concurrently with the vapor sub-slab samples; 5 indoor air samples were located near the five sub-slab locations and one outdoor/ambient sample was collected.

The results of the soil vapor sampling completed indicated that PCE, TCE, and DCE were detected in soil vapor samples collected within the dry-cleaning space and northeast adjacent stairwell. No other VOCs were detected above the applicable NYSDOH screening levels in the soil vapor samples analyzed.

The results of the indoor air sampling indicate that PCE, TCE, and carbon tetrachloride were detected at concentrations greater than the applicable NYSDOH screening levels. No other VOCs were detected above the applicable NYSDOH screening levels in the indoor and outdoor/ambient air samples analyzed. Carbon tetrachloride was detected at the highest concentration within the outdoor/ambient air sample; therefore, it can be concluded that the elevated carbon tetrachloride concentrations within the indoor air samples can be attributed to background concentrations

Based on the presence of the PCE groundwater and vapor contamination at the Site, the NYSDEC recommended that the current owner enter into the Brownfield Cleanup Program (BCP) to address the onsite PCE contamination.

The purpose of the project moving forward is to install a SSDS to remove chlorinated vapors from beneath the building slab of the facility to improve indoor air quality. The SSDS will cover the area occupied by the dry-cleaning tenant space and the tenant space immediately east of the dry-cleaner tenant space. Indoor air quality testing will be conducted following SSDS installation to ensure its effectiveness no sooner than 30 days following the startup of the system. Pressure differential testing will also be performed to demonstrate the effectiveness of the system at depressurizing the extent of the target mitigation area.

3.1 Historical Site Use

Based on a review of historical sources, the Site was used for commercial purposes since at least 1917. Various commercial tenants have occupied the strip mall within the Brownfield Site Boundary including a dry cleaner since 1985. Phase II Subsurface Investigations were conducted at the Site in June 2005, October 2018, and December 2018.

In 2006, the former property owner conducted soil excavation beneath the dry-cleaner tenant space. The activities consisted of the following:

- Disassembly and temporary removal of the dry-cleaning machine.
- Removal and off-site disposal of 12 tons of reinforced concrete.
- Excavation and removal of 23 tons of soils.
- Collection and laboratory analysis of six post excavation confirmatory soil samples.

This remedial excavation work was conducted with oversight of the Westchester County Department of Health (WCDOH) and NYSDEC.

3.2 Site Redevelopment Plan

The Site owner plans to maintain the property for its current commercial use following completion of remedial action at the Site. The building will remain as is.

4.0 Interim Remedial Measures Scope of Work

In August 2022 Clean Vapor, LLC conducted building diagnostic testing and designed a SSDS for the vapor intrusion mitigation plan at the Site. A copy of Clean Vapors Vapor Intrusion Mitigation Plan Design is attached as Appendix A. After approval by NYSDEC, Clean Vapor will install an active SSDS to prevent soil-borne contaminants from entering the building by creating a negative pressure beneath the slab. Depressurization points will be installed in the building's slab connecting to piping exiting to the exterior of the building to rooftop vents. Figure 3 shows the tenant spaces that make up the BCP site, the spaces covered by the SSDS and the monitoring points. Equipment can be procured and installed within 60-90 days after NYSDEC approval. Once the design is approved by the NYSDEC and prior to installation, an air permit will be obtained from the Westchester County Department of Health. A copy of the air permit will be included in the construction completion report.

The objective of the SSDS is to create and maintain a minimum negative pressure differential of -0.004 inches of water column (w.c.) below all concrete slabs which function as boundaries between sub-slab space and occupied interior space; achieving a pressure differential of -0.004 w.c. across the slab. This is generally considered sufficient to mitigate vapor intrusion based on available industry guidance. Once the SSDS has been installed, testing will be performed to verify that capture is achieved and there are no exceedances of contaminants of concern in the building interior. If and where necessary, additional measures

will be undertaken to ensure that performance and compliance objectives are met.

4.1 Monitoring Plan

Indoor air samples will be collected after the system is installed and operating to confirm the system operating properly. Post-mitigation indoor air samples will be collected no sooner than 30 days following system startup. If this falls outside of the heating season, samples will still be collected but may need to be repeated based on the results.

Based on the results of post installation monitoring, the NYSDEC and NYSDOH will determine the frequency of operation maintenance, and monitoring (OM&M) of the SSDS. Typically, OM&M is performed on an annual basis for a period of at least 3-5 years, or until such time that subsequent sub-slab soil vapor and indoor air sample results deem that active SSDS is no longer required by the NYSDEC/NYSDOH. ESI will submit an OM&M Work Plan to the departments following the completion of the project. OM&M of the SSDS will include the following:

- Inspection of the building slab to determine if any new or previously undetected cracks or fissures are present.
- System efficacy testing, to ensure the system is promoting sufficient sub-slab depressurization.
- A round of sub-slab soil vapor, indoor air, and ambient air sampling will be performed, to determine the existing vapor and indoor air conditions at the site, and to ensure that indoor air conditions have improved with the operation of the SSDS.

4.2 Investigation Derived Waste

Investigation derived waste (IDW) includes only 3 small (5-inch diameter) cores of concrete from the slab, less than 6 buckets of soil from hand excavation of suction points through the core holes, and miscellaneous pipe / materials cuttings and debris from typical construction methods. The waste will be temporarily stored on site pending waste characterization and subsequent removal. The waste will be removed with waste generated during additional investigative work that will be conducted on the property. All waste removed from site will be disposed in accordance with regulatory requirements.

4.3 Health and Safety

A site-specific Health and Safety Plan (HASP) and a Quality Assurance Project Plan (QAPP) for indoor air sampling is included as Appendix B. All work performed in this IRM Work Plan will be done so in accordance with the HASP.

4.4 Community Air Monitoring

The IRM work will be completed within a building occupied by commercial tenants. Air monitoring will be conducted in accordance with the Community Air Monitoring Plan (CAMP) included in Appendix C. The NYSDOH Generic CAMP is also included in Appendix C.

4.5 Reporting

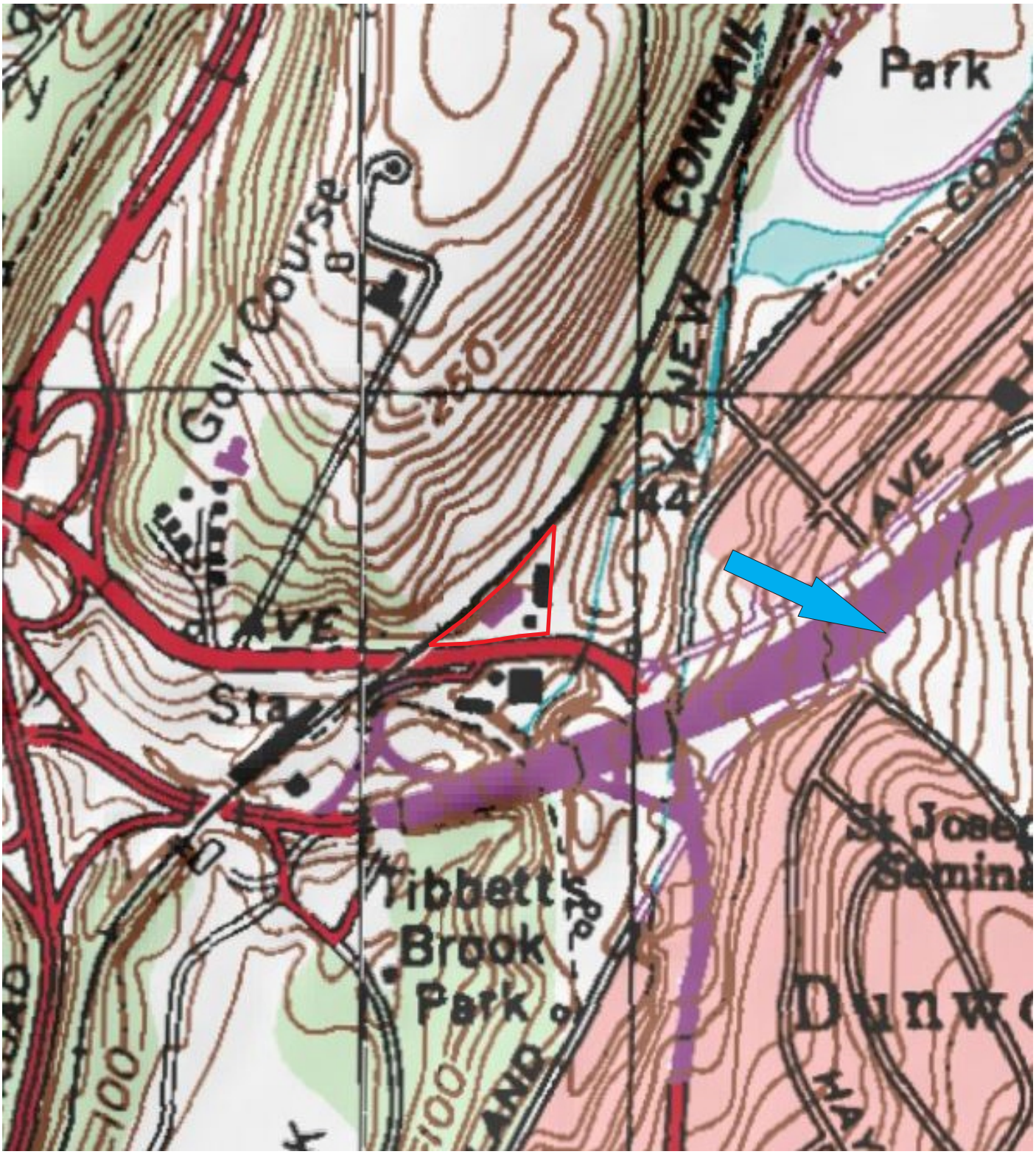
Upon completion of the SSDS and receipt of the post-installation sampling analytical results a Construction Completion Report detailing the installation of the active SSDS, photographic log of installation procedures, as-built drawings, a summary of the laboratory analytical data and any other summaries, descriptions of activities, and forms. A Site Management Plan will also be submitted upon completion of the remedial action.

4.6 Project Schedule

The IRM Work Plan is anticipated to begin in January 2023. The duration of tasks is anticipated to be completed as follows:

- Installation, startup, and commissioning of system, including documentation of confirmatory sub-slab vacuum measurements – 3 days, January 2023
- Post-mitigation indoor air sampling and pressure differential testing – a minimum of 30 days after startup of the system, February – March 2023
- Post-construction deliverables including a construction completion report and site management plan – 30 days following completion of vapor system installation, February – March 2023
- Certificate of Completion - Summer 2023

FIGURES



Legend

Approximate Property Boundary

Assumed Direction of Groundwater Flow

N

Figure 1: Site Location Map

325-397 Yonkers Avenue, Yonkers, NY 10701

esi
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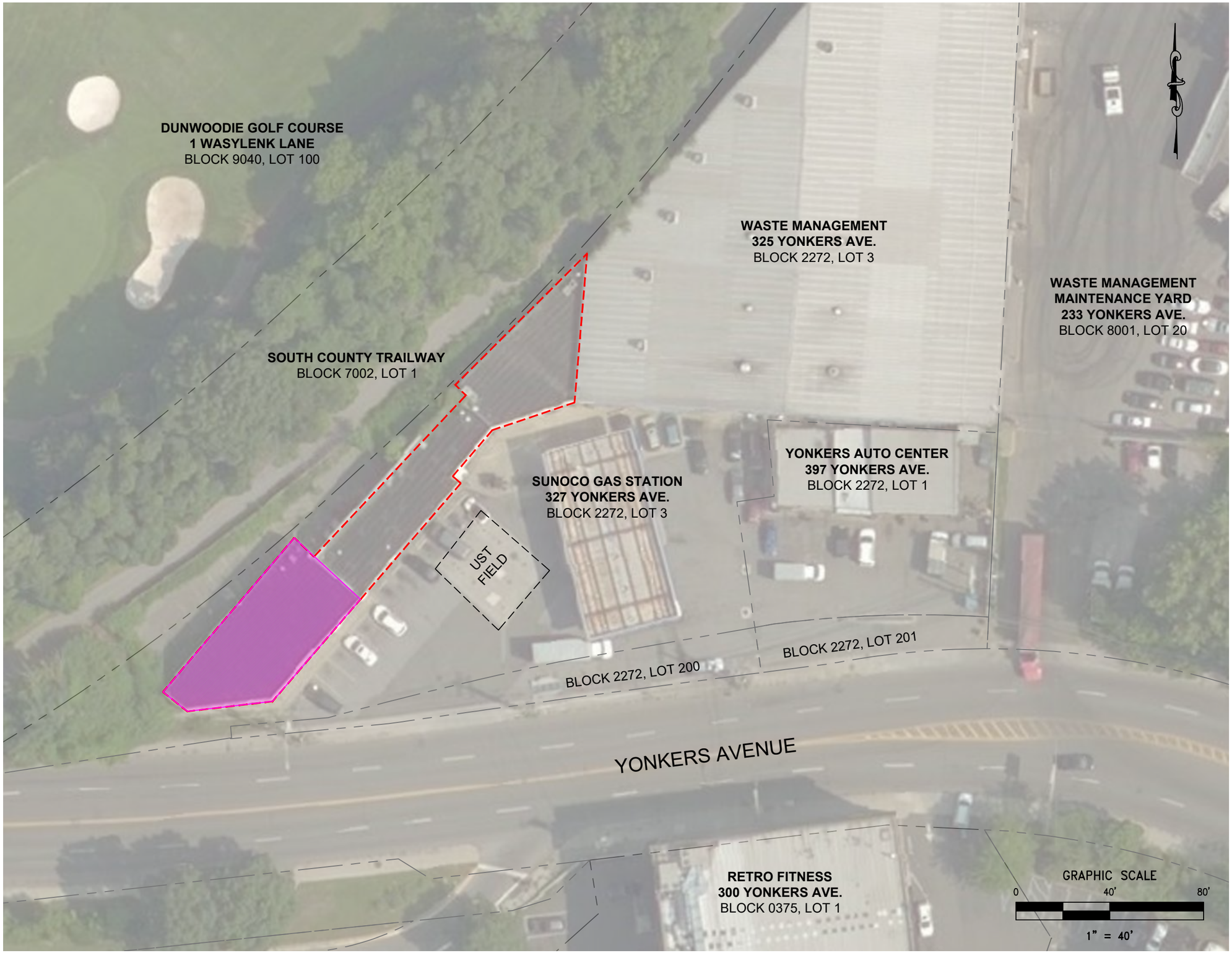


LEGEND

BCP SITE BOUNDARY

AREA OF PLANNED MITIGATION

FIGURE 2

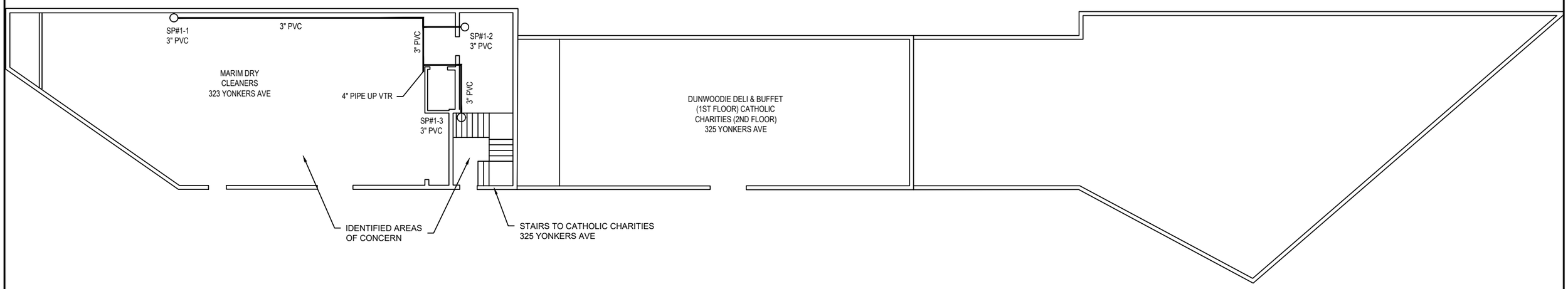
SITE MAP

323-325 YONKERS AVENUE
YONKERS, NEW YORK, 10701
BLOCK 2272, LOT 2200 & 2201

PROJECT MANAGER	ML	PROJECT NO.	Simchah: CFE101

ENVIRO-SCIENCES, (OF DELAWARE) INC.
781 Route 15 South, 2nd Floor
Lake Hopatcong, NJ 07849
973-398-8183 * Fax 973-398-8037

DRAWN BY/DATE	APPROVED/DATE	DRAWING NUMBER
OS/ 11-02-2022		YON-008



GRAPHIC SCALE

0 16' 32'

1" = 16'

FIGURE 3

SSDS SPACES AND MONITORING POINTS

323-325 YONKERS AVENUE
YONKERS, NEW YORK, 10701
BLOCK 2272, LOT 2200 & 2201

PROJECT MANAGER	ML	PROJECT NO.	Simchah: CFE101

ENVIRO-SCIENCES, (OF DELAWARE) INC.
781 Route 15 South, 2nd Floor
Lake Hopatcong, NJ 07849
973-398-8183 * Fax 973-398-8037

DRAWN BY/DATE	APPROVED/DATE	DRAWING NUMBER
OS/ 11-02-2022		YON-009

APPENDICES

APPENDIX A

Vapor Intrusion Mitigation Plan Design

VAPOR INTRUSION MITIGATION PLAN DESIGN
For:
325 Yonkers Avenue
Yonkers, NY 10701

Prepared for:

Mr. Irving D Cohen
President and CEO
Enviro-Sciences Inc.
781 Route 15 South/2nd Floor
Lake Hopatcong, NJ 07849

Prepared by:

Mr. Thomas E. Hatton
Chief Executive Officer
Clean Vapor, LLC
NRPP ID: 104705

August 25, 2022

Qualified Environmental Professional:

I, Thomas Hatton, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the NYSDEC DER Technical Guidance for Site Investigation and Remediation (DER-10).

Date: 11-4-2022

Thomas E. Hatton
Radon Mitigation Specialist

Table of Contents

KEY TERMS:
ESI: Enviro-Sciences (of Delaware), Inc.
Clean Vapor: Clean Vapor, LLC
SSDS: Sub-Slab Depressurization System
VOC: Volatile Organic Compound
': Feet
": Inches
"w.c.: Inches of Water Column
PVC: Polyvinyl Chloride

1 Introduction

1.1 Disclaimer

The information in this report including text, Clean Vapor example photographs, and diagrams shall be considered the intellectual property of Clean Vapor, LLC and is intended to facilitate the vapor intrusion mitigation of 325 Yonkers Avenue, Yonkers, NY 10701. Any reproduction of the content of this report in part or total for any other purpose is prohibited without the written consent of Clean Vapor, LLC.

1.2 Background

Environmental sampling at the site (not conducted by Clean Vapor) found that volatile organic compound (VOC) contaminants are present in the sub-slab soil of the site and levels exceed permissible concentration limits. ESI retained Clean Vapor, LLC (Clean Vapor) to conduct a building investigation, diagnostic testing, and prepare a Vapor Intrusion Mitigation System (VIMS) plan design.

A Sub-Slab Depressurization System (SSDS) has been designed to create a negative pressure field under the existing dry cleaner and stairwell slab areas. The SSDS is designed to ensure compliance with the New York State Department of Health's requirement for a negative pressure field of 0.004 inches of water column ("w.c.) / (~1 Pascals) at the outer extent of the negative pressure field during cumulative adverse conditions such as low outdoor temperatures, high winds, low barometer, and normal anticipated manufacturing exhaust equipment *(Sections 3 and 4, Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006).*

The design consists of specifications and drawings that provide details for installation. If installed, operated, and maintained per specifications, the SSDS will maintain required negative sub-slab pressures under reasonably anticipated conditions.

2 Building Investigation and Diagnostics

2.1 Building Areas of Concern

Clean Vapor completed the site investigation on Wednesday, August 17, 2022. The building is a two-story, concrete slab-on-grade structure. The first floor has a dry-cleaning facility, and the second floor is a vacant area which is accessed by a stairwell adjacent to the dry-cleaning facility. The total mitigation area is approximately 3,100 square feet. In the dry-cleaning facility, the slab is exposed. In the stairwell, the slab is covered in ceramic tiles. The slab thickness averages 6" and the substrate is sandy soil. The walls on the first and second floors are made of concrete - painted on the exterior and covered with drywall in the interior. The dry-cleaning facility and stairwell have a dropped ceiling with foam ceiling tiles and the vacant area on the second floor has an exposed ceiling. The roof is supported by steel beams on the second floor which are spaced 1' apart. The roof itself is made of plywood and is covered with a heat-applied rubber material on the exterior. There is also a parapet wall on 3/4 of the perimeter of the roof which is also covered in rubber material.

2.2 Diagnostic Testing

Diagnostic Testing involves vacuum field extension testing beneath the slab, recording indoor-outdoor pressure differentials, and gaining an awareness of mechanical equipment in the building that may induce vapor intrusion.

Floor plans of the building were hand sketched and test point locations for vacuum testing were determined based on the length of the building. A central 3-9/16" diameter suction point was cored through the slab and approximately 1 cubic foot of soil was removed. A series of ¼" test holes were drilled at approximately ten-foot intervals on transect lines extending away from the central suction point in 4 different directions.

Instrumentation used to collect data for vacuum field extension testing was as follows; micromanometer with 0.0001"w.c. resolution for all sub-slab vacuum measurements, digital manometer with .001"w.c resolution for applied vacuum, and vane anemometer for air flow.

Clean Vapor began by recording sub-slab differential pressure measurements from each test hole to establish a baseline prior to the application of vacuum. Next, a speed-controlled Shop Vacuum was used to generate multiple levels of applied vacuum at the central suction point. At each applied vacuum level, airflow yields from the suction point were recorded using a vane anemometer and sub-slab vacuum measurements were taken at each diagnostic test hole.

Upon completion of the vacuum field extension testing, the excavated soil was returned to the diagnostic suction point hole and the concrete surface restored. The test holes were sealed using gun-grade Tremco Vulkem 116 urethane-based Sealant.

2.3 Diagnostics Findings

The baseline pressures (no vacuum applied) indicated that the sub-slab pressure is positive relative to the indoor air, suggesting that there is potential for vapor intrusion. Pressure differentials that induce vapor intrusion are also expected to be greater during the heating season (winter) as compared to the cooling season (summer). The exhaust fans and drying machines in the space also affect the indoor air pressure and may induce vapor intrusion.

After coring the central suction point, we found that the sub-slab soil is sandy. Sandy soils have average permeability but variable porosity depending on compaction. Upon applying vacuum, we determined that there was a significant level of permeability and vacuum field extension at this site. It is expected that when future suction points are installed, a mitigation fan with 5"w.c. vacuum capacity will extend a sub-slab radius of influence of up to approximately 40'.

3 System Design and Installation

3.1 Suction Holes

Clean Vapor's SSDS design includes a total of 3 suction points. To limit potential disruption to building use, the suction points will be located near existing walls or corners. Once the suction point has been developed and sealed, vacuum will be applied to the suction point using an AMG Force mitigation fan.

3.2 Soil Management

ESI will be responsible for coordination of disposal soil and concrete cuttings.

3.3 Sealing Cracks and Joints

Observed slab cracks that have a 1/16" or greater opening will be sealed. Cracks will be sealed with a gun-grade urethane caulk sealant. Other observed slab openings, such as those that may occur around pipe penetrations through the slab or at expansion joints, will also be sealed with gun-grade urethane caulk.

3.4 Sealing Sump Pump

A retrofit, water-trap Dranjer will be installed to properly seal the sump pump. The Dranjer is designed to fit drains from 2"-8" in diameter and is installed under the existing strainer plate. After installation of the Dranjer, the new sump pump lid should be sealed using silicone caulking. Silicone is waterproof and easy to remove if the inside of the sump pump needs to be accessed in the future.

3.5 System Piping

Mitigation system components will be installed to facilitate servicing, maintenance and repair or replacement of other equipment components in or outside the building. Where mounting heights are not detailed, or dimensions not given, system materials and equipment are to be installed to provide the maximum headroom or side clearance as is possible. The owner's representative will be contacted in cases where a conflict is encountered.

The systems, materials and equipment will be installed level, plumb, parallel, or perpendicular to other building systems and components unless otherwise specified. Horizontal pipe runs between the fans and the first suction point will be installed with one-inch slope back to a suction point for each ten feet of horizontal pipe run. Horizontal runs after the first suction point may be run level. However, the piping should not be installed to create a possible water trap in the piping. Piping and fittings installed, unless otherwise noted or specified, should be PVC.

PVC pipes will be supported every six feet of horizontal run and every ten feet of vertical run. Suction point riser pipes will be secured to the wall or column adjacent to the suction point. Conduit channel with pipe clamps and split ring hangers will be used to support vertical pipe. Horizontal pipe can be supported using clamps, threaded rod, and swivel loop hangers. Pipes cannot be supported by other building piping or ducts.

3.6 Gate Valves

In the future there is a possibility that airflow in the sub-slab may change, and the system may need to be balanced to equalize the vacuum distribution throughout the system. Inline gate valves will be installed on suction point riser pipes at approximately the ten-foot elevation. Valves will enable the select suction points to be dampened to facilitate even distribution of sub-slab vacuum. Once adjusted, collar clamps may be used to lock the stem of the gate valve at a fixed position.

3.7 Blower Selection and Suction Point Locations

Blowers and suction points have been selected and specified based on the volume of air yield, static pressure readings, and measured vacuum field extension recorded during the diagnostic testing. The design objective of the Mitigation System is to create a minimum vacuum field of -0.004 "w.c. to the outer extent of the negative pressure field during cumulative adverse conditions. Pressure field projections are adjusted to accommodate anticipated field installation conditions. For example, when removing one cubic foot of soil under the slab, the static pressure can drop 20% and the volume of air increases subject to the limitations of the soil and blower. The radius of the negative pressure field beneath the slab may also increase. Since variability in soils and permeability exist beneath the slab, the projected radius is not based on a pure mathematical extrapolation but a total approach that includes the conditions. An examination of the soil matrix, sub-slab permeability mapping data, and Clean Vapor's professional experience factors are considered when developing these projections.

3.8 Blower Installation and Start Up

There will be one (1) AMG Force mitigation blower installed. The blower is specified based on diagnostic vacuum distribution and airflow measurements taken during diagnostics. When soil is removed from the suction point, solution channels that were not detected during the diagnostic phase are sometimes discovered. This can result in greater than expected airflow and decreased static vacuum. The blower has been sized in anticipation of these changes.

The blower frame will be supported by rubber Dura Bloks. The blower exhaust will be a minimum of two feet above the roofline and a minimum of 15 feet from windows, doors, air intakes, passive relief vents or other openings in the building that cannot be easily repaired.

A separate roofing contractor will need to be hired to seal pipe penetrations at the roof leading to the blower.

3.9 Blower Wiring

A separate electrician will need to be hired to provide power to the roof-mounted blower. A dedicated breaker should be used. This will prevent the blowers from being shut off when a circuit is powered down for an unrelated function. Based on the blower amperage requirements, the facilities engineer, or licensed electrician will determine the load for each circuit. The location of the panel chosen for wiring will be determined in conjunction with the building representative and ESI. The panel location and breaker number will be referenced in the final report and each breaker labeled. Electric panel locations, wire runs, and

breaker numbers will be noted on the As-Built Electrical Drawing and included in the final commissioning report.

3.10 Vacuum Indicators

A Magnehelic will be installed to indicate the static vacuum generated by the blower system. To the extent practicable, the range of the Magnehelic will be selected so that the indicator needle during operation is close to or just to the right of center on the dial face. The Magnehelics will be enclosed in a protective enclosure. The low pressure Magnehelic port will be connected with 1/4-inch outer-diameter, rigid polyethylene tubing to a common conveyance pipe in the system. The polyethylene tubing will arc to a higher elevation than where it exits the riser pipe before it is connected with the Magnehelics to reduce potential for condensation from running into the Magnehelics or creating a water trap in the tube. Exposed sections of tubing that run down from overhead will be enclosed in rigid conduit. The exact location of the Magnehelics panel is at the discretion of Clean Vapor, ESI, and the owner's representative and will be noted in the final system As-Built drawings.

3.11 Audible and Visual Alarm

A RadonAway Checkpoint IIA Audible and Visual alarm will be installed for regulatory compliance. The alarm system will be installed in the basement near the Magnehelic gage unless there is a determination to change the location of the alarm system during installation.

3.12 Fire Stopping

Small penetration openings such as those surrounding conduits will be sealed using intumescent fire-rated caulk. Hilti is the recommended manufacturer of fire stopping products.

3.13 Sampling Ports

Test ports for manually measuring vacuum and airflow will be installed in each of the riser pipes. Ports will be drilled, tapped, and plugged using a 3/8-16 x ¾ stainless steel socket cap screw with a neoprene washer. Soil gas samples may also be collected from these ports. Riser pipe port should be installed at approximately 60 inches above the floor. Permanent sub-slab test ports will be installed at various locations throughout the individual system vacuum fields for the purpose of measuring sub-slab vacuum. The vacuum measured at these permanent ports will have a somewhat linear relationship to the vacuum applied at the suction holes and measured at the pressure transducer port(s). The location of these ports will be shown on the As-Built drawings.

3.14 System Labeling

A label will be installed on the riser pipes, sensor enclosure and at the disconnect switch next to the fan that says, "Active Soil Depressurization System, Do Not Alter." The electrical circuit at the panel that is used to control the fan will be labeled as "Active Soil Depressurization System" with the corresponding blower number. At a minimum, every 20' of exposed horizontal contaminant vent pipe length will have an ANSI compliant label that reads "SSD System" and indicates direction of flow attached to the pipe. A

weatherproof engraved label will be affixed to the blower frame on the roof with a corresponding label on the Magnehelics panel. The labels will be readable from three feet away.

4 General Installation Notes

The mitigation system components will be installed to facilitate servicing, maintenance and repair or replacement of other equipment components in or outside the building. Where mounting heights are not detailed, or dimensions not given, system materials and equipment are to be installed to provide the maximum headroom or side clearance as is possible. ESI will be contacted in cases where a conflict exists. All systems, materials and equipment will be installed level, plumb, parallel, or perpendicular to other building systems and components unless otherwise specified.

Penetrations through walls and the roof will be sealed. There will not be placement of piping or conduit that would inhibit intended use of building areas under current foreseeable conditions. Foreign materials should not be left to be drawn into the vapor system piping or fan which could interfere with, or impair, the vapor system performance. System components should have UL or equivalent ratings as applicable.

5 System Materials

5.1 Vapor Vent Piping:

- 3", 4" Schedule 40 PVC Pipe and fittings ASTM D-2665
    i. Hollow Core PVC is not permissible
- PVC cement clear primer will comply with ASTM F-656
- PVC cement adhesive will comply with ASTM D-2564

5.2 Piping Supports and Hardware:

- 3", 4" Hanging Pipe Supports
    i. 3", 4" Unistrut Clamps
    ii. Adjustable swivel ring or standard bolt type clevis hangers
    iii. Adjustable band hangers
    iv. 3" Split Ring Hangers
    v. 3" and 4" Conduit Clamps
    vi. Sammy 3/8 in. x 2-1/2 in Vertical Rod Anchor Super Screw 3/8 in
- 3/8" threaded rod
- 1/2" threaded rod
- Assorted zinc plated bolts, nuts & washers
- 1 3/16" C- Profile Galvanized Uni-strut
- 1 5/8" C- Profile Galvanized Uni-strut
- Ceiling Plates / Wall Plates
- Beam Clamps

5.3 System Control Valves:

- 3" inline PVC Gate valves (Valterra Bladex)

5.4 Vapor Blowers:

- AMG Force

5.5 Vapor Blower Couplers:

- Fernco or equivalent 3"x3",4"x4",4"x3" Stainless Steel Banded Rubber Couplers

5.6 Blower Support Frames:

- 1 5/8-inch C- Profile Galvanized Uni-strut
- Dura Block™ Uni-strut Supports

5.7 Visual Pressure Indicator and Protective Enclosure:

- Dwyer Magnehelic (1) (Pressure Range to Be Determined)
- Integra Enclosures
    i. Magnehelics /Sensor Enclosure 8-inch X 8-inch H8084H Backing Plate PVCBP-88 (1)

5.8 Checkpoint Alarm

- RadonAway Checkpoint IIA Audible and Visual alarm

5.9 Sealing Materials:

- Gun-Grade Urethane Caulk (Vulkem 116)
- Flowable Urethane Caulk (Vulkem 45SSL)
- JN-6 Industrial Model Dranjer
- 3/8 Clear Polycarbonate
- Gun-Grade Silicone Sealant

5.10 Fire Stopping:

- Hilti Gun Grade Silicone Fire Sealant CFS-S-SIL GG
- *Note: Hilti is the suggested manufacturer of fastening and fire prevention products*

6 Administrative and Final Report

6.1 Permits

The owner or representative will need to provide building access for the municipal building inspectors or any other jurisdictional authority to inspect the relevant components of the SSDS.

6.2 Warranties

The mitigation contractor will warranty system components and workmanship for a period of one year from the date of system commissioning. Sub-slab vacuum extension values are based on the conditions at the date of the diagnostic measurements. The owner will not incur cost for warranty work performed during this period. Fluctuating water tables, sink holes, future building changes, and other unforeseen sub-slab anomalous conditions that may affect indoor air pressures or sub-slab soil gas channeling after commissioning values have been achieved may be considered outside of the warranty. Repairing system damage caused by others is not included in the warranty. Clean Vapor's performance, materials and workmanship warranty does not apply to systems installed by others.

6.3 Final Project Report

The pressure field extension beneath the slab created by the SSDS will be measured with a digital micro-manometer capable of reading down to 0.0001"w.c. The gate valves in the riser pipes will be adjusted to facilitate maximum vacuum distribution. Static vacuum measurements for each system will be recorded. The vacuum measurements will be measured in inches of water column. The exhaust airflow from the blower system will be measured, calculated, and reported in cubic feet per meter (CFM).

The final report summarizing remedial activities will include a summary of remedial activities, As-Built drawings, blower and system performance tables, photo documentation, equipment warranties and material submittals. The As-Built drawings will be a modification of the original design print and include the specific locations of mechanical equipment, conveyance piping and permanent sub-slab test ports. The electrical panel location and breaker number will also be noted for the blower. The location of the low-pressure gauges will also be shown on the drawing. The title block will include the final system installation date.

Photo documentation will include at least one picture of the blower(s) installed, the pressure gauge panel, system labels, suction points, relevant sealing, fire stopping, post-mitigation vacuum testing and pictures thought to be important by the owner. Warranties and Submittals will include blower warranties, performance and wiring information and Material "cut sheets." The Operations and Maintenance Section will include a table of items to be checked quarterly and annually. A copy of the final report will be maintained by Clean Vapor, ESI, and building representatives.

7 Submittals

The mitigation contractor will provide copies of submittals.

I. Pre-Work Submittals
   a. Copy of applicable licenses
   b. Equipment manufacturer cut sheets

II. Post Work Submittals
   a. As-Built drawings to include the applicable mechanical component locations
   b. Final project report
   c. OM&M instructions and recommendations

Schedule

The anticipated project schedule is as follows:

- Installation, startup, and commissioning of system, including documentation of confirmatory sub-slab vacuum measurements – 3 days, January 2023;
- Post-mitigation indoor air sampling and pressure differential testing – a minimum of 30 days after startup of the system, February – March 2023 (by ESI).

