

California Environmental Protection Agency



ARB Approved

Installation, Operation and Maintenance Manual

**For Standing Loss Control Vapor Recovery System
for New Installations of
Aboveground Storage Tanks
As Certified by Executive Order VR-302-C**

June 2, 2011

NOTICE:

The **ARB Approved Installation, Operation and Maintenance Manual for the Standing Loss Control Vapor Recovery System for New Installations of Aboveground Storage Tanks (AST)** describes the tools and methods required to install the Standing Loss Control Enhanced Vapor Reduction (EVR) System.

The AST manufacturers written instructions, procedures and guidelines will be adhered to when installing, operating and maintaining ASTs or the warranty will be void. It is the owner's (of the AST) responsibility to ensure that the Standing Loss Control EVR System is properly and safely installed, operated and maintained on their ASTs. The owner may also choose to hire any qualified contractor or technician to install, operate and maintain the Standing Loss Control EVR System on their ASTs. All the current requirements of state, federal and local codes for installation and repair of gasoline dispensing equipment must be adhered to. Installation, operation and maintenance of the Standing Loss Control EVR System must also meet all the necessary safety precautions and site safety requirements to assure a safe and trouble free installation.

A list of recommended qualified technicians/contractors can be located by contacting the manufacturer of the Standing Loss Control EVR System. The following is a list of manufacturers and their contact information:

Husky Corporation
2325 Husky Way
Pacific, Missouri 63069
Phone: (800) 325-3558

**Modern Custom Fabrication
SuperVault Protected AST**
2421 E. California Avenue
Fresno, California 93721
Phone: (800) 800-8268

**ConVault® Incorporated
ConVault® AST**
4109 Zeering Road
Denair, CA 95316
Phone: (800) 222-7099
<http://www.convault.com>

**Containment Solutions, Inc
Hoover Vault Tank**
5150 Jefferson Chemical Rd
Conroe, Texas 77301-6834
Phone: (936) 756-7731
<http://www.containmentsolutions.com>

**Steel Tank Institute
Fireguard Protected AST**
944 Donata Court
Lake Zurich, Illinois 60047
Phone: (847) 438-8265
<http://www.steeltank.com>

**Jensen Precast
Armor Cast® AST**
14221 San Bernardino Ave.
Fontana, CA 92335
Phone: (909) 350-4111
<http://www.jensenprecast.com>

**Standing Loss Control Vapor Recovery System
Installation, Operation and Maintenance Manual for
New Installations of Aboveground Storage Tanks**

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**Summary of Maintenance Required of the Standing Loss
Control Vapor Recovery System**

Component	Interval	Maintenance To Be Performed
Pressure/Vacuum Vent Valve Husky 5885	Annual	<ol style="list-style-type: none"> 1. Remove screws that hold on the top cover. Do not remove the screens. 2. Remove any debris from inside the lower cover 3. Check the drain holes in the lower cover. 4. Reinstall the top cover 5. Tighten the screws firmly
Modern Custom Fabrication SuperVault MH Series Aboveground Storage Tanks	Annual	CARB requires an annual leak decay test. Individual Districts may require an increased frequency.
Steel Tank Institute Fireguard Protected Aboveground Storage Tanks	Annual	CARB requires an annual leak decay test. Individual Districts may require an increased frequency.
ConVault® Incorporated ConVault® AST	Annual	CARB requires an annual leak decay test. Individual Districts may require an increased frequency.
Containment Solutions, Inc Hoover Vault Tank	Annual	CARB requires an annual leak decay test. Individual Districts may require an increased frequency.
Jensen Precast Armor Cast® AST	Annual	CARB requires an annual leak decay test. Individual Districts may require an increased frequency.

(End of maintenance table.)

¹ These maintenance requirements shall not circumvent use of the manufacturer's installation and maintenance instructions. Maintenance contractors or owner/operators shall refer to the manufacturers complete installation and maintenance instructions found herein to ensure that all maintenance requirements are met. Maintenance must be conducted within the interval specified from the date of installation and at least within the specified interval thereafter.

**Standing Loss Control EVR Installation Equipment Check List
Installing Products per ARB Executive Order VR-302-C**

Site Location :(name) _____

Address: _____

City/State: _____

Contact/Phone: _____

Installing Contractor :(name) _____

Address: _____

City/State: _____

Contact/Phone: _____

Tank Number: _____ Product: _____ Capacity: _____

Tank Number: _____ Product: _____ Capacity: _____

Tank Number: _____ Product: _____ Capacity: _____

Installing Technician: (name): _____

Technician Certification Number: _____

Signature: _____

Yes/No	Initials

1. Is all of the installed equipment for Standing Loss Control EVR listed in ARB Executive Order (E.O.) VR-302-C?

Note: All Standing Loss Control Vapor Recovery installed equipment must be listed in E.O. VR-302-C. See attached Exhibit 1 Checklist, and /check each item installed.

Yes/No	Initials

2. Pressure Vacuum Vent Valve
Is there a P/V Vent valve installed on the top of each (gasoline) vent pipe (a maximum of three EVR P/V valves per GDF) or manifold?

a. P/V vent valve(s) torqued to _____ ft. lbs.

Yes/No	Initials

3. Modern Custom Fabrication SuperVault MH Series
Has the SuperVault AST been installed with the proper pressure/vacuum vent valve?

a. Describe any issues: _____

Yes/No	Initials
--------	----------

4. Steel Tank Institute Fireguard Protected AST
Has the Fireguard AST been installed with the proper pressure/vacuum vent valve?

a. Describe any issues: _____

Yes/No	Initials
--------	----------

5. ConVault® AST
Has the ConVault® AST been installed with the proper pressure/vacuum vent valve?

a. Describe any issues: _____

Yes/No	Initials
--------	----------

6. Containment Solutions, Inc Hoover Vault Tank
Has the Hoover Vault Tank been installed with the proper pressure/vacuum vent valve?

a. Describe any issues: _____

Yes/No	Initials
--------	----------

7. Jensen Precast – Armor Cast®
Has the Jensen Precast Armor Cast Tank been installed with the proper pressure/vacuum vent valve?

a. Describe any issues: _____

**Standing Loss Control Vapor Recovery System
Exhibit 1 Equipment Checklist**

From the list below, check the box for each component you used:

Pressure/Vacuum Vent Valve

Husky 5885

Protected Aboveground Storage Tanks

Modern Custom Fabrication
SuperVault Model MH Series

Steel Tank Institute
Fireguard Protected AST

ConVault® Incorporated
ConVault® Protected AST

Containment Solutions, Inc
Hoover Vault Tank

Jensen Precast
Armor Cast® AST

Figure A-1
Husky Model 5885 2-Inch Threaded Pressure/Vacuum Vent Valve

	MODEL #5885 Recommended Installation, Maintenance and Inspection Instructions EVR Pressure Vacuum Vent	5885
---	--	------

WARNING Designed for use at motor fuel dispensing facilities only.

INSTALLATION INSTRUCTIONS

NOTE: Always adhere to installation / usage instructions and warnings. Improper use may result in injury, damage or hazardous spill.

1. Remove the vent from the carton and visually inspect for any shipping damage.
2. Apply fuel resistant pipe sealant to the threads on the 2" vent stack.
3. Screw the Pressure Vacuum (P/V) vent onto the vent stack and tighten to a range of 20 to 50 ft-lbs with a suitable wrench.
4. DO NOT OVERTIGHTEN

TESTING / MAINTENANCE / INSPECTION

Testing Criteria Per TP201.1E and Exhibit 3 of applicable Phase 1 E.O.

Leak rate: Pressure = .05 CFH @ 2" wc, Vacuum = .21 CFH @ -4" wc.
Cracking Pressure = 2 1/2" to 6" wc, Vacuum = -6" to -10" wc.



Annually Inspect the P/V vent valve for foreign objects:

1. Remove the screws that hold on the top cover. Do not remove the screens.
2. Remove any debris from inside the lower cover.
3. Check the drain holes in the lower cover.
4. Reinstall the top cover.
5. Tighten the screws firmly.

- All drive aways, maintenance and inspection activities must be logged using the serial number of the individual product.
- Apply city, state, or federal testing regulations as appropriate.

**ANY TEST / INSPECTION
FAILURE REQUIRES IMMEDIATE
EQUIPMENT REPLACEMENT OR
REMOVAL FROM SERVICE.
MADE IN THE USA**

Husky Corporation • 2325 Husky Way • Pacific, MO 63069 • Phone: (800) 325-3558 • Fax: (636) 825-7300 • www.husky.com

Figure A-1 (continued)
Husky Model 5885 2-Inch Threaded Pressure/Vacuum Vent Valve

ALWAYS ADHERE TO INSTALLATION / USAGE INSTRUCTIONS AND WARNINGS.
 Improper use may result in injury, damage, or hazardous spill.

GENERAL WARNINGS / INSTRUCTIONS

- Use of equipment is at individuals' own risk.
- Always abide and adhere to city, state, and federal regulations regarding use and installation of dispensing equipment.
- Always follow the dispenser manufacturer's instructions.
- Always turn off all power to dispenser during maintenance and inspection activities.
- Always close the shear valves during maintenance and inspection activities.
- Always relieve pressure from system prior to performing maintenance activities.
- Always check continuity after installation using a megohmmeter (Refer to PEI RP 400 for details).
- Always replace or remove from service damaged or leaking dispensing equipment immediately.
- Always report leaks / spills / accidents to appropriate authorities.
- Always wear appropriate safety equipment during maintenance activities.
- Always have appropriate fire extinguishing equipment within 5 feet of dispensers.
- Always use pipe sealant approved for gasoline service.
- Always place containers on the ground before filling.
- Always discharge static electricity before using or servicing equipment by touching a metal part of the dispenser before and after fueling vehicle.
- Never smoke within 20 feet of dispensers.
- Never keep in service past recommended life.
- Never leave the nozzle unattended while dispensing fuel.
- Never use sparking or flaming devices within 20 feet of dispensers.
- Never use power tools near dispensers or to aid in the installation process.
- Never use cell phone within 20 feet of dispensers.
- Never reenter car when fueling vehicle.
- Never allow gasoline to touch eyes or skin.
- Never use at flow rates in excess of regulatory guidelines.
- Never use at flow rates less than 5 gallons per minute.
- Never dispense flammable material into unapproved containers.
- Never dispense fuel without a valid driver's license.

**CAUTION: DO NOT ALTER OR COVER
 THE P/V VENT**

Figure A-1 (continued)
Husky Model 5885 2-Inch Threaded Pressure/Vacuum Vent Valve

TROUBLESHOOTING GUIDE

Pressure Decay Test Failure...	1. Test vent to CARB TP201.1E. 2. Replace vent.
--------------------------------	--

For stations with ISD monitoring

Vapor leak...	1. Verify other equipment is not the cause. 2. Test vent to CARB TP201.1E 3. Replace vent.
---------------	--

Exceeds allowable system cracking pressure...	1. Replace vent
---	-----------------

GENERAL TECHNICAL DATA

Fuel Type	Test and warranty for gasoline and diesel fuel
Body	Sand cast aluminum
Screens	Stainless Steel 40 mesh
Seal	Nitrile Foam
Covers	Aluminum
Weight	1.2 lbs
Threads	2" NPT
Case Quantity	20
Listings	CARB 
Patents	5,957,157

ACCESSORIES

Part #5041
3" to 2" Threaded Adaptor

Installation Procedure:

1. Visually inspect the o-ring and threads for chips, dirt & debris.
2. Apply fuel resistant pipe sealant to the 3" NPT threads of the vent pipe.
3. Screw the P/V vent adaptor onto the vent stack by hand.
4. Apply fuel resistant pipe sealant to the 2" NPT threads of the P/V vent adaptor.
5. Screw the P/V vent onto the adaptor and tighten to a range of 20 to 50 ft-lbs. with a suitable wrench. Do not overtighten.