Appendix A – Pressure Differential Data Tables

Test Suction Point #1 (SP-1)

Lithology: 6" Concrete slab atop of sandy soil

Power Setting		High	Medium	Low	Custom
Vacuum Applied (“w.c.)		18.91	9.50	4.5	2.25
Airflow (cfm):		106.09	67.66	40.00	20.25

Transect	Test Hole	Distance In Feet From SP-1	Baseline (Vacuum Off)	High	Medium	Low	Custom
1	V-1	1	+0.0004	-17.3000	-9.2300	-4.4700	-2.1300
	V-2	5	+0.0006	-9.4700	-4.1800	-1.8800	-0.9270
	T-1	10	+0.0012	-3.7000	-1.6800	-0.8590	-0.4170
	T-2	20	+0.0010	-0.4510	-0.2600	-0.0780	-0.0300
	T-3	30	+0.0007	-0.1060	-0.1210	-0.0212	-0.0080
2	T-4	10	+0.0020	-3.3900	-1.9000	-0.9560	-0.5870
3	T-5	10	+0.0014	-5.1300	-3.0100	-1.5800	-0.9810
	T-6	20	+0.0016	-2.3100	-1.4300	-0.7930	-0.5240
4	T-7	10	+0.0029	-5.1600	-2.9300	-1.4100	-0.9010

Pressure Differential Table

Outside Temp / Conditions	Clear Sky, 76 °F, S Wind at 6 MPH, 29.95" HG Bar Pressure, 50% Humidity
10 Second Interval	**Differential Pressure Reading ("w.c.) Reference = Outside Input = Inside (Main Entrance)**
1	-0.02
2	-0.0202
3	-0.0214
4	-0.0212
5	-0.0208
6	-0.0221
7	-0.0217
8	-0.0188
9	-0.0203
10	-0.0216
Average	-0.02081

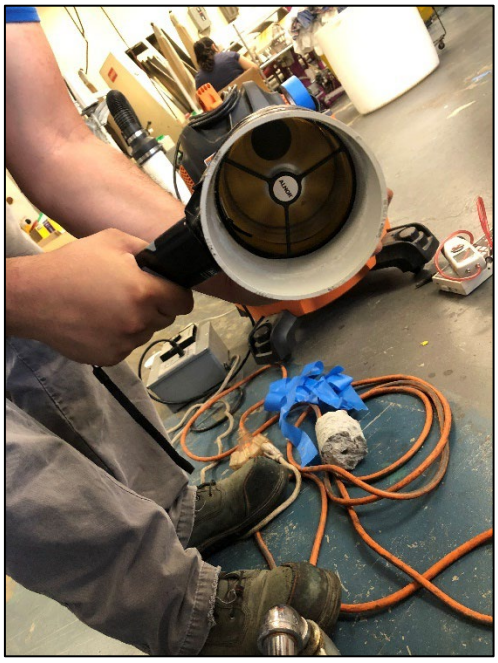
Appendix B – Photographs

Coring Test Suction Hole with Dust Collection

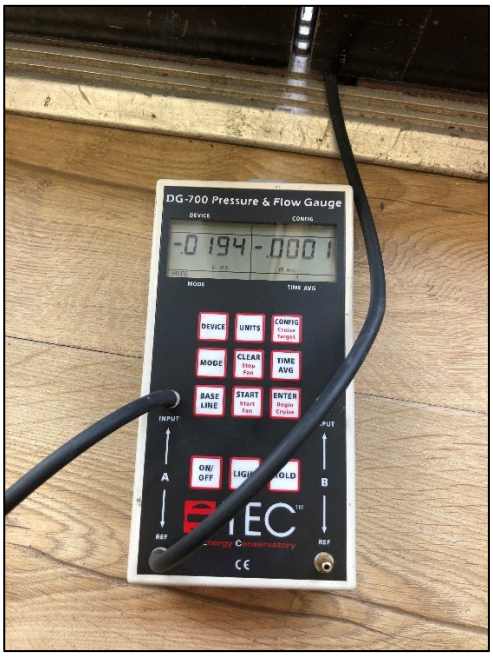
Drilling Quarter-Inch Test Hole with Dust Collection

Diagnostic Setup

Measuring Applied Vacuum



Measuring Soil Airflow Yields



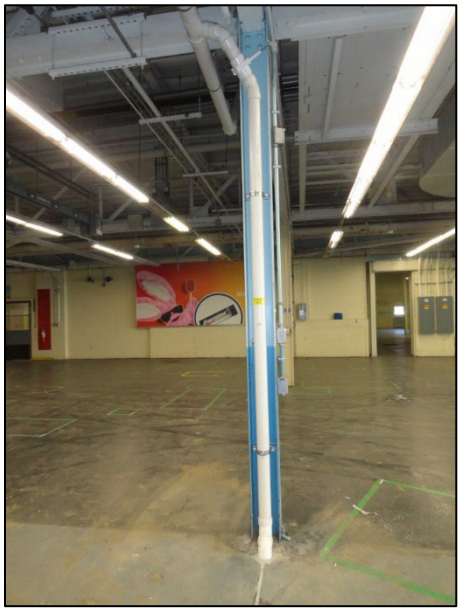
Measuring Indoor Outdoor Pressure Differentials

Sandy Soil Below the Slab

Exhausting Soil Vapors

Installation Examples

Suction Point Sealing



Vertical and Horizontal Pipe Runs

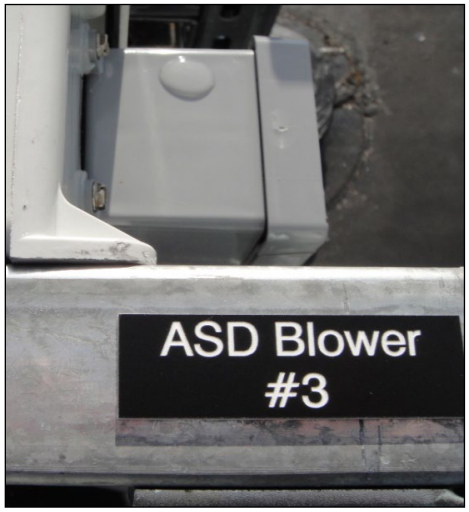
Vertical and Horizontal Pipe Runs

Inline Gate Valve

Typical Floor Crack or Expansion Joint Sealing

Riser Pipe with System Label, Suction Point # and Sampling Port

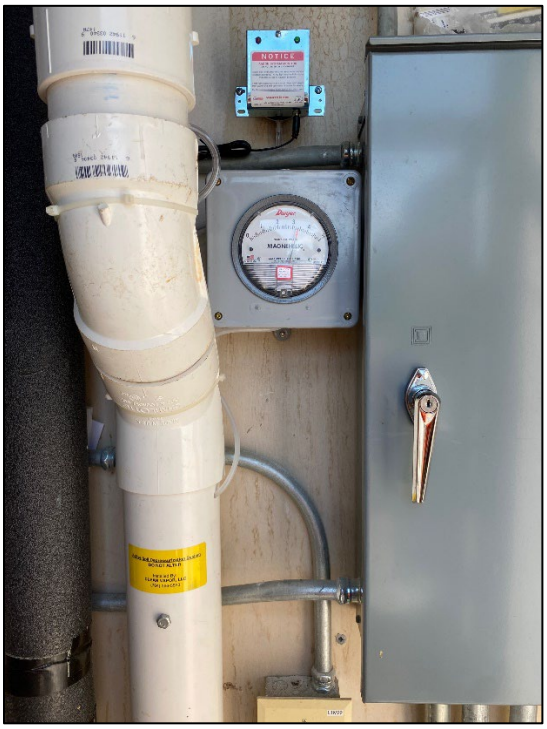
System Label



Outdoor Engraved Blower Label

Permanent Floor Test Port

Roof-Mounted AMG Force Blower with Custom Support Frame



Magnehelic Gauge Enclosure, Riser Test Port with ASD Affixed Label and Checkpoint IIA System Alarm

Electrical Room Breaker Panel with Labels

Appendix C – Drawings

ACTIVE SOIL DEPRESSURIZATION SYSTEM
325 YONKERS AVE
YONKERS, NY 10701

AUGUST 25, 2022

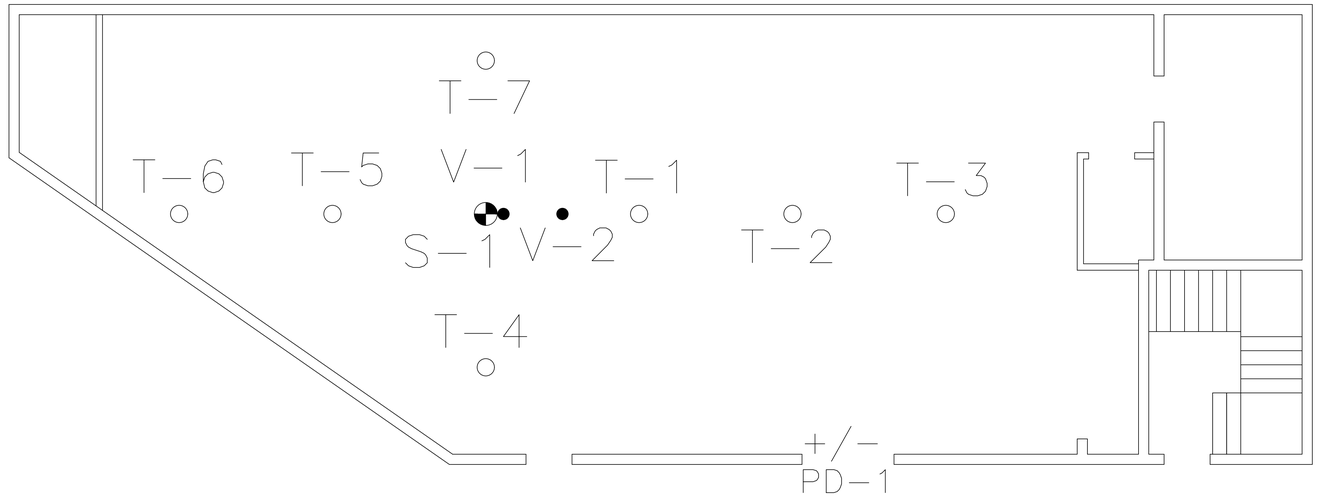
DRAWING LIST

C	Cover
V-1	Diagnostic Test Holes
V-2	Suction Points First Floor
V-3	Suction Points Second Floor
D-1	Mechanical Details

CLEAN VAPOR LLC

P.O. BOX 688, BLAIRSTOWN, NEW JERSEY 07825

Ph 908 362-5616 Fax 908 362-5433 www.cleanvapor.com



N

TRUE PLAN

0 4' 12'

2' 8' 16'

GRAPHIC SCALE

LEGEND

T–X	TEST HOLE
V–X	VELOCITY TEST HOLE
S–X	SUCTION POINT
+/– PD–1	INDOOR / OUTDOOR PRESSURE DIFFERENTIAL

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www.cleanvapor.com

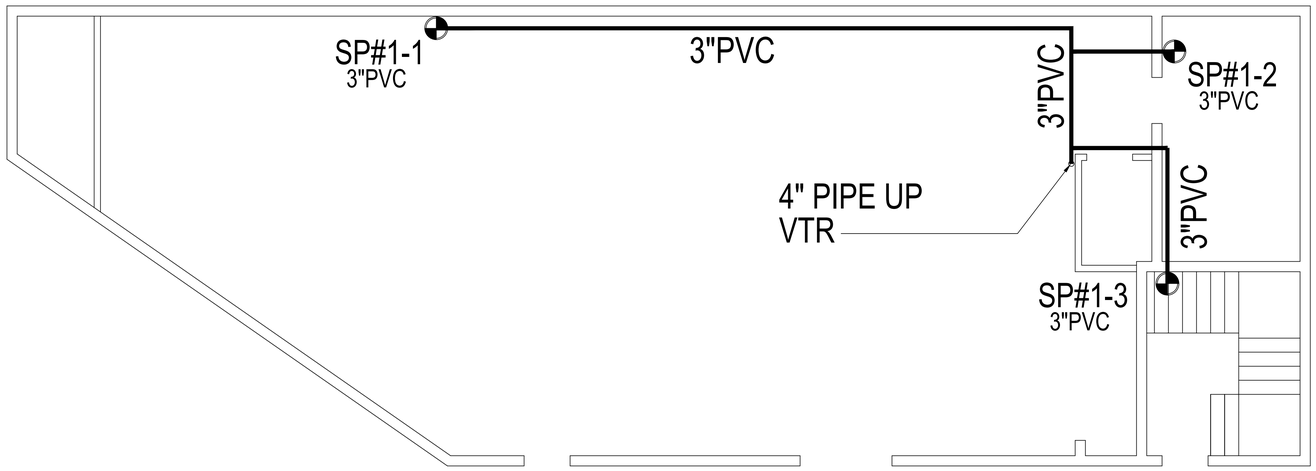
ACTIVE SOIL DEPRESSURIZATION SYSTEM
325 YONKERS AVE
YONKERS, NY 10701

REVISION	DATE

DATE	8–25–22
DRAWN BY	DAB
APPROVED	TEH
SCALE	1/4"=1'
CHECKED BY	TEH

SHEET TITLE
DIAGNOSTIC TEST HOLES

SHEET NO.
V-1



TRUE N PLAN

LEGEND

SP#1-1 3"PVC — SUCTION POINT

0 4' 12'

2' 8' 16'

GRAPHIC SCALE

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www.cleanvapor.com

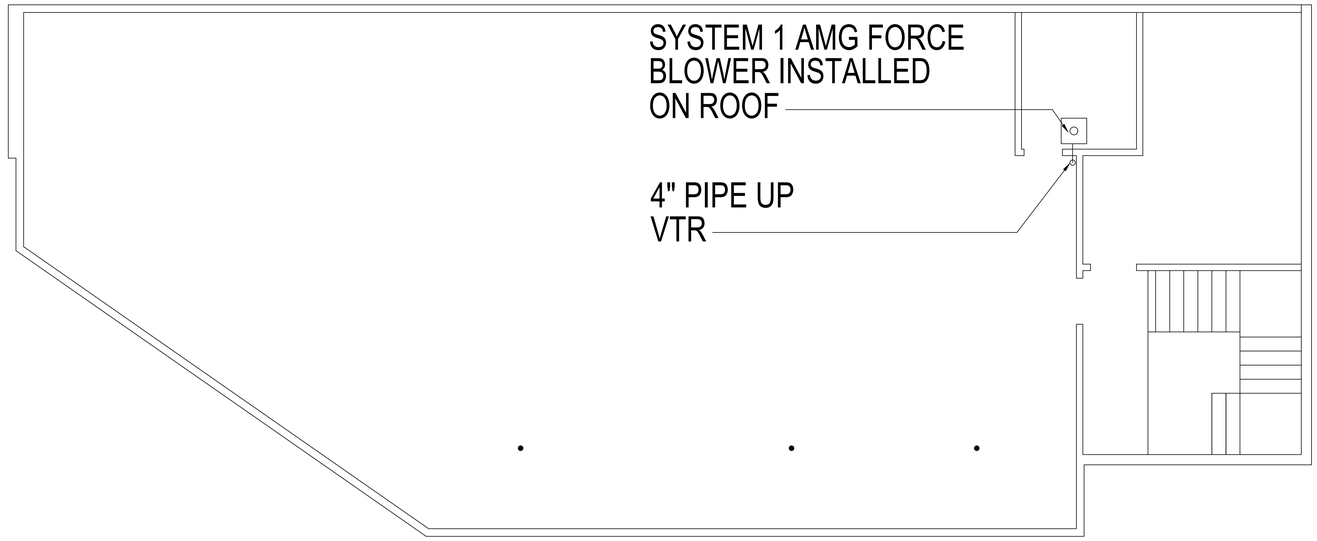
ACTIVE SOIL DEPRESSURIZATION SYSTEM
325 YONKERS AVE
YONKERS, NY 10701

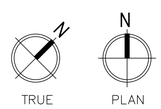
REVISION	DATE

DATE	8-25-22
DRAWN BY	DAB
APPROVED	TEH
SCALE	1/4"=1'
CHECKED BY	TEH

SHEET TITLE
SUCTION POINTS FIRST FLOOR

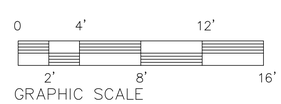
SHEET NO.
V-2





LEGEND

⊡ AMG FORCE BLOWER



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Ph. 908 362-5616 Fax. 908 362-5433
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CLEAN VAPOR

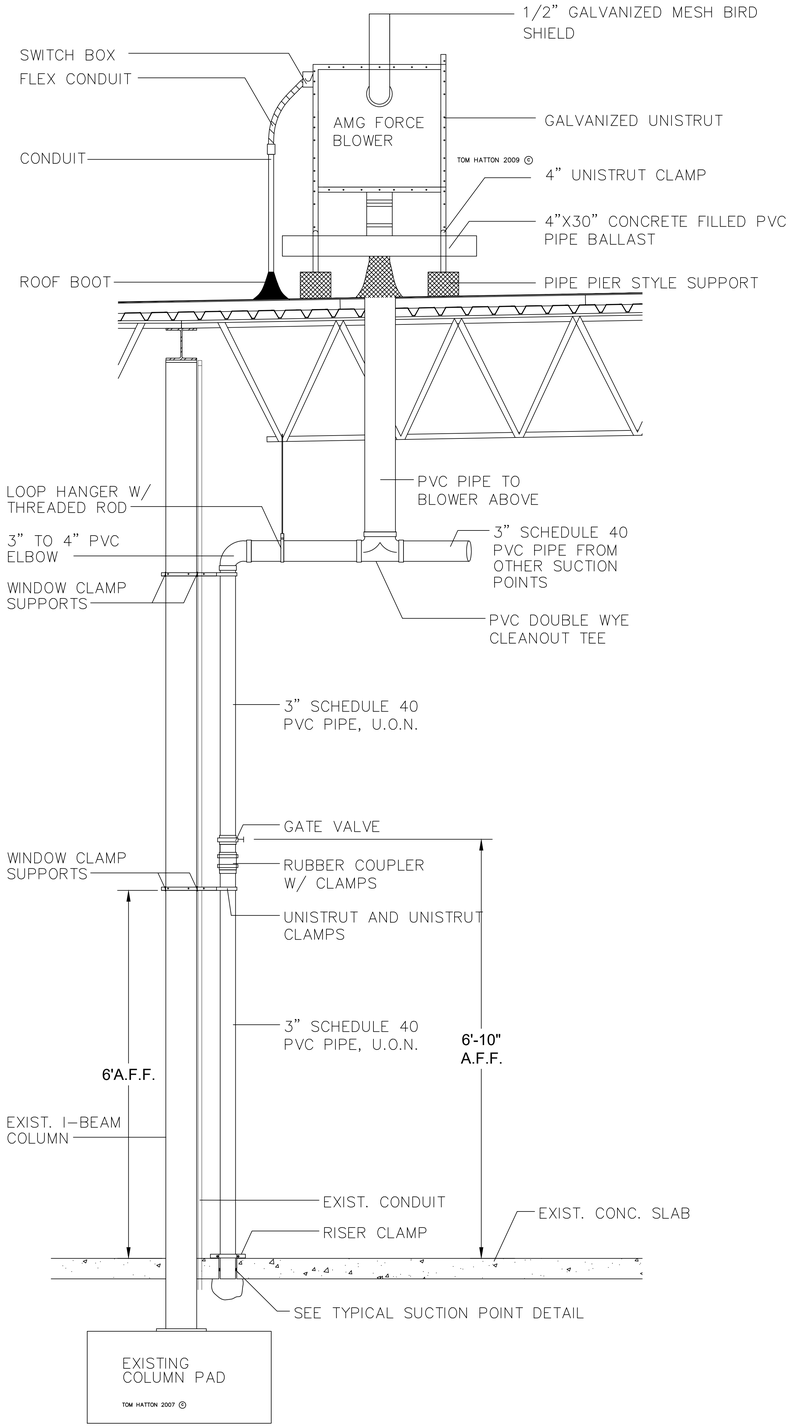
ACTIVE SOIL DEPRESSURIZATION SYSTEM
325 YONKERS AVE
YONKERS, NY 10701

REVISION	DATE

DATE	8-25-22
DRAWN BY	DAB
APPROVED	TEH
SCALE	1/4"=1'
CHECKED BY	TEH

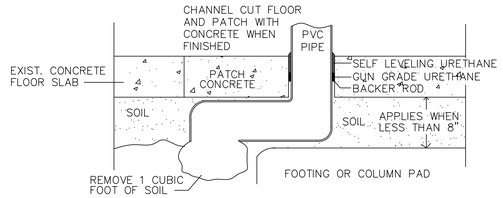
SHEET TITLE
SUCTION POINTS SECOND FLR

SHEET NO.
V-3

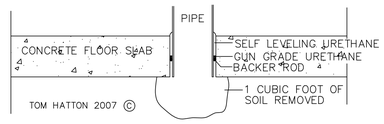


TYPICAL USED COLUMN DETAIL

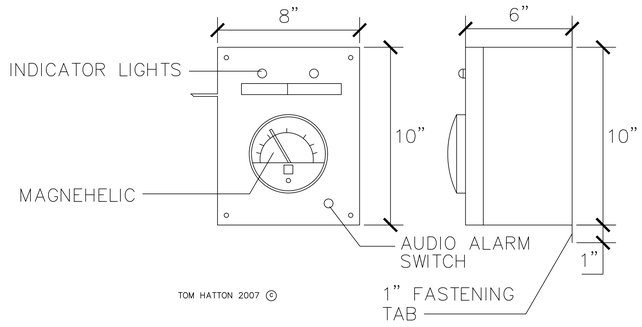
TYPICAL SUCTION POINT DETAIL AT FOOTER



TYPICAL SUCTION POINT DETAIL



MAGNEHELIC AND LIGHT ALARM PANEL DETAIL



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CLEAN VAPOR

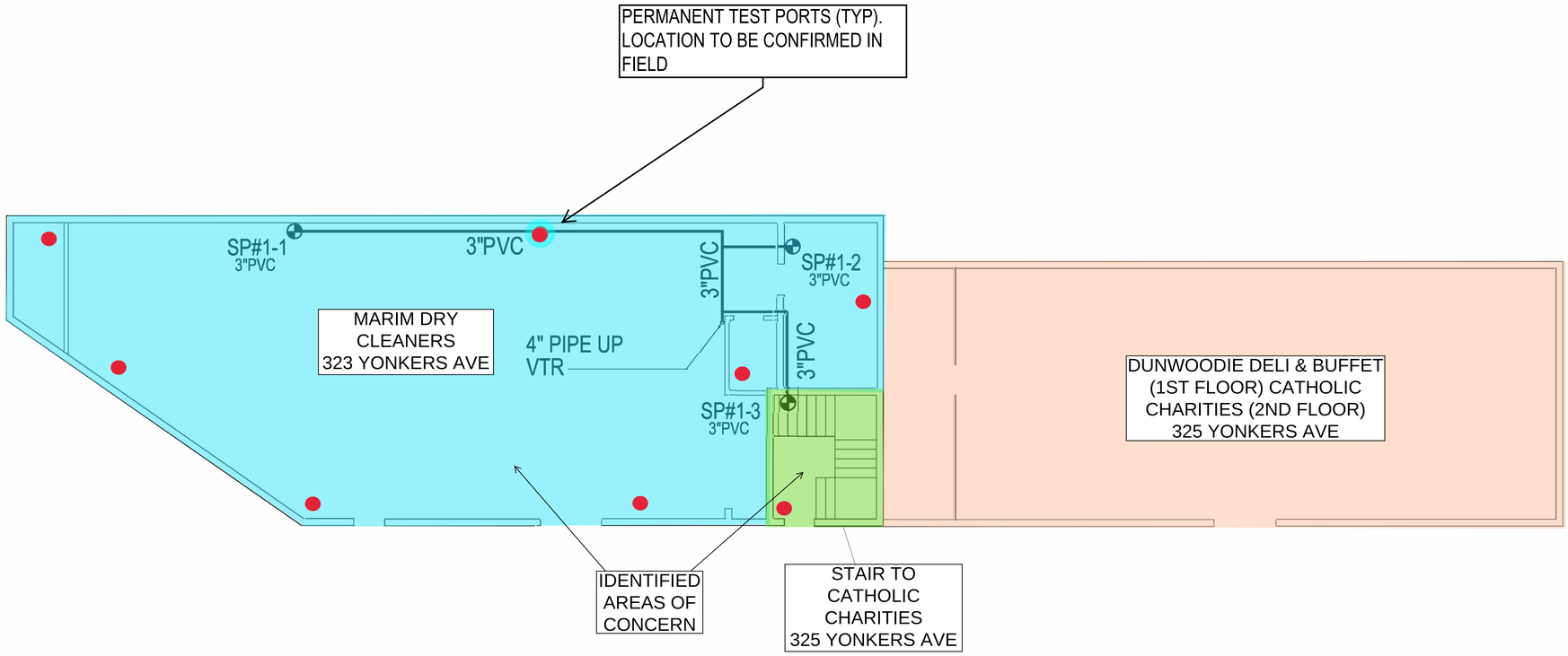
ACTIVE SOIL DEPRESSURIZATION SYSTEM
325 YONKERS AVE
YONKERS, NY 10701

REVISION	DATE

DATE	8-25-22
DRAWN BY	DAB
APPROVED	TEH
SCALE	NTS
CHECKED BY	TEH

SHEET TITLE
MECHANICAL DETAILS

SHEET NO.
D-1



TRUE

N
PLAN

LEGEND

SP#1-1
3"PVC
SUCTION POINT

PERMANENT TEST POINT

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www.cleanvapor.com

CLEAN VAPOR™

ACTIVE SOIL DEPRESSURIZATION SYSTEM
325 YONKERS AVE
YONKERS, NY 10701

REVISION	DATE
DATE APPROVED	10-21-22
DRAWN BY	DAB
APPROVED	TEH
SCALE	3/16"=1'
CHECKED BY	TEH

SHEET TITLE:

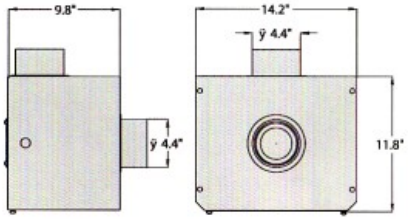
325 YONKERS AVE SITE PLAN

SHEET NO.

FIGURE 1

Appendix D – Cut Sheets

AMG Force



AMG Force, Radon Extract Fan Performance Figures

				CFM at STATIC PRESSURE in. w.g.										
Model	**Volts**	**Watts**	**Max. Amps**	**0"**	**0.5"**	**1.0"**	**1.5"**	**2.0"**	**2.5"**	**3.0"**	**3.5"**	**4.0"**	**4.5"**	**5"**
AMG Force	120V 60Hz	302	2.48	240	223	207	191	174	155	133	110	83	55	28
Weight: 8 lbs. 3 oz. Fan Speed: 3000 rpm														

Performance shown is for installation type D - Ducted inlet, Ducted outlet.
Speed (rpm) shown is nominal. Performance is based on actual speed of test.
Performance ratings do not include the effects of appurtenances in the air stream.
The performance figures shown have been corrected to standard air density.

*We have brackets, too!

To Order Call 1 (800) 806-7866 or 1 (877) 264-3267

Festa Manufacturing Enterprises, LLC.
Festa International Radon Supply Technologies, Co.
Festa Radon Technologies Co.

1 (800) 806-7866 1 (877) 264-3267
47A Progress Avenue, Cranberry Twp., PA 16066

DURA-BLOK™ Rooftop Supports

DURA-BLOK is made from 100% recycled rubber and qualifies for LEED credits. Reflective strips on both sides allow for easy product visibility.

Channels are through bolted on all sizes for added strength and a 1" (25.4mm) gap between blocks allows water to flow freely around longer assemblies.

Product composition is not sharp or abrasive, helping to extend the roof life and no penetration through the roof is required.

The DURA-BLOK dampens vibration, needs no supplemental rubber pad, and will not float or blow away.

DURA-BLOK can be used to support piping, HVAC/Ducts, roof walkways, conduit and cable tray.

Base Only

DBP


DBM

Base Only

Dimensions - 4" (101mm) High x 6" (152mm) Wide x Base Length

Material - 100% recycled rubber, UV resistant

Ultimate Load Capacity - (uniform load) *

DBP = 500 lbs. (2.22kN)

DBM = 200 lbs. (0.89kN)

DURA-BLOK channel support is designed as an economical support for piping systems, cable tray, HVAC equipment and many other applications. The DURA-BLOK is UV resistant and is suitable for any type of roofing material or other flat surfaces. Material effectively accepts screw fasteners for securing accessories.

Part No.	Weight Each
DBP	4.48 (2.03kg)
DBM	2.35 (1.07kg)

Part No.	Height	Width	Length
DBP	4" (101mm)	6" (152mm)	9.6" (244mm)
DBM	4" (101mm)	6" (152mm)	4.8" (122mm)

*** For Roof Loading, Consult Roofing Manufacturer or Engineer. As with most commercial roofs, the weakest point may be the insulation board beneath the rubber membrane.**

All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

EMT

DESIGNATORS		APPROX WT PER 100'		OUTSIDE DIAMETER		NOMINAL WALL THICKNESS		RED AND GALVANIZED BUNDLE QUANTITY		ALL OTHER COLORS BUNDLE QUANTITY	
TRADE SIZE	METRIC	LB	KG	IN	MM	IN	MM	IN	MM	FT	M*
1/2	16	30	13.6	0.706	17.9	0.042	1.07	7000	2135	3500	1067.5
3/4	21	46	20.9	0.922	23.4	0.049	1.25	5000	1525	2500	762.5
1	27	67	30.4	1.163	29.5	0.057	1.45	3000	915	1500	457.5
1-1/4	35	101	45.8	1.510	38.4	0.065	1.65	2000	610	2000	610.0
1-1/2	41	116	52.6	1.740	44.2	0.065	1.65	1500	457.5	1500	457.5
2	53	148	67.1	2.197	55.8	0.065	1.65	1200	366.0	1200	366.0
2-1/2	53	216	98.0	2.875	73.0	0.072	1.83	610	186.1	610	186.1
3	78	263	119.3	3.500	88.9	0.072	1.83	510	155.6	510	155.6
3-1/2	91	349	158.3	4.000	101.6	0.083	2.11	370	112.9	370	112.9
4	103	393	178.2	4.500	114.3	0.083	2.11	300	91.5	300	91.5

*Other Color sizes (2-4) are available thru special order.

Firestop Gun Grade Silicone Sealant CFS-S SIL GG

Product description

- A silicone based firestop sealant that provides maximum movement in fire-rated joints, and seals through-penetration applications

Product features

- Halogen and solvent free
- Asbestos free
- Simple to use and apply
- Good adhesion without use of a primer
- Smoke, fume, water and UV resistant
- Excellent movement capability, meets 500 cycle requirements (ASTM E 1966 and UL 2079)
- Meets Class I W-rating requirements
- Meets LEED™ requirements for indoor environmental quality credit 4.1 Low Emitting Materials, Sealants and Adhesives and 4.2 Paints and Coatings

Areas of application

- Sealing construction/expansion joints
- Top-of-wall joints
- Metal pipes
- Cable bundles
- HVAC penetrations

For use with

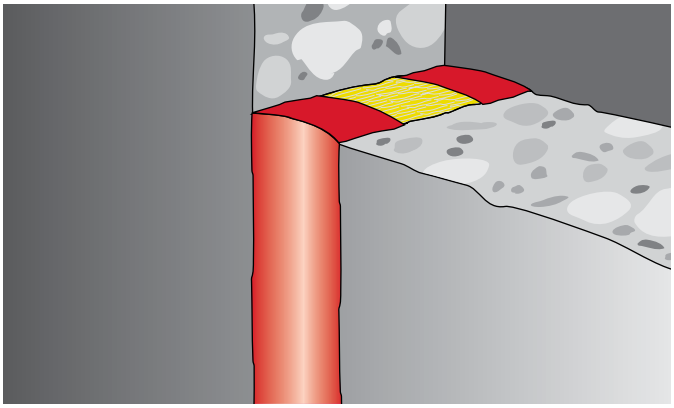
- Various base materials such as masonry, concrete, metal, etc.
- Wall and floor assemblies rated up to 4 hours

Examples

- Where a gypsum wall assembly meets the underside of a metal or concrete deck
- Sealing expansion joints to impede the passage of fire, smoke and toxic fumes
- Sealing around penetrations through fire-rated assemblies

Installation instructions

- Refer to what is included in the package, the MSDS, and the applicable listing.



Technical Data*	CFS-S SIL GG
Chemical basis	Neutral elastic silicone
Density	Approx. 1.4 g/cm³
Color	Available in red, white, and gray
Application temperature	40°F to 104°F (5°C to 40°C)
Skin-forming time	Approx. 15 min.
Curing time	Approx. 2 mm / 3 days
Volume shrinkage	Approx. 0 – 5%
Movement capability (UL 2079)	Approx. 33%
Temperature resistance	–40°F to 300°F (–40°C to 149°C)
Surface burning characteristics (ASTM E84-12)	Flame spread: 0 Smoke development: 25
Sound transmission classification (ASTM E 90-09)	59 (Relates to specific construction)
Tested in accordance with	UL 2079 ASTM E 814 ASTM E 1966 ASTM C 920 UL 1479 ASTM E 84 ASTM G21

*At 73°F (23°C) and 50% relative humidity

CLASSIFIED C UL US
FILL, VOID OR CAVITY MATERIAL
FOR USE IN THROUGH-PENETRATION
FIRESTOP SYSTEMS AND
JOINT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
5BP5

FM APPROVED

FBC SYSTEM COMPATIBLE
Visit fbcsystemcompatible.com.
FBC™ is a trademark of
the Lubrizol Corporation.

W rated SYSTEMS AVAILABLE

Hilti. Outperform. Outlast.

Firestop Collar (CP 643N)

Product description

- A ready-to-use firestop collar, made of a galvanized steel housing and intumescent inserts for firestopping combustible pipes

Product features

- Ready-to-use collar
- No construction required
- Fast installation time
- Adjustable mounting tabs
- Low profile for tight installations

Areas of application

- Firestopping combustible pipes up to 6" diameter in penetrations through fire walls and floors
- Suitable for the following pipe materials:
- PVC, CPVC, ABS, PVDF, PP and FRPP

For use with

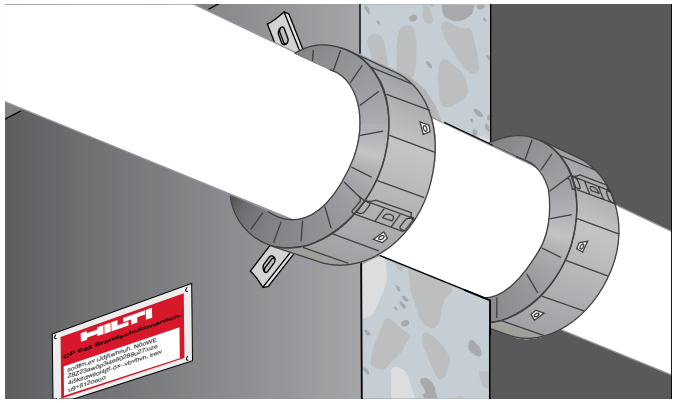
- Concrete, masonry, wood floor and gypsum wall assemblies
- Wall and floor assemblies rated up to 4 hours

Types of installation

- Wall: two collars, one on each side
- Floor: one collar on underside (bottom)

Example

- Waste water pipes
- Fresh water pipes



Technical Data	CP 643N		
Description	Pipe outside dia (in.)	Collar outside dia. (in.)	Collar Height (in.)	No. of hooks and fasteners
CP 643-50/1.5"N	1.4–2.0	2.8	0.9	2
CP 643-63/2"N	2.0–2.5	3.4	1.3	2
CP 643-90/3"N	2.6–3.6	4.9	1.7	3
CP 643-110/4"N	3.6–4.5	6.0	1.9	3
CP 643-160/6"N	6.6	9.8	1.9	4
Temperature resistance		-40°F to 140°F (–40°C to 60°C)		
Intumescent activation		Approx. 392°F (200°C)		
Expansion ratio (unrestricted)		Up to 1:10		

Tested in accordance with
• UL 1479 • ASTM E 814 • ASTM G21

CLASSIFIED c UL us
FIRESTOP DEVICE
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY 5N76

FM APPROVED

FBC SYSTEM COMPATIBLE
Visit fbcsystemcompatible.com.
FBC™ is a trademark of the Lubrizol Corporation.

Installation instructions for CP 643N

Notice

- Before handling, read Material Safety Data Sheet and product label for safe usage and health information.
- Instructions below are general guidelines — always refer to the applicable drawing in the UL Fire Resistance Directory or Hilti Firestop Systems Guide for complete installation information

Opening

1. Clean the plastic pipes. Expansion of the intumescent material during a fire acts to close the plastic pipe. Very dirty pipes (ie: with remains of mortar) may lead to a delay in this closing action. Soiled plastic pipes should, therefore, be cleaned in the area where the CP 643N Firestop Collar is to be installed.

Application of firestop system

2. Seal the opening if required. Gaps may be closed with FS-ONE. The approved methods vary and are given in the specific UL system.
3. Close the CP 643N Firestop Collar. Place the CP 643N Firestop Collar around the plastic pipe and lock the closure by applying firm pressure until it latches.
4. Attach fastening hooks. The fastening hooks can be attached to various points on the metal housing. This allows the fastening points to be made to suit the space available in each case. The hooks must be positioned as symmetrically as possible. The required number of fastening hooks is indicated on the packaging.
5. Fastening the CP 643N Firestop Collar. Only when fastened properly can CP 643N offer protection against fire.

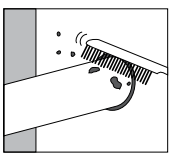
a. Mark the fastening points.
b. Drill holes with a Hilti rotary hammer drill (i.e. TE 4-A18) or, depending on base material, fasten using Hilti powder-actuated tool.
c. To secure the CP 643N Firestop Collar, use Hilti anchors/fasteners.
d. For maintenance reasons, a penetration can be permanently marked with an identification plate and fastened in a visible position next to the seal.

Not for use

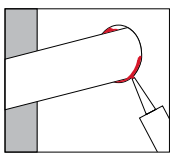
- With metal pipes
- In highly corrosive surroundings
- With unapproved anchors/fasteners

Storage

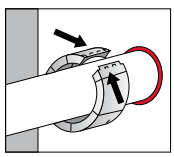
- Store only in the original packaging in a location protected from moisture



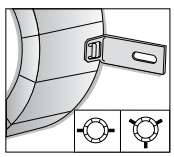
1. Clean plastic pipe.



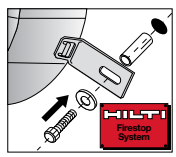
2. Close remaining gap to provide smoke and gas resistant seal.



3. Close collar.



4. Attach fastening hooks.



5. Fasten collar and identification plate (if required).

Hilti Firestop
Saving lives through innovation and education

Hilti. Outperform. Outlast.

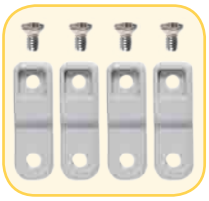
8X8X4 PREMIUM LINE

PREMIUM POLYCARBONATE ENCLOSURE

Features and Benefits

- 16 Standard configurations including hinged or non-hinged lids in 2-screw, 4-screw, or stainless steel metal latched lids.
- Standard color – light gray with a gloss finish.
- Best material – bases, opaque covers and clear covers are all made of high-impact, UV resistant polycarbonate.
- Easy ordering – one part number includes base, lid, mounting feet or flanges and all lid fastening hardware (mounting panels sold separately).
- Flexible interior mounting – features the unique and patented Integra adjustable depth "T-Rail" back panel mounting system (back panel and adjustable brackets sold separately).
- Features multiple bosses for easy installation of devices and DIN rails.
- UL-50 / c-UL Listed (files # E229365, # E207562)

Our Premium line of enclosures are the most durable, aesthetically pleasing, non-metallic Nema UL rated enclosures available. From the extremely versatile mounting options inside the enclosure to having the most off the shelf accessories, the Integra "Made In the USA" Premium line of enclosures provide great value to any application.



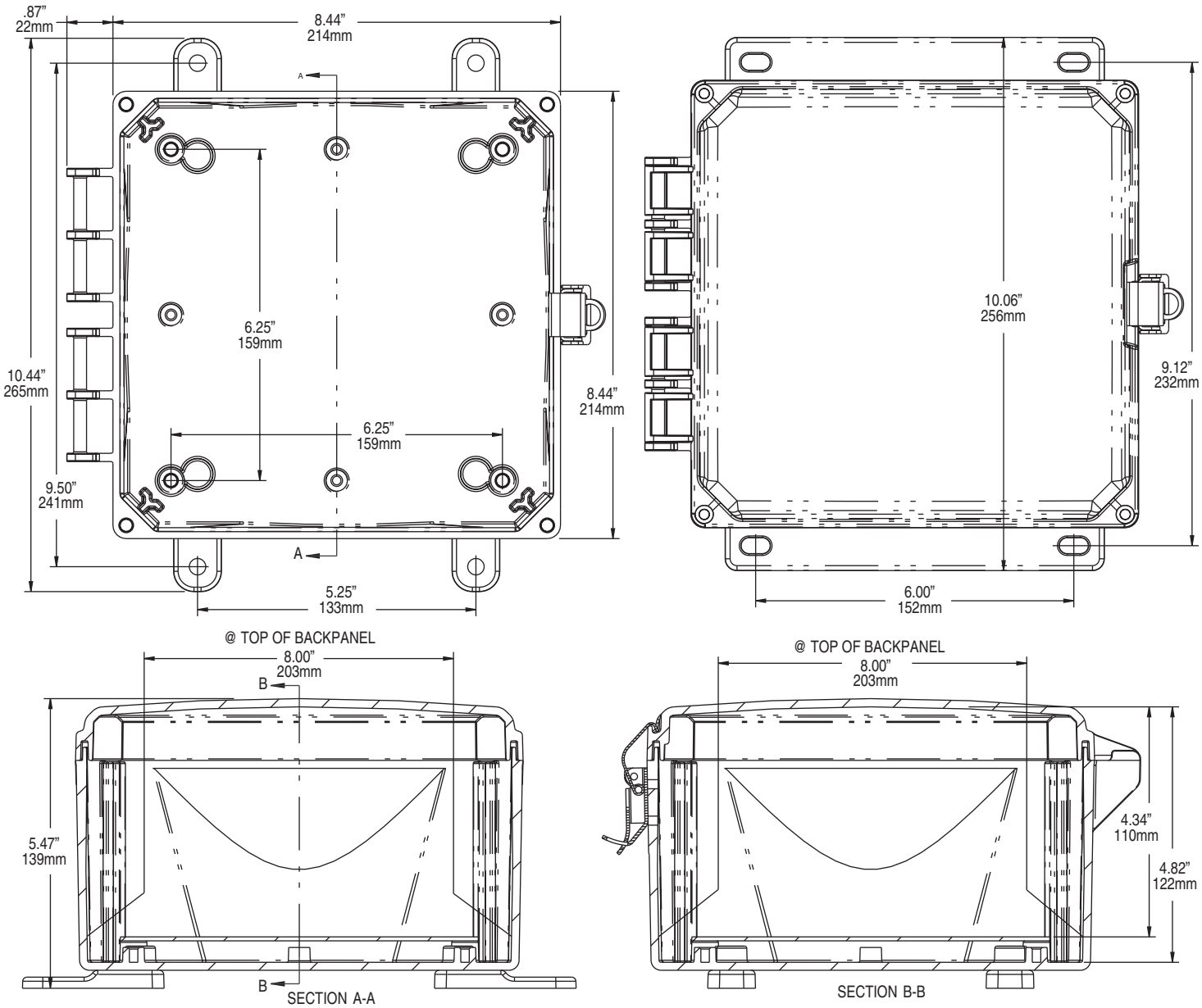
Comes with feet or flanges.

Atex pending, contact factory for details

Mechanical and Thermal	Test Spec.	Unit	Premium Line
Instrumented Dart Impact @ 73° F		in/lb.	565
Falling Ball/Impact @ 73° F	UL-746	in/lb.	900
Deflection Temperature @ 264 psi	ASTM D648	Deg. F	270
Modulus of Elasticity	ASTM D790	x 10^5 lb/in^2	3.4
Temperature Range		Deg. F	-40 to 265
Flammable / UV Ratings	**Test Spec.**	**Unit**	**Premium Line**
Flame Rating - UL	UL 94	-	V2
Outdoor UV Exposure	UL	-	F1

8084 P/N	4X IP66	6P IP68	Hinged Cover	Screw Cover	Opaque Cover	Clear Cover	Mounting Feet	Mounting Flange	Stainless Steel Locking Latch	T-Rail System
H8084S	✓	✓		✓	✓		✓			✓
H8084SC	✓	✓		✓		✓	✓			✓
H8084SF	✓	✓		✓	✓			✓		✓
H8084SCF	✓	✓		✓		✓		✓		✓
H8084H	✓		✓	✓	✓		✓			✓
H8084HC	✓		✓	✓		✓	✓			✓
H8084HF	✓		✓	✓	✓			✓		✓
H8084HCF	✓		✓	✓		✓		✓		✓
H8084HLL	✓		✓		✓		✓		✓	✓
H8084HCLL	✓		✓			✓	✓		✓	✓
H8084HFLL	✓		✓		✓			✓	✓	✓
H8084HCFLL	✓		✓			✓		✓	✓	✓
H8084H-6P	✓	✓	✓	✓	✓		✓			✓
H8084HC-6P	✓	✓	✓	✓		✓	✓			✓
H8084HF-6P	✓	✓	✓	✓	✓			✓		✓
H8084HCF-6P	✓	✓	✓	✓		✓		✓		✓

TORQUE SPECIFICATIONS - Mounting Brackets - 1/4"-20 x 0.25 SS, countersunk phillips drive screws (torque limit = 20 in. lbs.) | **Covers / Doors** - Torque for corner screws is 5 pounds inches.



Register online to download this drawing off the Integra website at www.integraenclosures.com | Your company's logo or other information on the lid. Consult factory for details.

Accessories for 8x8x4 (For complete accessories, see page 39-42)

Back Panels
ABP88 - Aluminum panel
SBP88 - Steel panel
PVCBP88 - PVC panel

Swing Out Panels
ABP-88SP/SOPK - Complete panel kit
ABP-88SP - Aluminum swing out panels only
SOPK - Hardware only

Back Panel Adjustment Kit
BPAKG - Grey
BPAKB - Black

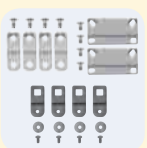
Air Vents
VENT 1 - Aluminum louvered
VENT 2 - Outdoor labyrinth

Lock
CAT 60
CAT 90

Mounting Screws
SP-10 - 10 Pieces self-tapping screws for bosses

Din Rail
DIN 8 - 2 rails, 4 screws

Pole Mounting Kit
PMKG-28 - 2" pole
PMKG-38 - 3" pole
PMKG-48 - 4" pole
PMKG-128 - 12" pole



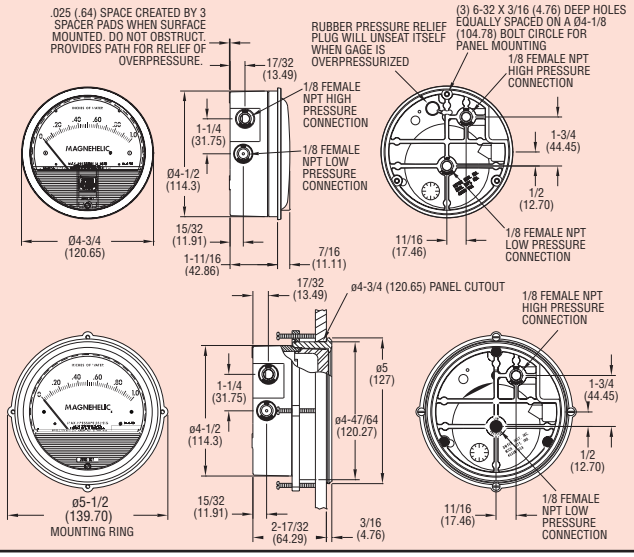
Mounting Feet & Flange Kits
MFKG - Premium line feet
MFKSS - Stainless steel feet
MFLK6 - 8" Flange kit

Series 2000

Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%

RoHS



Select the Dwyer® 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. No manometer fluid to evaporate, freeze or cause toxic or leveling problems. It's inexpensive, too.

The Magnehelic® gage is the industry standard to measure fan and blower pressures, filter resistance, air velocity, furnace draft, pressure drop across orifice plates, liquid levels with bubbler systems and pressures in fluid amplifier or fluidic systems. It also checks gas-air ratio controls and automatic valves, and monitors blood and respiratory pressures in medical care equipment.

Mounting

A single case size is used for most models of Magnehelic® gages. They can be flush or surface mounted with standard hardware supplied. Although calibrated for vertical position, many ranges above 1″ may be used at any angle by simply re-zeroing. However, for maximum accuracy, they must be calibrated in the same position in which they are used. These characteristics make Magnehelic® gages ideal for both stationary and portable applications. A 4-9/16″ hole is required for flush panel mounting. Complete mounting and connection fittings, plus instructions, are furnished with each instrument. See page 7 for more information on mounting accessories.

Flush, Surface or Pipe Mounted

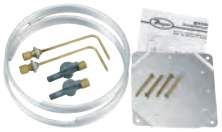
Enclosure Mounted

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, -100 Pa, -125 Pa, 10MM and ±4% on - 00, -60 Pa, -6MM ranges), throughout range at 70°F (21.1°C).
Pressure Limits: -20 in Hg to 15 psig† (-0.677 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 next 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 adapter, and three flush mounting adapters with screws. (Mounting and snap ring retainer substituted for three adapters in MP & HP gage accessories.)
Agency Approval: RoHS. **Note:** -SP models not RoHS approved.
†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options at lower left.

ACCESSORIES

Model A-432 Portable Kit
Combine carrying case with any Magnehelic® gage of standard range, except high pressure connection. Includes 9 ft (2.7 m) of 3/16″ ID rubber tubing, standhang bracket and terminal tube with holder.



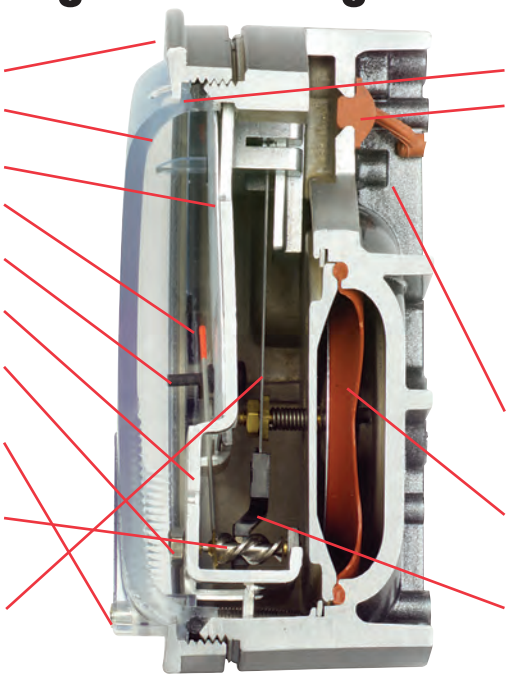
Model A-605 Air Filter Gage Accessory Kit
Adapts any standard Magnehelic® gage for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft (1.5 m) lengths of 1/4″ aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings on both tips and valves.

A-605B Air Filter Gage Accessory Kit, Air filter kit with two plastic open/close valves, two 4″ steel static tips, plastic tubing and mounting flange

A-605C Air Filter Gage Accessory Kit, Air filter kit with two plastic open/close valves, two plastic static tips, plastic tubing and mounting flange

Series 2000

Magnehelic® Gage Models & Ranges



Bezel provides flange for flush mounting in panel.

Clear plastic face is highly resistant to breakage. Provides undistorted viewing of pointer and scale.

Precision litho-printed scale is accurate and easy to read.

Red tipped pointer of heat treated aluminum tubing is easy to see. It is rigidly mounted on the helix shaft.

Pointer stops of molded rubber prevent pointer over-travel without damage.

"Wishbone" assembly provides mounting for helix, helix bearings and pointer shaft.

Jeweled bearings are shock-resistant mounted; provide virtually friction-free motion for helix. Motion damped with high viscosity silicone fluid.

Zero adjustment screw is conveniently located in the plastic cover, and is accessible without removing cover. O-ring seal provides pressure tightness.

Helix is precision made from an alloy of high magnetic permeability. Mounted in jeweled bearings, it turns freely, following the magnetic field to move the pointer across the scale.

Calibrated range spring is flat spring steel. Small amplitude of motion assures consistency and long life. It reacts to pressure on diaphragm. Live length adjustable for calibration.

O-ring seal for cover assures pressure integrity of case.

OVERPRESSURE PROTECTION
Blowout plug is comprised of a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig (1.7 bar). To provide a free path for pressure relief, there are four spacer pads which maintain 0.023˝ clearance when gage is surface mounted. Do not obstruct the gap created by these pads. The blowout plug is not used on models above 180˝ of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm. The blowout plug should not be used as a system overpressure control. High supply pressures may still cause the gage to fail due to over pressurization, resulting in property damage or serious injury. Good engineering practices should be utilized to prevent your system from exceeding the ratings or any component.

Die cast aluminum case is precision made and iridite-dipped to withstand 168 hour salt spray corrosion test. Exterior finished in baked dark gray hammerloid. One case size is used for all standard pressure options, and for both surface and flush mounting.

Silicone rubber diaphragm with integrally molded O-ring is supported by front and rear plates. It is locked and sealed in position with a sealing plate and retaining ring. Diaphragm motion is restricted to prevent damage due to overpressures.

Samarium Cobalt magnet mounted at one end of range spring rotates helix without mechanical linkages.

Model	Range Inches of Water
2000-00N†••	.05-0-.2
2000-00†••	0-.25
2000-0†•	0-.50
2001	0-1.0
2002	0-2.0
2003	0-3.0
2004	0-4.0
2005	0-5.0
2006	0-6.0
2008	0-8.0
2010	0-10
2012	0-12
2015	0-15
2020	0-20
2025	0-25
2030	0-30
2040	0-40
2050	0-50
2060	0-60
2080	0-80
2100	0-100
2120	0-120
2150	0-150
2160	0-160
2180*	0-180
2250*	0-250
Zero Center Ranges	
2300-00†••	0.125-0-0.125
2300-0†•	.25-0-.25
2301	.5-0-.5
2302	1-0-1
2304	2-0-2
2310	5-0-5
2320	10-0-10
2330	15-0-15

Model	Range PSI
2201	0-1
2202	0-2
2203	0-3
2204	0-4
2205	0-5
2210*	0-10
2215*	0-15
2220*	0-20
2230**	0-30

Model	Range, CM of Water
2000-15CM	0-15
2000-20CM	0-20
2000-25CM	0-25
2000-50CM	0-50
2000-80CM	0-80
2000-100CM	0-100
2000-150CM	0-150
2000-200CM	0-200
2000-250CM	0-250
2000-300CM	0-300
Zero Center Ranges	
2300-4CM	2-0-2
2300-10CM	5-0-5
2300-30CM	15-0-15

†These ranges calibrated for vertical scale position.
• Accuracy +/-3%
• • Accuracy +/-4%
*MP option standard
**HP option standard

Model	Range MM of Water
2000-6MM†••	0-6
2000-10MM†•	0-10
2000-15MM	0-15
2000-25MM	0-25
2000-30MM	0-30
2000-50MM	0-50
2000-80MM	0-80
2000-100MM	0-100
2000-125MM	0-125
2000-150MM	0-150
2000-200MM	0-200
2000-250MM	0-250
2000-300MM	0-300
Zero Center Ranges	
2300-6MM†••	3-0-3
2300-10MM†•	5-0-5
2300-20MM†•	10-0-10

Model	Range, Pa
2000-60NPA†••	10-0-50
2000-60PA†••	0-60
2000-100PA†•	0-100
2000-125PA†•	0-125
2000-250PA	0-250
2000-300PA	0-300
2000-500PA	0-500
2000-750PA	0-750
2000-1000PA	0-1000
Zero Center Ranges	
Model	**Range, Pa**
2300-60PA†••	30-0-30
2300-100PA†•	50-0-50
2300-120PA	60-0-60
2300-200PA	100-0-100
2300-250PA	125-0-125
2300-300PA	150-0-150
2300-500PA	250-0-250
2300-1000PA	500-0-500

Model	Range, kPa
2000-0.5KPA	0-0.5
2000-1KPA	0-1
2000-1.5KPA	0-1.5
2000-2KPA	0-2
2000-2.5KPA	0-2.5
2000-3KPA	0-3
2000-4KPA	0-4
2000-5KPA	0-5
2000-8KPA	0-8
2000-10KPA	0-10
2000-15KPA	0-15
2000-20KPA	0-20
2000-25KPA	0-25
2000-30KPA	0-30
Zero Center Ranges	
2300-1KPA	.5-0-.5
2300-2KPA	1-0-1
2300-2.5KPA	1.25-0-1.25
2300-3KPA	1.5-0-1.5

Dual Scale Air Velocity Units
For use with pitot tube

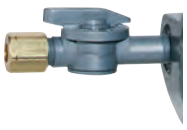
Model	Range in W.C./ Velocity F.P.M.
2000-00AV†••	0-.25/300-2000
2000-0AV†•	0-.50/500-2800
2001AV	0-1.0/500-4000
2002AV	0-2.0/1000-5600
2005AV	0-5.0/2000-8800
2010AV	0-10/2000-12500

Dual Scale English/Metric Models

Model	Range, in w.c.	Range, Pa or kPa
2000-00D†••	0-.25	0-62 Pa
2000-0D†•	0-0.5	0-125 Pa
2001D	0-1.0	0-250 Pa
2002D	0-2.0	0-500 Pa
2003D	0-3.0	0-750 Pa
2004D	0-4.0	0-1.0 kPa
2005D	0-5.0	0-1.25 kPa
2006D	0-6.0	0-1.5 kPa
2008D	0-8.0	0-2.0 kPa
2010D	0-10	0-2.5 kPa
2015D	0-15	0-3.7 kPa
2020D	0-20	0-5 kPa
2025D	0-25	0-6.2 kPa
2050D	0-50	0-12.4 kPa
2060D	0-60	0-15 kPa

VELOCITY AND VOLUMETRIC FLOW UNITS
Scales are available on the Magnehelic® that read in velocity units (FPM, m/s) or volumetric flow units (SCFM, m^3/s, m^3/h). Stocked velocity units with dual range scales in inches w.c. and feet per minute are shown above. For other ranges contact the factory.
When ordering volumetric flow scales please specify the maximum flow rate and its corresponding pressure. Example: 0.5 in w.c. = 16,000 CFM.

ACCESSORIES
A-321, Safety Relief Valve
A-448, 3-piece magnet kit for mounting Magnehelic® gage directly to magnetic surface
A-135, Rubber gasket for panel mounting
A-401, Plastic Carry Case



A-310A 3-Way Vent Valves
In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

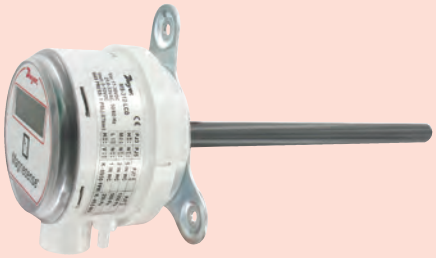
Series MS

Magnesense® Differential Pressure Transmitter

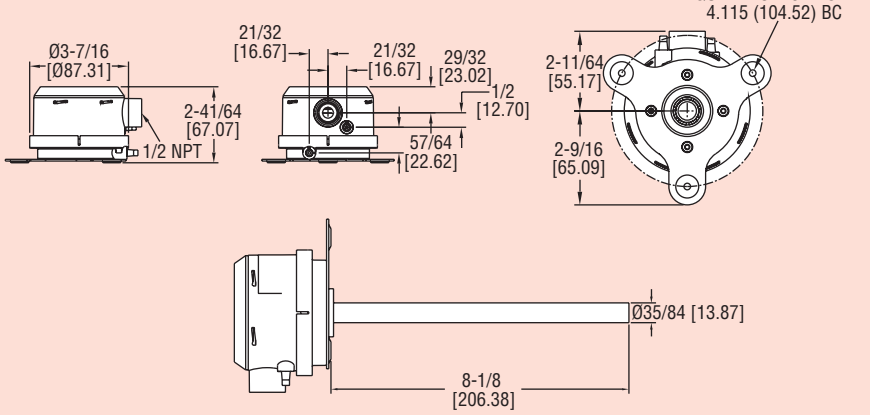
Monitors Pressure & Air Velocity

CE

Standard MS with optional LCD



MS with optional LCD and static probe



The Series MS Magnesense® Differential Pressure Transmitter is an extremely versatile transmitter for monitoring pressure and air velocity. This compact package is loaded with features such as:

- Field selectable English or Metric ranges
- Field upgradeable LCD display
- Adjustable damping of output signal (with optional display)
- Ability to select a square root output for use with pitot tubes and other similar flow sensors

Along with these features, the patented magnetic sensing technology provides exceptional long term performance and enables the Magnesense® Differential Pressure Transmitter to be the single solution for your pressure and flow applications.

Model	Output	Selectable Ranges
MS-121*	4-20 mA	0.1″, 0.25″, 0.5″ w.c. (25, 50, 100 Pa)
MS-321*	0-10 V	0.1″, 0.25″, 0.5″ w.c. (25, 50, 100 Pa)
MS-721*	0-5 V	0.1″, 0.25″, 0.5″ w.c. (25, 50, 100 Pa)
MS-111*	4-20 mA	1″, 2″, 5″ w.c. (250, 500, 1250 Pa)
MS-311*	0-10 V	1″, 2″, 5″ w.c. (250, 500, 1250 Pa)
MS-711*	0-5 V	1″, 2″, 5″ w.c. (250, 500, 1250 Pa)
MS-131	4-20 mA	10″ w.c. (2 kPa)
MS-141	4-20 mA	15″ w.c. (3 kPa)
MS-151	4-20 mA	25″ w.c. (5 kPa)
MS-331	0-10 V	10″ w.c. (2 kPa)
MS-341	0-10 V	15″ w.c. (3 kPa)
MS-351	0-10 V	25″ w.c. (5 kPa)
MS-021	4-20 mA	±0.1″, 0.25″,0.5″ w.c. (±25, 50, 100 Pa)
MS-221	0-10 V	±0.1″, 0.25″,0.5″ w.c. (±25, 50, 100 Pa)
MS-621	0-5 V	±0.1″, 0.25″,0.5″ w.c. (±25, 50, 100 Pa)

OPTIONS

Note: Add -LCD to end of model for units with display.
*Models available with duct mount static pressure probe. Change last digit from 1 to 2. Ex. MS-122

Add suffix -NIST to end of model numbers for NIST traceable calibration certificate. Example: MS-021-NIST.

Add suffix -FC to end of model numbers for factory calibration certificate. Example: MS-021-FC.

SPECIFICATIONS

Service: Air and non-combustible, compatible gases.
Wetted Materials: Consult factory.
Accuracy: ±1% for 0.25″ (50 Pa), 0.5″ (100 Pa), 2″ (500 Pa), 5″ (1250 Pa), 10″ (2 kPa), 15″ (3 kPa), 25″ (5 kPa) ±2% for 0.1″ (25 Pa), 1″ (250 Pa) and all bi-directional ranges.
Stability: ±1% / year FSO.
Temperature Limits: 0 to 150°F (-18 to 66°C).
Pressure Limits: 1 psi maximum, operation; 10 psi, burst.
Power Requirements: 10 to 35 VDC (2-wire); 17 to 36 VDC or isolated 21.6 to 33 VAC (3-wire).
Output Signals: 4 to 20 mA (2-wire); 0 to 5 V, 0 to 10 V (3-wire).
Response Time: Adjustable 0.5 to 15 sec. time constant. Provides a 95% response time of 1.5 to 45 seconds.
Zero & Span Adjustments: Digital push button.
Loop Resistance: Current output: 0-1250 Ω max; Voltage output: min. load resistance 1 kΩ.
Current Consumption: 40 mA max.
Display (optional): 4 digit LCD.
Electrical Connections:
4-20 mA, 2-Wire: European style terminal block for 16 to 26 AWG.
0-10 V, 3-Wire: European style terminal block for 16 to 22 AWG.
Electrical Entry: 1/2″ NPS thread.
Accessory (A-151): Cable gland for 5 to 10 mm diameter cable.
Process Connections: 3/16″ ID tubing (5 mm ID). Maximum OD 9 mm.
Enclosure Rating: NEMA 4X (IP66).
Mounting Orientation: Diaphragm in vertical position.
Weight: 8.0 oz (230 g).
Agency Approvals: CE.

ACCESSORIES

A-435, Field Upgradeable LCD
A-480, Plastic Static Pressure Tip
A-481, Installer kit. Includes 2 plastic static pressure tips and 7 ft (2.1 m) of PVC tubing
A-489, 4″ Straight Static Pressure Tip with Flange
A-302F-A, 303 SS Static Pressure Tip with mounting flange. For 3/16″ ID rubber or plastic tubing. 4″ insertion depth. Includes mounting screws
SCD-PS, 100 to 240 VAC/VDC to 24 VDC Power Supply

See page 567 for process tubing options.

MITSUBISHI ELECTRIC

Changes for the Better

for a greener tomorrow

Jul. 2014

New Product RELEASE

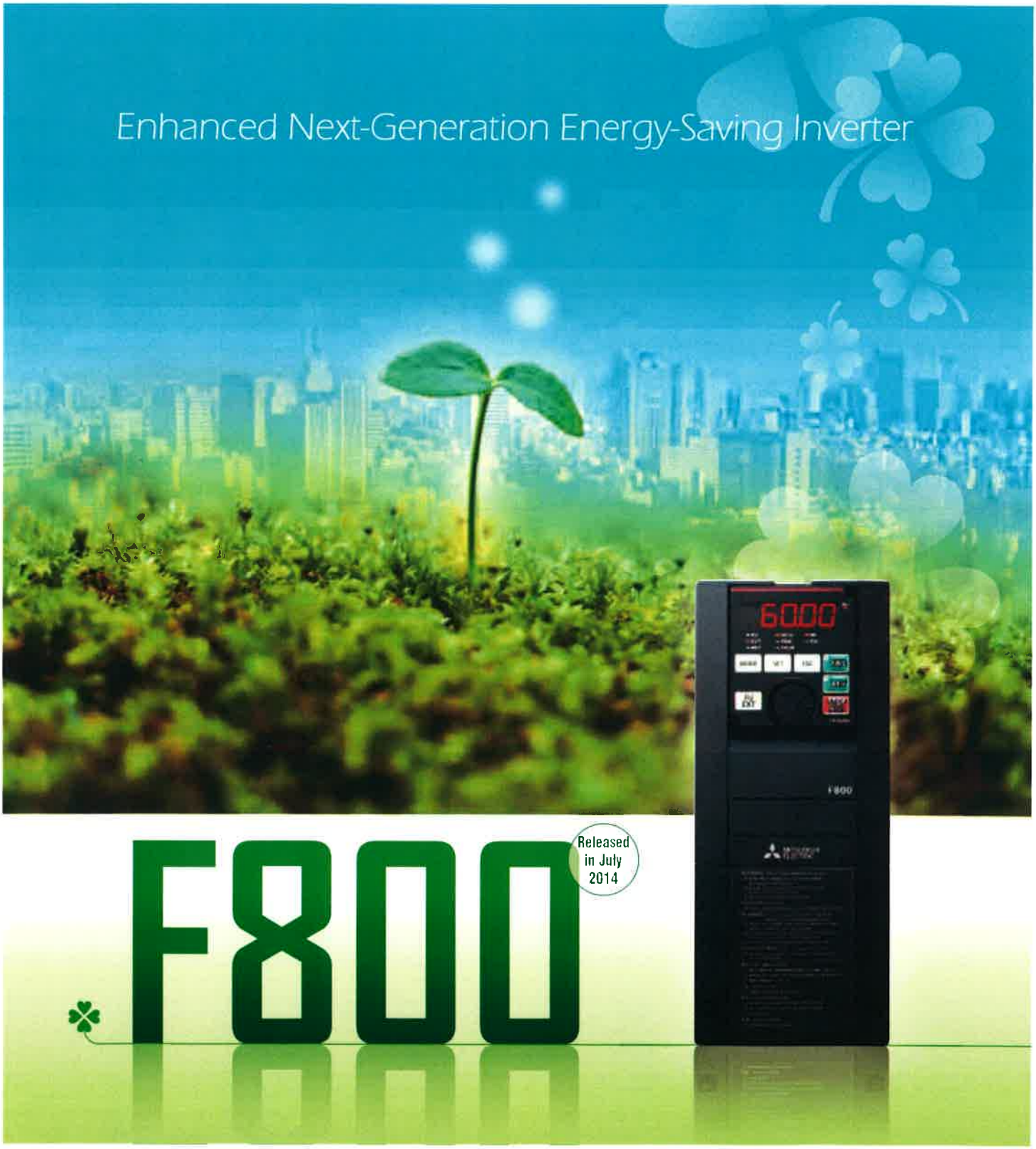
No.14-6

INVERTER

Model

FR-F800

800 series



Vapor Guardian 5500®

Dynamic Controls and Remote Management

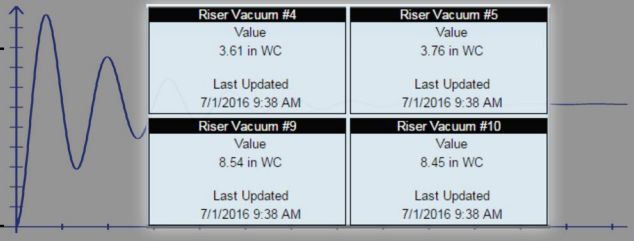
Backed by 30 Years of Mitigation Experience

Key Features

+ Save up to 90% on power consumption
+ Remotely manage 10 dynamically controlled blower systems
+ Remotely control sub-slab pressures to tolerance of 0.001 ″w.c.
+ Remotely monitor up to 44 additional performance metrics
+ Login and view system performance in real-time
+ Automated Email and text alerts
+ Automated quarterly and annual performance reports

Specification

Outputs to Control Blowers	10	Height	15.8"
Inputs for Sensors	44	Length	15.8"
Sensor Input Current	4-20 mA	Width	5.2"
Powered by	120VAC or 24VDC		



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PVC SCHEDULE 40 FITTINGS

40-2-0604

Performance Engineered & Tested

SPEARS® Schedule 40 PVC fitting designs combine years of proven experience with computer generated stress analysis to yield the optimum physical structure and performance for each fitting. Material reinforcement is uniformly placed in stress concentration areas for substantially improved pressure handling capability. Resulting products are subjected to numerous verification tests to assure the very best PVC fittings available.

Full 1/4" Through 12" Availability

Spears® comprehensive line of PVC fittings offers a variety of injection molded configurations in Schedule 40 sizes 1/4" through 12" conforming to ASTM D 2466.

Exceptional Chemical & Corrosion Resistance

Unlike metal, PVC fittings never rust, scale, or pit, and will provide many years of maintenance-free service and extended system life.

High Temperature Ratings

PVC thermoplastic can handle fluids at service temperatures up to 140°F (60°C), allowing a wide range of process applications, including corrosive fluids.

Lower Installation Costs

Substantially lower material costs than steel alloys or lined steel, combined with lighter weight and ease of installation, can reduce installation costs by as much as 60% over conventional metal systems.

Higher Flow Capacity

Smooth interior walls result in lower pressure loss and higher volume than conventional metal fittings.

Additional Fabricated Configurations through 36"

Extra large, hard-to-find, and custom configurations are fabricated from NSF Certified pipe. Fittings are engineered and tested to provide full pressure handling capabilities according to Spears® specifications.

PVC Valves

SPEARS® PVC Valve products are available for total system compatibility and uniformity; see SPEARS® THERMOPLASTIC VALVES PRODUCT GUIDE & ENGINEERING SPECIFICATIONS (V-4).

Advanced Design Specialty Fittings

Spears® wide range of innovative, improved products include numerous metal-to-plastic transition fittings and unions with Spears® patented special reinforced (SR) plastic threads.

Sample Engineering Specifications

All PVC Schedule 40 fittings shall be produced by Spears® Manufacturing Company from PVC Type I cell classification 12454, conforming to ASTM D 1784. All injection molded PVCSchedule 40 fittings shall be Certified for potable water service by NSF International and manufactured in strict compliance to ASTM D 2466. All fabricated fittings shall be produced in accordance with Spears® General Specifications for Fabricated Fittings.

MADE IN THE U.S.A. WITH PRIDE

LPCB

Quality Systems Certificate No. 293
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001

PROGRESSIVE PRODUCTS FROM SPEARS® INNOVATION & TECHNOLOGY

Visit our web site: www.spearsmfg.com

PVC Thermoplastic Pipe Temperature Pressure De-Rating

To determine the maximum internal pressure rating at an elevated temperature, simply multiply the pipe pressure rating at 73°F by the percentage specified for the desired temperature.

System Operating Temperature °F (°C)	73 (23)	80 (27)	90 (32)	100 (38)	110 (43)	120 (49)	130 (54)	140 (60)
PVC	100%	90%	75%	62%	50%	40%	30%	22%

NOTE: Valves, Unions and Specialty Products have different elevated temperature ratings than pipe.

PVC Basic Physical Properties

Properties	ASTM Test Method	PVC
Mechanical Properties, 73°F		
Specific Gravity, g/cm³	D 792	1.41
Tensile Strength, psi	D 638	7,200
Modulus of Elasticity, psi	D 638	440,000
Compressive Strength, psi	D 695	9,000
Flexural Strength, psi	D 790	13,200
Izod Impact, notched, ft-lb/in	D 256	.65
Thermal Properties		
Heat Deflection Temperature, °F at 66 psi	D 648	165
Thermal Conductivity, BTU/hr/sq ft/°F/in	C 177	1.2
Coefficient of Linear Expansion, in/in/°F	D 696	3.1 X 10^5
Flammability		
Limiting Oxygen Index, %	D 2863	43
UL 94 rating	94V-0	
Other Properties		
Water Absorption, % 24 hr.	D 570	.05
Industry Standard Color	White / Dark Gray	
ASTM Cell Classification	D 1784	12454
NSF Potable Water Approved	Yes	

PVC Chemical Resistance

PVC is generally inert to most mineral acids, bases, salts and paraffinic hydrocarbon solutions. For more information on PVC chemical resistance refer to the Chemical Resistance of Rigid Vinyls Based on Immersion Test, published by the GEON® Company.

NOT FOR USE WITH COMPRESSED AIR OR GAS

Spears® Manufacturing Company DOES NOT RECOMMEND the use of thermoplastic piping products for systems to transport or store compressed air or gases, or the testing of thermoplastic piping systems with compressed air or gases in above and below ground locations. The use of our product in compressed air or gas systems automatically voids any warranty for such products, and its use against our recommendation is entirely the responsibility and liability of the installer.