Part #5426
Test Adaptor

NOTE: This adaptor is designed to fit on the inlet of the P/V Vent to allow for field and lab tests.

Installation Procedure:

1. Screw P/V Vent adaptor into the P/V Vent valve until hand tight. Make sure the seal is compressed.
2. Place the P/V Vent valve and adaptor on a flat surface.
3. Attach a 3/16" hose (Tygon fuel tubing) from test apparatus to hose barb on the side of the adaptor.
4. After testing, remove hose from barb and remove adaptor from vent.

Figure B-1
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

SUPERVAULT MH
Multi-Hazard Rated

INSULATED AND PROTECTED
ABOVEGROUND FUEL STORAGE TANKS

Cylindrical and Rectangular Styles

Owners Manual

SUPERVAULT MH

•Smart •Safe •Secure •Reusable
Fire after Fire, Bullet after Bullet, Impact after Impact

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

SUPERVAULT MH
LISTINGS

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

SuperVault MH
Multi-Hazard Rated Insulated and Protected Aboveground Fuel
Storage Tanks

Cylindrical and Rectangular Styles

TESTING RESULTS

Tests Performed by Southwest Research Institute, San Antonio, Texas

NATIONAL STANDARDS REQUIRE DEMONSTRATED
RESISTANCE TO HIGH INTENSITY LIQUID POOL FIRE EXPOSURE

	Actual Results		Pass/Fail Criteria					
	Initial Test	Retest	SwRI 95-03		UFC Std A-II-F-1		UL2085 Protected	
Starting Temperature	80	61	Initial Test	Retest	Initial Test	Retest	Initial Test	Retest
2 Hour Results								
o Average Temp Rise (°F)	134	139	260	260	260	*	800	*
o Max. Absolute Temp. (°F)	275	212	400	400	400	*	1080	*
4 Hour Results								
o Average Temp Rise (°F)	165	n/a	260	*	*	*	*	*
o Max. Absolute Temp. (°F)	323	n/a	400	*	*	*	*	*

A sample tank was placed in a 2000 °F blast furnace. Thermometers located throughout the tank measure the temperature rise.

* No requirements

HOSE STREAM RESISTANCE

SwRI STANDARDS 95-03 AND 93-01 AND UFC STANDARDS A-II-F-1 REQUIRE DEMONSTRATION RESISTANCE TO HOSE STREAM IMPINGEMENT ON THE TEST TANK IMMEDIATELY AFTER CONCLUSION OF THE RATED FIRE EXPOSURE PERIOD.

For a 4 Hour Fire Rating the hose stream test is 5 minutes of a 45 PSI stream administered through a 1-1/8" fire nozzle. The pass/fail criteria is that the primary tank must remain leak tight after application of the hose stream to test tank.

Not only did the primary tank of the SuperVault MH remain leak tight but there was NO PENETRATION of the outer steel tank and NO LOSS of insulation.

PROJECTILE RESISTANCE

SwRI STANDARD 95-03 AND 93-01 AND UFC STANDARDS A-II-F-1 AND UL 2085 PROTECTED REQUIRE DEMONSTRATION RESISTANCE TO PROJECTILE PENETRATION OF THE PRIMARY TANK.

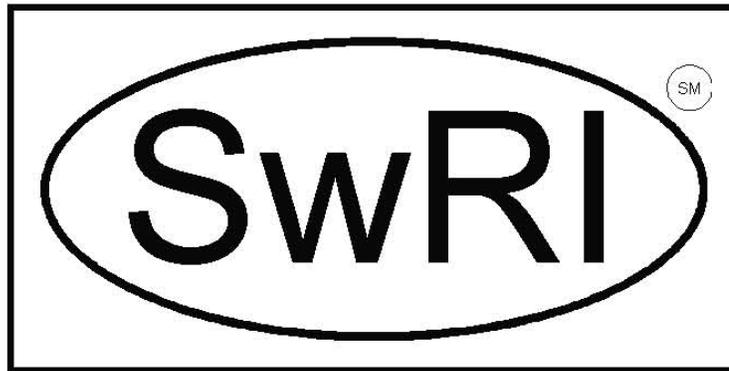
After conclusion of the hose stream test the SuperVault MH was subjected to 5 rounds of 150-grain, M-2 ammunition discharged from a 0.30 caliber rifle at a distance of 100 feet. The minimum muzzle velocity of the rounds was 2700 ft/sec. bullet resistance is the basis for Projectile Penetration Resistance rating. The SuperVault MH withstood all 5 rounds without penetration of the primary tank.

IMPACT RESISTANCE

SwRI STANDARD 95-03 AND 93-01 AND UFC STANDARD AII-F-1 AND UL 2085 PROTECTED REQUIRE DEMONSTRATION RESISTANCE TO HEAVY VEHICLE IMPACT WITHOUT PENETRATION OF THE PRIMARY TANK.

After anchoring in accordance with the manufacture's instructions the tank will be subject to an impact of 12,000 pounds traveling at 10 mph applied at 18" above the ground surface. The SuperVault MH withstood the impact without penetration of the primary tank.

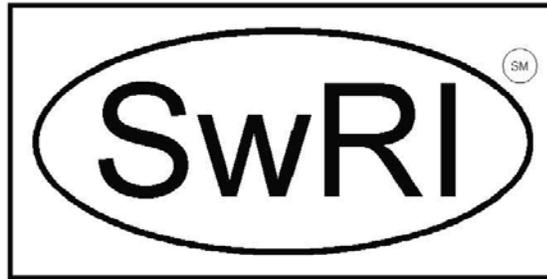
Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks



This mark on the product signifies that the product is listed by Southwest Research Institute.

The SuperVault MH is listed for compliance with SwRI Standards 95-03 and 03-01, Uniform Fire Code standard A-II-F-1 (formerly known as UFC 79-7) and UL 2085 Protected. The label on the tank bears the SwRI logo as evidence of listing and indicates compliance with the national standards listed above.

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks



	<p>SuperVault MH</p> <p>Manufactured by Modern Custom Fabrication, Inc. Fresno, CA</p> <p>SwRI ID NO. 02098-01-02</p> <p>Multi-Hazard Rated Protected Secondary Containment Aboveground Tank for Flammable and Combustible Liquids</p> <p>This product has been evaluated for re-use after exposure to fire, puncture, or heavy-vehicle impact. Should any of these occur, contact the manufacturer.</p> <p>This product has been listed after passing a 4-hour Fire Exposure Test, a Hose Stream Resistance Test, a Projectile Penetration Test, a Heavy Vehicle Impact Test, an environmental exposure evaluation, and an additional 2-hour Fire Exposure Test using the same, fully-assembled test tank for all tests.</p> <p>This tank complies with the requirements of SwRI Test Procedure 95-03, SwRI Test Procedure 93-01, UL 2085 and Section 20.9 of UL 1746 (1993) (Interstitial Communication Test), and is recognized listed product by Southwest Research Institute, San Antonio, Texas.</p> <p>Manufactured under one or more of the following patents: United States patent Nos. 5,038,456; 5,082,138; 5,092,024; and 5,103,996. Manufactured under license from Super Technologies, LLC.</p>
	<p>LISTED BY:</p> <p>Southwest Research Institutes © San Antonio, Texas</p>
<p>Serial No. <input type="text"/></p>	

SuperVault MH tank Label for Fresno

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

SUPERVAULT MH
INSTALLATION

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

Installation Instructions

These instructions are for the stationary installation of the SuperVault MH aboveground tank used for the storage of petroleum products at atmospheric pressure.

No amount of written instruction, provided by manufacturers or regulatory agencies, will serve to convert an incompetent or under supervised mechanic into a competent craftsman. Installation of storage systems for flammable and combustible liquids is a unique field. The ability to recognize and react to unexpected, abnormal conditions that may occur during a tank installation requires experience as well as skill.

In addition to proper system design and operation, use of tank installers who possess both the experience and integrity to insist on doing the job right constitutes the greatest protection against ultimate tank system failure and liability exposure.

Your SuperVault MH must be installed in accordance with all applicable federal, state and local environmental regulations and safety codes.

Location

Tank must meet local requirements. The enclosed "Clearance Requirements" diagram is based on the 2003 International Fire Code and is for reference only. Always check with your local authorities for their particular requirements before starting work.

Foundation

Tank foundation must comply with local Building Code regulations. Ask your local Fire Department or Building Department for recommendations. Modern Custom Fabrication Inc. recommends that at a minimum the concrete footing should be sufficiently above grade to prevent

accumulation of debris, dirt and water around the tank supports.

The SuperVault MH tank supports and base plates meet the requirements of 2007 California Building Code. Expansion joint material that will not absorb water (asphalt impregnated fiberboard) should be placed between the tank supports and the concrete foundation.

Handling

Do not handle or install tank without having knowledge and experience in procedures involved with safe aboveground tank installation.

Before any attempt is made to move a tank, it should be established that hoisting equipment has sufficient capacity and reach to safely lift and lower the tank without dragging or dropping.

Lifting with nylon straps is preferred to prevent damage of the tank coating. The straps must be clean to avoid scratching the tank coating.

Do not push, drag or drop the SuperVault MH.

Do not handle or move the SuperVault MH unless it is empty.

Venting

All aboveground fuel storage tanks are required to have emergency vents to prevent the buildup of pressure. The emergency venting requirement for SuperVault MH tank must be provided by the use of emergency vent valve attached to a properly sized primary tank fitting. The tank manufacturer provides emergency venting for secondary tank by means of relief caps over the pour ports.

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

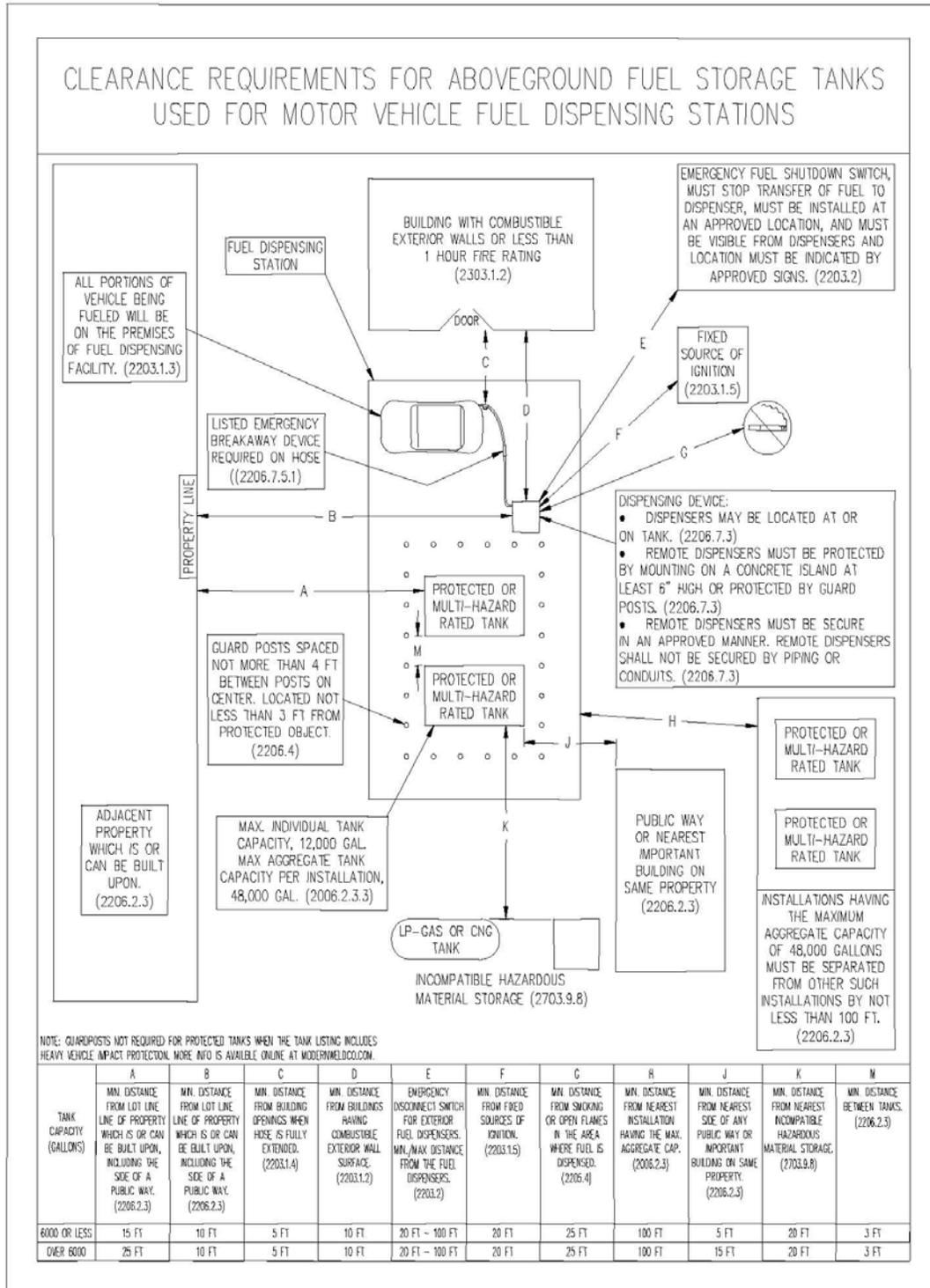


Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

SUPERVAULT MH

TESTING

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

TESTING

Each SuperVault MH is leak tested during the fabrication process by using 5 PSI of positive pressure internally and externally applying a leak detecting solution to all seams and joints. This is performed on both the primary and secondary tanks. Should the owner require additional field testing, the following procedure is offered to meet this requirement.

Warnings:

1. Do not air test a tank which has previously contained flammable or combustible liquids.
2. Air pressure used for this test must not exceed 5 PSI.

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

Procedure No. SV-P1

SUPERVAULT MH ABOVEGROUND PROTECTED FUEL STORAGE TANK
PRIMARY TANK FIELD TESTING

These tanks are thoroughly tested at the factory and certified to be leak free. Should the owner require additional field testing, the following procedure is offered to meet this requirement.

Modern Custom Fabrication Inc. is not responsible for any cost incurred relating to field testing.

PROCEDURE

1. Cap openings and install test equipment in the order listed below starting at compressor or air supply.
 - a. Pressure reducing valve (5 PSI on outlet side)
 - b. 0 to 5 PSI pressure gage
 - c. 5 PSI pressure relief valve
 - d. Shut-off valve
 - e. 0 to 5 PSI pressure gage at tank
2. Slowly raise tank pressure to 4 PSI. CAUTION: Do not exceed 4 PSI.
3. Close shut-off valve when test pressure of 4 PSI is reached.
4. Leak test all pipe caps and test manifold with leak-detecting fluid to insure no loss of air pressure at these points.
5. Record time and pressure gage reading on a Test Log every 5 minutes. After 30 minutes have elapsed, record final pressure test and time.
6. No more than a 1% loss in test pressure over test period is allowed for tank to satisfactorily pass pressure test.

CERTIFICATION

The undersigned hereby certify that the pressure test was performed in strict conformance with this procedure for the SuperVault listed below.

Performed By: _____ Company Name _____ _____ Date of Test _____	_____ Company Representative Signature _____ _____ Company Representative Name (Please Print)
Witnessed By: _____ Regulating Authority _____ _____ Regulator/Inspector Name (Please Print)	_____ Regulator/Inspector Signature _____ _____ Time
Tank Owner: _____	Customer P.O. No. _____
Installation Address: _____ _____ _____	Delivery Date _____ Installation Date _____ Tank Serial No. _____

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

SuperVault MH Test Log

Date of Test _____

Tank Serial No. _____

Test Start Time _____

Record Pressure

4 PSI Reached (Time) _____ (PSI) _____

1. 5 minute lapse (Time) _____ (PSI) _____

2. 5 minute lapse (Time) _____ (PSI) _____

3. 5 minute lapse (Time) _____ (PSI) _____

4. 5 minute lapse (Time) _____ (PSI) _____

5. 5 minute lapse (Time) _____ (PSI) _____

6. 5 minute lapse (Time) _____ (PSI) _____

No more than a 1% loss in test pressure over test period is allowed for tank to satisfactorily pass pressure test.

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

SUPERVAULT MH

MAINTENANCE

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

Maintenance

These maintenance procedures cover the tank only. Different applications and sizes of tanks create a variety of equipment configurations that would be impossible to cover in this section. Follow the equipment manufacturer's recommendation for maintenance schedules.

The following tank components should be inspected at least once a week:

Emergency and Normal Vents

Check the operation of the vents for free movement and no obstructions.

Spill Pan

Spill pan should be clean and free of obstructions. Drain valve must have free movement and be normally closed during operation of the tank.

Monitor Tube

Ensure the monitor tube is dry. This can be accomplished by sticking the tube with the gauge stick that is supplied with the tank. If the tank is equipped with a mechanical or electronic monitoring device, test it for proper operation.

Finish

Inspect surface of the tank for chips or corrosion. If found sand, clean and paint in accordance with the paint manufacturer recommendation.

Fuel

Impurities and moisture in fuel can damage the tank and equipment. Check with your fuel supplier for assistance with a clean fuel program and check for procedures to eliminate containments, including water from your fuel.

Figure B-1 (continued)
Modern Custom Fabrication SuperVault MH Series Protected
Aboveground Storage Tanks

FUEL STORAGE TANK MONITORING LOG RECORD

DATE	GASOLINE	DIESEL	OPERATOR	COMMENTS
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
Additional notes for this period:				

DIRECTIONS: WEEKLY

- 1) Tank operator to write in the date the tank leak monitor or indicator is checked.
- 2) Operator write in condition observed for each tank, i.e. dry or fuel present.
- 3) Operator to initial and comment on condition of each tank.
- 4) Report any liquid present in the monitor tube or alarm condition to your supervisor.
- 5) Tanks fitted with float actuated LEAK GAUGE have viewing indicator window.
 CLEAR indicates NO LEAKS, RED indicates LEAK. Check gauge periodically for proper operation.

Figure B-2 Steel Tank Institute Fireguard Protected Aboveground Storage Tanks



FEBRUARY 2007

- 1.0 TANK SITE EVALUATION AND PREPARATION PRIOR TO INSTALLATION**
- 1.1** The foundation must be designed to support the tank plus 100% of its contents when full. The foundation design shall also take into account the type of support that is being used and the point load associated with that support. The foundation may be constructed using concrete, asphalt, gravel or other stable material and must include provisions in its design to prevent tank movement. The foundation should include any provisions necessary for seismic design. The foundation design must also include provision for draining surface water away from the tank.
- 1.2** For tank installations without cathodic corrosion protection, the tank should be grounded in accordance with applicable electrical and fire code standards.
- 1.3** Where the steel tank body is in contact with the earth, use a zinc grounding rod. Do not use a copper grounding rod.
- 1.4** Where the steel tank body is in contact with the earth or foundation, it should be protected from external corrosion. For external corrosion protection using cathodic corrosion protection, consult applicable standards (i.e., National Association of Corrosion Engineers) to provide the tank with appropriate protection from lightning without interference with the corrosion protection. Steel tanks in contact with the earth should not use copper grounding. Refer to STI R893-89, "Recommended Practice for External Corrosion Protection of Shop Fabricated Aboveground Storage Tank Floors."
- 1.5** Tanks located in areas subject to flooding must be protected against floatation.
- 1.6** Aboveground tanks should not be located above underground utilities or directly beneath overhead power lines.
- 1.7** The tank shall be protected from vandalism and accidental damage in accordance with all applicable codes, i.e., NFPA 30, NFPA 30A, UFC, etc. as well as local environmental regulations and safety codes. Consult local authorities before installing this tank.
- 2.0 TANK HANDLING**
- 2.1** Do not handle or install the tank without having knowledge and experience in procedures involved with proper and safe installation of an aboveground tank used for storage of stable, flammable and combustible liquids.
- 2.2** Equipment for handling the tank shall be of adequate size to lift and position the tank. **DO NOT DROP OR DRAG THE TANK.**
- 2.3** Tanks shall be carefully handled using cables or chains of adequate length (with spreader bars, if necessary) and size. Attach to the tank using the lifting lugs provided. Care should be taken that the angle between the two cables, at the lift point, shall be no greater than 60 degrees.
- 2.4** **DO NOT HANDLE OR MOVE THE TANK UNLESS IT IS EMPTY.**
- 2.5** This is a stationary tank. Do not use this tank for transport of any product.
- 3.0 TESTING**
- 3.1 General Requirements**
- 3.1.1** An on-site air test of the tank may be required by local authorities to ensure no damage has occurred in shipping and handling. All testing shall be done as described below.
- 3.1.2** Vacuum monitored double wall tanks are shipped from the manufacturer with a vacuum drawn on the space between the walls. Read and record the vacuum pressure. If the vacuum gauge reading is less than 12 inches

Figure B-2 (continued) Steel Tank Institute Fireguard Protected Aboveground Storage Tanks

- 3.1.3 In lieu of the air pressure test described below, a vacuum may be applied to the interstice of a double-wall tank or to the interstice of a double-bottom tank. DO NOT APPLY A VACUUM TO THE PRIMARY TANK OF A DOUBLE-WALL TANK OR TO A SINGLE-WALL TANK. A vacuum of 7" to 10" Hg is to be applied to the interstice and held for at least 24 hours with no more than a 2" Hg vacuum loss allowed. If this vacuum cannot be held for 24 hours, then perform the air test procedure described below.
- 3.1.3.1 Caution must be taken in applying a vacuum to the interstice of a tank and the testing must be stopped if any deformation appears on the tank.