WARNING: DO NOT USE COMPRESSED AIR OR GAS TO TEST ANY PVC OR CPVC THERMOPLASTIC PIPING PRODUCT OR SYSTEM, AND DO NOT USE DEVICES PROPELLED BY COMPRESSED AIR OR GAS TO CLEAR SYSTEMS. THESE PRACTICES MAY RESULT IN EXPLOSIVE FRAGMENTATION OF SYSTEM PIPING COMPONENTS CAUSING SERIOUS OR FATAL BODILY INJURY.

SPEARS® MANUFACTURING COMPANY • CORPORATE OFFICE
15853 Olden St., Sylmar, CA 91342 • PO Box 9203, Sylmar, CA 91392
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PACIFIC SOUTHWEST
15860 Olden St.
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FLORIDA
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Orlando, FL 32837
(407) 843-1960 • (800) 327-6390
Fax (407) 425-3563

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Series 668 Differential Pressure Transmitter

Ranges from 0 to 100" w.c., Overpressure Protection to 10 psig, ±1% Accuracy

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Our low cost **Series 668 Differential Pressure Transmitter** is capable of measuring low pressures with a ±1% accuracy - ideally suited for proper building pressurization and air flow control. Transmitters can withstand up to 10 psig overpressure with no damage to the unit. Variable capacitance sensor design provides excellent sensitivity and long-term stability. Compact, lightweight design makes installation simple and easy. Units also feature reverse-polarity protection.

Product Applications

- Variable air volume systems
- HVAC
- Building management

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Specifications

Service:	Air and non-conductive gases.
Accuracy:	±1% FS (RSS), (includes non-linearity, hysteresis, and non-repeatability).
Temperature Limits:	Operating: 0 to 150˚F (-18 to 65˚C), Storage: -40 to 185˚F (-40 to 85˚C).
Pressure Limits:	10 psig (0.69 bar).
Compensated Temperature Range:	0 to 150˚F (-18 to 65˚C).
Thermal Effects:	0.033% FS/˚F (0.18% FS/˚C).
Supply Voltage:	12 to 30 VDC.
Output:	4 to 20 mA, 2-wire.
Zero and Span Adjustment:	±1 mA, non-interactive.
Response Time:	<60 msec.
Loop Resistance:	0 to 800 Ω.
Electrical Connection:	Terminal strip.
Pressure Connection:	3/16" OD fitting for 1/4" ID tubing.
Housing:	Fire retardant glass filled polyester.
Weight:	3 oz (85 g).
Agency Approval:	CE.

VALTERRA®

VALVES AND ACCESSORIES

15230 San Fernando Mission Blvd., Suite 107
Mission Hills, CA 91345
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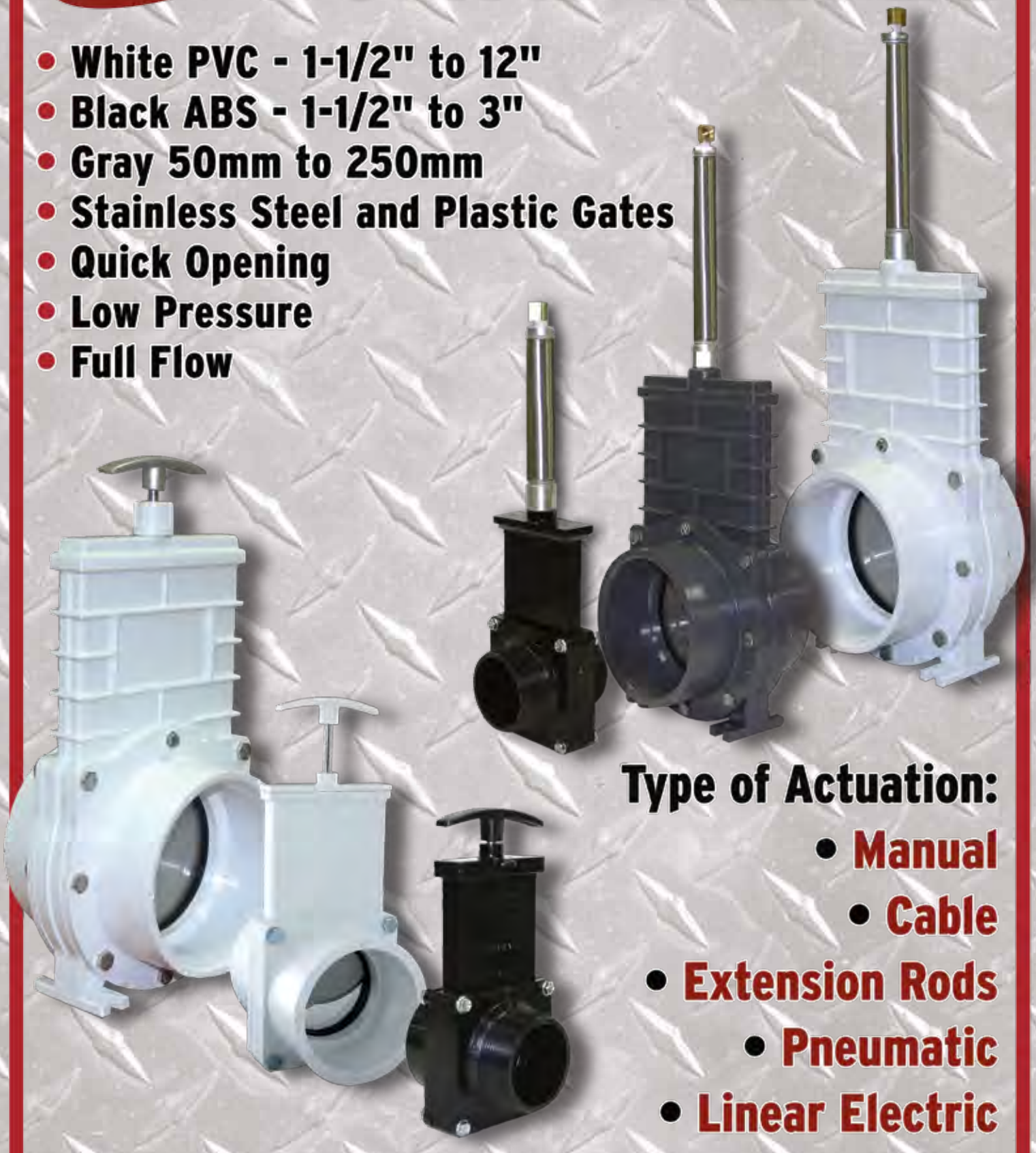
VALTERRA® GATE VALVES

- White PVC - 1-1/2" to 12"
- Black ABS - 1-1/2" to 3"
- Gray 50mm to 250mm
- Stainless Steel and Plastic Gates
- Quick Opening
- Low Pressure
- Full Flow



Type of Actuation:

- Manual
- Cable
- Extension Rods
- Pneumatic
- Linear Electric

See spec sheets located at the back of the catalog

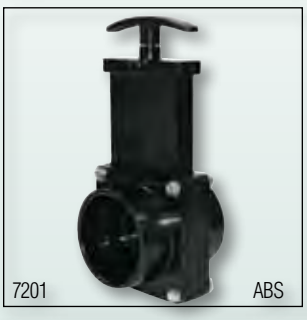

2101X PVC


7107 ABS

1.5" Gate Valves with Plastic Paddles

Part No. PVC/White	Part No. ABS/Black	Description	Handle	Carton Qty. PVC/White	Carton Qty. ABS/Black
2101X		1-1/2" Slip x Slip Unibody (One Piece Valve)	Plastic	30	
2102X		1-1/2" Slip x Spig Unibody (One Piece Valve)	Plastic	30	
6101	7101	1-1/2" Slip x Slip	Plastic	30	36
6101M	7101M	1-1/2" Slip x Slip	Metal	30	36
6102	7102	1-1/2" Slip x Spig	Plastic	30	36
6103	7103	1-1/2" Spig x Spig	Plastic	30	36
	7103M	1-1/2" Spig x Spig	Metal		36
6104	7104	1-1/2" MPT x MPT	Plastic	20	20
6105	7105	1-1/2" MPT x Slip	Plastic	24	26
6105M	7105M	1-1/2" Slip x MPT	Metal	24	26
6106	7106	1-1/2" MPT x Spig	Plastic	24	28
6106M	7106M	1-1/2" Spig x MPT	Metal	24	28
6107	7107	1-1/2" FPT x FPT	Plastic	30	30
	7107M	1-1/2" FPT x FPT	Metal		30
6108	7108	1-1/2" FPT x MPT	Plastic	24	26
6109	7109	1-1/2" FPT x Slip	Plastic	30	30
	7109M	1-1/2" FPT x Slip	Metal		30
6110	7110	1-1/2" FPT x Spig	Plastic	30	36
	7110M	1-1/2" FPT x Spig	Metal		36


6201 PVC


7201 ABS

2" Gate Valves with Plastic Paddles

Part No. PVC/White	Part No. ABS/Black	Description	Handle	Carton Qty. PVC/White	Carton Qty. ABS/Black
2201X		2" Slip x Slip Unibody (One Piece Valve)	Plastic	20	
6201	7201	2" Slip x Slip	Plastic	20	20
6201M	7201M	2" Slip x Slip	Metal	20	20
6202	7202	2" Slip x Spig	Plastic	16	20
	7202M	2" Slip x Spig	Metal		20
6203	7203	2" Spig x Spig	Plastic	16	22
	7203M	2" Spig x Spig	Metal		22
	7204	2" MPT x MPT	Plastic		20
6205	7205	2" MPT x Slip	Plastic	20	20
6205M	7205M	2" MPT x Slip	Metal	20	20
	7206	2" MPT x Spig	Plastic		22
	7206M	2" MPT x Spig	Metal		22
6207	7207	2" FPT x FPT	Plastic	20	20
	7207M	2" FPT x FPT	Metal		20
	7208	2" FPT x MPT	Plastic		20
	7208M	2" FPT x MPT	Metal		20
6209	7209	2" FPT x Slip	Plastic	20	22
	7209M	2" FPT x Slip	Metal		22
	7210	2" FPT x Spig	Plastic		22
	7210M	2" FPT x Spig	Metal		20
	7217	2" Rot Flanges, FPT x FPT	Plastic		20

2" Gate Valves with Stainless Steel Paddles

Part No. PVC/White	Part No. ABS/Black	Description	Handle	Carton Qty. PVC/White	Carton Qty. ABS/Black
4201	5201	2" Slip x Slip	Metal	20	20
4202	5202	2" Slip x Spig	Metal	16	20
4203		2" Spig x Spig	Metal	16	
4203S		2" Spig X Spig	Metal	16	
4204		2" MPT x MPT	Metal	20	
4205	5205	2" MPT x Slip	Metal	20	20
4206		2" MPT x Spig	Metal	20	
4207	5207	2" FPT x FPT	Metal	20	20
4208	5208	2" FPT x MPT	Metal	20	20
4209		2" FPT x Slip	Metal	20	
4210	5210	2" FPT x Spig	Metal	20	22

3" Gate Valves with Plastic Paddles

Part No. PVC/White	Part No. ABS/Black	Description	Handle	Carton Qty. PVC/White	Carton Qty. ABS/Black
6301	7301	3" Slip x Slip	Plastic	12	18
6301M	7301M	3" Slip x Slip	Metal	12	18
	7302	3" Slip x Spig	Plastic		18
	7302M	3" Slip	Metal		18
	7303	3" Spig x Spig	Plastic		18
	7303M	3" Spig x Spig	Metal		18
	7304	3" MPT x MPT	Plastic		18
	7304M	3" MPT x MPT	Metal		18
	7305	3" MPT x Slip	Plastic		18
	7305M	3" MPT x Slip	Metal		18
	7306	3" MPT x Spig	Plastic		18
	7306M	3" MPT x Spig	Metal		18
	7307	3" FPT x FPT	Plastic		18
	7307M	3" FPT x FPT	Metal		18
	7308	3" FPT x MPT	Plastic		18
	7309	3" FPT x Slip	Plastic		18
	7309M	3" FPT x Slip	Metal		18
	7310	3" FPT x Spig	Plastic		18
	7341	3" Spig x Bay with Cap	Plastic		18
	7342	3" MPT x Bay with Cap	Plastic		18
	7343	3" FPT x Bay with Cap	Plastic		18

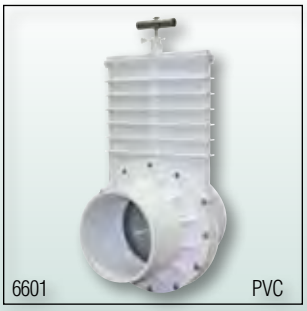
Manual Gate Valves

3" Gate Valves with Stainless Steel Paddles

Part No. PVC/White	Part No. ABS/Black	Description	Handle	Carton Qty. PVC/White	Carton Qty. ABS/Black
4301	5301	3" Slip x Slip	Metal	12	18
4302	5302	3" Slip x Spig	Metal	12	18
4303	5303	3" Spig x Spig	Metal	14	18
4304	5304	3" MPT x MPT	Metal	16	18
4305	5305	3" MPT x Slip	Metal	16	18
4306	5306	3" MPT x Spig	Metal	15	18
4307	5307	3" FPT x FPT	Metal	16	18
4308	5308	3" FPT x MPT	Metal	16	18
4309	5309	3" FPT x Slip	Metal	12	18
4310		3" FPT x Spig	Metal	15	

4" Gate Valves with Stainless Steel Paddles

Part No. PVC/White	Part No. PVC/Gray	Description	Handle	Carton Qty. PVC/White	Carton Qty. PVC/Gray
6401	6401G	4" Slip x Slip	Metal	6	6



6" -8" Gate Valves with Stainless Steel Paddles

Part No. PVC/White	Description	Handle	Carton Qty. PVC/White
6601	6" Slip x Slip	Metal	1
6801	8" Slip x Slip	Metal	1

10" -12" Gate Valves with Stainless Steel Paddles

Part No. PVC/White	Description	Handle	Carton Qty. PVC/White
6910	10" Slip x Slip	Metal	1
6912	12" Slip x Slip	Metal	1

Gate Valves for Direct Tank Mounting

Part No. ABS/Black	Description	Carton Qty. ABS/Black
7120	1-1/4" Simple Tank Drain Valve, with one seal (No Fittings)	18
7121	1-1/2" Simple Tank Drain Valve, with one seal (No Fittings)	18
7311	3" Slip x Tank Flange	18
7312	3" Spig x Tank Flange	18
7314	3" MPT x Tank Flange	18

"Bag in a Box" Valve (NSF Listed Materials)

Part No. ABS/Black	Part No. PC/Stainless	Description	Carton Qty. ABS/Black	Carton Qty. PC/Stainless
7218		2" FPT x Polypropylene MPT	25	
	Custom	Star Cutter Price Calculation is Base Cost + Length Cost = List Price		1

Union and Barbed Valves with Plastic Paddles

Part No. PVC/White	Part No. ABS/Black	Description	Handle	Carton Qty. PVC/White	Carton Qty. ABS/Black
6114		1-1/2" Slip x Union Slip	Plastic	24	
6125		1-1/2" FPT x Union Slip	Plastic	30	
6124M		1-1/2" MPT x Union Slip	Metal	20	
6130		1-1/2" Slip x Hose Barb	Plastic	54	
6136		1-1/2" MPT x Hose Barb	Plastic	24	
	7134	1-1/2" Stepdown Pool Hose x MPT	Plastic		22
6101BB		1-1/2" Hose Barb x Hose Barb	Plastic	26	

Metric Gate Valves

Metric Gate Valves with Plastic Paddles

Part No. PVC/Gray	Description	Carton Qty. PVC/Gray
3101	50mm Slip x Slip Unibody (One Piece Valve)	30
3201	63mm Slip x Slip Unibody (One Piece Valve)	20
8101	50/63mm Slip-Spig x 50/63mm Slip-Spig	26
8201	63mm Slip x Slip	16
8251	75/90mm Slip-Spig x 75/90mm Slip-Spig	12
8301	90mm Slip x Slip	12

Metric Gate Valves with Stainless Steel Paddles

Part No. PVC/Gray	Description	Carton Qty. PVC/Gray
8401	110mm Slip x Slip	6
8601	160mm Slip x Slip	1
8801	200mm Slip x Slip	1
8910	250mm Slip x Slip	1

Metric Gate Valves with Plastic Paddles & Pneumatic Cylinder

Part No. PVC/Gray	Description	Carton Qty. PVC/Gray
8201P	63mm Slip x Slip, Metal Air Cylinder	24
8201PP	63mm Slip x Slip, Plastic Air Cylinder	12
8301P	90mm Slip x Slip, Metal Air Cylinder	9
8301PP	90mm Slip x Slip, Plastic Air Cylinder	15

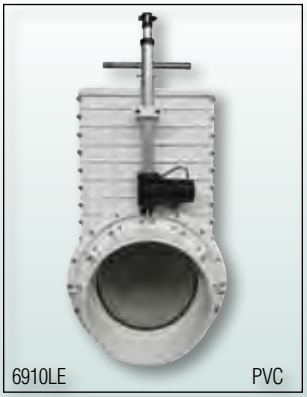
Metric Gate Valves with Stainless Steel Paddles & Pneumatic Cylinder

Part No. PVC/Gray	Description	Carton Qty. PVC/Gray
8201PPS	63mm Slip x Slip, Plastic Air Cylinder	12
8201PS	63mm Slip x Slip, Metal Air Cylinder	24
8301PPS	90mm Slip x Slip, Plastic Air Cylinder	15
8301PS	90mm Valve, Slip x Slip, Metal Air Cylinder	9
8401P	110mm Slip x Slip, Metal Air Cylinder	6
8601P	160mm Slip x Slip, Metal Air Cylinder	1
8801P	200mm Slip x Slip, Metal Air Cylinder	1


E1003VP ABS

Electric Gate Valves with Plastic Paddles

Part No. ABS/Black	Description	Carton Qty. ABS/Black
E1003VP	EZ Valve, Electric Waste Valve System, 3_, No Fittings	4
E40-8	EZ-Valve, Electric Waste Valve, 3" Hub x 3" Spigot	4
E40A-8	EZ-Valve, Electric Waste Valve, 3" Spigot x 3" Spigot	4
E40B-8	EZ-Valve, Electric Waste Valve, 3" Hub x 3" Hub	4
E7301	EZ-Valve, Electric Waste Valve, 3" Slip x 3" Slip, No Wiring Harness	4


6910LE PVC

Electric Linear Gate Valves with Stainless Steel Paddles

Part No. PVC/White	Part No. PVC/Gray	Description	Carton Qty. PVC/White	Carton Qty. PVC/Gray
6601LE		6" Slip x Slip	1	
6801LE		8" Slip x Slip	1	
6910LE		10" Slip x Slip	1	
6912LE		12" Slip x Slip	1	
	8601LE	160mm Slip x Slip		1
	8801LE	200mm Slip x Slip		1
	8910LE	250mm Slip x Slip		1


9201 ABS


6201P PVC

2" Gate Valves with Plastic Paddles & Pneumatic Cylinder

Part No. ABS/Black	Part No. PVC/White	Description	Carton Qty. ABS/Black	Carton Qty. PVC/White
9201		2" Slip x Slip, Metal Air Cylinder	28	
9202		2" Slip x Spig, Metal Air Cylinder	28	
9203		2" Spig x Spig, Metal Air Cylinder	28	
9204		2" MPT x MPT, Metal Air Cylinder	20	
9205		2" MPT x Slip, Metal Air Cylinder	30	
9206		2" MPT x Spig, Metal Air Cylinder	24	
9207		2" FPT x FPT, Metal Air Cylinder	20	
9208		2" FPT x MPT, Metal Air Cylinder	20	
9209		2" FPT x Slip, Metal Air Cylinder	24	
9210		2" FPT x Spig, Metal Air Cylinder	24	
	6201P	2" Slip x Slip, Metal Air Cylinder		28
	6201PP	2" Slip x Slip, Plastic Air Cylinder		12
9201P		2" Slip x Slip, Plastic Air Cylinder	12	


9201S ABS

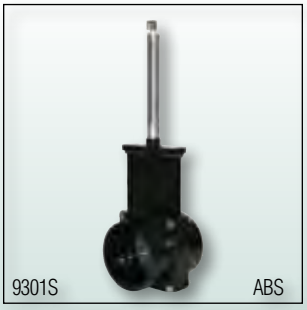
2" Gate Valves with Stainless Steel Paddles & Pneumatic Cylinder

Part No. PVC/White	Part No. ABS/Black	Description	Carton Qty. PVC/White	Carton Qty. ABS/Black
4201P		2" Slip x Slip, Metal Air Cylinder	24	
	9201PS	2" Slip x Slip, Plastic Air Cylinder		12
	9201S	2" Slip x Slip, Metal Air Cylinder		28
	9202S	2" Slip x Spig, Metal Air Cylinder		28
	9207S	2" FPT x FPT, Metal Air Cylinder		20
	9208S	2" FPT x MPT, Metal Air Cylinder		20

Actuated Gate Valves

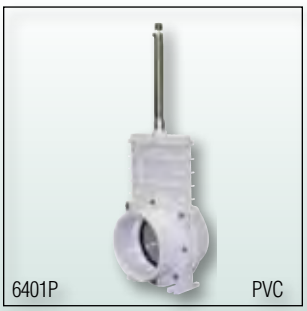
3" Gate Valves with Plastic Paddles & Pneumatic Cylinder

Part No. ABS/Black	Part No. PVC/White	Description	Carton Qty. ABS/Black	Carton Qty. PVC/White
9301		3" Slip x Slip, Metal Air Cylinder	12	
9302		3" Slip x Spig, Metal Air Cylinder	12	
9303		3" Spig x Spig, Metal Air Cylinder	12	
9304		3" MPT x MPT, Metal Air Cylinder	12	
9305		3" Slip x MPT, Metal Air Cylinder	12	
9306		3" Spig x MPT, Metal Air Cylinder	12	
9307		3" FPT x FPT, Metal Air Cylinder	12	
9308		3" FPT x MPT, Metal Air Cylinder	12	
9309		3" FPT x Slip, Metal Air Cylinder	12	
9310		3" FPT x Spig, Metal Air Cylinder	12	
9311		3" Slip x Tank Flange, Metal Air Cylinder	12	
9312		3" Spig x Tank Flange, Metal Air Cylinder	12	
	6301P	3" Slip x Slip, Metal Air Cylinder		12
	6301PP	3" Slip x Slip, Plastic Air Cylinder		15
9301P		3" Slip x Slip, Plastic Air Cylinder	15	



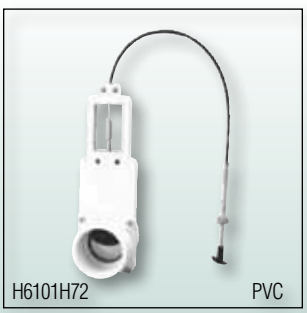
3" Gate Valves with Stainless Steel Paddles & Pneumatic Cylinder

Part No. PVC/White	Part No. ABS/Black	Description	Carton Qty. PVC/White	Carton Qty. ABS/Black
4301P	9301PS	3" Slip x Slip, Metal Air Cylinder	12	15
	9301S	3" Slip x Slip, Metal Air Cylinder		12
	9307S	3" FPT x FPT, Metal Air Cylinder		12
	9308S	3" FPT x MPT, Metal Air Cylinder		12



4" - 12" Gate Valves with Stainless Steel Paddles Pneumatic Cylinder

Part No. PVC/White	Description	Carton Qty. PVC/White
6401P	4" Slip x Slip, Metal Air Cylinder	6
6601P	6" Slip x Slip, Metal Air Cylinder	1
6801P	8" Slip x Slip, Metal Air Cylinder	1
6910P	10" Slip x Slip, Metal Air Cylinder	1
6912P	12" Slip x Slip, Metal Air Cylinder	1



Cable Valves, Remote Actuating

Part No. PVC/White	Description	Carton Qty. PVC/White
H6101H72	1-1/2" Slip x Slip w/ 72" Cable (Custom Lengths Available)	12
6201H72	2" Slip x Slip with 72" Cable (Custom Lengths Available)	10
H6301H72	3" Slip x Slip w/ 72" Cable (Custom Lengths Available)	8


700-12 PVC

Compact Ball Valves

Part No. PVC/White	Description	Carton Qty. PVC/White
700-12	1/2" Slip x Slip	24
700-14	3/4" Slip x Slip	24
700-10	1" Slip x Slip	18
700-11	1-1/4" Slip x Slip	10
700-15	1-1/2" Slip x Slip	12
700-20	2" Slip x Slip	6
700-12F	1/2" FPT x FPT	24
700-14F	3/4" FPT x FPT	24
700-10F	1" FPT x FPT	18
700-11F	1-1/4" FPT x FPT	10
700-15F	1-1/2" FPT x FPT	12
700-20F	2" FPT x FPT	6


700-25 PVC

Compact Ball Valves, Single Handle

Part No. PVC/White	Description	Carton Qty. PVC/White
700-25	2-1/2" Slip x Slip	2
700-30	3" Slip x Slip	1
700-40	4" Slip x Slip	2
700-25F	2-1/2" FPT x FPT	2
700-30F	3" FPT x FPT	1
700-40F	4" FPT x FPT	2

Check Valves


400-15 PVC

Sump Pump Check Valves

Part No. PVC/Gray	Description	Carton Qty. PVC/Gray
400-15	1-1/2" Sump Pump Check	14
400-20	2" Sump Pump Check	12


200-15W PVC

Swing (No Spring) Check Valves

Part No. PVC/White	Part No. PVC/Clear	Description	Carton Qty. PVC/White	Carton Qty. PVC/Clear
200-15W	200-C15W	1-1/2" Slip x Slip Swing Check	6	6
200-20W	200-C20W	2" Slip x Slip Swing Check	4	4
	200-CU50	50mm Union Slip x Slip Swing Check		12
	200-CU63	63mm Union Slip x Slip Swing Check		12

Swing/Spring COMBO Check Valves

- Combines the benefits of a spring and a swing check valve; full-flow design--installs in any position
- Quiet - does not chatter
- 15% more flow than comparable spring check valves; eliminates the restriction of a spring center poppet
- Schedule 40 white or clear PVC
- PSI rating: 150 @ 73°F
- 1/2 Lb PSI crack pressure
- 316 Stainless Steel spring
- Flow/Pressure Drop (see page 21)


200-05F PVC


200-07 PVC

Swing/Spring Combo Check Valves

Part No. PVC/White	Part No. PVC/Clear	Description	Tension	Carton Qty. PVC/White	Carton Qty. PVC/Clear
200-05	200-C05	1/2" Slip x Slip Check	1/2 lb.	10	10
200-05F	200-C05F	1/2" FPT x FPT Check	1/2 lb.	10	10
200-07	200-C07	3/4" Slip x Slip Check	1/2 lb.	12	12
200-07F	200-C07F	3/4" FPT x FPT Check	1/2 lb.	12	12
200-10	200-C10	1" Slip x Slip Check	1/2 lb.	12	12
200-15	200-C15	1-1/2" Slip x Slip Check	1/2 lb.	8	8
200-20	200-C20	2" Slip x Slip Check	1/2 lb.	9	9
200-30	200-C30	3" Slip x Slip Check	1/2 lb.	5	5
UNIONS					
200-U10	200-CU10	1" Union x Union Check	1/2 lb.	8	8
200-U15	200-CU15	1-1/2" Union x Union Check	1/2 lb.	12	12
200-U20	200-CU20	2" Union x Union Check	1/2 lb.	12	12
	200-CUS50	50mm Union x Union Check	1/2 lb.		12
	200-CUS63	63mm Union x Union Check	1/2 lb.		12
2 LBS TENSION					
2002-20	2002-C20	2" Slip x Slip Check	2 lbs.	9	9
2002-U20	2002-CU20	2" Union x Union Check	2 lbs.	12	12


200-15AC PVC

Air Check Valves

Part No. PVC/White	Part No. PVC/Clear	Description	Carton Qty. PVC/White	Carton Qty. PVC/Clear
200-15AC	200-C15AC	1-1/2" Slip /2" Spig Compact Air CV	8	8
	400-S	1-1/2" Slip x Slip Air Check (Clear) - Repairable		8


310-20 PVC

Corrosion Resistant Check Valves

Part No. PVC/White	Description	Carton Qty. PVC/White
310-20	2" Window Check	6
310-00	1-1/2" Adapter for 310-20 Check, Set of 2	6

***Can be used in pool and spa applications for chlorinated flow water**


2161 PVC

Three-Way Valves

Part No. PVC/Black	Part No. ABS/White	Description	Carton Qty. PVC/Black	Carton Qty. ABS/White
2161	2162	1-1/2" I.D. x 2" O.D. Three Way Valve	20	20
2261		2" I.D. x 2-1/2" O.D. Three Way Valve	20	

Gate Valve Accessories & Fittings

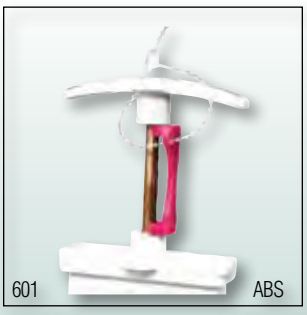

6100PB PVC


9300PB ABS

Valve Body Kits, Manual & Pneumatic

Part No. PVC/White	Part No. ABS/Black	Description	Handle	Carton Qty. PVC/White	Carton Qty. ABS/Black
6100PB	7100PB	1-1/2" Valve Body Kit, Seals, Hardware, Bagged	Plastic	1	1
	7100PBM	1-1/2" Valve Body Kit, Seals, Hardware, Bagged			1
6200PB	7200PB	2" Valve Body Kit, Seals, Hardware, Bagged	Plastic	1	1
	7200PBM	2" Valve Body Kit, Seals, Hardware, Bagged			1
4300PB	5300PB	3" Valve Body Kit, Seals, Hardware, Bagged	Plastic	1	1
	5300PBM	3" Valve Body Kit, Seals, Hardware, Bagged			1
	7300PB	3" Valve Body Kit, Seals, Hardware, Bagged			1
	7300PBM	3" Valve Body Kit, Seals, Hardware, Bagged			1
6400PB		4" Valve Body Kit, Seals, Hardware, Bagged	Plastic	1	
6600PB		6" and 8" Valve Body Kit, Seals, Hardware, Bagged	Plastic	1	
6900PB		10" and 12" Valve Body Kit, Seals, Hardware, Bagged	Plastic	1	

Part No. PVC/Gray	Part No. ABS/Black	Description	Handle	Carton Qty. PVC/Gray	Carton Qty. ABS/Black
8300PB		90mm Pneumatic Valve Body Kit, Seals, Hardware Bagged	Plastic	1	
	9300PB	3" Pneumatic Valve Body Kit, Metal Cylinder, Bagged			1
	9300SPB	3" Pneumatic Valve Body, Metal Cylinder, Bagged			1

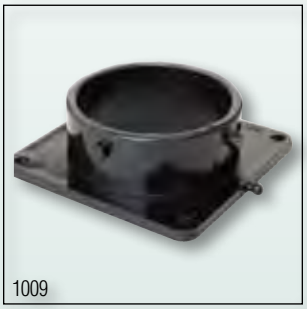

601 ABS

Safety Locks

Part No. ABS/Red	Part No. PE/Black	Description	Carton Qty. ABS/Red	Carton Qty. PE/Black
601		Safety Lock for 1-1/2" Valves	N/A	
602		Safety Lock for 2" Valve	N/A	
	603	Safety Lock for 3" Valve		1
	604	Safety Lock for 4" Valve		1

Gate Valve Accessories & Fittings


1005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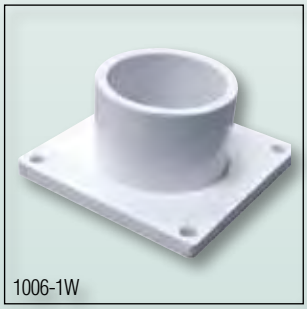

1006-1W

Flanged Valve Fittings

Part No. ABS/Black	Part No. PVC/White	Part No. PVC/Gray	Description	Carton Qty.
1005			3" Slip	1
1006			3" Spig	1
1007			3" FPT	1
1008			3" MPT	1
1009			3" Bayonet Lugs	1
7182			1-1/2" Hose Barb with Flange	60
7184			1-1/2" Step Down with Flange	50
1005-1			1-1/2" Slip	1
	1005-10W		10" Slip	1
		1005-110MM	110mm Slip	1
	1005-12W		12" Slip	1
		1005-160MM	160mm Slip	1
	1005-1W		1-1/2" Slip	1
1005-2			2" Slip	1
	1005-2W		2" Slip	1
	1005-4CW		4" Slip	1
	1005-6		6" Slip	1
	1005-8		8" Slip	1
		1005-90MM	90mm Slip (Gray)	1
	1005W		3" Slip	1
1006-1			1-1/2" Spig	1
	1006-1W		1-1/2" Spig	1
1006-2			2" Spig	1
	1006-2W		2" Spig	1
1008-1			1-1/2" MPT	1
	1008-2W		2" MPT	1
	7182W		1-1/2" Hose Barb with Flange	60


1003-6WN

Handles

Part No.	Description	Carton Qty.
2203-6W	Unibody Handle - Fits 1-1/2" - 2" Unibody Valve	1
1003-6N	Plastic Handle - Fits 1-1/2" - 3" Bolted Valve	1
1003-6WN	Plastic Handle - Fits 1-1/2" - 3" Bolted Valve	1
1003-6MN	Metal Handle - Fits 1-1/2" - 4" Bolted Valve	1
1008C-6	Metal Handle - Fits 6" and 8" Bolted Valve	1


1001-7N

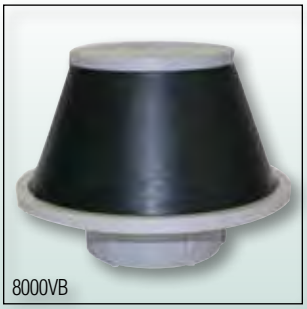
Seals

Part No. Sarlink/Black	Description	Carton Qty. Sarlink/Black
1001-7N	1-1/2" Gate Seal, Bulk	1
1001-9PB	1-1/2" Gate Seals and Hardware, Bagged	1
1002-7N	2" Gate Seal, Bulk	1
1002-9PB	2" Gate Seals and Hardware, Bagged	1
1003-7N	3" Gate Seal, Bulk	1
1003-9PB	3" Gate Seals and Hardware, Bagged	1
1004-7N	4" Gate Seal, Bulk	1
1008C-7N	6" and 8" Gate Seals, Bulk	1
1009-7	10" and 12" Gate Seals, Bulk	1


TX12T

Gate Valve Extension Rod Kits

Part No. Aluminum	Part No. SS	Description	Carton Qty. Aluminum	Carton Qty. SS
TX12T		12" Extension Rod for 1-1/2" to 3" Valves, Aluminum	1	
TX24T		24" Extension Rod for 1-1/2" to 3" Valves, Aluminum	1	
TX36T		36" Extension Rod for 1-1/2" to 3" Valves, Aluminum	1	
	X12-36	36" Extension Rod for 10" & 12" Valves, Stainless Steel		1
	X12-72	72" Extension Rod for 10" & 12" Valves, Stainless Steel		1
	X4-24	24" Extension Rod for 4" Valves, Stainless Steel		1
	X4-6	6" Extension Rod for 4" Valves, Stainless Steel		1
	X8-12	12" Extension Rod for 6" & 8" Valves, Stainless Steel		1
	X8-72	72" Extension Rod for 6" & 8" Valves, Stainless Steel		1


8000VB

Septic Valve Access Box

Part No. PP/Gray & Blk	Description	Carton Qty. PP/Gray & Blk
8000VB	Septic Valve Extension Rod Access Box	6


7150


7152

Bulkhead Parts

Part No. Rubber/Blk	Description	Carton Qty. Rubber/Blk
7150	1-1/2" Thick Rubber Gasket	500
7151	1-1/2" Thin Rubber Gasket	100
7152	1-1/2" Die Cast Metal Locknut	500
7252	2" Die Cast Metal Locknut	350
7180	1-1/2" Male Thread x 1-1/2" Hose Barb w/ Flange	200
7180G	1-1/2" Male Thread x 1-1/2" Hose Barb w/ Flange	200