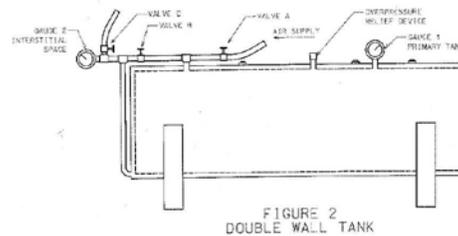
3.2 Air Pressure Test Procedure for Tanks

- 3.2.1 Remove emergency vents and cap openings to hold tank pressure as required.
- NOTE: Use only calibrated air pressure gauges with a 0-15 psig (0-103 kPa) dial span. The relief valve must have a flow rate at the set pressure that is greater than the flow rate of the air supply line. The regulated air supply test pressure used for this test should be as follows:
- a. **Horizontal cylindrical tanks** - Not less than 3 psig (20.7 kPa) nor more than 5 psig (34.5 kPa). Set the pressure relief valve in the test air supply line at 5.5 psi (38 kPa).
 - b. **Vertical tanks**-Not less than 1½ psig (10.4 kPa) nor more than 3 psig (20.7 kPa). Set pressure relief valve in test air supply line at 3 psig (20.7 kPa).
 - c. **Rectangular tanks**-Not more than 3 psig (20.7 kPa). Set pressure relief valve in test air supply line at 3 psig (20.7 kPa). CAUTION: Do not leave pressurized tank unattended while the pressure line/air line is connected. Do not stand in front of tank heads or fittings when pressurizing tank. Pressurizing of large tanks may result in the slight deformation of the top and bottom of vertical tanks, of the sides of rectangular tanks, and of the heads and ends of cylindrical tanks. Should

deformation appear severe, immediately relieve the pressure.

3.2.2 Tank Pressurizing Procedure

- 3.2.2.1 The following air pressure testing does not apply to double-wall tanks equipped with interstitial vacuum monitoring systems. (In lieu of the air pressure test, the tank may be shipped from the factory with a vacuum in the tank interstice. Read and record the vacuum pressure. If the vacuum pressure gauge reading is less than 12 inches Hg (40.5 kPa), contact the tank manufacturer).
- 3.2.2.2 Install test piping as shown in Figure 2. Close valves A and B. Open valve C. Temporarily plug, cap or seal off remaining tank openings to hold pressure.
- 3.2.2.3 Connect the regulated test air supply line to test piping as shown in Figure 2.



- 3.2.2.4 Close valves B and C. Slowly open valve A to pressurize the primary tank. Pressure gauge 1 should indicate test air pressure given in Section 3.2.1 above.
- 3.2.2.5 Close valve A. Disconnect the regulated test air supply line from the test piping.
- 3.2.2.6 Monitor test pressure in the primary tank for 1 hour minimum. A steady drop in pressure reading for gauge 1 indicates there may be a leak in the primary tank. Check the fittings, the gauge, and then retest. If the problem persists, contact the tank manufacturer.
- 3.2.2.7 If no leaks are found, close valve C and slowly open valve B to pressurize the interstitial space between the double walls of the tank.

Figure B-2 (continued) Steel Tank Institute Fireguard Protected Aboveground Storage Tanks

WARNING: Do not apply air pressure to the interstitial space between the walls of a double wall tank without air pressure in the primary tank. Do not apply air pressure to the interstitial space that is higher than the air pressure in the primary tank. Damage to the tank may result.

Pressure gauge 1 will indicate a slight drop in test pressure when valve B is opened, but should hold steady at the lower pressure. If the test pressure drops below the minimum requirements, close valve B, reconnect the air supply line and slowly open valve A to increase the pressure in the primary tank. When the required pressure is indicated on gauge 1 close valve A, disconnect the test air supply line. Open valve B to equalize pressure in the primary tank and the interstitial space. Gauge 1 and gauge 2 should have the same pressure reading.

3.2.2.8 Close valve B. Hold the test pressure in the interstitial space for 1 hour minimum. A steady drop in pressure gauge 2 indicates there may be a leak in the interstitial space. Check the fittings, the gauges, and then retest. If the problem persists, contact the tank manufacturer.

3.2.2.9 Proceed to Section 3.2.3, "Detection of Leaks" below.

3.2.3 Detection of Leaks

3.2.3.1 Immediately apply the leak test solution to the tank exterior surfaces, welds, fittings, etc. Check for leaks. No leaks are allowed. If leaks are found, notify the tank manufacturer. If no leaks are found, testing of the tank is complete.

3.2.3.2 Open valve C, then slowly open valve B to release the test air pressure.

3.2.3.3 With the tank depressurized, remove the test piping, temporary plugs, caps and seals. Reinstall the emergency relief vents, etc. which were removed in Section 3.2.1 above. Emergency vents are required on both the primary tank and the secondary tank.

WARNING: Emergency relief vents must be operable to prevent causing tank failure by over-pressurization.

4.0 TANK PIPING AND ACCESSORIES

4.1 Install all permanent piping and fittings using compatible, non-hardening thread sealant material.

4.2 All unused tank openings must be properly sealed and tested to be liquid and vapor tight prior to putting the tank into service.

4.3 **DO NOT WELD ON THE TANK, MODIFY OR PENETRATE THE TANK STRUCTURE IN ANY WAY WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE TANK MANUFACTURER.**

4.4 All tank accessories shall be installed as required per local codes. Anti-siphon devices, overfill shut-offs and alarms, vents gauges, emergency vents, etc. are common requirements for tanks storing motor fuels for the purpose of being dispensed into motor vehicles.

5.0 LABELING

5.1 Tanks shall be labeled in accordance with all applicable codes.

6.0 MAINTENANCE

6.1 The tank operator should perform periodic walk-around inspections to identify and repair areas of damage to the vessel or the coating itself and check for proper drainage around the tank area.

6.2 It is imperative that the tank exterior be inspected periodically to ensure that the integrity of the coating is maintained. The frequency of periodic repainting will be based upon environmental factors in the geographic area where the tank is located. Special consideration should be given to the selection of the paint, surface preparation and coating application. The coating selected should be suitable for use with the current coating, or the existing coating should be removed. The coating

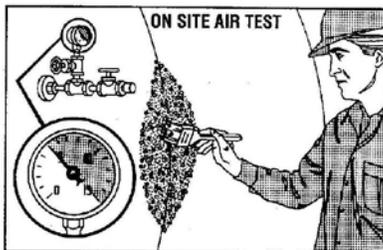


Figure B-2 (continued)
Steel Tank Institute Fireguard Protected Aboveground Storage Tanks

- selected should be of industrial quality.
- 6.3** Proper site preparation and maintenance are vital to ensure drainage of surface water. Should ground conditions change or settlement occur, take the appropriate steps to maintain proper drainage and prevent standing water near or under the tank area.
- 6.4** The primary tank shall be inspected monthly for the presence of water at the lowest possible points inside the primary tank. Remove any water found. Water and sediment in fuel can cause plugging of filters. Also, bacterial growth, originating from the fuel can cause corrosion of tanks and lines. For procedures on how to check for the presence of water and removal of water, refer to API Recommended Practice 1621, Appendix D and API Standard 2610. Another source of information is a report by the US Department of Energy Brookhaven National Laboratory, BNL 48406, which provides information on methods to test for and remove water, test for bacterial presence in fuel, tank cleaning and fuel additives.
- 6.5** This tank must be removed from service if damaged by fire exposure, other physical means or misuse.
- 6.6** Failure to adhere with these maintenance instructions may void your warranty.
- 6.7** Tank relocation requirements - often aboveground storage tanks are relocated. The following instructions are to be followed when this occurs: All steps are to be documented and the documentation is to be kept for the life of the tank.
- 6.7.1** The hazards associated with the cleaning, entry, inspection, testing, maintenance or other aspects of ASTs are significant. Safety considerations and controls should be established prior to undertaking physical activities associated with ASTs. Cleaning of tanks must be per state and local jurisdiction requirements.
- 6.7.2** Refer to the STI Standard SP001, "Standard for the Inspection of Aboveground Storage Tanks" for requirements concerning tank inspections. This SP001 Standard details requirements for inspections based on the tank installation and age. A tank must undergo
- the appropriate inspection prior to relocation.
- 6.7.3** In addition, the tank must be subjected to a pressure (or vacuum) test as detailed paragraph 3.2 above except an inert gas, such as nitrogen, should be used for tanks that have previously held fuel.

Disclaimer

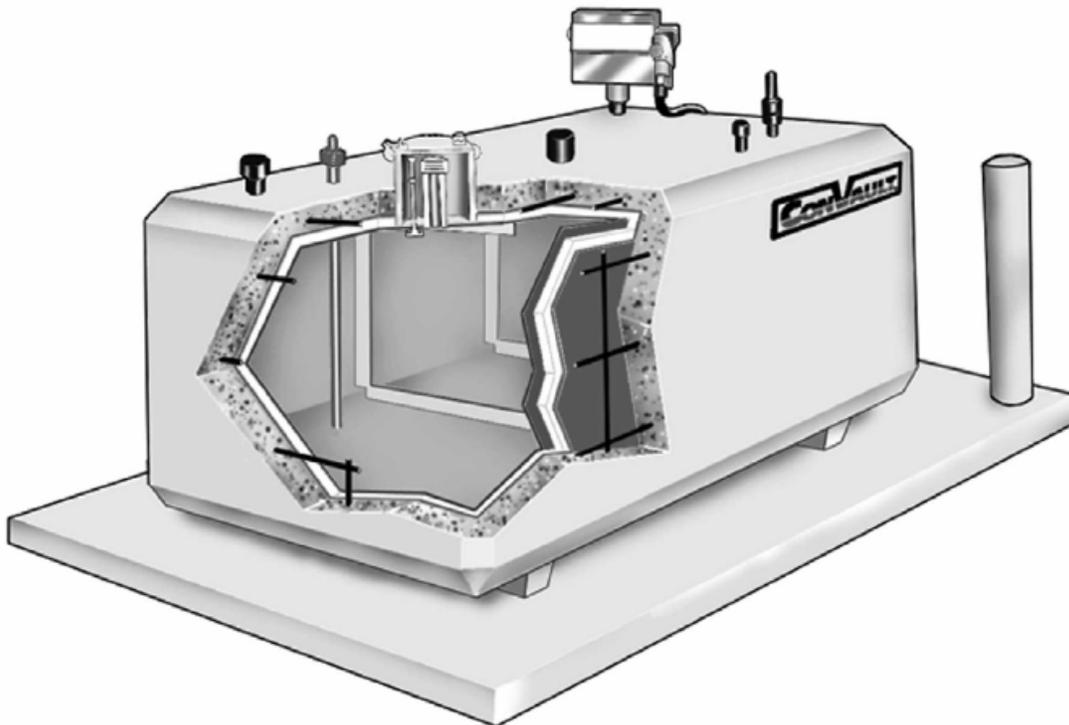
These instructions are intended only as an aid to tank installers who are knowledgeable and experienced in aboveground tank installation. Compliance herewith does not necessarily meet the requirements of applicable federal, state and local laws, regulations and ordinances concerning tank installation. STI makes no warranties, express or implied, including but not limited to, any implied warranties of merchantability or fitness for a particular purpose, as a result of these installation instructions.

Figure B-3
ConVault® Aboveground Storage Tanks



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INSTALLATION INSTRUCTIONS



April 2007

Installation Instructions

Pg. 21

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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Figure B-3 (continued) ConVault® Aboveground Storage Tanks



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A. SCOPE

1. These instructions apply to stationary, shop fabricated, aboveground, concrete encased steel tanks for the storage of stable, flammable and combustible liquids at normal atmospheric pressure. Because the tank installation is a specialized skill, it is assumed that those using these instructions will have knowledge of, and possess the skills and equipment necessary to install this type of aboveground storage tank properly and safely.
- **NOTE:** Consult the Authorities Having Jurisdiction to insure compliance with local codes and regulations prior to carrying out any instructions given herein.

B. PERMITS AND APPROVALS

1. Because of the combustible and flammable nature of the hydrocarbon liquids stored in the Aboveground Storage Tanks (AST), they are subject to various codes, and regulations. The codes and regulations govern the fabrication, testing, shipment, installation, operation, and maintenance of the tanks. The codes and regulations may originate from local fire authorities (e.g. Fire Marshals), local building jurisdictions (e.g. city or county building officials), state laws and regulations (e.g. Air Resource Board), Federal agencies (e.g. Environmental Protection Agency) and regional and national codes (e.g. National Fire Protection Association (NFPA), Uniform Fire Code (UFC), or International Fire Code (IFC).
2. Installation, operation and maintenance of the tanks must be carried out in accordance with the applicable codes and regulations. These aboveground storage tanks are intended for installation in accordance with NFPA 30, NFPA 30A, UFC (including article 79 Appendix A-II-F), and IFC.
3. System installation starts with obtaining the required state and local permits.
4. Typical approval process and documents needed are shown in the **List 1, Page 17, Product Description**. Specific local or jurisdictional requirements may slightly differ from location to locations but the list is a good reference and a guide for your permit requirements.
5. State and local permit applications must be made with the current and up-to-date forms.
6. Zoning permits may also be required.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



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C. TANK SITE

- **NOTE:** The location of each ConVault® tank is stored in ConVault, Inc.'s central data bank. If the tank is to be relocated to a different location, ConVault, Inc. must be properly notified to update the data bank. The product limited warranty could be voided if ConVault® is not informed of tank relocation or if tank is not reinstalled in accordance with these installation instructions. It should be noted that ConVault® Warranty is conditional on installation of tanks in accordance with ConVault® Installation Instructions. Your attention is specifically drawn to the tank site selection and foundations requirements.

▲WARNING Follow the instructions enumerated below. Failure to follow these instructions may result in death or serious injury.

1. Tank location and foundation to comply with the current edition of the Uniform Building Code (UBC) and all applicable local codes and ordinances. For sites subject to ground frost, the foundation slab design should be reviewed to take into consideration frost line requirements.
2. The tanks should be located a minimum of 1/3 the height of the vault away from down slopes - greater than 3:1, and 1/2 the height of the vault away from up slopes smaller than 3:1.
3. Tanks located in areas subject to flooding must be protected against floatation. Flood resistant tie-down brackets are available for all tank sizes to resist floatation during complete submergence.
4. Aboveground storage tanks should not be located over underground utilities or directly beneath overhead power and telephone lines.
5. The tank should be protected from vandalism and accidental damage in accordance with all the applicable codes.
6. Fire department vehicle access should be provided within 150 feet of any tank.
7. The venting of a tank to a remote location must include the use of a steel pipe equal to or greater in size than the vent outlet, and the methods of supporting such piping against displacement must comply with local codes. Provide the vent piping with a slope to ensure that all condensed vapors drain back to the tank.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



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D. BOLLARD INSTALLATION

Collision protection is recommended on sides of the tank exposed to traffic. This is generally accomplished with pipe bollards. Always check state and local codes. Sample installations are shown below:

Spacing from the tank should conform to the applicable code requirements.

As an alternative to steel pipes, you may use precast concrete barriers. You can obtain the precast barriers from your ConVault® representative.

Figure No. 6
Sample Bollard Installation

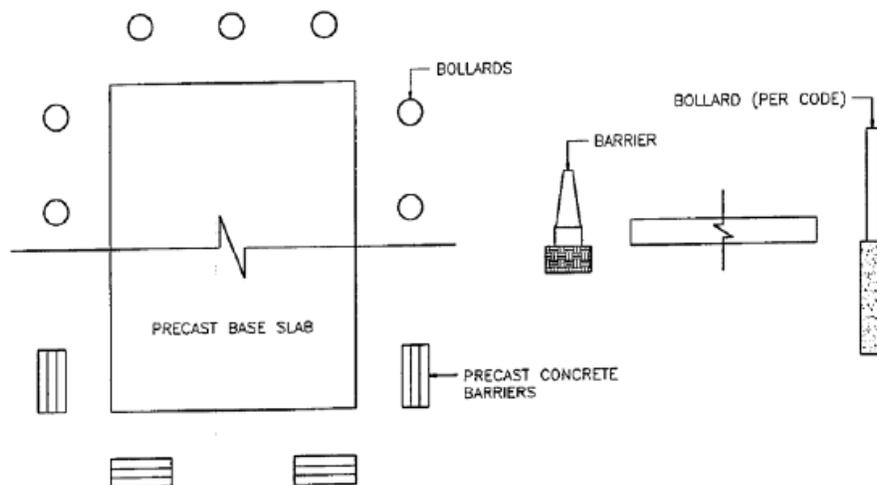


Figure B-3 (continued) ConVault® Aboveground Storage Tanks



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E. FOUNDATIONS

CAUTION Failure to provide proper foundation may result in damage to the tank and equipment affixed to it and may void the tank warranty.

1. Tank location and foundation must comply with requirements of the current edition of the relevant building code and all the applicable local codes and ordinances.
2. The tank slab may be poured in place using the ConVault standard slab drawing, which may be obtained by contacting ConVault or your local representative. An alternative to pouring the slab in the field is to purchase a precast slab from the manufacturer.
3. The foundation for the tank must be designed to support the tank plus the weight of the maximum amount of product the tank will be storing. The foundation design must also include provision for draining surface water away from the tank to minimize the risk of fuel accumulation under the tank from an overflow or spills.
4. Tanks located in areas subject to earthquake must be protected against seismic forces. Optional earthquake restraints are available. The restraints can be retrofitted to the slab should local requirements change. The restraints are mounted on the slab and are secured with anchor bolts directly into the slab. The tank feet rest in the restraints and do not require bolting directly to the tank. Insure that the slab is large enough to accommodate earthquake restraints or hold-downs.
5. Tanks located in areas subject to hurricanes may be required by your local Authority Having Jurisdiction (AHJ) to be fitted with hurricane hold down restraints.
6. The tank foundation is to sit on undisturbed earth or compacted fill, free of organic material.
7. The following minimum soil characteristics may be used if the ConVault® tank is installed on a continuous solid slab which will uniformly distribute the weight of the tank and its contents to the soil:
 - a. Bearing Capacity: minimum 1,000 but preferably 2,000 lb. per sq. ft.
 - b. Total settlement: 1 inch maximum.
 - c. Differential settlement: 1/2 inch maximum.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

- d. Provide a minimum six-inch (6") thick granular sub-grade, compacted and graded to a level uniform subsurface prior to the cast slab placement or pouring of the cast-in-place slab.
- e. A geological engineer should evaluate the effect of the water table and frost lines if such unusual conditions exist at the site.
- f. Soil surface and granular sub grade under foundation should be flat within 1/16" per foot. Soil around foundation should be sloped away 1/8" per foot minimum for 5 feet.
- **NOTE:** If Bearing pads are used under the tank legs instead of grouting, the tank foundation and slab should be designed to withstand concentrated loads under the bearing pads. For grouting instructions see paragraph J on Page 31.
- **NOTE:** The above soil characteristics, foundation and slab design requirements may be revised by a qualified design engineer who would design the foundation and the slab on a site-specific basis.
- **NOTE:** Some Authorities Having Jurisdiction require up-lift restraints for areas subject to flooding and hurricanes.

F. TANK HANDLING

▲WARNING Failure to obey the following tank handling instructions may result in death or serious injury.

- **NOTE:** Do not handle or install tank without having knowledge and experience in procedures involved with proper and safe installation of an aboveground tank used for storage of flammable and combustible liquids. Reliance on skilled and professional installers is an important factor in avoiding damage to tank and system failure.
 1. Equipment required in the shipping and off-loading of ConVault® aboveground storage tanks include lifting straps, nylon tie-down straps, crane, forklift, and carpet remnants strategically placed on the bevels to prevent the tie-down straps from scraping the paint loose while the tank is en-route. See also **Equipment Required and Procedures Page 29.**
 2. Do not drop or drag the tank. Dropping or dragging a tank may result in damaging the tank beyond repair and voiding the ConVault® Limited warranty.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

3. Do not handle or move the ConVault®, unless it is empty. Under no circumstances should a tank containing petroleum product be moved.
4. If petroleum product has been introduced in the tank, first empty and cleanse the tank, then relocate using the Department of Transportation Guidelines for transporting fuel containers.

G. TRANSPORTATION

It is important that ConVault® tanks are properly lifted and loaded on trailers and flat beds. The tank should be supported on solid lumber under the far two legs. The tank should be properly secured to prevent sliding and undue vibration from the road.

CAUTION ConVault® 8,000 through 12,000-gallon tanks are provided with three legs. The middle leg is approximately $\frac{3}{4}$ " shorter than the other two. The middle leg is made shorter to prevent the tank from damage caused by vibration while being transported. Therefore, the middle leg should not be supported on the trailer or on the flatbed. Supporting the third leg during transportation may result in property damage.

H. UNLOADING AND SETTING

WARNING Failure to provide adequate equipment and proper procedures for unloading and setting the tank may result in death or serious injury.

1. The unloading equipment and procedures are critical to setting the tank safely and without harming the people or damaging the tank.
 - **NOTE:** The most important aspect of a job procedure is SAFETY. Please ensure that every step of this procedure is carried out with safety first in mind.
2. Tanks Weight and Dimensions.

Please refer to Figures No. 2, 3, 4 and 5 in Product Description, pages 13 through 16. For actual tank weights and dimensions, please contact your ConVault® distributor.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

I. EQUIPMENT REQUIRED & PROCEDURES

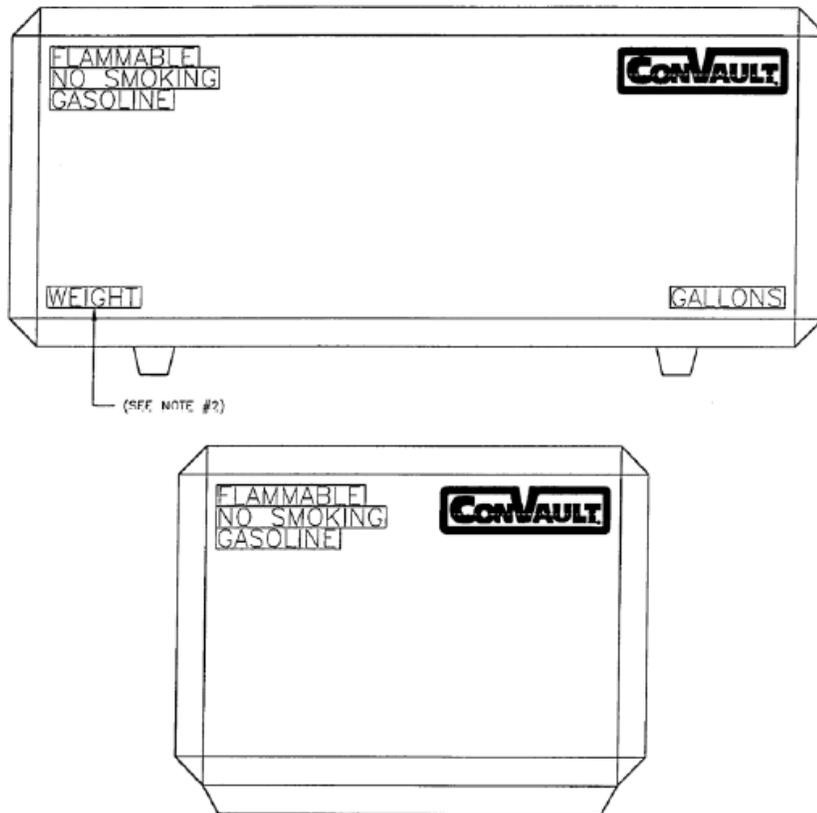
1. Following is a list of equipment that may be required to handle a ConVault® tank:
 - a. A crane or a forklift of sufficient capacity to safely lift and place the unit.
 - b. Slings minimum 20 feet long each and rated for the tank weight. The angles between the slings should be at least 50 degrees.
 - c. 4-way spreader.
 - d. Miscellaneous shackles, tag lines, and rigging tools.
2. Note the following guidelines to handle and install a ConVault® tank.
 - a. Plan the required crane and rigging capacity to safely unload the tank.
 - b. Inspect the tank on the delivery truck prior to unloading. Report any damage in transit to the truck driver and note on the shipping ticket.
 - c. Allow sufficient crane time for installing the load block and organizing the rigging.
 - d. During unloading and setting, allow one person in-charge to signal the crane operator. Keep people clear of the load and avoid being trapped between the load and building walls and equipment.
 - e. Make sure there is no overhead wiring to interfere with crane or boom operation. Provide sufficient room for cranes and boom trucks to off load.
 - f. Department of Transportation prohibits transportation of tanks with product and warning labels. Product and warning labels should be installed on site. If installed at the plant, they should be masked prior to shipment. Labels and decals must be placed on the tank in accordance with Figure No. 7 page 30.