H03-0001


H03-0004

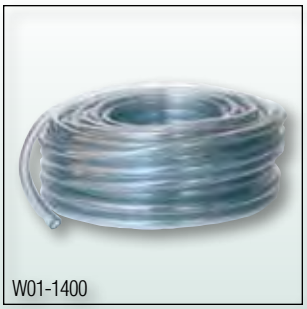

H03-0010


H03-0058


H03-0058

Hose Clamps

Part No.	Description	Band Width	Carton Qty.
H03-0001	Hose Clamp # 8, Stainless Steel, 7/16" x 1", Bagged	1/2"	10
H03-0001BU	Hose Clamp # 8, Stainless Steel, 7/16" x 1", Bulk	1/2"	100
H03-0002	Hose Clamp # 10, Stainless Steel, 1/2" x 1-1/16", Bagged	1/2"	10
H03-0002BU	Hose Clamp # 10, Stainless Steel, 1/2" x 1-1/16", Bulk	1/2"	50
H03-0003	Hose Clamp # 12, Stainless Steel, 1/2" x 1-1/4", Bagged	1/2"	10
H03-0003BU	Hose Clamp # 12, Stainless Steel, 1/2" x 1-1/4", Bulk	1/2"	100
H03-0004	Hose Clamp # 20, Stainless Steel, 3/4" x 1-3/4", Bagged	1/2"	10
H03-0004BU	Hose Clamp # 20, Stainless Steel, 3/4" x 1-3/4", Bulk	1/2"	50
H03-0005	Hose Clamp # 16, Stainless Steel, 1-1/1 6" x 1-1/2", Bagged	1/2"	10
H03-0005BU	Hose Clamp # 16, Stainless Steel, 1-1/1 6" x 1-1/2", Bulk	1/2"	100
H03-0006	Hose Clamp # 24, Stainless Steel, 1" x 2", Bagged	1/2"	10
H03-0006BU	Hose Clamp # 24, Stainless Steel, 1" x 2", Bulk	1/2"	50
H03-0007	Hose Clamp # 36, Stainless Steel, 1" x 2-3/4", Bagged	1/2"	10
H03-0007BU	Hose Clamp # 36, Stainless Steel, 1" x 2-3/4", Bulk	1/2"	50
H03-0008	Hose Clamp # 48, Stainless Steel, 2-1/2" x 3-1/2", Bagged	1/2"	10
H03-0008BU	Hose Clamp # 48, Stainless Steel, 2-1/2" x 3-1/2", Bulk	1/2"	50
H03-0009	Hose Clamp # 56, Stainless Steel, 3" x 4", Bagged	1/2"	10
H03-0009BU	Hose Clamp # 56, Stainless Steel, 3" x 4", Bulk	1/2"	50
H03-0010	Hose Clamp # 28, Stainless Steel, 1-1/4" x 2-1/4", Bagged	1/2"	10
H03-0010BU	Hose Clamp # 28, Stainless Steel, 1-1/4" x 2-1/4", Bulk	1/2"	50
H03-0011	Hose Clamp # 32, Stainless Steel, 1-1/2" x 2-1/2", Bagged	1/2"	10
H03-0011BU	Hose Clamp # 32, Stainless Steel, 1-1/2" x 2-1/2", Bulk	1/2"	50
H03-0012	Hose Clamp # 40, Stainless Steel, 2" x 2", Bagged	1/2"	10
H03-0012BU	Hose Clamp # 40, Stainless Steel, 2" x 2", Bulk	1/2"	50
H03-0013	Hose Clamp # 60, Stainless Steel, 3-1/4" x 4-1/4", Bagged	1/2"	10
H03-0013BU	Hose Clamp # 60, Stainless Steel, 3-1/4" x 4-1/4", Bulk	1/2"	25
H03-0014	Hose Clamp # 52, Stainless Steel, 2-3/4" x 3-3/4", Bagged	1/2"	10
H03-0014BU	Hose Clamp # 52, Stainless Steel, 2-3/4" x 3-3/4", Bulk	1/2"	50
H03-0015	Hose Clamp # 4, Stainless Steel, 1/4" x 5/8", Bagged	5/16"	10
H03-0015BU	Hose Clamp # 4, Stainless Steel, 1/4" x 5/8", Bulk	5/16"	100
H03-0016	Hose Clamp # 6, Stainless Steel, 3/8" x 7/8", Bagged	5/16"	10
H03-0016BU	Hose Clamp # 6, Stainless Steel, 3/8" x 7/8", Bulk	5/16"	100
H03-0017	Hose Clamp # 64, Stainless Steel, 2-1/2" x 4-1/2", Bagged	1/2"	10
H03-0017BU	Hose Clamp # 64, Stainless Steel, 2-1/2" x 4-1/2", Bulk	1/2"	25
H03-0018	Hose Clamp # 44, Stainless Steel, 2-1/4" x 3-1/4", Bagged	1/2"	10
H03-0018BU	Hose Clamp # 44, Stainless Steel, 2-1/4" x 3-1/4", Bulk	1/2"	50
H03-0019	Hose Clamp # 72, Stainless Steel, 3" x 5", Bagged	1/2"	10
H03-0019BU	Hose Clamp # 72, Stainless Steel, 3" x 5", Bulk	1/2"	25
H03-0020	Hose Clamp # 6, Stainless Steel, 3/8" x 7/8", Bagged	1/2"	10
H03-0020BU	Hose Clamp # 6, Stainless Steel, 3/8" x 7/8", Bulk	1/2"	100
H03-0058	Hose Clamp # 48, Galvanized Steel, 2-1/2" x 3-1/2", Boxed	1/2"	50
H03-0058VP	Hose Clamp # 48, Galvanized Steel, 2-1/2" x 3-1/2", 2 per Card	1/2"	46


W01-1400

Clear Vinyl Tubing

Part No. PVC/Clear	Description	Carton Qty. PVC/Clear
W01-1400	3/8" I.D. x 1/2" O.D. x 100' Boxed	2
W01-1400BU	3/8" I.D. x 1/2" O.D. x 100' Bulk	4
W01-1600	1/2" I.D. x 5/8" O.D. x 100' Boxed	6
W01-1800	1/2" I.D. x 5/8" O.D. x 50' Reinforced	6
W01-2105NSF-5	1/2" I.D. x 5/8" O.D. x 500' Reinforced High Pressure Hose	1


140-20CS PVC

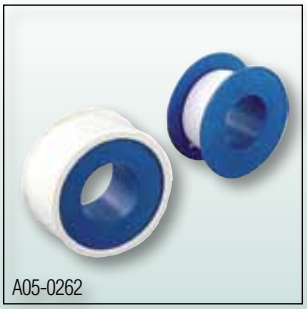
Unions

Part No. PVC/White	Description	Carton Qty. PVC/White
140-15CS	1-1/2" Union, Standard	48
140-20CS	2" Union, Standard	24
2098-1W	1-1/2" Half Pump Union	25
2098-2W	2" Half Pump Union	25


1019-2 ABS

Drain Spouts

Part No. ABS/Black	Part No. ABS/White	Description	Carton Qty. ABS/Black	Carton Qty. ABS/White
1019-1A		45° Drain Spout, 1-1/2" Male Slip x 1-1/2" Female Slip	200	
1019-2	1019-2W	45° Drain Spout, 2" Male Slip x 2" Female Slip	100	100


A05-0262

PTFE Tape

Part No.	Description	Carton Qty.
A05-0262	PTFE Tape, 1/2" x 24"	500
A05-0260	PTFE Tape, 1/2" x 260"	100
A05-0265	PTFE Tape, 1/2" x 520"	100

Plastic Barbed Fittings


RF850

Male Adapter

Part No. PP/Black	Description	Carton Qty. PP/Black
RF850	1/4" MPT x 3/8" Barb, Straight	25
RF847	1/4" MPT x 1/2" Barb, Straight	25
RF834	3/8" MPT x 3/8" Barb, Straight	25
RF840	3/8" MPT x 1/2" Barb, Straight	25
RF883	1/2" MPT x 3/8" Barb, Straight	25
RF841	1/2" MPT x 1/2" Barb, Straight	25


RF851

90° Ell Male Adapter

Part No. PP/Black	Description	Carton Qty. PP/Black
RF851	1/4" MPT x 3/8" Barb, Elbow	25
RF848	1/4" MPT x 1/2" Barb, Elbow	25
RF842	3/8" MPT x 1/2" Barb, Elbow	25
RF882	1/2" MPT x 3/8" Barb, Elbow	25
RF846	1/2" MPT x 1/2" Barb, Elbow	25
RF881	1/2" MPT x 5/8" Barb, Elbow	25
RF871	1/8" MPT x 3/8" Barb, Elbow	25


RF854

90° Ell

Part No. PP/Black	Description	Carton Qty. PP/Black
RF854	3/8" Barb x 3/8" Barb, Elbow	25
RF844	1/2" Barb x 1/2" Barb, Elbow	25


RF855

Coupler

Part No. PP/Black	Description	Carton Qty. PP/Black
RF855	3/8" Barb x 3/8" Barb, Straight	25
RF845	1/2" Barb x 1/2" Barb, Straight	25


RF884

Reducer Coupler

Part No. PP/Black	Description	Carton Qty. PP/Black
RF884	3/8" Barb x 1/4" Barb, Straight	25
RF885	1/2" Barb x 3/8" Barb, Straight	25


RF853

Tee Male Adapter

Part No. PP/Black	Description	Carton Qty. PP/Black
RF853	1/4" MPT x 3/8" Barb x 3/8" Barb	25
RF833	3/8" MPT x 3/8" Barb x 3/8" Barb	25
RF849	1/2" MPT x 1/2" Barb x 1/2" Barb	25


RF852

Tee

Part No. PP/Black	Description	Carton Qty. PP/Black
RF852	3/8" Barb x 3/8" Barb x 3/8" Barb	25
RF843	1/2" Barb x 1/2" Barb x 1/2" Barb	25

Fresh Water Hose

W01-5300BU

High Pressure Drinking Water Hose

Part No. Vinyl/White	Description	Carton Qty. Vinyl/White
W01-5120BU	1/2" x 10' Water Hose	10
W01-5300BU	1/2" x 25' Water Hose	10
W01-5600BU	1/2" x 50' Water Hose	6
W01-6300BU	5/8" x 25' Water Hose	8
W01-6600BU	5/8" x 50' Water Hose	4


A01-0144C

Hi Flow Ball Valve

Part No. ABS/Black	Description	Carton Qty. ABS/Black
1020-1D	Ball Valve Cap Only	300
A01-0144C	Hi Flow Ball Valve with Cap	100


A01-0130VP

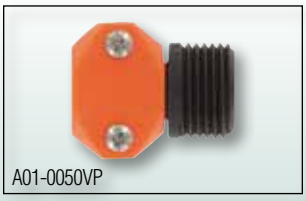
Double Hose Shutoff

Part No.	Description	Carton Qty.
A01-0130VP	Double Hose Shutoff, Plastic, Carded	50
A01-0131VP	Double Hose Shutoff, Metal, Carded	20


A01-0144VP

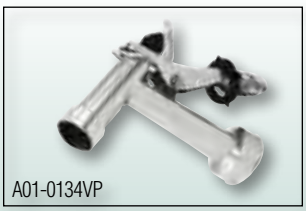
Single Hose Shutoff

Part No.	Description	Carton Qty.
A01-0144VP	Single Hose Shutoff, High Flow, Carded	30


A01-0050VP

Hose Fixers

Part No.	Description	Carton Qty.
A01-0050VP	Hose Fixer, HSE x MGH, Carded	20
A01-0055VP	Hose Fixer, HSE x FGH, Carded	20
A01-0060VP	Hose Fixer, HSE x HSE, Carded	50


A01-0134VP

Pistol Nozzles

Part No.	Description	Carton Qty.
A01-0134VP	Pistol Nozzle, Metal, Carded	30
A01-0136VP	Pistol Nozzle, Plastic, Carded	36


W1516 & W1526

Hose Washers

Part No.	Description	Carton Qty.
W1516	Hose Washers, Black, 250 Per Bag	10
W1516VP	Hose Washers, Blue, 10 Per Card	100
W1526	Hose Washers With Screen, Red, Bag of 100	8
W1526VP	Hose Washers With Screen, Red, 3 Per Card	40


R8009

ABS Water Tanks

Part No. ABS/Black	Description	Carton Qty. ABS/Black
R8009	8" x 16" x 9" ABS Water Tank	1
R8012	8" x 16" x 12" ABS Water Tank	1
R8018	8" x 16" x 18" ABS Water Tank	1
R8024	8" x 16" x 24" ABS Water Tank	1
R8030	8" x 16" x 30" ABS Water Tank	1
R8036	8" x 16" x 36" ABS Water Tank	1
R8042	8" x 16" x 42" ABS Water Tank	1
R8048	8" x 16" x 48" ABS Water Tank	1
R8054	8" x 16" x 54" ABS Water Tank	1
R8060	8" x 16" x 60" ABS Water Tank	1
R8066	8" x 16" x 66" ABS Water Tank	1
R8072	8" x 16" x 72" ABS Water Tank	1


RK907

ABS Tank Fill Kits, Fittings & Cement

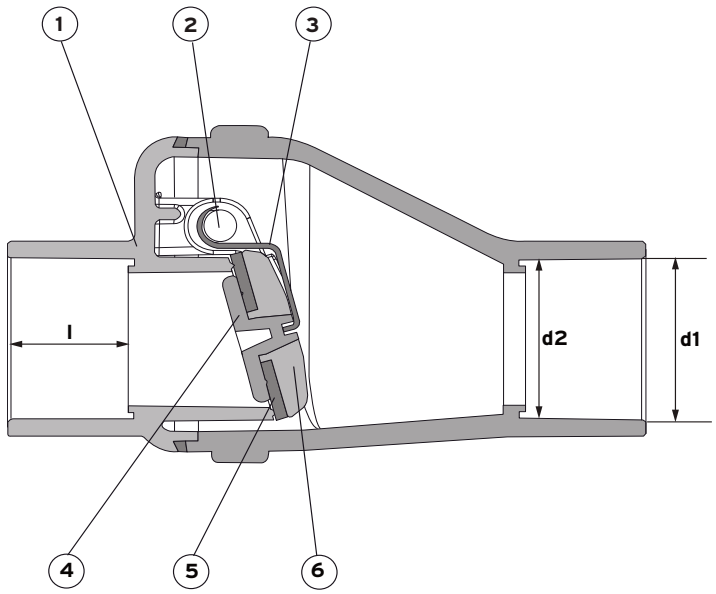
Part No. PP/Black	Description	Carton Qty. PP/Black
RF835	3/8" MPT x 3/8" Barb, 90° Elbow	25
RF836	Fill Cap 1-1/2" FPT	200
RF865	Pipe Plug 3/8" MPT	25
RF907	Barbed Fill-Elbow 1-1/4"	100
RF908	Barbed Fill-Straight 1-1/4"	180
RF909	Fill Thread Adaptor 1-1/2" MPT	150
RF922	Drain Nut, 3/8" FPT	200
RK907	ABS Tank Fill Kit - 90° Barbed Elbow, with Cement	70
RK908	ABS Tank Fill Kit - Straight Barbed Elbow, with Cement	70
RK909	ABS Tank Fill Kit - Thread with Cap, with Cement	70

Well Pressure Tank Products

Well Pressure Tank Products

Part No. PVC/Gray	Description	Carton Qty. PVC/Gray
100-50	1/2" x 1/2" Pressure Relief, PVC	20
100-75	3/4" x 1/2" Pressure Relief, PVC	24
105-10	Tank Tee, PVC	20
600-75	3/4" Float Valve	8
600-100	1" Float Valve	10
600-125	1-1/4" Float NPT Valve	6
610-6	6" x 1/4" Float Ball	8
610-8	8" x 1/4" Float Ball	8
610-8F	8" x 5/16" Float Ball	8
615-12	12" x 1/4" Stainless Steel Float Rod	8
615-14F	14" x 5/16" Stainless Steel Float Rod	8

SPECIFICATIONS - SWING/SPRING COMBO CHECK VALVES



SPECIFICATION OF MATERIAL

ITEM	PARTS	MATERIAL
1	BODY	PVC, WHITE OR CLEAR
2	SHAFT	NORYL GFN3
3	SPRING	316 STAINLESS STEEL
4	SEAL RETAINER	PVC WHITE
5	SEAL	BUNA, 40 SHORE
6	GATE	PVC WHITE

ANSI SOCKET SWING/SPRING CHECK VALVES

SIZE	l (min)	d1	d2
1/2"	0.688	0.848	0.836
3/4"	0.719	1.058	1.046
1"	0.895	1.325	1.310
1-1/2"	1.094	1.912	1.894
2"	1.156	2.387	2.369
3"	1.875	3.516	3.492

FLOW VS. PRESSURE DROP

1-1/2" COMBO CHECK VALVES

FLOW RATE (GPM)	0	10	20	30	40	50	60	70	80	90	100
PSI DROP (ΔP)	0.00	0.40	0.52	0.63	0.76	0.90	1.08	1.26	1.46	1.70	1.88

Air Temp = 75 Deg. F Water Temp = 82 Deg. F TDS = 390 ppm

2" COMBO CHECK VALVES

FLOW RATE (GPM	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
PSI DROP (ΔP)	0.00	0.25	0.33	0.38	0.45	0.51	0.56	0.59	0.61	0.65	0.67	0.70	0.72	0.78	0.85	0.94

Air Temp = 78 Deg. F Water Temp = 82 Deg. F TDS = 390 ppm

3" COMBO CHECK VALVES

FLOW RATE (GPM	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
PSI DROP (ΔP)	0.00	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.10	0.11	0.13	0.14	0.15	0.17	0.17

Air Temp = 78 Deg. F Water Temp = 84 Deg. F TDS = 390 ppm

Gate Valve Technical Data

MATERIAL & GENERAL SPECIFICATIONS

	1½" (50mm)	2" (63mm or 75/90mm)	3" (90mm)	4" (110mm)	6"/8" (160/200mm)	10" / 12"
Color	White or Black (Gray)	White or Black (Gray)	White or Black (Gray)	White (Gray)	White (Gray)	White
Hubs	PVC or ABS (PVC)	PVC or ABS (PVC)	PVC or ABS (PVC)	PVC (PVC)	PVC	PVC
Body	PVC or ABS (PVC)	PVC or ABS (PVC)	PVC or ABS (PVC)	PVC (PVC)	ABS	ABS
Shaft	304SS	304SS	304SS	304SS	304SS	304SS
Paddle	Polypro	Polypro or 304SS	Polypro or 304SS	304SS	304SS	304SS
Handle	Plastic or Die Cast Al	Plastic or Die Cast Al	Plastic or Die Cast Al	Die Cast Al	304SS	304SS
Seals	Sarlink	Sarlink	Sarlink	Sarlink	Sarlink	Sarlink
Max PSI Open/Closed	45/100	40/80	30/30	20/40	10/20	10/15
Mid-Flow Max Closing Pressure	6 psi	1 psi (PP) 15 psi (SS)	.5 psi (PP) 9 psi (SS)	8 psi	2.5 psi	2.5 psi
Air Cylinder	Reinforced Nylon	Metal or Reinforced Nylon	Metal or Reinforced Nylon	Metal	Metal	Metal

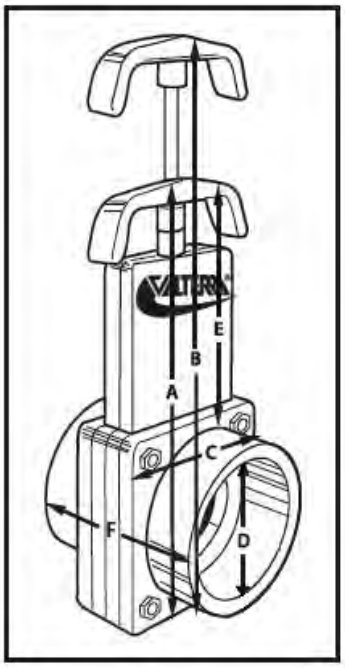
Notes:

Vacuum Applications: 1½" to 4" tested to 26 Hq in. when requested by customer

Metric Valves are Gray PVC

MANUAL VALVE DIMENSIONS (Inches)(mm)

Size	A	B	C	D	E	F
1.5 ABS	6.5	8.625	2.896	1.912	3.9375	2.875
1.5 PVC	6.5	8.625	2.896	1.913	3.9375	3.375
50mm	168	222	72.6	50.3	98	98
2 ABS	7.5	10.25	3.364	2.388	4.5	3.125
2 PVC	7.5	10.25	3.37	2.387	4.5	3.5
63mm	191	260	85.4	63.3	111	105
75/90mm	238	324	111	75.3	130	133
3 ABS	9.25	13	4.35	3.518	5.1875	4.5
3 PVC	9.25	13	4.37	3.516	5.1875	4.5
90mm	238	324	111	90.3	130	133
4 PVC	13.25	18	6.665	4.518	7.4375	5.1875
110mm	330	454	169	110.4	181	130
6 PVC	22.75	31.125	11.1	6.647	13.25	11.125
160mm	572	800	279.4	160.7	343	279
8 PVC	22.75	31.125	11.1	8.655	12.1875	13.75
200mm	572	797	279.4	200.7	327	276
10 PVC	35	48.5	18.475	10.78	16.99	13.75
12 PVC	35	48.5	18.475	12.78	18	15.375

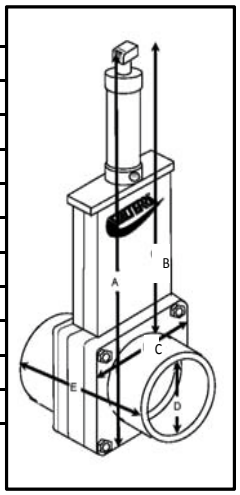


"B" Dimension is height of valve in fully open position

Gate Valve Technical Data

PNEUMATIC VALVE - ALUMINUM/STAINLESS STEEL AIR CYLINDER DIMENSIONS (Inches)(mm)

Size	A	B	C	D	E	Air Tubing Size	Recomm. Operating Pressure	Cylinder Air Volume
2	12.5	8.5	3.364	2.388	3	1/4"	55-70 psi	1.209 in³
63mm	318	216	85.4	63.3	105	1/4"	55-70 psi	1.209 in³
3	15.5	11.25	4.35	3.518	4.5	1/4"	55-70 psi	1.662 in³
90mm	394	286	111	90.3	133	1/4"	55-70 psi	1.662 in³
4	19.5	13.25	6.665	4.518	5	1/4"	55-70 psi	1.742 in³
110mm	489	337	169	110.4	130	1/4"	55-70 psi	1.742 in³
6	33	24	11.1	6.647	11.125	1/4"	90-120 psi	19.36 in³
160mm	838	610	279.4	160.7	279	1/4"	90-120 psi	19.36 in³
8	33	22.75	11.1	8.655	13.75	1/4"	90-120 psi	19.36 in³
200mm	838	590	279.4	200.7	276	1/4"	90-120 psi	19.36 in³
10	50	34	18.475	10.78	13.1	1/4"	100-130 psi	51.08 in³
12	50	33	18.475	12.78	15.375	1/4"	100-130 psi	51.08 in³

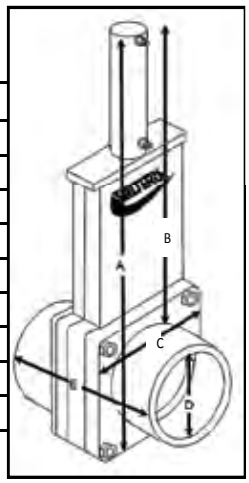


Note: Aluminum/SS Air Cylinders assembled with Air Restrictor - removal of restrictor voids warranty

Cylinder working temperature: 40°F - 140°F

PNEUMATIC VALVE - REINFORCED NYLON PLASTIC AIR CYLINDER DIMENSIONS (Inches)(mm)

Size	A	B	C	D	E	Air Tubing Size	Recomm. Operating Pressure	Cylinder Air Volume
1.5	10	7.375	2.896	1.912	2.875	I.D. 4 mm x O.D. 6 mm	60-75 psi	1.196 in³
50mm	254	187	72.6	50.3	98	I.D. 4 mm x O.D. 6 mm	60-75 psi	1.196 in³
2	11	8	3.364	2.388	3	I.D. 4 mm x O.D. 6 mm	60-75 psi	1.196 in³
63mm	279	203	85.4	63.3	105	I.D. 4 mm x O.D. 6 mm	60-75 psi	1.196 in³
3	13	8.5	4.35	3.518	4.5	I.D. 4 mm x O.D. 6 mm	60-75 psi	1.196 in³
90mm	330	216	111	90.3	133	I.D. 4 mm x O.D. 6 mm	60-75 psi	1.196 in³



Note: Cylinder working temperature: 40°F - 140°F

CEMENT

VALVE FITTING	PIPE	SIZE	CEMENT
ABS	PVC	1.5-6"	Use IPS #794 or equivalent
ABS	ABS	1.5-3"	Use IPS #771 or equivalent
PVC	ABS	1.5-6"	Use IPS #794 or equivalent
PVC	PVC	1.5-12"	Use IPS #717 or equivalent

STATIC HEAD PRESSURE

Feet Head	PSI
1	0.43
3	1.03
6	2.6
9	3.9
12	5.2
15	6.51
20	8.66
30	12.99
40	17.32
50	21.65

► **Feet Head to PSI, multiply by 0.434**

► **PSI to Feet Head, multiply by 2.3**

VALVE MAX WORKING TEMPERATURE

Material	Suggested Maximum Working Temperature	
ABS	205° F	96° C
PVC	167° F	75° C
PC	280° F	137° C

15230 San Fernando Mission Blvd., Suite 107
Mission Hills, CA 91345
(818) 898-1671 • Fax (818) 361-5389
valterra@valterra.com
www.valterra.com

M01141

Vulkem® 45SSL

Semi-Self-Leveling, Single-Component, Polyurethane Sealant

Commercial Sealants & Waterproofing

Product Description

Vulkem® 45SSL is a semi-self-leveling, single-component, moisture-curing, low-modulus, polyurethane sealant.

Basic Uses

Vulkem 45SSL is formulated for use in expansion joints in sidewalks, swimming pool decks, plazas, floors and any other horizontal surfaces with slopes up to 6% (e.g. 1' rise for every 16' run).

Features and Benefits

- Vulkem 45SSL is a traffic rated, pourable, semi-self-leveling sealant with exceptional primerless adhesion and movement capability.
- Vulkem 45SSL is suitable for continuous immersion in non-chlorinated water.
- The Vulkem 45SSL technology provides the sealant with greater UV resistance and will not out gas.
- Vulkem 45SSL provides exceptional wear and tear resistance required in high traffic areas.
- Formulated with an innovative polymer technology, similar to TREMproof® 250GC and Dymonic® 100, Vulkem 45SSL is highly versatile and has a unique capability to adhere to damp or green concrete.

Availability

Vulkem 45SSL is immediately available from your local Tremco Sales Representative, distributor, or warehouse.

Coverage Rates

308' of joint per gallon for a 1/4" x 1/4" (6 mm x 6 mm) joint. For specific coverage rates that include joint size, and usage efficiencies, visit our website usage calculator at www.tremcosealants.com

Packaging

1-qt (890-mL) cartridges
2-gal (7.6-L) pails
5-gal (18.9-L) pails
55-gal (208-L) drums

Colors

Black, Buff, Gray, Limestone, White.

Shelf Life

1 year when stored at 40 to 100 °F (5 to 38 °C)

Storage

Store Vulkem 45SSL in original, undamaged packaging in a clean, dry, protected location with temperatures between 40 to 110 ˚F (5 to 43 ˚C).

Applicable Standards

Vulkem 45SSL meets or exceeds the requirements of the following specifications:

- ASTM C920, Type S, Grade P, Class 35, Use T, M, A, O and I (Class 2)
- CAN/CGSB 19.13-M87, MC-1-25-B-N
- ASTM E 1966/UL 2079

Fire Rated Systems

FF-D-1062, and FW-D-1058

Limitations

- Use with adequate ventilation.
- Always utilize the accompanying MSDS for information on Personal Protective Equipment (PPE) and Health Hazards.
- Vulkem 45SSL is not recommended for use in chlorinated, potable, heavy or waste water.
- Although Vulkem 45SSL is paintable, this does not imply adhesion to and compatibility with all paints. Please refer to Tremco Technical Bulletin No. S-09-05 for more information.

Substrate Preparation

Surfaces must be sound and clean. All release agents, existing waterproofing, dust, loose mortar, paints, other finishes or field applied coating must be removed. This can be accomplished with a thorough wire brushing, grinding, sandblasting, or solvent washing, depending on the contamination.

Tremco recommends that surface temperatures be 40 ˚F (5 ˚C) or above at the time the sealant is applied. If sealant must be applied in temperatures below 40 ˚F, please refer to the Tremco Technical Bulletin for Applying Sealants in Cold Conditions (No. S-08-44 rev 1) that can be found on our website at www.tremcosealants.com

Priming

Vulkem 45SSL typically adheres to common construction substrates without primers. However, Tremco always recommends that a mock-up or field adhesion test be performed on the actual materials being used on the job to verify the need for a primer, proper cleaning and prep requirements. A description of the field adhesion test can be found in appendix X1 of ASTM C1193, Standard Guide for Use of Joint Sealants.

Where deemed necessary, use Vulkem® Primer #191 Low-VOC QD on porous substrates and TREMprime® Non-Porous Primer for metals or plastics.

Application

Vulkem 45SSL is easy to apply with conventional caulking equipment. Ensure that the backer rod is properly friction-fitted and any primers have been applied.

Fill the joint completely with a proper width-to-depth ratio, and then tool to ensure intimate contact of sealant with joint substrates.

Dry tooling is always preferred, although compatible wetting agents can be used in limited amounts to slick the spatula if needed after an initial pass.

For a cleaner finish, mask the sides of the joint with tape prior to filling.

Joint Design

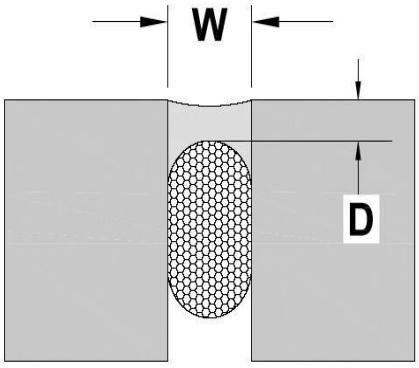
Vulkem 45SSL may be used in horizontal joints designed in accordance with accepted architectural/engineering practices. Joint width should be 4 times anticipated movement but not less than 1/4" (6 mm).

Joint Backing

Polyethylene backer rod is recommended as joint backing to control sealant depth and ensure intimate contact of sealant with joint substrate when tooling. Where depth of joint will prevent the use of backer rod, an adhesive backed polyethylene tape (bond breaker tape) should be used to prevent three-sided adhesion. All backing should be dry at the time of sealant application.

Sealant Dimensions

W = Sealant width, D = Sealant depth,



Expansion Joints- The minimum width and depth of any sealant application should be 1/4" x 1/4" (6 mm x 6 mm). The depth (D) of sealant may be equal to width (W) of joints that are less than 1/2" wide.

For joints ranging from 1/2" to 1" (13 mm to 25 mm) wide, the sealant depth should be approximately one-half of the joint width. The maximum depth (D) of any sealant application should be 1/2" (13 mm). For joints that are wider than 1" (25 mm) contact Tremco Technical Services or your local Tremco Sales Representative.

Cure Time

At 75 °F (23.9 °C), 50% RH a skin forms within 5 hr. Curing continues at a rate of approximately 1/16" (1.6 mm) per day. The cure time will increase as the temperature and/or humidity decrease. A good rule of thumb is one additional day of cure for every 10 °F decrease in temperature. Cure time can be increased by adding water when using pails of Vulkem 45SSL. Please refer to the Technical Bulletin on Vulkem 45SSL Activator that can be found on our website at: www.tremcosealants.com

Clean Up

Excess sealant and smears adjacent to the joint interface can be carefully removed with xylene or mineral spirits before the sealant cures. Any utensils used for tooling can also be cleaned with xylene or mineral spirits.

Warranty

Tremco warrants its Products to be free of defects in materials, but makes no warranty as to appearance or color. Since methods of application and on-site conditions are beyond our control and can affect performance, Tremco makes no other warranty, expressed or implied including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE with respect to Tremco Products. Tremco's sole obligation shall be, at its option, to replace or refund the purchase price of the quantity of Tremco Products proven to be defective, and Tremco shall not be liable for any loss or damage.

Please refer to our website at www.tremcosealants.com for the most up-to-date Product Data Sheets.

TYPICAL PHYSICAL PROPERTIES

PROPERTY	TEST METHOD	TYPICAL VALUES
Type		Single component polyurethane sealant
Color		4 Standard Colors
Solids		98%
Specific Gravity		1.32
Application		Semi self leveling sealant, applied with typical caulking equipment
Rheological Properties	ASTM C639	Type I Single component, flowable
Hardness, durometer scale “A”	ASTM C661	40 +/-5
Weight Loss	ASTM C1246	Pass
Skin Time	ASTM C679	2 hr
Tack Free Time	73.4°F (23°C) 50% RH	5 hr
Stain and Color Change	ASTM C510	Pass
Adhesion to Concrete	ASTM C794	31 pli (before water)
Adhesion to Concrete After Immersion	ASTM C794	28 pli
Adhesion to Green Concrete	ASTM C794	>15 pli
Adhesion to Damp Concrete	ASTM C794	>15 pli
Effects of Accelerated Aging	ASTM C793	Pass
Movement Capability	ASTM C719	+/-35%
Movement Capability	ASTM C719* Modified	+100/-50%
Tensile Strength	ASTM D412	250 to 300 psi
% Elongation	ASTM D412	600 to 750%
Tear Strength	ASTM D412	35 psi
Service Temperature		-40 to (-40 to 37°C)
Application Temperature		40 to 100°F (4 to 37 °C)

Tremco Commercial Sealants & Waterproofing

3735 Green Rd
Beachwood OH 44122
216.292.5000 / 800.321.7906

1451 Jacobson Ave
Ashland OH 44805
419.289.2050 / 800.321.6357

220 Wicksteed Ave
Toronto ON M4H1G7
416.421.3300 / 800.363.3213

1445 Rue de Coulomb
Boucherville QC J4B 7L8
514.521.9555

www.tremcosealants.com

Vulkem® 116

Multi-Purpose, Single-Component, Polyurethane Sealant

Product Description

Vulkem® 116 is a multi-purpose, single-component, moisture-curing, gun-grade polyurethane sealant.

Basic Uses

Vulkem 116 is an excellent general-purpose sealant designed for use on poured and precast concrete, masonry work, window and door perimeters, and similar types of construction joints. Vulkem 116 is approved for exterior use only.

Features and Benefits

- Vulkem 116 has a 30-year history of delivering superior primerless adhesion to porous substrates, which makes it the choice for sealing expansion joints in commercial construction applications.
- Vulkem 116 is suitable for certain water immersion applications.
- Vulkem 116 is rated for +/-25% movement capability.
- The cure of the sealant can be accelerated with the addition of the Vulkem Catalyst 45/116.
- Vulkem 116 is durable, flexible, and offers excellent performance in dynamic joints.

Availability

Immediately available from your local Tremco Field Representative, Tremco Distributor or Tremco Warehouse.

Coverage Rates

308 linear feet of joint per gallon for a 1/4" x 1/4" (6 mm x 6 mm) joint. For specific coverage rates that include joint size, and usage efficiencies, visit our website usage calculator at www.tremcosealants.com.

Packaging

10.1-oz. (300-mL) cartridges, 20-oz. (600-mL) sausages, 2- and 5-gal (7.6- and 18.9-L) pails, and 55-gal (208-L) drums. All colors are not available in every package size. Contact Tremco Customer Service for more information.

Colors

Almond, Aluminum, Black, Bronze, Buff, Gray, Dark Bronze, Ivory, Limestone, Redwood Tan, Beige, Stone, Anodized Aluminum, Aluminum Stone, White, Natural Clay.

Storage

Store Vulkem 116 in original, undamaged packaging in a clean, dry, protected location with temperatures between 40 to 110 ˚F (5 to 43 ˚C).

Applicable Standards

Vulkem 116 meets or exceeds the requirements of the following specifications:

- ASTM C920 Type S, Grade NS, Class 25, Use T, NT, M, A, I class II, and O
- U.S. Federal Specification TT-S-00230C, Class A, Type II
- CAN/CGSB-19.13-M87
- USDA regulation for indirect food contact
- Canadian Food Inspection Agency
- City of Los Angeles (COLA) approval standards

Limitations

- Do not apply Vulkem 116 over damp, green or contaminated surfaces.
- Vulkem 116 is approved for exterior use only. Do not use this product inside an occupied building even if there are no occupants present during use.
- Always utilize the sealant's MSDS found on our website at www.tremcosealants.com for information on proper ventilation, Personal Protective Equipment (PPE) and other health concerns.
- Do not use in chlorinated, potable, heavy or waste water.
- Although this product is paintable, this does not imply adhesion to and compatibility with all paints. Please refer to Tremco Technical Bulletin No. S-09-05 for more information.

Substrate Preparation

Surfaces must be sound and clean. All release agents, existing waterproofing, dust, loose mortar, paints, other finishes or field applied coating must be removed. This can be accomplished with a thorough wire brushing, grinding, sandblasting, or solvent washing, depending on the contamination.