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

Figure No. 7



NOTES:

1. For best results, attach decals or signs at 60° – 70° F.
2. Empty weight.
3. ConVault logo to be located in upper right corners.
4. NO SMOKING, FLAMMABLE or COMBUSTIBLE and "product" signs to be located in upper left corners.
5. Capacity signs to be located in lower right corner of long sides.
6. Weight signs to be located in lower left corner of long sides.
7. FILL, VENT, EMERGENCY VENT, LEAK DETECTOR TUBE, Do Not Drill..., Caution: This Tank..., signs to be located along upper bevel near corresponding nipples.
8. Warning: Death May Occur... sign to be located on top of tank near manway, if applicable.

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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J. GROUTING OF LEGS

1. All tanks larger than 2000 gallon must be grouted with non-shrink grout to the concrete slab or supported with alternative engineered pad interface.
2. We recommend grouting the legs of all tank sizes, which will provide a uniform load distribution on legs and foundations.
3. Neoprene pads may be used instead of grouting in accordance with the manufacturer's recommendations. Pads should be neoprene with 50 durometer Type A hardness. The physical properties of neoprene pads should meet or exceed AASHTO specifications M251, Sections 18, 25. For specifications and installation instructions of neoprene pads contact your ConVault® representative.
4. Also, see Notes on page 27 under FOUNDATIONS.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

K. ELECTRICAL

1. Electrical service and fuel piping to the pump units should be installed in accordance with the requirements of National Electric Code (NEC)- NFPA 70 and local requirements.
2. All electrical devices used with or located within twenty (20) feet of the ConVault® tank should conform to NEC Hazardous Locations. All electric conduits and wiring connected to the tank should be explosion proof and in strict accordance with NEC Class-1, Division 1 or other local standards whichever is stricter.
3. An emergency shut-off switch is required to be mounted in a location visible from the dispenser. The switch is normally mounted on a building wall or a post. The switch must be marked as an emergency shut-off switch, in accordance with NEC.
4. Pumps and all other equipment used in the hazardous area should be rated by UL or Factory Mutual (FM).
5. Electrical grounding is required for flammable liquid fuel tanks. ConVault® Tanks are provided with two grounding bolts welded to the steel tank or lugs welded to the nipples on tank top. Installation of grounding shall be in accordance with the NFPA 780 code. See Appendix B of this manual for a summary of Lightning Protection Installation Instructions.

L. PIPING

1. Piping on ConVault® tanks will mainly depend on dispensing method considered for your facilities. Several methods are suggested below. You should note that dispensing methods suggested here are schematic only and they are not detailed installation drawings. You should engage an engineer/designer to design the piping arrangement and make sure they are in accordance with the applicable codes, rules and regulations. Please also make sure you check with your Authorities Having Jurisdiction and find out which codes and regulations are applicable to your area.

CAUTION Do not connect any fuel return or vapor recovery pipe to leak detector tube or communication nipple. Failure to comply will result in filling the interstice with fuel and consequently voiding your warranty. The leak detector tube and the communication nipple are powder coated red for easy identification.

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

M. GENERAL APPLICATION REQUIREMENTS

1. The following requirements apply to **all applications**:
 - a) Fuel tank shall be located with set backs from buildings, property lines and public highways in accordance with state and local codes.
 - b) Emergency venting device shall be installed on the emergency vent pipe nipple prior to use. See also paragraph H.2 on page 48 for operation.
 - c) Pressure vacuum vent (PV) caps shall be installed on normal vent.
 - d) Phase I vapor recovery system shall be installed, if required by the Authorities Having Jurisdiction.
 - e) Net positive suction head (NPSH) problems and cavitation may occur in extremely high altitudes or as a result of long suction piping. In these cases, use of submersible pump should be considered.
 - f) Fire extinguishers shall be provided as required by the applicable fire codes.
 - g) A cleanup kit shall be provided at the site.
 - h) Always consult Authorities Having Jurisdiction.

2. The following requirements apply to **Dispensing Applications** shown in **Figures 8 through 11**:
 - a) Dispensing shall be by a UL/ULC listed pump equipped with:
 - i. Vacuum breaker
 - ii. Filter and adapter
 - iii. UL listed fuel hose
 - iv. Safety breakaway valve
 - v. Auto shutoff nozzle
 - b) Phase II vapor recovery system shall be installed, if required by the Authorities Having Jurisdiction.
 - c) Any pump described as "remote" must be approved by the Authorities Having Jurisdiction in advance of the installation of the pump.

3. The following requirements apply to **Generator Fuel Supply** shown in **Figures 12, 13 and 14** and recommended piping shall include:
 - a) Angle check valve with pressure relief or foot valve, strainer and pressure relief valve.
 - b) Shut-off valve with fusible link on supply piping
 - c) Anti siphon valve if the level of the suction piping falls below the high level of fuel in the tank.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



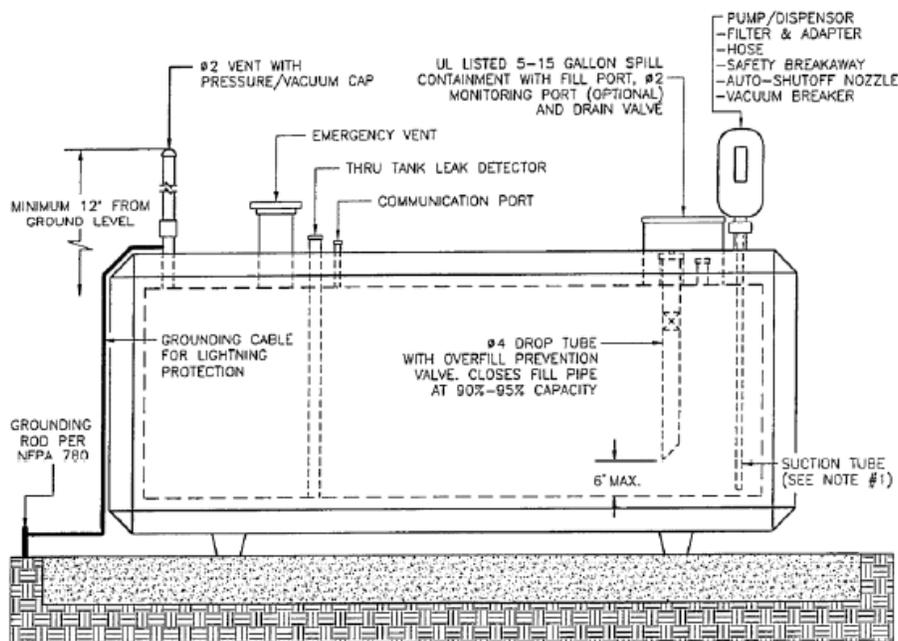
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N. DISPENSING APPLICATIONS

1. On-Tank Suction Type Dispensing Application

Dispensing from the ConVault® tank system is most simply accommodated by a top of tank pump. This arrangement eliminates leaking valves and fittings. Our recommended dispensing configuration is shown in Figure 8. Diagram provided is recommended for sites with tanks 2000 gallon and less that serve the end-user's internal fleet/vehicles. See the **General Applications Requirements in M.1 and M.2 on page 33.**

Figure No. 8



Notes:

1. Bottom of foot valve/strainer to be 1" from bottom of steel tank
2. Stairway assembly to fill port (optional)

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



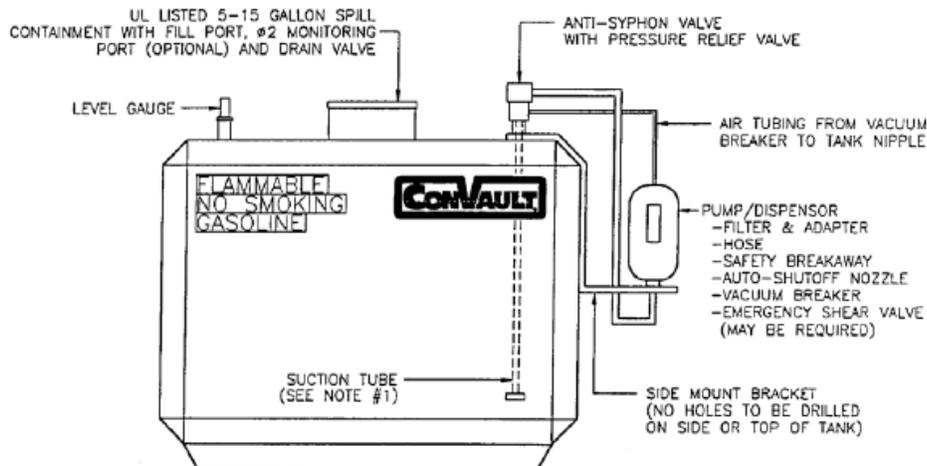
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2. Side-Mount Suction Type Dispensing Application

The diagram provided in Figure 9 is recommended for the sites to dispense fuel to private user or for fleet vehicles. In addition to the **General Applications Requirements in M.1 and M.2** on page 33, the system should be equipped with:

- a) Anti siphon valve with pressure relief or solenoid valve,
- b) Emergency shear valve, if required by Authority Having Jurisdiction.