Tremco recommends that surface temperatures be 40 ˚F (5 ˚C) or above at the time the sealant is applied. If sealant must be applied in temperatures below 40 ˚F, please refer to the Tremco Technical Bulletin for Applying Sealants in Cold Conditions (No. S-08-44 rev 1) that can be found on our website at www.tremcosealants.com

Priming

Vulkem 116 typically adheres to common construction substrates without primers; however, Tremco always recommends that mock-up or field adhesion test be performed on the actual materials being used on the job to verify the need for a primer, proper cleaning and prep requirements. The field adhesion test can be found in appendix X1 of ASTM C 1193, Standard Guide for Use of Joint Sealants.

Where deemed necessary, use Vulkem Primer® #191 Low VOC QD for porous substrates and TREMprime® Non-Porous Primer for metals and plastics.

Application

Vulkem 116 is easy to apply with conventional caulking equipment. Ensure that the backer rod is friction-fitted properly and any primers have been applied.

Fill the joint completely with a proper width-to-depth ratio, and then tool to ensure intimate contact of sealant with joint walls.

Dry tooling is always preferred, although xylene can be used in limited amounts to slick the spatula if needed.

For a cleaner finish, mask the sides of the joint with tape prior to filling.

Joint Design

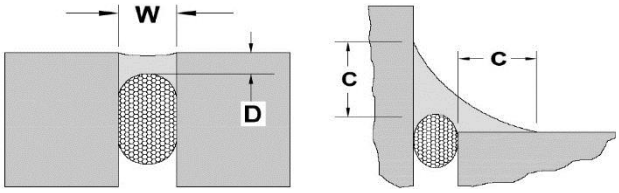
Vulkem 116 may be used in any vertical or horizontal joint designed in accordance with accepted architectural/engineering practices. Joint width should be 4 times anticipated movement, but not less than 1/4" (6 mm).

Joint Backing

Closed cell or reticulated polyethylene backer rod is recommended as joint backing to control sealant depth and to ensure intimate contact of sealant with joint walls when tooling. Where depth of joint will prevent the use of backer rod, an adhesive backed polyethylene tape (bond breaker tape) should be used to prevent three-sided adhesion. All backing should be dry at time of sealant application.

Sealant Dimensions

W = Sealant width, D = Sealant depth, C = Contact area.



EXPANSION JOINTS - The minimum width and depth of any sealant application should be 1/4" x 1/4" (6 mm x 6 mm). The depth (D) of sealant may be equal to the width (W) of joints that are less than 1/2" (13 mm) wide. For joints ranging from 1/2" to 1" (13 mm to 25 mm) wide, the sealant depth should be approximately one-half of the joint width. The maximum depth (D) of any sealant application should be 1/2" (13 mm). For joints that are wider than 1" (25 mm) contact Tremco's Technical Service Department, or your local Tremco Sales Representative.

WINDOW PERIMETER – For fillet beads, or angle beads around windows and doors, the sealant should exhibit a minimum surface contact area [C] of 1/4" (6 mm) onto each substrate, with provisions for release at the heel of the angle using backer rod or bond breaker tape.

Cure Time

Vulkem 116 generally cures at a rate of 1/16" (2 mm) per day at 75 °F (24 °C) and 50% RH. It will skin in 5 hr and be tack free in 30 hr. The cure time will increase as temperatures and/or humidity decrease. A good rule of thumb is one additional day for every 10 °F decrease in temperature.

Clean Up

Excess sealant and smears adjacent to the joint interface can be carefully removed with xylene or mineral spirits before the sealant cures. Any utensils used for tooling can also be cleaned with xylene or mineral spirits.

Warranty

Tremco warrants its Products to be free of defects in materials, but makes no warranty as to appearance or color. Since methods of application and on-site conditions are beyond our control and can affect performance, Tremco makes no other warranty, expressed or implied including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE with respect to Tremco Products. Tremco's sole obligation shall be, at its option, to replace or refund the purchase price of the quantity of Tremco Products proven to be defective, and Tremco shall not be liable for any loss or damage.

Please refer to our website at www.tremcosealants.com for the most up-to-date Product Data Sheets.

TYPICAL PHYSICAL PROPERTIES

PROPERTY	TEST METHOD	TYPICAL VALUES
Type		Single component polyurethane sealant
Color		Almond, Aluminum, Black, Bronze, Buff, Gray, Dark Bronze, Ivory, Limestone, Redwood Tan, Beige, Stone, Anodized Aluminum, Aluminum Stone, White, Natural Clay.
Solids		94%
Specific Gravity		1.1344
Application		gun-grade sealant, applied with typical caulking equipment
Extrusion Rate	ASTM C1183	40 to 50 mL/min
Hardness Properties	ASTM C661	40
Weight Loss	ASTM C1246	Pass
Skin Time	ASTM C679	6 hr
Tack Free Time	73.4°F (23°C) 50% RH	30 hr
Stain and Color Change	ASTM C510	No visible color change/No stain
Adhesion to Concrete	ASTM C794	20 to 25 pli (89 to 111 N)
Adhesion to Aluminum	ASTM C794	18 to 22 pli (80 to 99 N)
Adhesion to Brick	ASTM C794	19 to 23 pli (85 to 102 N)
Effects of Accelerated Aging	ASTM C793	Pass
Movement Capability	ASTM C719	±25%
Tensile Strength	ASTM D412	200 to 250 psi
% Elongation	ASTM D412	200 to 300%
Modulus at 100%	ASTM D412	150 to 200 psi

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J-S5 Dranjer®- Retrofit sump seal - ball valve

SKU: 28007

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Dranjer seals permit unrestricted flow of water into floor drains or sump pits while sealing out the entry of mold spores, insects, radon and other gases from the sub-slab floor area.

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  - Standby Sump Pump
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  - Uniseal Pipe Seals
  - Dranjer Floor Drains and Sump Seals
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INSTALLATION & OPERATING INSTRUCTIONS
Instruction P/N IN015 Rev E
FOR *CHECKPOINT IIa*™ P/N 28001-2 & 28001-3
RADON SYSTEM ALARM

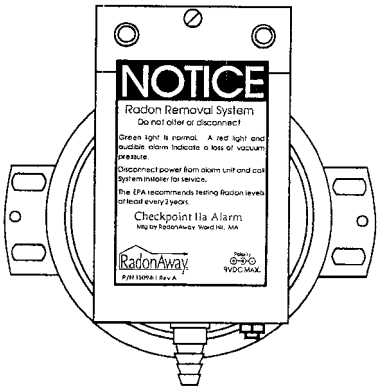
INSTALLATION INSTRUCTIONS
(WALL MOUNTING)

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

APPENDIX B

Health and Safety Plan
And
QAPP – Indoor Air

Client Code: Sassoon-Simchah
Project Code: Vapor Investigaton

ENVIRO-SCIENCES (OF DELAWARE), INC.
781 Route 15 South, 2nd Floor
Lake Hopatcong, NJ 07849
(973) 398-8183 • (973) 398-8037 – Fax

SITE-SPECIFIC HEALTH AND SAFETY PLAN

Site: 323-325 Yonkers Ave.
BCP Site No. C360184

Address: 323-325 Yonkers Avenue
Yonkers, NY 10701

Plan Revisions

Number	Date	Initials
1		
2		
3		
4		

Melanie Lombardo _____ _____
Plan Preparer(s) Date

Jason Pollack _____ _____
Site Supervisor Date

Jason Pollack _____ _____
Site Health & Safety Officer Date

Daniel E. Kent, IV _____ _____
Director, Health & Safety Date

Table of Contents

Page

Introduction

This Site-Specific Health and Safety Plan (HASP) has been prepared by Enviro-Sciences (of Delaware), Inc. (ESI) to summarize the health and safety hazards associated with *a vapor mitigation system installation and monitoring and sub-slab and indoor air sampling* at the 325 Yonkers Ave site, and the requirements and procedures to protect its employees from them. This plan meets or exceeds the requirements of Occupational Safety and Health Administration (OSHA), 29 CFR 1910.120, for a site-specific health and safety plan.

This plan was designed to reduce the potential for occupational illness or injury resulting from working at this site. The purpose of the HASP is to inform ESI's employees of the health and safety risks present at this site, and the proper methods of protecting themselves from those risks. Each worker must be fully aware of the risks associated with the work to be accomplished and be dedicated to completing that work safely.

Existing and potential hazards at this site have been identified. As new information becomes available, this HASP will be revised. Standard practices and procedures of industrial hygiene, occupational health, safety, and environmental protection are prescribed in this plan, which was prepared and reviewed by experienced professionals.

All ESI employees who work on this Site must read the HASP and sign the form included in this plan, to indicate that they understand the plan's contents, and agree to comply with its provisions. Anyone who cannot or will not comply with this HASP will be excluded from on-site activities. Violations of this HASP or any applicable federal, state, or local health and safety regulations should be reported immediately to the Site Health and Safety Supervisor (SHSO), or to ESI's Director, Health & Safety (DHS).

This HASP will be readily available on site so workers can reference it when necessary.

Site Information

Location: 323-325 Yonkers Avenue
Yonkers, Westchester County, NY 10701

Directions to Site:

- Route 15 South
- Route 80 East
- Route 95 North to George Washington Bridge
- Keep right stay on 95 North on US 9 North back to 95 North/US 1 Lower Level N
- Use left lane to take exit 1 for NY-9A
- Continue onto Henry Hudson Parkway
- Continue onto Saw Mill River Parkway N
- Take exit 5 for Yonkers Ave toward Yonkers
- Turn left onto Yonkers Ave
- 325 Yonkers Ave on the left

Historical/Current Site Information:

The Site totals approximately 0.23 acres and is improved with one (1) two-story, slab-on-grade building, located on the north side of Yonkers Avenue, in a mixed commercial and residential area of Yonkers, New York. The Site is currently occupied by Marin's dry cleaner, Dunwoodie Deli Buffet, and The Church of Pentecost U.S.A, Inc. Additionally, the portions of the exterior of the Site are improved with asphalt-paved parking areas and concrete walkways.

The Site was used for commercial purposes since at least 1917. Various commercial tenants have occupied the strip mall within the Brownfield Site Boundary including a dry cleaner since 1985. Investigations and remedial work completed at the Site between June 2005 and December 2018 have identified tetrachloroethene (PCE) impacts in soil, groundwater, soil vapor, and indoor air at the Site. Based on the presence of the PCE groundwater and vapor contamination at the Site, the NYSDEC recommended that the current owner enter into the Brownfield Cleanup Program (BCP) to address the onsite PCE contamination.

The current owner, Simchah 325 Yonkers, LLC, purchased the Site in 2006. ESI is currently retained by Simchah 325 Yonkers, LLC to assist in the completion of remedial actions regarding the PCE release at the Site, pursuant to NYSDEC requirements.

Location/Class: [] Industrial [X] Commercial [ ] Urban/Residential
[ ] Rural

Site Regulatory Status: [ ] CERCLA/SARA [ ] US EPA [ ] NJDEP
[ ] NPL [ ] RCRA [ ] NJ ISRA
[X] Other

Operations or Tasks to be Performed, and Approximate Duration of Each:

- Installation of vapor mitigation system by Clean Vapor – 3 days
- Monitoring, maintenance, and testing of vapor mitigation system including collection of indoor air and sub-slab samples in retail space – 1-2 days

Surrounding Population/Structures:

The Site is located in a commercial area and is bordered by South County Trailway to the north and across the road the Fairways at Dunwoodie Golf Course; a gas station and convenience store adjoin the property to the east followed by a vacant former auto repair shop, wooded land and Tibbets Creek; to the south bordering the property is Yonkers Avenue followed by Planet Fitness across the street, and the Fairways at Dunwoodie Golf Course to the west.

Site and Surrounding Topography:

The subject property and surrounding properties are relatively flat.

Known or Suspected Pathways of Contaminant Dispersion:

Chlorinated solvents were discharged to the subsurface. This discharge contaminated the on-site soil and groundwater, and vapor contamination has been identified. Contaminated soils have previously been excavated and properly disposed of.

Emergency Shower, Eyewash and First Aid Equipment Located at:

First aid equipment will be located in the ESI personal field vehicle, and shower and eyewash will not be available on site.

Personnel On-Site trained in First Aid:

1. Jason Pollack
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Site Map

Legend

BCP Site Boundary

Emergency Medical Care

Hospital #1

Hospital Name: **New York-Presbyterian Lawrence Hospital**

Address: 55 Palmer Ave, Bronxville, NY 10708

Contact: Emergency Room **Telephone # 914-787-1000**

Type of Service ( ) Physical Trauma Only

(X) Physical Trauma and Chemical Exposure

(X) Available 24 Hours

Hospital Route:

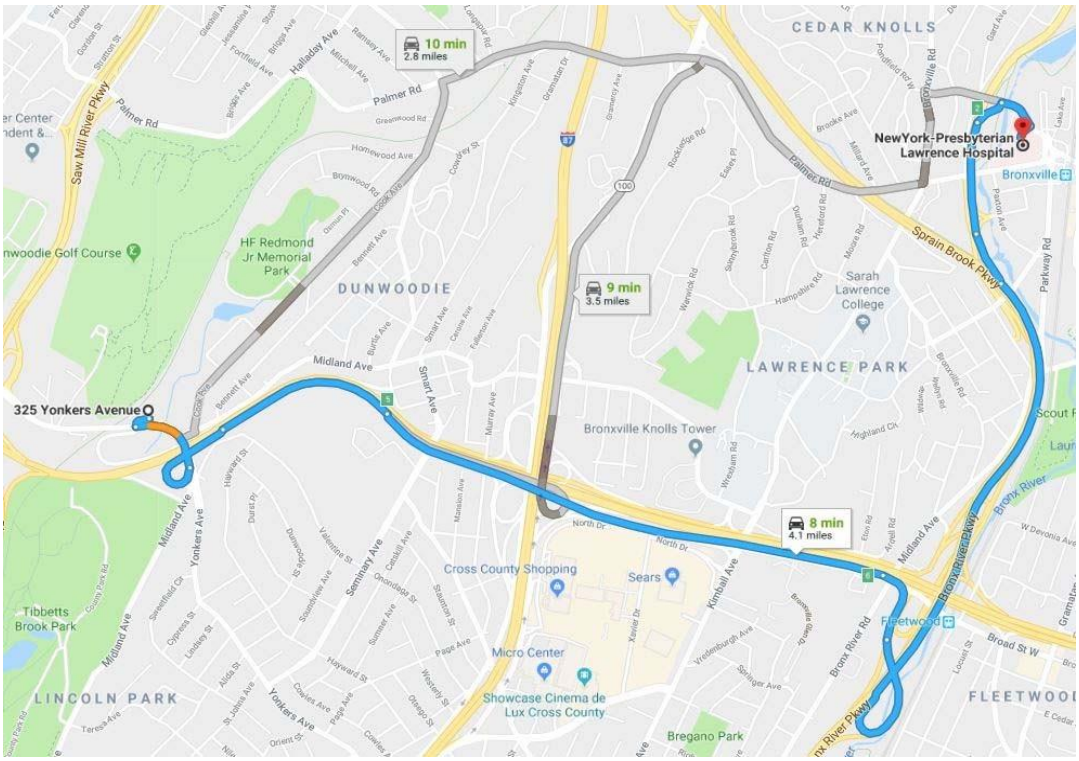
1. Head west toward Yonkers Ave
2. Turn left onto Yonkers Ave
3. Sharp right onto the Cross Country Pkwy ramp
4. Merge onto Cross County Pkwy/New York State Reference Rte 907K
5. Use the right 2 lanes to take exit 5 for Kimball Ave/W Broad St
6. Keep right at the fork to continue on Exit 6, follow signs for Bronx Ri Pkwy/Sprain Brook Pkwy
7. Keep left at the fork, follow signs for Bronx Pkwy N/Sprain Pkwy and merge onto Bronx River Pkwy
8. Take the exit toward Bronx Pkwy/White Plains
9. Continue onto Bronx River Pkwy
10. Take exit 2 toward Pondfield Rd W
11. Turn right onto Pondfield Rd W
12. Turn right

Arrive at hospital.

Hospital route information has been provided to satisfy OSHA requirements (29 CFR 1910.120). **However, where 911-emergency service and/or transport is available, ESI personnel are strictly prohibited from transporting accident victims in either company or personal vehicles.**

Transporting the injured in non-emergency vehicles increases the potential for motor vehicle accidents during transit to the hospital and further injury to the victim. Also, the victims' condition can worsen during transit. As a result, transportation in non-emergency vehicles can delay or even prevent treatment by trained emergency personnel during a critical time. Employees must remain at the site of the accident, administer appropriate first aid, and await the arrival of **trained emergency and/or rescue personnel.**

Map with Route to Hospital



Emergency Medical Care

Hospital #2

Hospital Name: **Saint Joseph's Medical Center**

Address: 127 South Broadway
Yonkers, NY 10701

Contact: Emergency Department **Telephone # 973-429-6000**

Type of Service ( ) Physical Trauma Only

(X) Physical Trauma and Chemical Exposure

(X) Available 24 Hours

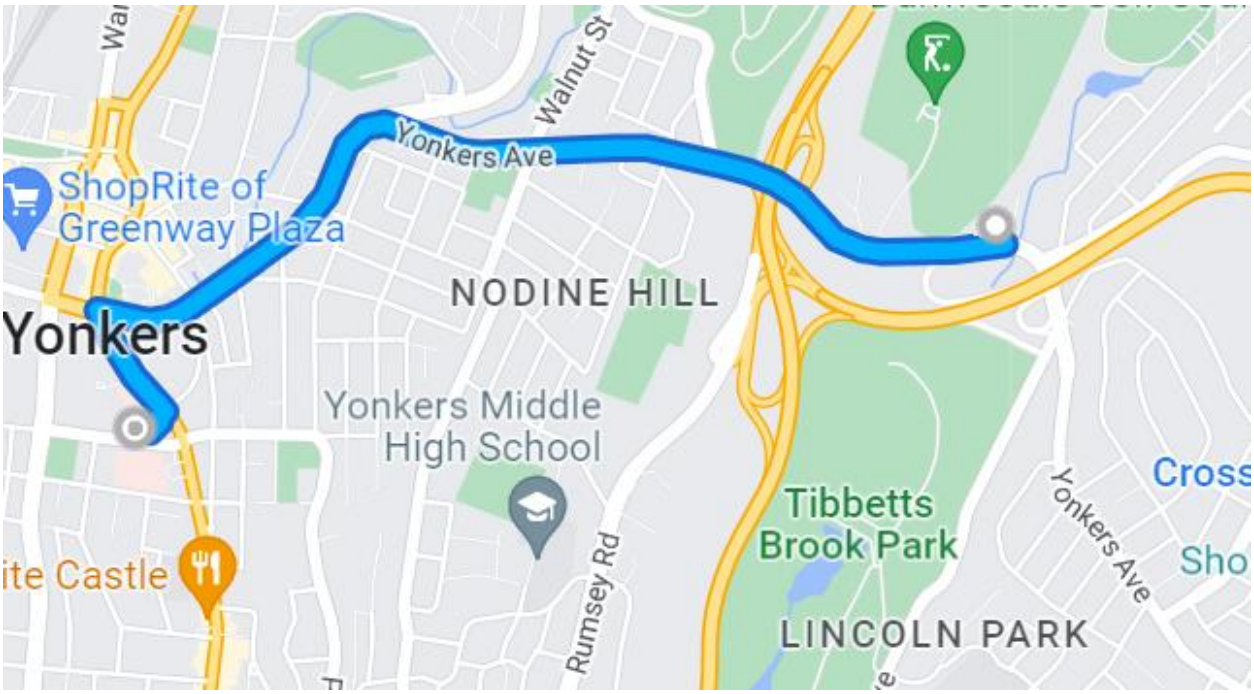
Hospital Route:

- Right onto Yonkers Avenue
- Left onto Nepperhan Avenue
- Left onto South Broadway
- Continue on South Broadway St. Joseph's Medical Center will be on Right

Hospital route information has been provided to satisfy OSHA requirements (29 CFR 1910.120). **However, where 911-emergency service and/or transport is available, ESI personnel are strictly prohibited from transporting accident victims in either company or personal vehicles.**

Transporting the injured in non-emergency vehicles increases the potential for motor vehicle accidents during transit to the hospital and further injury to the victim. Also, the victims' condition can worsen during transit. As a result, transportation in non-emergency vehicles can delay or even prevent treatment by trained emergency personnel during a critical time. Employees must remain at the site of the accident, administer appropriate first aid, and await the arrival of **trained emergency and/or rescue personnel.**

Map with Route to Hospital



Emergency Contacts

	Town	Phone
Fire Department	Yonkers Fire Department	**911** or 914-377-7500
Police Department	Yonkers Police Department	**911** or 914-377-7452
Site Contact		212-234-0234
Site Telephone	ESI Staff	--
Nearest Telephone	Cell phone	908-763-7952
First Aid/EMS	Yonkers	**911**
Federal Agency Representative	National Response Center	(800) 424-8802
State Agency Representative	NA	NA
Local Agency Representative	NA	NA
State Poison Control Center	NY	800-222-1222
CHEM TREC	--	(800) 424-9300
Utility	**Company Name**	**Phone**
Water Supply	Yonkers Public Works	914-377-6738
Sewer	Sewer Department	914 377-6271
Telephone		811
Power	ConEdison	800-752-6633
Gas		811

ESI - Emergency Contact List – Cellular Numbers

Jason Pollack	908-763-7952
Ryan Stauffer	732-850-8209
Melanie Lombardo Palen	973-420-6303
Dan Kent	973-713-2927
John Gear	201-513-6152
ESI Office	**973-398-8183**

Key Project Personnel

The following describes the project positions assignments, responsibilities, and reporting.

Position	Job Description	Interactions
Project Manager	Responsible for technical and administrative performance of the project. Supports Site Supervisor and is available to him/her at all times. Will visit the site periodically, or as necessary. Reports progress of project on a regular basis. Assigns key personnel, and identifies, requests, secures, and monitors use of resources for project. Approves program expenditures and invoices.	Reports directly to President. Works closely with Site Supervisor.
Site Supervisor	Acts as point of contact for client and client's representative(s). Supervises all on-site personnel and subcontractors. Coordinates daily site-specific work efforts, and ensures all activities are in strict compliance with site-specific health and safety plan. Has authority to suspend all work that possesses any health and safety risk. Briefs subordinate technical personnel on task requirements. Identifies and resolves technical problems. Provides periodic review of project progress.	Reports directly to Project Manager.
Site Health & Safety Officer (SHSO)	Assures compliance with HASP. Instructs site personnel in health and safety procedures through daily pre-work meetings. Performs any monitoring activities as required. Has authority to discontinue site operations if safety violations exist.	Reports directly to Project Manager. Works closely with Director, Health & Safety, and Site Supervisor.
Director, Health & Safety (DHS)	Develops, implements, and enforces the on-site safety program. Oversees all health and safety aspects of project, conducts periodic audits to ensure compliance. Available at all times to discuss project progress and health and safety related issues.	Reports directly to President. Works closely with Project Manager, Site Supervisor, and SHSO.

ESI must follow Transco's protocol for managing health and safety at this site.

Project Manager:	Melanie Lombardo	973-810-9016; 973-420-6303
	Name	Telephone and Cellular Number
Site Supervisor:	Jason Pollack	(908)763-7952
	Name/	Cellular Number
SHSO:	Jason Pollack	(908)763-7952
	Name/	Cellular Number
DHS:	Daniel Kent	973-810-9003; 973-713-2927
	Name	Telephone and Cellular Number

Medical Surveillance and Training Dates for Authorized Personnel

Employee	Physical	OSHA Training
Ryan Stauffer	118/2021	11/24/2022
Jason Pollack	11/11/2022	3/25/2023
Ramzy Iskander	12/23/2022	4/8/2023

Task Identification

Tasks covered under this plan:

Task #	Description
1	Vapor Mitigation System Installation
2	Sub-slab and Indoor Air Sampling and vapor system check

Off-site tasks planned? _____

Describe:_____

Chemical Hazards

Task No.(s)	Chemical Name (or class)	PEL	TLV	Other Limits (specify)	Primary Hazard			MSDS Attached Y/N
					Ingestion	Dermal	Inhalation	
1, 2	PCE	25 ppm	25 ppm				X	Yes
1, 2	TCE	25 ppm	10 ppm				X	Yes
1, 2	cis-1,2-DCE	1 ppm	200 ppm				X	Yes
1, 2	Vinyl Chloride	1 ppm	1 ppm				X	Yes

PEL – OSHA Permissible Exposure Limit: the maximum allowable 8-hour time weighted average (TWA) exposure concentration.
TLV – ACGIH Threshold Limit Value: the recommended 8-hour TWA exposure concentration.
STEL – ACGIH or OSHA Short-term Exposure Limit: the maximum allowable 15-minute TWA exposure concentration.
Ceiling – OSHA and Cal-OSHA Ceiling Limit: the maximum exposure concentration above, which an employee shall not be exposed during any period without respiratory protection.
IDLH – Immediately Dangerous to Life and Health: the concentration at which one could be exposed for 30 minutes without experiencing escape-impairing or irreversible health effects.

Physical and Biological Hazards

Hazard	Yes	No	Task No.(s)	Hazard	Yes	No	Task No.(s)
Electrical (overhead lines)		X		Uneven Terrain		X	
Electrical (underground lines)	X		1	Unstable Surfaces	X		1, 2
Gas Lines				Elevated Surfaces		X	
Water Lines				Lightning	X		1, 2
Drilling Equipment				Rain	X		1, 2
Excavation Equipment		X	1	Snow	X		1, 2
Power Tools	X		1	Liquefied/Pressurized Gases	X		1, 2
Heat Exposure	X		1, 2	Lifting Equipment	X		1
Cold Exposure	X		1, 2	Vermin	X		1, 2
Oxygen Deficiency		X		Insects	X		1, 2
Confined Spaces		X		Disease-causing organisms	X		1, 2
Noise	X		1	Others, e.g., marine sampling (specify)		X	
Ionizing Radiation		X					
Non-Ionizing Radiation	X		1, 2				
Fire	X		1, 2				
Explosive Atmospheres	X		1, 2				
Shoring		X					
Scaffolding		X					
Holes/Ditches	X		1, 2				
Steep Grades		X					
Slippery Surfaces	X		1, 2				

Risk Analysis

Task #	Substance	Concentration (if known)	Risk*
1, 2	PCE		1
1, 2	TCE		1
1,2	1,1-Dichloroethene (DCE)		1
1,2	Vinyl Chloride		1

Based on groundwater monitoring 2018 thru 2019 – highest concentrations encountered.
ppb – parts per billion

*Risk
0 – No Risk
1 – Slight Risk
2 – Moderate Risk
3 – Dangerous Conditions/Caution
4 – High Risk
5 – Extremely Dangerous

Heat Stress

Site employees will be trained to recognize signs of heat stress. The SHSO will maintain a log of all site employees exposed to temperature extremes, showing the work and rest times as well as worker monitoring results. Appropriate rest periods will be provided to help site workers accommodate to temperature extremes. **Wearing long sleeves or heavy protective garments such as Flame-Resistant clothing may increase worker stress during hot weather, PLAN ACCORDINGLY WITH BREAKS AND WATER.**

Signs and Symptoms of Heat Stress

- **Heat rash** may result from continuous exposure to heat or humid air.
- **Heat cramps** are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:
  - muscle spasms
  - pain in the hands, feet and abdomen
- **Heat exhaustion** occurs from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms are:
  - pale, cool, moist skin
  - heavy sweating
  - dizziness
  - nausea
  - fainting
- **Heat stroke** is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occurs. Competent medical help must be obtained. Signs and symptoms are:
  - red, hot, usually dry skin
  - lack of reduced perspiration
  - nausea
  - dizziness and confusion
  - strong, rapid pulse
  - coma

Measures to Avoid Heat Stress

- Establish work-rest cycles (short and frequent are more beneficial than long and seldom).
- Identify a shaded, cool rest area.
- Rotate personnel, alternate job functions.
- Water intake should be equal to the sweat produced. Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst. DO NOT DEPEND ON THIRST TO SIGNAL WHEN AND HOW MUCH TO DRINK. For an 8-hour workday, 50 ounces of fluids should be drunk.
- Eat lightly salted foods or drink salted drinks such as Gatorade to replace lost salt.
- Save most strenuous tasks for non-peak hours, such as the early morning or at night.
- Avoid alcohol during prolonged periods of heat. Alcohol will cause additional dehydration.

Site personnel should monitor their pulse rate as an indicator of heat strain by the following method:

At the beginning of the rest period, count the radial pulse during a 30-second period. If the rate exceeds 110 beats per minute, lengthen the rest period by one-third. If the heat rate still exceeds 110 beats per minute at the end of the rest period, shorten the next work cycle by one-third.

Cold Stress

ESI will provide appropriate protective clothing and heated shelters for cold weather exposures. Furthermore, ESI will provide appropriate rest periods to help site workers accommodate to temperature extremes. Site employees will be trained to recognize signs of cold stress.

Measures to Avoid Cold Stress

- Wear multi-layer clothing (the outer most layer should be of wind-resistant fabric)
- Drink warm fluids
- Work in pairs
- Avoid heavy sweating

Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (in mph)	Equivalent Chill Temperature (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-195
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect).	LITTLE DANGER In <hr with dry skin. Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute.				GREAT DANGER Flesh may freeze within 30 seconds.			
	Trenchfoot and immersion foot may occur at any point on this chart											

* Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA

The SHSO will maintain a log of all site employees exposed to temperature extremes, showing the work and rest times as well as environmental monitoring results.

General Safety Rules

1. If an employee must work alone, he/she must call his/her supervisor twice a day. If the supervisor is unavailable, that supervisor's supervisor must be contacted.

2. Workers must wear all personal protective equipment required for the tasks to be performed.

3. Horseplay, scuffling, or practical jokes are forbidden on the job.

4. Compressed air must not be used to blow dirt from clothing or played with or blown at another person.

5. Drinking of alcoholic beverages or the use drugs on the job is prohibited. Their use will cause immediate dismissal.

6. All areas must be continually cleaned to maintain good housekeeping. Trash is to be piled neatly and removed promptly. All tools and work areas are to be kept in clean and safe condition.

7. Competent workers must do welding and cutting.

8. Ladders are to be of proper design and tied off while in use. Do not go up or down a ladder without the free use of both hands. Use a rope to lift or lower materials or tools. Always face a ladder when climbing or descending.

9. Every work site must have a qualified first aid person and a complete first aid kit.

10. **ALL** accidents must be investigated and reported. Use the Accident Investigation Form in the back section of this plan.

11. Injuries sustained while on duty must be reported to supervisor immediately, or as soon as possible after injury is sustained.

12. Explosives must be handled and transported by licensed people only.

13. All tools and electrical equipment must be in proper working order.

14. Clothing appropriate to the duties performed shall be work by all workers. Large pockets, loose jewelry, cuffed trousers and loose or torn clothing are dangerous and should not be worn around machinery, or when climbing ladders, or working on structures.

Employee Training Program

All personnel performing work in areas on this site covered by this HASP must have completed the appropriate training requirements specified in 29 CFR 1910.120(e). Each individual must have completed an 8-hour refresher-training course and/or initial 40-hour training course within the last year prior to performing any intrusive work on this site covered by this HASP. Also, on-site managers must have completed the specified 8-hour supervisor's training course. Records that demonstrate that all persons subject to the training requirements have actually met them will be maintained on site. The Project Manager is responsible for verifying compliance of the project team with these rules.

Prior to commencement of on-site activities, a site safety meeting will be held to review the specific information and requirements of this HASP. HASP sign-off sheets will be collected at this meeting.

Site Specific Training will include:

- Explanation of the overall site HASP.
- Health and safety personnel and organization.
- Brief site history.
- Special attention to signs and symptoms of overexposure to known and suspected site contaminants.
- Health effects of site contaminants.
- Air monitoring description.
- Physical hazards associated with the project.
- Selection, use and limitations of available safety.
- Personal hygiene and decontamination.
- Respirator facepiece fit testing.
- PPE use and maintenance.
- Site rules and regulations.
- Work zone establishment and markings.
- Site communication.
- Emergency preparedness procedures.
- Equipment decontamination.
- Medical monitoring procedures.
- Contingency plan.
- Confined space entry.

Prior to work, each ESI employee will attend the contractor's health and safety orientation. In addition, ESI's employees will review health and safety items specific to the tasks to be performed that were not covered in the contractor's orientation.

Site Health and Safety Meetings

In addition, the SHSO will meet daily with all ESI employees prior to beginning work on site. The agenda of the meeting will include a review of important elements of this plan, any special safety items, and a discussion of the emergency response procedures. Also, everyone will agree on a schedule for periodic meetings, (for example, before beginning work each day), to review the effectiveness of this plan and make changes as necessary. If significant changes at the site occur, special meetings will be scheduled. (If ESI is a subcontractor, all ESI employees on site will participate in the contractor's daily safety meetings.) Additionally, all subcontractors are required to attend ESI's daily safety meetings.

Training Records

The SHSO will complete a report of the daily safety meetings, using the form in the back section of this plan, and all attending the meeting will sign the Daily Safety Meeting Log.

The training status of contractor and subcontractor employees has been verified, and their training criteria meet the requirements specified in 29 CFR 1910.120(e). A copy of all training certificates will be kept at the job site for each person working at the site.

Personal Protective Equipment (PPE) Requirements

Task No.(s)	Level of Protection (A – D)*	Level of Upgrade	PPE Suit	PPE Gloves	PPE Feet	PPE Head	PPE Eye	PPE Ear	PPE Respirator	Additional PPE for Upgrade
1, 2	D	None		N, Work	Steel			Plugs	None	**

SUIT

Std = Standard Work Clothes
Tyvek = Uncoated Tyvek Disposal Coverall
PE Tyvek = Polyethylene-coated Tyvek
Saranex = Saranex-laminated Tyvek
PVC Suite = PVC Raingear
FR = Flame Resistant Work Clothes

GLOVES

Work = Work Gloves (canvas, leather)
Neo = Neoprene Gloves
PVC = PVC Gloves
N = Nitrile Gloves
V = Vinyl Gloves
L = Latex Gloves

FEET

Steel = Steel-toe shoes or boots
Steel+ = Steel-toe PVC boots
Booties = PVC booties

HEAD

HH = Hardhat

EYE

Glasses = Safety glasses
Goggles = Goggles
Shield = Face shield

EAR

Plugs = Earplugs
Muff = Ear muffs

RESPIRATOR

APR = Air purifying respirator
Full APR = Full face APR
Half APR = Half face APR
SAR = Airline supplied air respirator
SCBA = Self contained breathing apparatus
Escape = Escape SCBA
OV = Organic Vapor Cartridge
AG = Acid Gas Cartridge
OV/AG = Organic Vapor/Acid Gas Cartridge
AM = Ammonia Cartridge
Dust/Mist = Dust/Mist pre-filter and cover for cartridge
HEPA = High efficiency particulate air filter cartridge

* For unspecified volatile organics (based on 1-minute breathing zone measurement using PID or OVA):
Up to 1 ppm above background Level D, 1 – 5 ppm above background Level C, 5 – 500 ppm above background Level B, 500 ppm above background Level A

** No PPE upgrade specified- stop work and reevaluate the PPE requirements

Suggested Levels of Protection

Level "D" Protection

1. Coveralls
2. Gloves
3. Boots/shoes – steel toe
4. Boots (outer) chemical resistant (disposable)
5. Safety glasses or chemical splash goggles
6. Hard hat (safety shield)

Level "C" Protection

1. Full-face, air-purifying, canister-equipped respirator (NIOSH/MSHA approved)
2. Chemical resistant clothing (coveralls; hooded, two-piece, chemical splash suit; chemical resistant hood & apron; disposable, chemical-resistant coveralls)
3. Coveralls
4. Gloves (outer) chemical-resistant
5. Gloves (inner) chemical-resistant
6. Boots (outer) chemical-resistant
7. Boots (inner) chemical-resistant
8. Hard hat (face shield)
9. Escape mask
10. Two-way radio

Level "B" Protection

1. Pressure/Demand SCBA (MSHA-NIOSH approved)
2. Chemical resistant clothing (overalls and long-sleeved jacket; coveralls; hooded, one- or two-piece chemical splash suite; disposable, chemical-resistant coveralls)
3. Coveralls
4. Gloves (outer) chemical-resistant
5. Gloves (inner) chemical-resistant
6. Boots (outer) chemical-resistant
7. Boots (inner) chemical-resistant
8. Hard hat (face shield)
9. Two-way radio

Level "A" Protection

1. Pressure/Demand SCBA (MSHA-NIOSH approved)
2. Fully encapsulating, chemical-resistant suit
3. Coveralls
4. Gloves (outer) chemical-resistant
5. Gloves (inner) chemical-resistant
6. Boots, chemical-resistant, steel toe (depending on suit construction, work over or under suit boot)
7. Hard hat (under suit)
8. Two-way radio

PPE Summary

	Number Required*
Boots	
Steel Toe	X
Outer Chemical Resistant (disposable)	
Chemical Resistant (Steel Toe)	
Clothing	
White Tyvek	
Yellow Poly Tyvek (Water, Solvents, Oils)	
Saranex (Acids)	
Flame Resistant	
Gloves	
Surgical	
Utility	
Nitrile	X
Vinyl	
Neoprene	
Leather work gloves	
Respirator	
Dust	
Half Mask	
Full-Face	
Cartridges	
Dust/Asbestos	
Ammonia/Methylamine	
Paints/Lacquers/Pesticides	
Organics/Hydrogen Chloride	
Sulfur Dioxide/Asbestos	
Pesticides/Organics	
Hearing	
Ear Plugs	X
Ear Muffs	
Head	
Hardhat	
Faceshield	X in work area
Safety Glasses/Goggles	

* Face shield/Safety Glasses/Goggles based on number of workers, days in field, changes per day, etc.

Medical Surveillance

Requirements

All ESI employees covered by this HASP, who engage in on site activities governed by 29 CFR 1910.120 for 30 or more days per year, must meet the medical surveillance requirements specified in 1910.120(f). Therefore, such personnel must have completed occupational medical baseline or surveillance examination, performed by a licensed physician, within the last 24 months. The medical examination includes the following components:

- Personal Medical Questionnaire
- Occupational Exposure History
- Physical Examination
- Vision Testing
- Spirometry
- Audiometry
- Blood Chemistry Panel (e.g., SMAC-20)
- Complete Blood Count with Differential
- Urinalysis
- Chest X-Ray (every two years at a minimum)
- Electrocardiogram (at physician's discretion)

Examinations are required upon hiring, termination, and exposure to substances at or above the PEL.

Results of the examinations are communicated directly from the physician to the employee. Medical records for ESI's employees are kept by the physician:

Morristown Medical Group
95 Madison Avenue Suite 101
Morristown, New Jersey 07960
(973)267-1010 – office
(973)267-5521 – fax

Monitoring Requirements

Monitoring is to be conducted by the SHSO, or his/her designee. The results will be interpreted by the SHSO and the DHS. Copies of monitoring results and calibration logs will be filed with the HASP.

Monitoring is designed to assess exposure to employees during site activities, and to determine if PPE is required and adequate to assure protection. Because investigation and remediation activities at hazardous waste sites are of an inconsistent nature, it is not possible to assign a monitoring protocol that excludes, or is not directly dependent upon, professional judgement in determining when monitoring is required to assess exposure. Thus, the following generic protocol must be followed at a minimum and should be modified to be more conservative (e.g., require more monitoring) if deemed necessary by the SHSO or DHS. Under no conditions will the required frequency be decreased.

At a minimum, air monitoring will be conducted before and during each task or activities for which air monitoring has been designated. If airborne concentrations of contaminants reach action levels based on observations with the direct reading instruments, then the appropriate PPE upgrade or work stoppage order will be enforced by the SHSO. In case a work stoppage order is given, the area must be cleared of all personnel immediately.

The use of action levels and the basis for the selection of monitoring equipment is explained as follows:

Action levels determine:

(1) the PPE to be used by site workers
(2) their ability to remain and work in the exclusion zone

The selection of the specified monitoring equipment is based on

(1) the nature of the contaminants
(2) the likely concentrations of the contaminants
(3) the probable duration of exposure
(4) the relative sensitivity of the monitoring equipment to the specific contaminants

The following summarizes the calibration requirements for the air monitoring instruments used at the site:

Instrument	Calibration Frequency
Direct Reading Instruments	Beginning of each work shift
Personal Exposure Monitoring	Before and after sampling

Air Monitoring and Contaminant Action Levels

Task No.(s)	Location	Contaminant	Monitoring Equipment	Monitoring Frequency	Action Level Concentration	
					Mandatory Respirator Use	Mandatory Work Stoppage
1	Throughout building at work locations	VOCs	PID	Throughout workday	N/A	5 ppm above background

PID = Photoionization Detector (HNU, TIP, OVM)
FID = Flame Ionization Detector (OVA)
LEL-O_2 = Explosivity and Oxygen Meter

Name(s) of individual(s) responsible for performing the monitoring, and certifying the results:

- Travis Kot, Jason Pollack, Dan Hemmerlin, Justin Kuriawa

Type, make and model of instruments used: PID – Mini Rae 3000

Method and frequency of calibration: Daily calibration with isobutylene

Decontamination (DECON) Procedures

Depending on the specific task, decon may include personnel, sampling equipment, and heavy equipment. The following sections summarize general decon protocols.

General Procedures

- Sampling equipment will be brushed clean and rinsed with distilled water or other appropriate cleaning material.
- Heavy equipment will be high-pressure washed at operating locations when practical.
- Samples will be dry-wiped prior to packaging.
- Monitoring equipment will be wiped down.
- Vehicles that become contaminated with suspect contaminated soil will be cleaned prior to leaving the site. The wheel wells, tires, sides of vehicles, etc., will be high-pressure washed at a location to be determined by the SHSO.
- Spent decon solutions may have to be drummed and disposed of as hazardous waste; solvent solutions may be required to be segregated from water rinses.
- Decon must be performed so that waste generated is minimized.

Heavy Equipment

Decon heavy equipment prior to personnel. Drillers will steam clean their augers after use. Wash hand auger buckets in an acceptable cleaning solution, and rinse in distilled water. Set up systems for collecting decon fluids and materials. Set up berms and wind barriers, if appropriate.

Personnel

- Gross wash and rinse; suit wash (where appropriate).
- Tape removal (where appropriate).
- Outer glove removal.
- Boot removal.
- Suit removal (where appropriate).
- Respirator/hard hat removal (where appropriate).
- Respirator wash (where appropriate).
- Inner glove wash/rinse/removal.
- Inner clothing removal.
- Field wash and redress.

Samples and Sampling Equipment

Same configuration, equipment and materials as required for personnel decon. Use same decon line.

Procedures for Handling Anticipated Wastes

Waste Generation

Anticipated: Yes X No

Types: Liquid Solid X Sludge Gas
Quantity: Expected volume of each type ~15 gallons (3 5-gaalon buckets)

This project X will will not generate hazardous wastes. These wastes will be:

X stored treated
X transported X manifested in the following manner:

*****TRANSCO WILL REMOVE AND DISPOSE OF ALL WASTES GENERATED AT THE SITE**

Characteristics:

Corrosive		Ignitable		Radioactive		Volatile	X
Toxic		Reactive		Unknown		Carcinogenic	X
Other (specify)							

Listed, Tested, By
(signature)

Transportation – Transportation and disposal will take place at a later date

DOT Classification (Anticipated): Nonhazardous

Type(s) of labels required for waste shipment:

Packaging requirements for waste material:

Open head 55-gallon drum
Closed head 55-gallon drum
Overpack drum
Baker tanks
Lined waste bins
Other

The manifest and disposal contract to be signed by

TSD Facility to be used:

Name:
EPA I.D. Number:

Waste Transporter:

Name:
EPA I.D. Number:
State I.D. Number:

Spill Prevention and Response

Potentially hazardous spill situations can be mitigated by using containment devices and materials in work areas. If site conditions are suitable, earthen berms will be constructed around specific areas. If site conditions are not suitable for this, or the potential spill is smaller, barriers will be constructed with sorbent materials such as "speedi-dry", sorbent booms and/or straw bales. Dikes and berms will also be used to divert stormwater run-on and run-off away from critical zones.

Because a spill cleanup must be conducted under crisis conditions, it is important that the methods used for dealing with a spill be thought out beforehand. However, the steps followed cannot be inflexible, because no two spills are identical. Factors that will be assessed in the event of any and all spills include:

1. The volume of the hazardous substance released and the rate of release.
2. The nature of the spill material.
3. What danger exists to personnel in the immediate area.
4. Nature of damage and possibilities of repair.
5. If the transfer of material to an alternate containment is advisable.
6. Feasibility of the construction of a containment dike.
7. Nature of spill area.
8. Whether the spilled substance has reached a watercourse or sewer.
9. Danger of explosion or fire.
10. Equipment and supplies necessary to confine the material and carry out the cleanup.

In most cases, the success of a cleanup operation is dependent upon the time it takes to contain the spill. Therefore, ESI's first attempt at spill containment will be at the point of discharge. This can often be accomplished by closing valves, reinforcing or repairing damaged containers, moving or changing the position of fallen or ruptured containers, or emptying the container by pumping to a temporary storage or holding vessel. Pumps, suction hoses and containers will be available to recover spilled materials when directed to do so by the Site Supervisor.

Handling and transport of drummed waste always must be conducted in a controlled and safe manner, which will minimize damage to structurally sound drums, repacks and overpacks. If leakage or spillage of waste occurs, the drum must immediately be placed within an overpack unit. Overpack units must be provided at each staging area, at areas of existing drums, and along all site roadways.

In the event of a spill, the drum handling team must immediately contact the SHSO, who will have all personnel evacuated from the immediate spill area. Only personnel trained in spill response procedures shall isolate and contain the spill. Where possible, spilled waste material must be collected and placed in repack containers for ultimate disposal. Following containment and collection of spilled waste, the area must be surveyed by the SHSO, who will decide if it is safe to permit re-entry of work teams.

Task/Work Area	Potential Spill or Discharge	Equipment, Materials, and Procedures for Spill Cleanup

Emergency Action Plan

Responsibilities/Training (Written and Oral Plans)

This plan must be reviewed by all personnel prior to entrance to the worksite. ESI will designate an employee, usually the SHSO, to be responsible for initiating any emergency actions. In the event an injury or illness requires more than first aid treatment, the SHSO (or alternate) will accompany the injured person to the hospital and will remain with the person until release or admittance is decided. This emergency action plan will be kept on-site during work and reviewed orally as part of the daily tailgate H&S meetings at a worksite.

Emergency Reporting

In the event of fire or other emergency, emergency response agencies will be contacted by calling 911. Employees should contact Melanie Lombardo, at ESI for further information/clarification on the plan.

Any incident (other than minor first aid treatment) resulting in injury, illness or property damage will be reported immediately. An incident investigation will be initiated as soon as emergency conditions are under control. The purpose of this investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided. The investigations will begin while details are fresh in the mind of all involved. The person administering first aid may be able to start the fact gathering process if the injured are able to speak. Pertinent facts must be determined. Questions beginning with who, what, when, where, and how are usually most effective to discover ways to improve job performance in terms of efficiency, quality of work, as well as safety and health concerns.

On-Site Evacuation Plan

An emergency evacuation alarm (air horn, etc.) will be on site at all times. This alarm should be of sufficient power to be heard by personnel operating heavy equipment. A series of repeated blasts is the signal for all ESI personnel and subcontractors to evacuate the site. The ESI SHSO will account for all ESI employees and any subcontractors. All ESI work occurs outside, so evacuation would be on foot or vehicle to the road, depending on location of the incident in relation to work areas.

The criteria for activating the alarm will be the first sign of any serious problem that requires assistance or evacuation.

Should either a fire or explosion occur, all personnel will proceed immediately to the evacuation assembly point and await further instructions. At that time a personnel check will be conducted to determine if anyone is missing, and the local fire and police departments will be called for assistance.

Alarm Systems Emergency Signals

The simplest and most effective emergency communication system, in any situation, is direct voice communications. Voice communications will be supplemented anytime voices cannot be clearly perceived above ambient noise levels (e.g., noise from drilling rigs) and anytime a clear line-of-sight cannot be easily maintained among all site personnel because of distance, terrain, or other obstructions. When voice communications must be supplemented, the following emergency signals, using hand-held portable airhorns, will be used.

- One Horn Blast: General Warning

One blast is used to signal relatively minor, but important events on site. An example would be a minor spill where there is no immediate damage to life or health, yet personnel working on site should be aware of the situation so unnecessary problems are avoided. If one horn blast is sounded, personnel must stop all activity and equipment on site and await further instruction from the SHSO.

- Two Horn Blasts: Medical Emergency

Two blasts are used to signal a medical emergency where immediate first aid or emergency medical care is required. If two horn blasts are sounded, all first aid and CPR trained personnel should respond, as appropriate. All other activity and equipment should stop, and personnel should await further instructions from the SHSO.

- Three Horn Blasts Followed by One Continuous Blast: Immediate Danger to Life or Health

Three blasts followed by another extended or continuous horn blast signals a situation that could present an immediate danger to the life or health (IDLH) to all employees on site. Examples of possible IDLH situations could include fires, explosions, hazardous chemical spills or releases, hurricanes, tornadoes, blizzards or floods. If three horn blasts followed by a continuous blast are sounded, all activity and equipment must stop, and all personnel must evacuate the site to an appropriately designated site located outside the site gate, or further off site if necessary. (Note: unless otherwise specified, all decontamination procedures must be implemented.) All personnel must be accounted for by the SHSO or Site Supervisor, and other response actions determined by the SHSO or Site Supervisor must be followed.

Employees on site will use the "buddy" system (pairs). Buddies should pre-arrange hand signals or other means of emergency communication in case radios/phones cannot be used or no longer operate. The following had signals are suggested:

1. Hand gripping throat: out of air, can't breathe.
2. Grip partner's wrist or place both hands around waste: leave area immediately, no debate.
3. Hand on top of head: need assistance.
4. Thumbs up: OK, I'm alright, I understand.
5. Thumbs down: No, negative.

Visual contact will be maintained between employee pairs. Team members will remain in close proximity to each other in order to provide assistance in case of emergencies, and will inform each other of any of the following effects of exposure to site contamination:

- headaches
- dizziness
- blurred vision
- cramps
- irritation of eyes, skin or respiratory tract

If any member of the work crew experiences any adverse symptoms while on site, the entire work crew will immediately stop work and follow the instructions provided by the SHSO.

Medical Treatment/First Aid

The on-site SHSO is trained in CPR and first aid and will have first aid kits for use in a medical emergency. First aid kits will be located in field vehiclesCommunity emergency services (EMS, fire, and police) will be notified immediately if their resources are needed on site. If necessary, the injured or sick party shall be taken to the nearest hospital.

Subcontractor Safety

It has been and shall continue to be the policy of ESI that employees of all subcontractors are required to adhere to all applicable company, local, state, and federal safety rules and regulations.

When an infraction of a local, state, federal, or company safety regulation is observed, the SHSO will request verbally that the subcontractor's supervisory personnel correct the infraction immediately. If correction is not made, then the project director will request in writing that proper corrective action be taken. Subcontractors who continue to ignore proper safety procedures will have payments withheld until compliance is achieved.

Subcontractors are required to hold safety meetings for their employees when they are working on ESI projects and submit documentation of such meetings to the Project Manager.

Material Safety Data Sheets

SECTION 2. Hazards identification. ... / >>

2.2. Label elements.

Hazard labelling pursuant to EC Regulation 1272/2008 (CLP) and subsequent amendments and supplements.

Hazard pictograms:

Signal words: Warning

Hazard statements:

H351	Suspected of causing cancer.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H411	Toxic to aquatic life with long lasting effects.

Precautionary statements:

P201	Obtain special instructions before use.
P273	Avoid release to the environment.
P280	Wear protective gloves / protective clothing / eye protection / face protection.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P308+P313	IF exposed or concerned: Get medical advice / attention.

INDEX. 602-028-00-4

2.3. Other hazards.

Information not available.

SECTION 3. Composition/information on ingredients.

3.1. Substances.

Contains:

Identification.	Conc. %.	Classification 67/548/EEC.	Classification 1272/2008 (CLP).
PERCHLOROETHYLENE			
CAS. 127-18-4 *EC. 204-825-9* *INDEX. 602-028-00-4*	100	Carc. Cat. 3 R40, N R51/53	Carc. 2 H351, Skin Irrit. 2 H315, Skin Sens. 1 H317, Aquatic Chronic 2 H411

The full wording of the Risk (R) and hazard (H) phrases is given in section 16 of the sheet.

T+ = Very Toxic(T+), T = Toxic(T), Xn = Harmful(Xn), C = Corrosive(C), Xi = Irritant(Xi), O = Oxidizing(O), E = Explosive(E), F+ = Extremely Flammable(F+), F = Highly Flammable(F), N = Dangerous for the Environment(N)

3.2. Mixtures.

Information not relevant.

SECTION 4. First aid measures.

4.1. Description of first aid measures.

EYES: Remove contact lenses, if present Wash immediately with plenty of water for at least 15 minutes, opening the eyelids fully. If problem persists, seek medical advice

SKIN: Remove contaminated clothing. Wash immediately with plenty of water. If irritation persists, get medical advice/attention. Wash contaminated clothing before using it again.

INHALATION: Remove to open air. In the event of breathing difficulties, get medical advice/attention immediately.

INGESTION: Get medical advice/attention. Induce vomiting only if indicated by the doctor. Never give anything by mouth to an unconscious person, unless authorised by a doctor.

4.2. Most important symptoms and effects, both acute and delayed.

For symptoms and effects caused by the contained substances, see chap. 11.

SECTION 4. First aid measures. ... / >>

4.3. Indication of any immediate medical attention and special treatment needed.
Information not available.

SECTION 5. Firefighting measures.

5.1. Extinguishing media.
SUITABLE EXTINGUISHING EQUIPMENT
The extinguishing equipment should be of the conventional kind: carbon dioxide, foam, powder and water spray.
UNSUITABLE EXTINGUISHING EQUIPMENT
None in particular.

5.2. Special hazards arising from the substance or mixture.
HAZARDS CAUSED BY EXPOSURE IN THE EVENT OF FIRE
Do not breathe combustion products.

5.3. Advice for firefighters.
GENERAL INFORMATION
Use jets of water to cool the containers to prevent product decomposition and the development of substances potentially hazardous for health. Always wear full fire prevention gear. Collect extinguishing water to prevent it from draining into the sewer system. Dispose of contaminated water used for extinction and the remains of the fire according to applicable regulations.
SPECIAL PROTECTIVE EQUIPMENT FOR FIRE-FIGHTERS
Normal fire fighting clothing i.e. fire kit (BS EN 469), gloves (BS EN 659) and boots (HO specification A29 and A30) in combination with self-contained open circuit positive pressure compressed air breathing apparatus (BS EN 137).

SECTION 6. Accidental release measures.

6.1. Personal precautions, protective equipment and emergency procedures.
Block the leakage if there is no hazard.
Wear suitable protective equipment (including personal protective equipment referred to under Section 8 of the safety data sheet) to prevent any contamination of skin, eyes and personal clothing. These indications apply for both processing staff and those involved in emergency procedures.

6.2. Environmental precautions.
The product must not penetrate into the sewer system or come into contact with surface water or ground water.

6.3. Methods and material for containment and cleaning up.
Collect the leaked product into a suitable container. Evaluate the compatibility of the container to be used, by checking section 10.
Absorb the remainder with inert absorbent material.
Make sure the leakage site is well aired. Check incompatibility for container material in section 7. Contaminated material should be disposed of in compliance with the provisions set forth in point 13.

6.4. Reference to other sections.
Any information on personal protection and disposal is given in sections 8 and 13.

SECTION 7. Handling and storage.

7.1. Precautions for safe handling.
Before handling the product, consult all the other sections of this material safety data sheet. Avoid leakage of the product into the environment. Do not eat, drink or smoke during use. Remove any contaminated clothes and personal protective equipment before entering places in which people eat.

7.2. Conditions for safe storage, including any incompatibilities.
Store only in the original container. Store the containers sealed, in a well ventilated place, away from direct sunlight. Keep containers away from any incompatible materials, see section 10 for details.

7.3. Specific end use(s).
Information not available.

SECTION 8. Exposure controls/personal protection.

8.1. Control parameters.

Regulatory References:

United Kingdom	EH40/2005 Workplace exposure limits. Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations (as amended).
Éire	Code of Practice Chemical Agent Regulations 2011.
OEL EU	Directive 2009/161/EU; Directive 2006/15/EC; Directive 2004/37/EC; Directive 2000/39/EC.
TLV-ACGIH	ACGIH 2012

PERCHLOROETHYLENE

Threshold Limit Value.

Type	Country	TWA/8h		STEL/15min	
		mg/m3	ppm	mg/m3	ppm
WEL	UK	345	50	689	100
OEL	IRL	170	25	678	100
TLV-ACGIH		170	25	678	100

Legend:
(C) = CEILING ; INHAL = Inhalable Fraction ; RESP = Respirable Fraction ; THORA = Thoracic Fraction.

8.2. Exposure controls.

As the use of adequate technical equipment must always take priority over personal protective equipment, make sure that the workplace is well aired through effective local aspiration.
Personal protective equipment must be CE marked, showing that it complies with applicable standards.
Provide an emergency shower with face and eye wash station.
HAND PROTECTION
Protect hands with category III work gloves (see standard EN 374).
The following should be considered when choosing work glove material: compatibility, degradation, failure time and permeability.
The work gloves' resistance to chemical agents should be checked before use, as it can be unpredictable. The gloves' wear time depends on the duration and type of use.
SKIN PROTECTION
Wear category II professional long-sleeved overalls and safety footwear (see Directive 89/686/EEC and standard EN ISO 20344). Wash body with soap and water after removing protective clothing.
EYE PROTECTION
Wear airtight protective goggles (see standard EN 166).
RESPIRATORY PROTECTION
If the threshold value (e.g. TLV-TWA) is exceeded for the substance or one of the substances present in the product, use a mask with a type A filter whose class (1, 2 or 3) must be chosen according to the limit of use concentration. (see standard EN 14387). In the presence of gases or vapours of various kinds and/or gases or vapours containing particulate (aerosol sprays, fumes, mists, etc.) combined filters are required.
Respiratory protection devices must be used if the technical measures adopted are not suitable for restricting the worker's exposure to the threshold values considered. The protection provided by masks is in any case limited.
If the substance considered is odourless or its olfactory threshold is higher than the corresponding TLV-TWA and in the case of an emergency, wear open-circuit compressed air breathing apparatus (in compliance with standard EN 137) or external air-intake breathing apparatus (in compliance with standard EN 138). For a correct choice of respiratory protection device, see standard EN 529.
The emissions generated by manufacturing processes, including those generated by ventilation equipment, should be checked to ensure compliance with environmental standards.
Product residues must not be indiscriminately disposed of with waste water or by dumping in waterways.

SECTION 9. Physical and chemical properties.

9.1. Information on basic physical and chemical properties.

Appearance		liquid	
Colour		colourless	
Odour		Not available.	
Odour threshold.		Not available.	
pH.			
Melting point / freezing point.		-22	°C.
Initial boiling point.		121	°C.
Boiling range.		Not available.	
Flash point.	>	60	°C.

SECTION 9. Physical and chemical properties. ... / >>

Evaporation Rate	Not available.
Flammability of solids and gases	Not available.
Lower inflammability limit.	Not available.
Upper inflammability limit.	Not available.
Lower explosive limit.	Not available.
Upper explosive limit.	Not available.
Vapour pressure.	13 mmHg
Vapour density	N/A
Relative density.	1.600 Kg/l
Solubility	Not available.
Partition coefficient: n-octanol/water	Not available.
Auto-ignition temperature.	Not available.
Decomposition temperature.	Not available.
Viscosity	Not available.
Explosive properties	Not available.
Oxidising properties	Not available.

9.2. Other information.

VOC (Directive 1999/13/EC) :	100.00 % - 1,600.00 g/litre.
VOC (volatile carbon) :	14.47 % - 231.56 g/litre.

SECTION 10. Stability and reactivity.

10.1. Reactivity.

There are no particular risks of reaction with other substances in normal conditions of use.

TETRACHLOROETHYLENE: incombustable, however it decomposes above 150°C. Decomposition also occurs due to the action of UV rays and moisture.

10.2. Chemical stability.

The product is stable in normal conditions of use and storage.

10.3. Possibility of hazardous reactions.

No hazardous reactions are foreseeable in normal conditions of use and storage.

TETRACHLOROETHYLENE: risk of explosion on contact with: alkaline metals, aluminium, alkaline hydroxides, sodium amide. May react violently on contact with: strong bases, strong oxidising agents, alkaline earth metals, light metals, metal powders and zinc oxide.

10.4. Conditions to avoid.

None in particular. However the usual precautions used for chemical products should be respected.

10.5. Incompatible materials.

Information not available.

10.6. Hazardous decomposition products.

TETRACHLOROETHYLENE: hydrogen chloride, phosgene, chlorine, ethane tetrachloride, other toxic chlorine compounds.

SECTION 11. Toxicological information.

11.1. Information on toxicological effects.

This product must be handled carefully because of its possible carcinogenic effects. Anyway, currently available data do not allow us to comprehensively assess this product.
Acute effects: contact with skin may cause: irritation, erythema, edema, dryness and chapped skin. Vapour inhalation may slightly irritate the upper respiratory trait. Ingestion may cause health disorders, including stomach pain and sting, nausea and sickness.
Upon contact with skin, this product causes sensitization (dermatitis). Dermatitis derives from skin irritation on the areas which repeatedly come into contact with the sensitizing agent. Cutaneous lesions may include: erythemas, edemas, papules, vesicles, pustules, scurvies, ulcerations and exudative phenomena, whose intensity varies according to illness seriousness and affected areas.
Erythemas, edemas and exudative phenomena prevail during the acute phase. Scurfy skin, dryness, ulcerations and skin thickening prevail during the chronic phase.

TETRACHLOROETHYLENE: has a toxic effect on the central and peripheral nervous system, liver, kidneys and heart. Mucous membranes and skin are affected by its irritant effect.

PERCHLOROETHYLENE

LC50 (Inhalation).	4000 ppm/4h Rat

SECTION 12. Ecological information.

This product is dangerous for the environment and is toxic for aquatic organisms. In the long term, it have negative effects on acquatic environment.

12.1. Toxicity.

PERCHLOROETHYLENE
EC50 - for Crustacea. 18 mg/l/48h Daphnia magna

12.2. Persistence and degradability.
TETRACHLOROETHYLENE:not easily biodegradable.

12.3. Bioaccumulative potential.
TETRACHLOROETHYLENE: low bioaccumulation potential (log Ko/w>3).

12.4. Mobility in soil.
TETRACHLOROETHYLENE: slightly mobile in soil.

12.5. Results of PBT and vPvB assessment.

On the basis of available data, the product does not contain any PBT or vPvB in percentage greater than 0,1%.

12.6. Other adverse effects.

Information not available.

SECTION 13. Disposal considerations.

13.1. Waste treatment methods.
Reuse, when possible. Product residues should be considered special hazardous waste. The hazard level of waste containing this product should be evaluated according to applicable regulations.
Disposal must be performed through an authorised waste management firm, in compliance with national and local regulations.
Avoid littering. Do not contaminate soil, sewers and waterways.
Waste transportation may be subject to ADR restrictions.
CONTAMINATED PACKAGING
Contaminated packaging must be recovered or disposed of in compliance with national waste management regulations.

SECTION 14. Transport information.

These goods must be transported by vehicles authorized to the carriage of dangerous goods according to the provisions set out in the current edition of the Code of International Carriage of Dangerous Goods by Road (ADR) and in all the applicable national regulations.
These goods must be packed in their original packagings or in packagings made of materials resistant to their content and not reacting dangerously with it. People loading and unloading dangerous goods must be trained on all the risks deriving from these substances and on all actions that must be taken in case of emergency situations.

SECTION 14. Transport information. ... / >>

Road and rail transport:

ADR/RID Class:	6.1	UN:	1897
Packing Group:	III		
Label:	6.1		
Nr. Kemler:	60		
Limited Quantity.	5 L		
Tunnel restriction code.	(E)		
Proper Shipping Name:	TETRACHLOROETHYLENE		

Carriage by sea (shipping):

IMO Class:	6.1	UN:	1897
Packing Group:	III		
Label:	6.1		
EMS:	F-A, S-A		
Marine Pollutant.	NO		
Proper Shipping Name:	TETRACHLOROETHYLENE		

Transport by air:

IATA:	6.1	UN:	1897
Packing Group:	III		
Label:	6.1		
Cargo:			
Packaging instructions:	663	Maximum quantity:	220 L
Pass.:			
Packaging instructions:	655	Maximum quantity:	60 L
Proper Shipping Name:	TETRACHLOROETHYLENE		

SECTION 15. Regulatory information.

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture.

Seveso category. 9ii

Restrictions relating to the product or contained substances pursuant to Annex XVII to EC Regulation 1907/2006.
Product.
Point. 3

Substances in Candidate List (Art. 59 REACH).
None.
Substances subject to authorisarion (Annex XIV REACH).
None.
Substances subject to exportation reporting pursuant to (EC) Reg. 649/2012:
None.

Substances subject to the Rotterdam Convention:
None.

Substances subject to the Stockholm Convention:
None.

Healthcare controls.
Workers exposed to this chemical agent must not undergo health checks, provided that available risk-assessment data prove that the risks related to the workers' health and safety are modest and that the 98/24/EC directive is respected.

15.2. Chemical safety assessment.

No chemical safety assessment has been processed for the mixture and the substances it contains.

SECTION 16. Other information.

Text of hazard (H) indications mentioned in section 2-3 of the sheet:

Carc. 2	Carcinogenicity, category 2
Skin Irrit. 2	Skin irritation, category 2

SECTION 16. Other information. ... / >>

Skin Sens. 1	Skin sensitization, category 1
Aquatic Chronic 2	Hazardous to the aquatic environment, chronic toxicity, category 2
H351	Suspected of causing cancer.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H411	Toxic to aquatic life with long lasting effects.

Text of risk (R) phrases mentioned in section 2-3 of the sheet:

Carc. Cat. 3	Carcinogenicity, category 3.
R40	LIMITED EVIDENCE OF A CARCINOGENIC EFFECT.
R51/53	TOXIC TO AQUATIC ORGANISMS, MAY CAUSE LONG-TERM ADVERSE EFFECTS IN THE AQUATIC ENVIRONMENT.

LEGEND:
- ADR: European Agreement concerning the carriage of Dangerous goods by Road
- CAS NUMBER: Chemical Abstract Service Number
- CE50: Effective concentration (required to induce a 50% effect)
- CE NUMBER: Identifier in ESIS (European archive of existing substances)
- CLP: EC Regulation 1272/2008
- DNEL: Derived No Effect Level
- EmS: Emergency Schedule
- GHS: Globally Harmonized System of classification and labeling of chemicals
- IATA DGR: International Air Transport Association Dangerous Goods Regulation
- IC50: Immobilization Concentration 50%
- IMDG: International Maritime Code for dangerous goods
- IMO: International Maritime Organization
- INDEX NUMBER: Identifier in Annex VI of CLP
- LC50: Lethal Concentration 50%
- LD50: Lethal dose 50%
- OEL: Occupational Exposure Level
- PBT: Persistent bioaccumulative and toxic as REACH Regulation
- PEC: Predicted environmental Concentration
- PEL: Predicted exposure level
- PNEC: Predicted no effect concentration
- REACH: EC Regulation 1907/2006
- RID: Regulation concerning the international transport of dangerous goods by train
- TLV: Threshold Limit Value
- TLV CEILING: Concentration that should not be exceeded during any time of occupational exposure.
- TWA STEL: Short-term exposure limit
- TWA: Time-weighted average exposure limit
- VOC: Volatile organic Compounds
- vPvB: Very Persistent and very Bioaccumulative as for REACH Regulation.

GENERAL BIBLIOGRAPHY
1. Directive 1999/45/EC and following amendments
2. Directive 67/548/EEC and following amendments and adjustments
3. Regulation (EC) 1907/2006 (REACH) of the European Parliament
4. Regulation (EC) 1272/2008 (CLP) of the European Parliament
5. Regulation (EC) 790/2009 (I Atp. CLP) of the European Parliament
6. Regulation (EC) 453/2010 of the European Parliament
7. Regulation (EC) 286/2011 (II Atp. CLP) of the European Parliament
8. Regulation (EC) 618/2012 (III Atp. CLP) of the European Parliament
9. The Merck Index. - 10th Edition
10. Handling Chemical Safety
11. Niosh - Registry of Toxic Effects of Chemical Substances
12. INRS - Fiche Toxicologique (toxicological sheet)
13. Patty - Industrial Hygiene and Toxicology
14. N.I. Sax - Dangerous properties of Industrial Materials-7, 1989 Edition
15. ECHA website

Note for users:

SECTION 16. Other information. ... / >>

The information contained in the present sheet are based on our own knowledge on the date of the last version. Users must verify the suitability and thoroughness of provided information according to each specific use of the product.
This document must not be regarded as a guarantee on any specific product property.
The use of this product is not subject to our direct control; therefore, users must, under their own responsibility, comply with the current health and safety laws and regulations. The producer is relieved from any liability arising from improper uses.
Provide appointed staff with adequate training on how to use chemical products.

SAFETY DATA SHEET

Trichloroethylene

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier : Trichloroethylene

Chemical name : trichloroethylene

Other means of identification : trichloroethene; Ethene, 1,1,2-trichloro-; Ethene, trichloro-; Trichlorethylene; Ethylene, trichloro-

Product use : Synthetic/Analytical chemistry.

Synonym : trichloroethene; Ethene, 1,1,2-trichloro-; Ethene, trichloro-; Trichlorethylene; Ethylene, trichloro-

SDS # : 001206

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A
GERM CELL MUTAGENICITY - Category 2
CARCINOGENICITY - Category 1
AQUATIC HAZARD (LONG-TERM) - Category 3

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Causes serious eye irritation.
Causes skin irritation.
May cause cancer.
Suspected of causing genetic defects.
Harmful to aquatic life with long lasting effects.

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Avoid release to the environment. Wash hands thoroughly after handling.

Response : IF exposed or concerned: Get medical attention. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Section 2. Hazards identification

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : trichloroethylene

Other means of identification : trichloroethene; Ethene, 1,1,2-trichloro-; Ethene, trichloro-; Trichlorethylene; Ethylene, trichloro-

CAS number/other identifiers

CAS number : 79-01-6

Product code : 001206

Ingredient name	%	CAS number
trichloroethylene	100	79-01-6

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

Skin contact : Causes skin irritation.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : No known significant effects or critical hazards.

Section 4. First aid measures

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:, pain or irritation, watering, redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:, irritation, redness

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst. This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds
carbonyl halides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Section 6. Accidental release measures

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Avoid release to the environment. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

trichloroethylene

ACGIH TLV (United States, 3/2016).
STEL: 25 ppm 15 minutes.
TWA: 10 ppm 8 hours.
OSHA PEL 1989 (United States, 3/1989).
STEL: 1080 mg/m³ 15 minutes.
STEL: 200 ppm 15 minutes.
TWA: 270 mg/m³ 8 hours.
TWA: 50 ppm 8 hours.
OSHA PEL Z2 (United States, 2/2013).
AMP: 300 ppm 5 minutes.
CEIL: 200 ppm
TWA: 100 ppm 8 hours.

Section 8. Exposure controls/personal protection

Appropriate engineering controls : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid. [Watery liquid.]

Color : Colorless.

Molecular weight : 131.38 g/mole

Molecular formula : C2-H-Cl3

Boiling/condensation point : 86.7°C (188.1°F)

Melting/freezing point : -84.8°C (-120.6°F)

Critical temperature : Not available.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : Not available.

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : 6.39 (butyl acetate = 1)

Flammability (solid, gas) : Not available.

Section 9. Physical and chemical properties

Lower and upper explosive (flammable) limits : Lower: 8%
Upper: 10.5%

Vapor pressure : 9.9 kPa (74.256033302 mm Hg) [room temperature]

Vapor density : 4.5 (Air = 1)

Specific Volume (ft ^{3}/lb) : 0.6849

Gas Density (lb/ft ^{3}) : 1.46

Relative density : 1.5

Solubility : Not available.

Solubility in water : 1.1 g/l

Partition coefficient: n-octanol/water : 2.53

Auto-ignition temperature : 410°C (770°F)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Dynamic (room temperature): 0.58 mPa·s (0.58 cP)

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
trichloroethylene	LC50 Inhalation Vapor LD50 Dermal LD50 Oral	Rat Rabbit Rat	140700 mg/m³ >20 g/kg 4920 mg/kg	1 hours - -

IDLH : 1000 ppm

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
trichloroethylene	Eyes - Moderate irritant Skin - Severe irritant	Rabbit Rabbit	- -	24 hours 20 milligrams 24 hours 2 milligrams	- -

Sensitization

Not available.

Section 11. Toxicological information

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
trichloroethylene	-	1	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

Skin contact : Causes skin irritation.

Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:, pain or irritation, watering, redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:, irritation, redness

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : Suspected of causing genetic defects.