Figure No. 9



Notes:

1. Bottom of foot valve/strainer to be 1" from bottom of steel tank
2. Stairway assembly to fill port (optional)

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



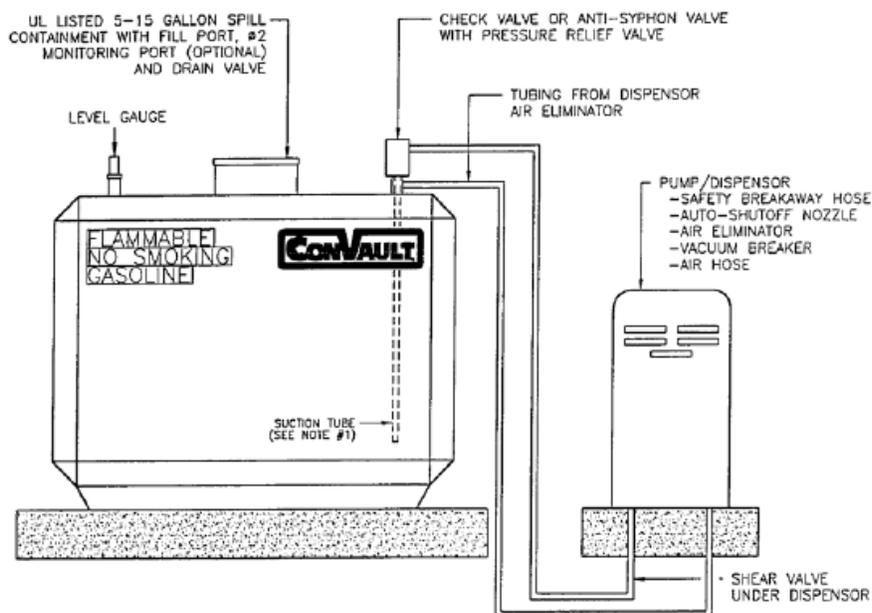
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3. Off-Tank Suction Type Dispensing Application

The diagram in **Figure 10** provided is recommended for those sites authorized to either: dispense to motor vehicles for public use or fleet vehicles with high-speed dispensing accessories. In addition to the **General Applications Requirements in M.1 and M.2 on page 33**, the system should be equipped with:

- a) Angle check valve or anti siphon valve with pressure relief,
- b) Under pump emergency shear valve, if required by Authority Having Jurisdiction.

Figure No. 10



Notes:

1. Bottom of foot valve/strainer to be 1" from bottom of steel tank
2. Stairway assembly to fill port (optional)

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



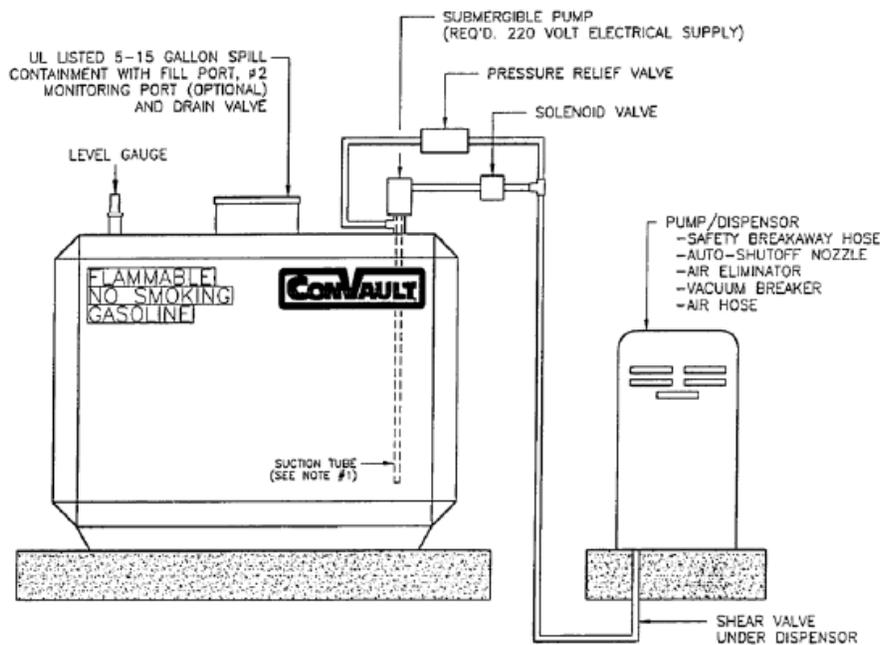
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4. Submersible Pump Dispensing Application

The diagram shown in Figure No. 11 is recommended for those sites authorized to either dispense to motor vehicles for public use or fleet vehicles with high-speed dispensing accessories. In addition to the **General Applications Requirements in M.1 and M.2 on page 33**, the system should be equipped with:

- a) Solenoid valve with pressure relief,
- b) Emergency shear valve, if required by Authority Having Jurisdiction,
- c) Submersible pump, which will require 220-volt electric supply.

Figure No. 11



Notes:

1. Bottom of foot valve/strainer to be 1" from bottom of steel tank
2. Stairway assembly to fill port (optional)

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



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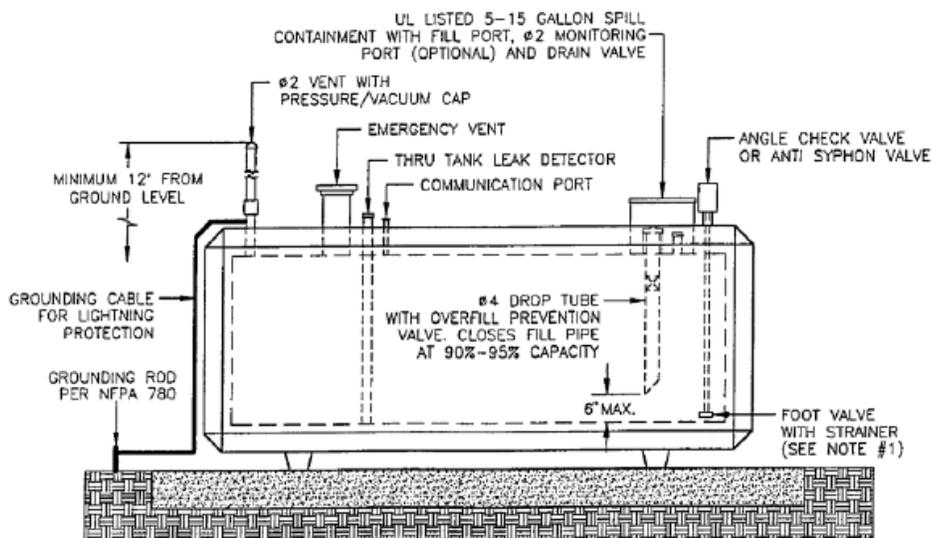
O. GENERATOR FUEL SUPPLY APPLICATION

The diagrams shown in Figure No. 12, 13 and 14 are recommended for those sites utilizing a ConVault® AST to supply a generator, whether it is primary or standby in function. See also the General Applications Requirements in M.1 and M.3 page 33.

For directions and side view, see Figure 12; for end view, see Figure 13; for option of using one connection for both suction and return lines see Figure 14.

Figure No. 12

Side View



Notes:

1. Bottom of foot valve/strainer to be 1" from bottom of steel tank
2. Stairway assembly to fill port (optional)

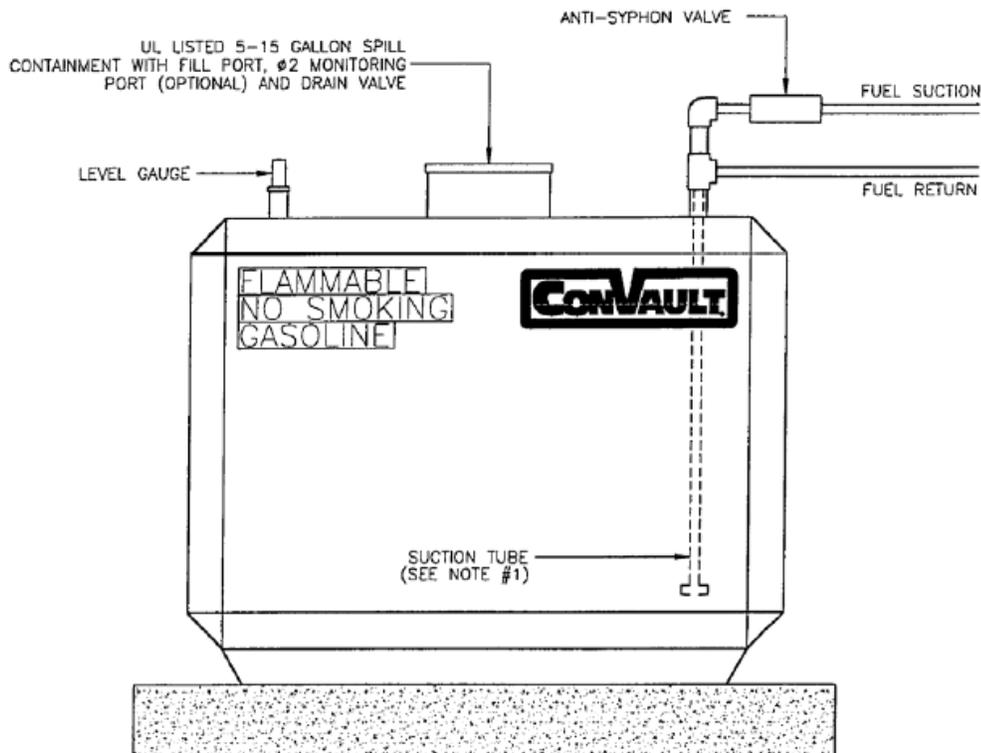
Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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See the General Applications Requirements in M.1 and M.3 page 33.

Figure No. 13
Generator Fuel Supply
End View



NOTES:

1. Bottom of foot valve/strainer to be 1" from bottom of steel tank
2. Stairway assembly to fill port (optional)

CAUTION Do not connect any fuel return or vapor recovery pipe to leak detector tube or communication nipple. Failure to comply will result in filling the interstice with fuel and consequently voiding your warranty. The leak detector tube and the communication nipple are powder coated red for easy identification.

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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Figure No. 14
Generator Fuel Supply
Optional use of one connection for both suction and fuel return line.