Section 11. Toxicological information

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
trichloroethylene	Acute EC50 95000 µg/l Marine water	Algae - Skeletonema costatum	96 hours
	Acute EC50 36.5 mg/l Fresh water	Algae - Chlamydomonas reinhardtii - Exponential growth phase	72 hours
	Acute LC50 20 mg/l Marine water	Crustaceans - Elminius modestus	48 hours
	Acute LC50 18 mg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 3100 µg/l Fresh water	Fish - Jordanella floridae - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
	Chronic EC10 12.3 mg/l Fresh water	Algae - Chlamydomonas reinhardtii - Exponential growth phase	72 hours
	Chronic NOEC 10 mg/l Fresh water	Daphnia - Daphnia magna	21 days

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
trichloroethylene	2.53	17	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 13. Disposal considerations

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Trichloroethylene; Ethene, trichloro-	79-01-6	Listed	U228

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1710	UN1710	UN1710	UN1710	UN1710
UN proper shipping name	TRICHLOROETHYLENE	TRICHLOROETHYLENE	TRICHLOROETHYLENE	TRICHLOROETHYLENE	TRICHLOROETHYLENE
Transport hazard class(es)	6.1 	6.1 	6.1 	6.1 	6.1 
Packing group	III	III	III	III	III
Environment	No.	No.	No.	No.	No.
Additional information	**Reportable quantity** 100 lbs / 45.4 kg [8. 2147 gal / 31.096 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 60 L **Cargo aircraft** Quantity limitation: 220 L **Special provisions** IB3, N36, T4, TP1, T1	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.26-2.36 (Class 6). **Explosive Limit and Limited Quantity Index** 5	-	-	**Passenger and Cargo Aircraft** Quantity limitation: 60 L **Cargo Aircraft Only** Quantity limitation: 220 L **Limited Quantities - Passenger Aircraft** Quantity limitation: 2 L

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 5(a)2 final significant new use rules**: trichloroethylene
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
TSCA 12(b) one-time export: trichloroethylene
United States inventory (TSCA 8b): This material is listed or exempted.
Clean Water Act (CWA) 307: trichloroethylene
Clean Water Act (CWA) 311: trichloroethylene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
trichloroethylene	100	No.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	trichloroethylene	79-01-6	100
Supplier notification	trichloroethylene	79-01-6	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Section 15. Regulatory information

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
trichloroethylene	Yes.	Yes.	14 µg/day (ingestion) 50 µg/day (inhalation)	No.

International regulations

International lists

National inventory

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : This material is listed or exempted.

Malaysia : This material is listed or exempted.

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Taiwan : This material is listed or exempted.

Canada

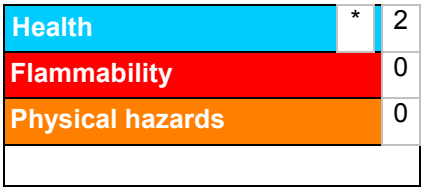
WHMIS (Canada) : Class D-1B: Material causing immediate and serious toxic effects (Toxic).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class D-1B: Material causing immediate and serious toxic effects (Toxic).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

Section 16. Other information

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Skin Irrit. 2, H315	Expert judgment
Eye Irrit. 2A, H319	Expert judgment
Muta. 2, H341	Expert judgment
Carc. 1, H350	Expert judgment
Aquatic Chronic 3, H412	Expert judgment

History

Date of printing : 11/21/2016

Date of issue/Date of revision : 11/21/2016

Date of previous issue : No previous validation

Version : 0.01

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SAFETY DATA SHEET

Vinyl Chloride

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier : Vinyl Chloride

Chemical name : vinyl chloride

Other means of identification : chloroethylene; Ethene, chloro-; Chloroethene; Vinyl chloride, monomer; Ethene, chloro- (vinyl chloride); Vinyl chloride monomer; Monochloroethylene; Monochloroethene; Ethylene monochloride; VCM; VC

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : chloroethylene; Ethene, chloro-; Chloroethene; Vinyl chloride, monomer; Ethene, chloro- (vinyl chloride); Vinyl chloride monomer; Monochloroethylene; Monochloroethene; Ethylene monochloride; VCM; VC

SDS # : 001067

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas
CARCINOGENICITY - Category 1
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (liver) - Category 2

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May cause frostbite
May displace oxygen and cause rapid suffocation.
May cause cancer.
May cause damage to organs through prolonged or repeated exposure. (liver)

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Do not breathe gas.

Section 2. Hazards identification

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Store locked up. Protect from sunlight. Store in a well-ventilated place.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : vinyl chloride

Other means of identification : chloroethylene; Ethene, chloro-; Chloroethene; Vinyl chloride, monomer; Ethene, chloro-(vinyl chloride); Vinyl chloride monomer; Monochloroethylene; Monochloroethene; Ethylene monochloride; VCM; VC

Product code : 001067

CAS number/other identifiers

CAS number : 75-01-4

Ingredient name	%	CAS number
vinyl chloride	100	75-01-4

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Section 4. First aid measures

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Section 6. Accidental release measures

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Do not breathe gas. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Store locked up. Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
vinyl chloride	**ACGIH TLV (United States, 3/2017).** TWA: 1 ppm 8 hours. **OSHA PEL (United States, 6/2016).** STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Section 8. Exposure controls/personal protection

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [COLORLESS GAS OR LIQUID (BELOW 7 F) WITH A PLEASANT ODOR AT HIGH CONCENTRATIONS. [NOTE: SHIPPED AS A LIQUEFIED COMPRESSED GAS.]

Color : Colorless.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Melting point : -153.8°C (-244.8°F)

Boiling point : -13.4°C (7.9°F)

Critical temperature : 158.45°C (317.2°F)

Flash point : Closed cup: -78°C (-108.4°F)
Open cup: -78°C (-108.4°F)

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 3.8%
Upper: 29.3%

Section 9. Physical and chemical properties

Vapor pressure : Not available.

Vapor density : 2.2 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.25

Gas Density (lb/ft ^{3}) : 0.16129 (21.1°C / 70 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 1.1 g/l

Partition coefficient: n-octanol/water : 1.38

Auto-ignition temperature : 472°C (881.6°F)

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 62.5 g/mole

Aerosol product

Heat of combustion : -18924336 J/kg

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : Oxidizers

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Section 11. Toxicological information

Classification

Product/ingredient name	OSHA	IARC	NTP
vinyl chloride	+	1	Known to be a human carcinogen.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
vinyl chloride	Category 2	Not determined	liver

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Section 11. Toxicological information

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
vinyl chloride	1.38	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Vinyl chloride; Ethene, chloro-	75-01-4	Listed	U043

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1086	UN1086	UN1086	UN1086	UN1086
UN proper shipping name	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED

Section 14. Transport information

Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

DOT Classification : **Reportable quantity** 1 lbs / 0.454 kg. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.
Limited quantity Yes.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: 150 kg.
Special provisions 21, B44, T50

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
Explosive Limit and Limited Quantity Index 0.125
ERAP Index 3000
Passenger Carrying Road or Rail Index Forbidden

IATA : **Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: 150 kg.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined
Clean Water Act (CWA) 307: vinyl chloride
Clean Air Act (CAA) 112 regulated flammable substances: vinyl chloride

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

Section 15. Regulatory information

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	vinyl chloride	75-01-4	100
Supplier notification	vinyl chloride	75-01-4	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

California Prop. 65

⚠ **WARNING**: This product can expose you to Vinyl chloride, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Ingredient name	No significant risk level	Maximum acceptable dosage level
Vinyl chloride	Yes.	-

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : **Japan inventory (ENCS)**: This material is listed or exempted.
Japan inventory (ISHL): This material is listed or exempted.

Malaysia : This material is listed or exempted.

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Taiwan : This material is listed or exempted.

Thailand : Not determined.

Turkey : This material is listed or exempted.

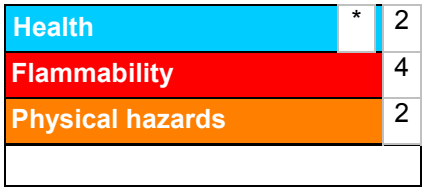
Section 15. Regulatory information

United States : This material is listed or exempted.

Viet Nam : Not determined.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE GASES - Category 1	Expert judgment
GASES UNDER PRESSURE - Liquefied gas	Expert judgment
CARCINOGENICITY - Category 1	Expert judgment
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (liver) - Category 2	Expert judgment

History

Date of printing : 7/9/2018

Date of issue/Date of revision : 7/9/2018

Date of previous issue : 10/11/2016

Version : 0.02

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Section 16. Other information

References : Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SAFETY DATA SHEET

Creation Date 22-Sep-2009 **Revision Date** 24-Dec-2021 **Revision Number** 4

1. Identification

Product Name **cis-1,2-Dichloroethylene**

Cat No. : **AC113380000; AC113380025; AC113380100; AC113380500**

Synonyms cis-Acetylene dichloride.

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 2
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Harmful if swallowed

Harmful if inhaled
Causes serious eye irritation
Causes skin irritation
May cause respiratory irritation

Precautionary Statements
Prevention
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Avoid breathing dust/fume/gas/mist/vapors/spray
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Take precautionary measures against static discharge
Do not eat, drink or smoke when using this product
Response
Call a POISON CENTER or doctor/physician if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
Rinse mouth
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Fire
Explosion risk in case of fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store in a well-ventilated place. Keep cool
Store in a closed container
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition/Information on Ingredients

Component	CAS No	Weight %
cis-1,2-Dichloroethylene	156-59-2	97

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Get medical attention.

Inhalation Remove to fresh air. Get medical attention. If not breathing, give artificial respiration.

Ingestion Do NOT induce vomiting. Get medical attention.

Most important symptoms and effects Difficulty in breathing. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Water mist may be used to cool closed containers. Chemical foam. Water mist may be used to cool closed containers.

Unsuitable Extinguishing Media No information available

Flash Point 6 °C / 42.8 °F

Method - No information available

Autoignition Temperature 440 °C / 824 °F

Explosion Limits

Upper	12.80%
Lower	9.70%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Flammable. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Vapors may form explosive mixtures with air.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2). Hydrogen chloride gas.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	3	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes or clothing.

Environmental Precautions See Section 12 for additional Ecological Information. Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling

Ensure adequate ventilation. Wear personal protective equipment/face protection. Use spark-proof tools and explosion-proof equipment. Use only non-sparking tools. Avoid contact with skin, eyes or clothing. Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.

Storage.

Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat, sparks and flame. Flammables area. Keep container tightly closed in a dry and well-ventilated place. Incompatible Materials. Bases.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
cis-1,2-Dichloroethylene	TWA: 200 ppm			TWA: 200 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

Engineering Measures

Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

No protective equipment is needed under normal use conditions.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-80 °C / -112 °F
Boiling Point/Range	60 °C / 140 °F @ 760 mmHg
Flash Point	6 °C / 42.8 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	12.80%
Lower	9.70%
Vapor Pressure	201 mmHg @ 25 °C
Vapor Density	3.34 (Air = 1.0)
Specific Gravity	1.280
Solubility	No information available
Partition coefficient; n-octanol/water	No data available

Autoignition Temperature	440 °C / 824 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C2 H2 Cl2
Molecular Weight	96.94

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Exposure to air. Exposure to light. Incompatible products. Exposure to moist air or water.

Incompatible Materials Bases

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Hydrogen chloride gas

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
cis-1,2-Dichloroethylene	156-59-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. Do not flush into surface water or sanitary sewer system. Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
cis-1,2-Dichloroethylene	Not listed	Not listed	EC50 = 721 mg/L 5 min EC50 = 905 mg/L 30 min	Not listed

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN1150
Proper Shipping Name 1,2-DICHLOROETHYLENE
Hazard Class 3
Packing Group II

TDG

UN-No UN1150
Proper Shipping Name 1,2-DICHLOROETHYLENE
Hazard Class 3
Packing Group II

IATA

UN-No UN1150
Proper Shipping Name 1,2-DICHLOROETHYLENE
Hazard Class 3
Packing Group II

IMDG/IMO

UN-No UN1150
Proper Shipping Name 1,2-DICHLOROETHYLENE
Hazard Class 3
Packing Group II

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
cis-1,2-Dichloroethylene	156-59-2	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
cis-1,2-Dichloroethylene	156-59-2	-	X	205-859-7	-	X	X	X	X	KE-10124

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
cis-1,2-Dichloroethylene	X	-	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
cis-1,2-Dichloroethylene	156-59-2	Not applicable	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
cis-1,2-Dichloroethylene	156-59-2	Not applicable	Not applicable	Not applicable	Annex I - Y45

16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	22-Sep-2009
Revision Date	24-Dec-2021
Print Date	24-Dec-2021
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Forms

Job Safety & Health Protection

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Provisions of the Act include the following:

Employers

All employers must furnish to employees' employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational salary and health standards, and its Compliance Safety and Health Officers conduct job site inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Complaint

Employees or their representatives have the right to file a compliant with the nearest OSHA office requesting an inspection. If they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discriminatory action.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period with which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory penalties against employers of up to $1,000 for each serious violation and for optional penalties of up to $1,000 for each non-serious violation. Penalties of up to $1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $10,000 for each such violation.

There are also provisions for central penalties. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of up to $250,000 (or $500,000 if the employer is a corporation), or by imprisonment for up to six months or both. A second conviction of an employer doubles the possible term of imprisonment.

Voluntary Activity

While providing penalties for violation, the Act also encourages efforts by labor and management before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

OSHA has published Safety and Health Program Management Guidelines to assist employers in establishing or perfecting programs to prevent or control employee exposure to workplace hazards. There are many public and private organizations that can provide information and assistance in this effort if requested. Also, your local OSHA office can provide considerable help and advice on saving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free assistance in identifying and correcting hazards and in improving safety and health management is available to employers, without citation or penalty, through OSHA-supported programs in each State. These programs are usually administered by the State of Labor or Health Department or a State University.

Under provisions of Title 29, Code of Federal Regulations, part 1903.2(s)(1) employers must post this notice (or facsimile) in a conspicuous place where notices to employees are customarily posted.

HASP Sign-Off Form

INSTRUCTIONS: Site personnel are required to read, understand, and agree to the provision of the plan. Personnel are required to sign this form indicating agreement. The original of this form is maintained by the Project Manager, and becomes part of the permanent site project files upon completion of site work.

Site Name: 323-325 Yonkers Ave

Location: 323-325 Yonkers Ave Yonkers, NY

Project Name and Number:

I have read, understand, and agree to comply with the provisions of this HASP for work activities on this site.

Name	Signature	Company/Agency	Date

Site Safety Checklist

(Answer all questions as follows: Y= Yes; N /A = Not applicable

1. Site Name 323-325 Yonkers Ave
   Supervisor _____

2. Location 323-325 Yonkers Ave , Yonkers, NY Date _____

Certification of Personnel

1. All Personnel on site have current OSHA Certifications?
2. SHSO Site Supervisor are qualified?

Medical and First Aid

1. First aid kits accessible and identified?
2. Emergency eye washes available?
3. First aid kit(s) stocked?
4. First aid kits inspected weekly?
5. At least two first-aid-trained persons on site at all times when working?

Training

1. Daily safety meetings documented?
2. Question and answer time available for all site personnel?
3. All employees instructed in hazardous materials handling practices?
   New personnel reviewed HASP?

Decontamination

1. Decon procedures system set up on-site?
2. Used according to safety plan?
3. Contamination zone and corridor clearly delineated?
4. Appropriate waste receptacles available for all waste?
5. Receptacles properly closed at end of day?
6. All decon liquids properly contained and disposed of?
7. All wastes disposed of according to approved plan?
8. All personnel received decon training?
9. All reusable personal protection gear deconned and disinfected at least daily?

Site Safety Checklist (continued)

Site Safety/Emergency Plans

1. Safety plan posted on site and reviewed by each person?
2. Initial site safety plan meeting held and documented before work begins?
3. Hazardous materials information available for all known or expected hazards?
4. Employees trained in toxicology/exposure risks?
5. Emergency telephone numbers posted?
6. Emergency routes designated?
7. Emergency plan and signal reviewed with all persons?
8. Spill containment program per 1910.120 Item J?
9. Hazard waste and emergency response plan per 1910.120(g)(5) and (l)(3)(ii)?

Personal Protection

1. All equipment meets ANSI/NIOSH approvals?
2. Levels of protection (LOP) established?
3. Site control zones clearly designated?
4. All employees know their LOP scheme?
5. OSHA respirator program in place?
6. Employees fit tested for respirators?
7. Defective equipment removed from service?
8. Breathing air grade “D” Certified?
9. Breathing-air cylinders charged only to prescribed pressure?
10. No other gas system can be mistaken for breathing air?
11. Fittings prohibit cross connection?
12. Sufficient quantities of equipment?
13. Safety instrumentation maintained and calibrated?
14. Maintenance and calibration logs up to date?
15. Monthly inspection of SCBAs per 1910.134(f)(2)(ii)?

Fire Prevention/Protection

1. Hot work permits required?
2. Smoking restricted to designated areas?
3. Fire lanes established and maintained?
4. Flammable/combustible liquid dispensing grounded?
5. Proper flammable materials storage?
6. Fire alarm established and workers aware?
7. Location and use of fire extinguishers known by all personnel?
8. Fire extinguishers checked before each shift and inspected monthly?
9. Fire extinguisher appropriate for fire hazard potential?
10. Combustible materials segregated from ignition sources?

Site Safety Checklist (continued)

Walking and Working Surfaces

1. Accessways, stairs, ramps and ladders free of ice, mud, snow, or debris?
2. Ladders exceed maximum length?
3. Ladders used in passageways, doors, or driveways?
4. Broken or damaged ladders tagged out?
5. Metal ladders prohibited in electrical service?
6. Safety feet on straight and extension ladders?
7. Stairways, floor and wall openings guarded?
8. Elevated work areas have appropriate guardrail?
9. Flotation devices worn when working on or over water?
10. Toe boards on overhead work surfaces?
11. Mobile offices/labs have fixed stairs and handrails?

Motor Vehicles/Heavy Equipment

1. Inspected before each use?
2. Operators licensed for equipment used?
3. Unsafe equipment tagged out and reported?
4. All safety appliances/guards in place?
5. Alarm shut down for fueling?
6. Equipped with back-up alarms, or spotter used in 360 degrees visibility restricted?
7. Loads secure before transport?
8. Road and structures inspected for load capacity per vehicle weights?
9. Riders prohibited on heavy equipment?

Excavations, Confined Spaces, Tunnels

1. Excavations sloped or shored to prevent cave-ins?
2. Shoring approved by engineer?
3. Guardrails or fences placed around excavations near walkways or roads?
4. Excavations locations visible at night?
5. Utility check performed and documented before excavation or drilling?
6. Ladders available in trenches more than 4 feet deep?
7. Excavated material is at least 24” from the edge of all trenches?
8. Confined space entry permit procedure in place and communicated to all?
9. Employees trained in confined space entry?
10. Tunnels are adequately ventilated?
11. Proper lighting? (explosion-proof where needed)
12. Confined spaces tested for: O_2 _____, CO _____, LEL ____, Toxic gases ____?
13. Communication available inside to out?
14. No flammable or combustibles in tunnel?
15. Confined space entry procedures used for tunnel?

Site Safety Checklist (continued)

16. Confined space entry checklist:
    Safety watch (attendant)?
    Safety watch protected same as enterers?
    Safety line or appropriate harness?
    Level B respiratory protection or constant ventilation and monitoring?
    Instruments calibrated?
17. Work does not begin inside any tank, vessel or other container until there is no possibility that lines or electrical or equipment could be activated, lines are disconnected, blanked out fuses are pulled, circuit breakers are off, energy source is locked and tagged, and the entry permit is completed and signed?

Slings and Chains

1. Slings, chains and rigging inspected per OSHA, and documented?
2. Damaged slings, chains or rigging tagged out and reported?
3. Employees are instructed and keep clear of suspended loads?

Electrical

1. Warning signs indicate high voltage, 250 V or greater, present, and its location?
2. Electrical equipment and wiring properly guarded?
3. Electrical lines, extension cords and cables guarded and properly maintained?
4. Grounding required and provided?
5. Extension cords kept out of wet areas?
6. Damaged equipment tagged out?
7. Underground electrical lines located and indicated?
8. Overhead electrical lines de-energized, or elevated work platforms, work areas, booms or ladders erected so no contact can occur with electrical lines?
9. Lock out/tag out system is used whenever work is done on or in electric electric equipment, or electrically activated equipment?

Compressed Gas Cylinders/Pressurized Lines

1. Cylinders segregated appropriately in controlled, protected but well-ventilated areas?
2. Smoking prohibited in storage areas?
3. Cylinders stored upright and secured?
4. Cylinder caps in place when stored (not in use) or when cylinders moved?
5. Pressurized air or water lines are securely connected?

Site Safety Checklist (continued)

6. All site personnel know never to step across a pressurized line (Except for breathing lines)?
7. Gas or other hazardous lines are labeled appropriately?

Hand and Power Tools

1. Guards and safety devices in place and used?
2. Inspected before each use?
3. Tagged out if defective?
4. Eye protection areas identified and protection worn?
5. Proper protection from rotating equipment and drive shafts? (No loose clothing)

Welding and Cutting

1. Fire extinguishers present at all welding and cutting operations?
2. Confined spaces, tanks, pipelines tested before welding or cutting?
3. Hot work permit system in use?
4. Proper helmets and shields?
5. Properly grounded?
6. Fuel gas and oxygen gas cylinders stored at least 20’ apart, upright and secured?
7. Only trained vehicles used?

Miscellaneous

1. Tools and other equipment (portable) are stored away from walkways, roads or driveways where they cannot fall on or be fallen over by site personnel?
2. Overhead hazards are noted, communicated to all, and labeled as needed?
3. Hard hat, eye and hearing protection areas are defined and signs in place?
4. Safety shoes with rubber soles?
5. Appropriate signs or labels are in place?
6. Copies of contracts with client and sub-contractors are on site?
7. Responsibilities for site health and safety are clear to the site manager(s)?
8. Subcontractors have received copies of this safety plan or have signified their intent to conform with it?

Site Safety Checklist (continued)

Comments:

_____

_____

_____

_____

SHSO Signature:_____ Date:_____

Equipment Calibration Log

Operator Name:_____ Instrument Notice:_____

Signature:_____ Serial Number:_____

Date	Time	Concentration	Comments

Sampling Log

Operator Name:_____ Instrument Notice:_____

Signature:_____ Serial Number:_____

Was the equipment calibrated? _____ Yes _____ No

Date	Time	Concentration	Comments

Daily Sign In/Sign Out Form

(to be completed on site)

Site Name: 323-325 Yonkers Ave

Location: 323-325 Yonkers Ave Yonkers, NY

Employee Name	Company Name	Purpose	Time In	Time Out

Signature of SHSO (or designee)

Date

Daily Safety Meeting Log

(to be completed on site)

Site Name 323-325 Yonkers Ave

Location 323-325 Yonkers Ave Yonkers, NY

Weather _____

Topics _____

_____

_____

_____

_____

_____

_____

Employee Names:	Signatures
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

_____ _____

Signature of SHSO (or designee) Date

Prevailing Wind Condition Log

Date _____

Instrument Model _____

Serial Number _____

Was the equipment calibrated prior to use? _____ Yes _____ No

Time	Location	Prevailing Wind Condition

INCIDENT INVESTIGATION ASSESSMENT/INJURY REPORT

Place Accident Occurred:		Name of Person Involved:	
Site Location	Age	Sex	Job Title
	Yrs in This Job		Yrs with Company
Date & Time of Incident AM ___/___/_____:___ PM	Date & Time of Investigation AM ___/___/_____:___ PM		
Date Incident Reported ___/___/	Reported to Whom	Investigated By:	
Regulatory Agencies or Insurance Carriers Contacted:		Witness(es):	
Description from injured or witnesses (use reverse side of form for more space): Signature Date			

Select one or more in each column. Don't hesitate to write in your own words (continue on reverse side, if necessary).

When completing the following task:
- ☐Operating (what machine)_____
- ☐Using (what tool)_____
- ☐Handling (what material)_____
- ☐Maintenance or repair (of what)_____
- ☐Office or sales task_____
- ☐Other -- Provide details_____

The following occurred:
- ☐Amputation (total or partial)_____
- ☐Burn (thermal)_____
- ☐Burn (chemical)_____
- ☐Electric shock_____
- ☐Concussion/unconscious_____
- ☐Crushing injury (contusion, crush, bruise) -- intact skin_____
- ☐Cut, laceration, puncture, abrasion_____
- ☐Fracture or dislocation_____
- ☐Sprain/strain_____
- ☐Cumulative trauma_____
- ☐Occupational illness or disease_____
- ☐Internal injuries_____
- ☐None -- Near accident_____
- ☐Other -- Provide details_____
- ☐Respiratory_____

To the (explain details):
- ☐Head, face, neck_____
- ☐Eye_____
- ☐Trunk, abdomen_____
- ☐Back (upper, lower)_____
- ☐Arm, shoulder_____
- ☐Fingers_____
- ☐Leg, hip, knee_____
- ☐Ankle, foot_____
- ☐Toes_____
- ☐Internal Injuries_____
- ☐Body System:_____
- ☐Circulatory_____
- ☐Digestive_____
- ☐Musculoskeletal_____
- ☐Nervous_____
- ☐Other_____
- ☐Other (specify)_____

Person was, or got:
- ☐Struck against (not including falls)_____
- ☐Struck by_____
- ☐Fell from (from a higher level)_____
- ☐Slipped, tripped, fell on (in the same level)_____
- ☐Foreign body in eye_____
- ☐Contacted electrical energy from_____
- ☐Exposure to (substance)_____
  - from inhalation_____
  - ingestion_____
  - skin absorption_____
- ☐Vehicle accident_____
- ☐Caught in, under or between_____
- ☐Repetitive_____
- ☐Other_____

While (taking what position) Where (or What):
- ☐Carrying_____
- ☐Climbing_____
- ☐Bending_____
- ☐Driving_____
- ☐Jumping_____
- ☐Kneeling_____
- ☐Lifting - below waist, give weight)_____
- ☐Lifting - above waist, give weight)_____
- ☐Pulling_____
- ☐Pushing_____
- ☐Reaching or stretching_____
- ☐Riding_____
- ☐Running_____
- ☐Sitting_____
- ☐Standing_____
- ☐Throwing_____
- ☐Twisting or turning_____
- ☐Walking_____
- ☐Other_____

Medical Treatment (check as many as apply)
- ☐The injured employee was able to return to work the same day.
- ☐The injured employee was sent home
- ☐The injured employee was sent to a doctor/ clinic; list the doctor/clinic name, address, and phone:_____

_____

_____

_____

- ☐The employee was hospitalized.

List name and address of hospital:

_____

_____

_____

Attending physician:_____

_____

What conditions contributed
- ☐Awkward job procedure
- ☐Inadequate guard/safety device
- ☐Inadequate warning/labeling system
- ☐Fire/explosion hazard
- ☐Not secured against moving
- ☐Poor housekeeping
- ☐Protruding object
- ☐Close clearance/congestion
- ☐Hazardous arrangement/storage
- ☐Defective tools/equipment
- ☐Inadequate ventilation
- ☐Atmospheric condition: gases, dusts, fumes, vapors
- ☐Repetitive motion
- ☐Illumination/noise hazard
- ☐Other

What unsafe procedures contributed
- ☐Operating without training/authority
- ☐Failure to follow proper procedure
- ☐Failure to secure
- ☐Operating at unsafe speed
- ☐Failure to warn/signal
- ☐Congestion
- ☐Used defective equipment
- ☐Used equipment improperly/unsafely
- ☐Improper loading or placement
- ☐Horseplay/distraction
- ☐Improper protective equipment
- ☐Improper lifting or carrying
- ☐Taking unsafe or awkward position
- ☐Servicing moving equipment
- ☐Other

The underlying causes of the incident are:
- ☐Unaware of job hazards
- ☐Inattention to hazard
- ☐Unaware of how to avoid incident
- ☐Not enough time to act
- ☐Person motivated to use unsafe procedure
- ☐Emotional/mental/physical stress
- ☐Equipment failed to perform as expected
- ☐Intoxicant/drugs
- ☐Failure to report/correct unsafe condition
- ☐Illness/medical condition
- ☐Work procedure not ergonomically correct
- ☐Substandard design
- ☐Other

Classification (check as many as apply)
- ☐Fatality
- ☐Medical treatment other than First Aid
- ☐Occupation illness or disease
- ☐First Aid
- ☐Environmental Release
- ☐Property Damage
- ☐Near-accident

ACCIDENT DESCRIPTION (continued):

What steps have already been taken to prevent similar incidents?

What else can be done (engineering controls, training, enforcement, process changes) to eliminate the hazard?

SHSO's Signature Date

Health and Safety Review: Is proposed action appropriate? Yes ☐ No ☐ Comments

DHS's Signature Date

VEHICLE INCIDENT REPORT

EMPLOYEE NAME:_____ DRV LIC NO.:_____

COMPANY ADDRESS:_____ INSURANCE COMPANY_____

POLICY NO.:_____

DESCRIPTION OF ACCIDENT

DATE:_____ TIME:_____ SPEED LIMIT_____:

LOCATION:_____

DIRECTION OF TRAVEL:_____

HOW DID IT HAPPEN?_____

_____

USE SPACE BELOW TO INDICATE VEHICLE PATHS - INDICATE NORTH BY ARROW

POLICE REPORT

NAME OF OFFICER: _____ BADGE #:_____

DEPARTMENT:_____ LOCATION:_____

SUMMONS ISSUED? Y [ ] N [ ] TO WHOM?_____

YOUR VEHICLE

YEAR/MAKE:_____ REGIST #:_____

DRIVEN BY:_____ AGE:_____ TEL #:_____

ADDRESS:_____ CITY:_____ STATE:_____

NATURE OF DAMAGE:_____

OTHER DRIVER
(continue below for additional drivers and witnesses)

NAME:_____ DRV LIC NO.:_____

ADDRESS:_____ VEHICLE REGISTRATION:_____

_____ INSURANCE COMPANY_____

POLICY NO.:_____

INDOOR AIR SAMPLING QUALITY ASSURANCE PROJECT PLAN

Indoor air (IA) sampling is being conducted to characterize the indoor air quality and to determine if a potential for vapor intrusion exists for the building located on site.

IA samples will be analyzed in accordance with the "Compendium Method TO-15 Determination of VOCs in Air Collected in Specially Prepared Canisters and Analyzing by Gas Chromatography/Mass Spectrometry (GC/MS)", as published in the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air* (EPA, January 1999).

Sampling methods, sample preservation requirements, sample handling times, frequency for field blanks, field duplicates, trip blanks, matrix spike and matrix spike duplicates will conform to the NYSDEC and NYSDOH regulations in effect as of the date on which sampling is performed.

The indoor air samples collected for EPA TO-15 analysis will be analyzed by:

Alpha Analytical
320 Forbes Boulevard
Mansfield, MA 02048-1806
Telephone: (508) 822-9300
Fax: (508) 822-3288

Alpha Analytical is a New York certified laboratory. Enviro-Sciences (of Delaware), Inc. personnel from the Lake Hopatcong, New Jersey Office, will perform all project coordination.

Data Quality Objectives

The overall objective of the indoor air sampling is to collect data for evaluation of indoor air quality and the potential for vapor intrusion. The sample results will be compared to the applicable the New York State Department of Health (NYSDOH) Soil Vapor/Indoor Air Matrices A, B, and C for indoor air.

To achieve this objective, indoor air sampling and analytical data must be *representative, accurate, and reliable*. These three data quality objectives (DQO) will be met by following the procedures described in this Quality Assurance Project Plan (QAPP).

QA Summary

The Analytical Methods/Quality Assurance Summary is presented below:

Matrix	Quality Assurance Summary Analytical Method	Preservation Method	Sample Container Volume	Sample Holding Time
Indoor Air	USEPA Method TO-15	--	6-Liter SUMMA Canister	30 days

Indoor Air Sampling Equipment

- 6-Liter Stainless Steel Canister (SUMMA Canister).
- Flow Rate Regulator which is provided and calibrated by the laboratory.

Equipment Cleaning and Decontamination

- Laboratory prepares canisters.

Sampling Procedures

Air samples will be collected from locations within the buildings and one (1) of the samples will be an ambient/background air sample collected outside of the building. The air samples will be collected over a period of approximately eight-hours per NYSDOH Vapor Intrusion (VI) Guidance Manual requirements for non- residential buildings. The air samples will be collected using laboratory- supplied six (6) liter evacuated Summa® canisters with calibrated flow controllers.

The air samples will be analyzed for VOCs using EPA method TO-15.

- The *Chain-of-Custody/Field Test Data Sheet for USEPA Method TO-15* will be completed by the laboratory and ESI on-site personnel.
- Place and set up SUMMA canisters at pre-determined sample locations. At a minimum, one sample is to be collected from an indoor location equal to outdoor surface grade and collected approximately 3 to 5 feet from ground surface. If a basement or crawl space exists, then a second sample will be collected. The basement/crawl space sample (if applicable) will be collected from ground surface or as close to a potential source area.

- Attach the pre-calibrated regulator to the SUMMA canister. Record canister serial number, regulator serial number, and regulator pressure reading onto the chain-of-custody. Assure writing utensil does not contain VOCs.

- Open and record time regulator was opened along with the regulator pressure reading. Ensure vacuum reading on the gauge remains constant. Canister will remain in place and undisturbed for the sampling period.

- After the sampling period, return to sample location: 1) close canister, 2) record time and pressure, and 3) remove regulator. Record all information onto the chain-of-custody.

Quality Control Samples

A minimum of one outdoor ambient background sample will be collected; this sample location is not to be placed near traffic or a potential source of VOCs.

Chain-of-Custody Procedures

- Sign a form at the lab indicating that all of the requested items were received.

- Complete the sample specific information section of the chain-of-custody form at the time samples are collected.

- Complete the remainder of the chain-of-custody form after all samples are collected.

- Deliver the samples to the laboratory and sign chain-of-custody form.

Transferring the samples to another party (e.g., courier) requires that the list on the chain-of-custody form be compared to the samples actually in the insulated container. Any discrepancies are noted on the chain-of-custody form. After this check is completed, a signature releasing custody of the samples and a signature accepting custody are required on the chain-of-custody form.

Holding Times

All holding times recommended or required by NJDEP will be observed; no analyses are performed if the holding time has been exceeded.

APPENDIX C

Community Air Monitoring Plan

COMMUNITY AIR MONITORING PLAN

Simchah 325 Yonkers, LLC
323-325 Yonkers Avenue
Yonkers, NY 10701

Brownfield Cleanup Program Site No. C360184

November 2022

ENVIRO-SCIENCES (OF DELAWARE), INC.
781 ROUTE 15 SOUTH 2ND FLOOR
LAKE HOPATCONG, NJ 07849
(973) 398-8183 • FAX (973) 398-8037

TABLE OF CONTENTS

1.0 INTRODUCTION

Enviro-Sciences (of Delaware), Inc. (ESI) on behalf of Simchah 325 Yonkers, LLC has developed a Community Air Monitoring Plan (CAMP) to implement real time monitoring at the at 323-325 Yonkers Avenue, Yonkers, NY 10701 (Site) during remedial activities.

The monitoring program will be implemented at all times when ground surface disturbance activities are occurring. The CAMP is designed to provide a measure of protection for the onsite dry cleaner staff that are not directly involved with the remediation activities from potential airborne contaminant releases as a direct result of remedial activities. This plan is consistent with the New York State Department of Health's Generic Community Air Monitoring Plan, included as Attachment A.

1.1 Monitoring Approach

Special Requirements for Work Within 20-Feet of Potentially Exposed Individuals or Structures

- A portable Volatile Organic Compound (VOC) and Particulate (PM-10) monitoring station will be set up at a 20-foot radius of each proposed slab penetration as the penetration is installed in areas where there are facility activities occurring.

- Background readings of VOCs in the occupied spaces will be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work. Based upon previous sampling, no VOC levels of concern have been found or are anticipated.

- Background readings of PM-10 in the occupied spaces will be taken prior to commencement of the planned work. If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m3, work activities will be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m3 or less at the monitoring point.

- Other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) are not anticipated and will not be monitored.

Special Requirements for Indoor Work With Co-Located Residences or Facilities

All individuals not directly involved with the planned work will be prohibited from entering within 20-feet of the area in the room in which the work will occur. Monitoring requirements shall be as stated above under "Special Requirements for Work Within 20

Feet of Potentially Exposed Individuals or Structures". There are no "nearby/occupied structures" that would constitute adjacent occupied rooms outside of the 20-feet radius of activity. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, will be considered and the monitoring locations established accordingly.

2.0 VOC Monitoring

Prior to work commencing, ambient background readings will be collected indoors in the work area. Total VOC concentration will be monitored continuously proximal to the immediate work area. The monitoring work will be conducted using MiniRAE 3000 (or equivalent) portable VOC monitors, or similar type monitors, for all VOC monitoring. The monitoring unit is equipped with an audible alarm to indicate exceedance of the action levels, as summarized below.

- If the ambient air concentration of total organic vapors proximal to the work area exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

- If total organic vapor levels proximal to the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

- All 15-minute readings will be recorded and be available for NYSDEC personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

3.0 Particulate Monitoring

Particulate concentrations will be monitored continuously proximal to the work areas. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate

exceedance of the action level, as summarized below. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (pre-work conditions) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed (i.e., wetting down areas). Work will continue with dust suppression techniques provided that PM-10 particulate levels do not exceed 150 mcg/m3 above the background level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, PM-10 particulate levels are greater than 150 mcg/m3above the background level, work will be stopped, and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the PM-10 particulate concentration to within 150 mcg/m3 of the background level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC personnel to review.

ATTACHMENT A

Appendix 1A New York State Department of
Health Generic Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

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