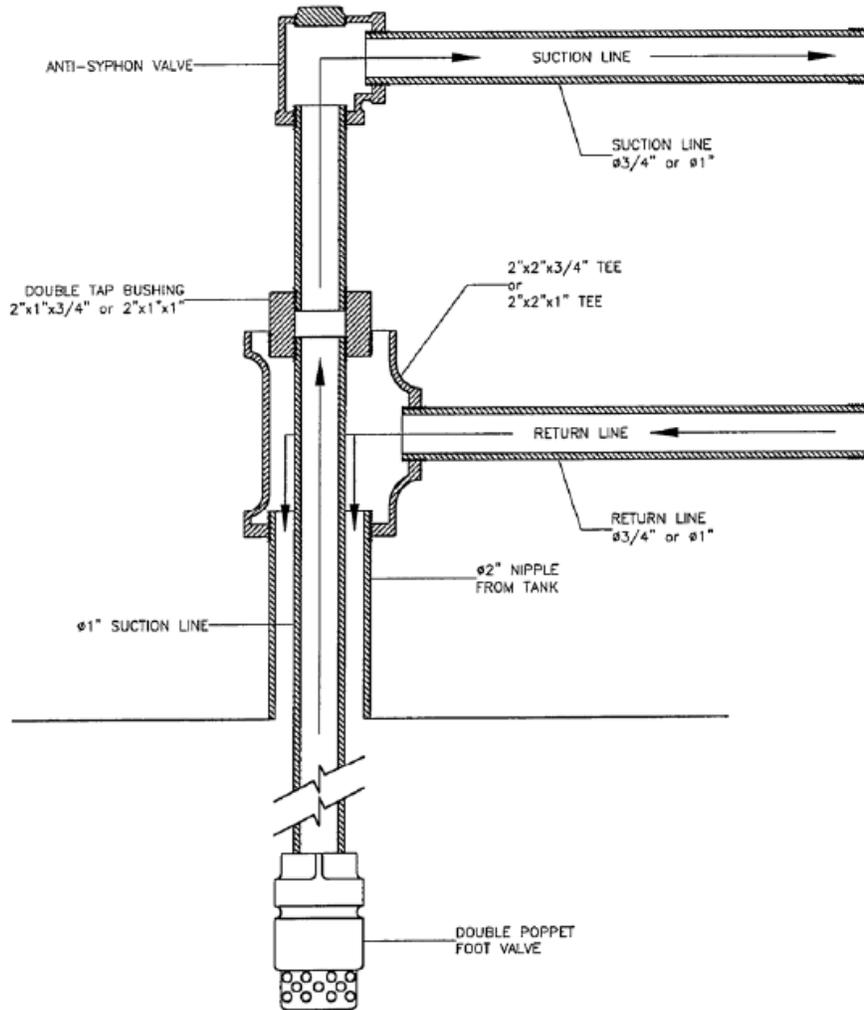


Figure B-3 (continued) ConVault® Aboveground Storage Tanks



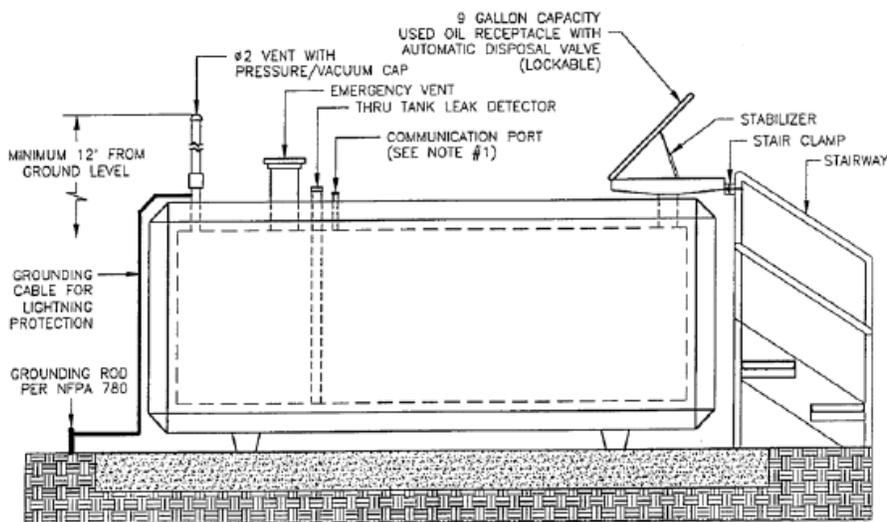
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P. USED OIL APPLICATION

The diagram provided in Figure No. 15 is recommended for use with used oil storage and is not a requirement. Confirm with the local Authorities Having Jurisdiction and ensure that all pertinent operational requirements have been met in advance of installation. See also the General Applications Requirements in M.1 page 33.

ConVault® recommends the use of a used-oil receptacle, stair clamps, and a step-platform for manual pouring sites. Where the tank is filled by a remote pump, an overfill prevention system should be utilized. ConVault® recommends the use of an audible alarm in conjunction with existing level indicator devices, as well as a solenoid valve in the fill pipe or shut-off switch to control the pump. Fire extinguisher and spill cleanup kit should be provided at the site.

Figure No. 15



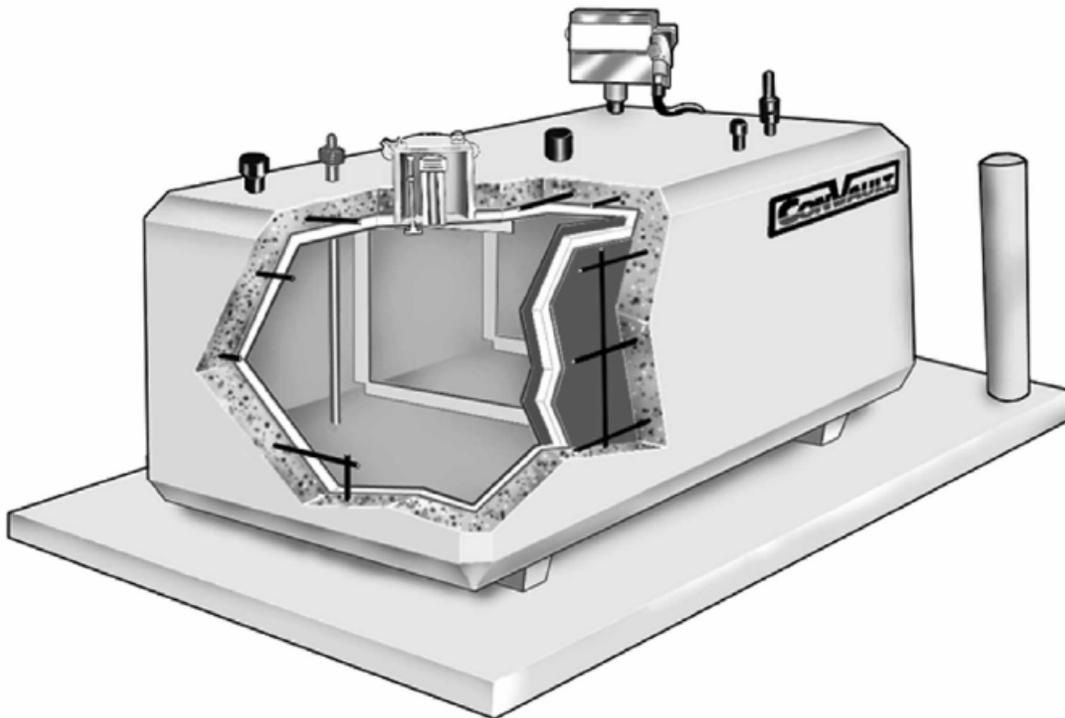
1. STAIRWAY ASSEMBLY TO FILL PORT (OPTIONAL)

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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OPERATING MANUAL



April 2007

Operating Manual

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Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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Figure B-3 (continued) ConVault® Aboveground Storage Tanks



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A. GENERAL

Convault® tank is a steel storage tank insulated with Styrofoam and wrapped in a secondary containment consisting of 30 mil high density polyethylene membrane encased in a 6 inch thick reinforced concrete vault.

Since the tank contains flammable or combustible liquids, it is therefore prudent that general common sense is exercised in operating the fuel storage system. Dispensing of fuel from the Convault® storage tank to other equipment, automobiles, generators, etc., requires connection of accessories to the tank. Therefore it is important to establish practices and procedures to ensure that accessories and their piping connections are free from any leaks or other hazardous conditions.

- **NOTE:** it is very important that you familiarize yourself with the fuel dispensing equipment and accessories and follow their manufacturer's operating instructions to their full extent. Equipment manufacturer's operating instructions, guidelines, and recommendations take precedence to the instructions contained in the Convault® operating manual. Use the following list as your order of priority:
 1. Local jurisdiction codes, rules and regulations.
 2. Applicable state codes, rules and regulations.
 3. Applicable regional and national codes, rules and requirements.
 4. Manufacturer's recommended installation, and operating procedures.
 5. Convault® operating manual.

B. FILLING THE TANK

- **NOTE:** Filling of tanks should be carried out under continuous and close supervision.

Tank filling nipple is a threaded 4 or 6-inch pipe located inside the spill containment compartment. The filling nipple is located lower than the containment top to catch any potential spills.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

CAUTION DO NOT ever use the 2" Leak Detector Tube or the 1" communication nipple for filling the tank. These nipples are not connected to the primary tank. They are powder coated red to distinguish them from all other primary tank nipples, which are coated black or white. If the leak detector tube or the communication nipple are used as filling ports, or connected to any other filling or vapor recovery system, the secondary containment will be filled with fuel or petroleum product vapors. This will invalidate your ConVault® Limited Warranty. It is essential that all operating personnel and fuel delivery truck drivers are trained and are made familiar with the proper filling operations.

- **NOTE:** Multi-Compartment tanks must be carefully labeled to prevent cross-filling the individual tanks; for example, a double 500 gallon tank should be labeled as diesel and gasoline to insure the operator or the fill truck driver can easily identify each compartment.

C. GENERAL FIRE PROTECTION

Smoking is prohibited within fifty feet (50') of all storage and dispensing devices. Signs prohibiting smoking must be conspicuously posted.

Portable fire extinguishers must be provided for the suppression of fires in accordance with NFPA 10 and UFC for high hazard area. Additional fire control equipment might be required, if in the opinion of the fire official, an unusual fire exposure hazard exists.

D. LEAK DETECTOR

All ConVault® aboveground storage tanks are equipped with one or two Leak Detector Tubes to enable you to check and monitor any leaks from your primary steel tank into the secondary containment. The secondary containment consists of a 30-mil high-density polyethylene membrane encased in 6-inch thick concrete to provide 2-hour fire resistant vault for protection of primary and secondary containments.

The primary steel storage tank is shop-tested at 5 psig for 24 hours and is checked for leaks and any other damage before it is wrapped in the secondary containment. Under normal circumstances, the primary steel tank is not expected to leak.

Notwithstanding the above, the tanks should be visually inspected, on a weekly basis for any signs of leaks from the primary tank, pipes, fittings, and auxiliary equipment attached or connected to the tank.

The 2-inch leak detector tube is located on top of the tank and is powder coated in red to make it easy to identify. Except for a 1-inch communication nipple and the 2-inch leak

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

detector tube, all other connections on the tank are powder coated black or white. If the leak detector tube is not equipped with mechanical or electronic leak monitoring devices, to perform your weekly operating inspection, remove the cap and insert a clean dry wooden gauge stick into the leak detector tube until the wooden stick touches the bottom. Remove the gauge stick and visually inspect the gauge stick for any sign of fuel. If the gauge stick is wet or smells like hydrocarbon fuel, call your ConVault® distributor or the corporate office at 209-632-7571 or toll free 800-222-7099. Be prepared to provide the following information:

1. Location of the tank
2. Tank size
3. UL or UL Canada serial number.

E. COMMUNICATION NIPPLE

ConVault® tanks are equipped with a one inch (1") communication nipple powder coated red. Under normal operating conditions, the communication nipple should be kept capped. The communication port is provided to disperse air from the secondary containment during certain performance tests. Such tests, if deemed necessary by the ConVault® representative, should be performed under direct supervision of ConVault® or its authorized representative.

- **NOTE:** If your ConVault® is fitted with a double walled steel tank, the 1" communication nipple is not required and therefore it will not be supplied.

CAUTION **DO NOT** ever use the 2" Leak Detector Tube or the 1" communication nipple for filling the tank. These nipples are not connected to the primary tank. They are powder coated red to distinguish them from all other primary tank nipples, which are coated black or white. If the leak detector tube or the communication nipple are used as filling ports, or connected to any other filling or vapor recovery system, the secondary containment will be filled with fuel or petroleum product vapors. This will invalidate your ConVault® Limited Warranty. It is essential that all operating personnel and fuel delivery truck drivers are trained and are made familiar with the proper filling operations.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

F. FUEL DISPENSING

- Important Note: Any pump described as “remote” must be approved by the Authorities Having Jurisdiction in advance of the installation of the pump. Specific operating instructions must be obtained from the manufacturer of such pump, and followed implicitly and exclusive of any Convault® directives.
- NOTE: The majority of Convault® tanks are equipped with either a Fill-Rite pump or GasBoy pump. However, your tank may have been supplied with a different pump make. Familiarize yourself with the make of the pump supplied with your tank. Make sure you get the manufacturer’s operating manual. Learn how to operate the pump, and make sure your operating personnel know how to operate it as well.
- NOTE: Do not overfill or top off fuel port.
- NOTE: The minimum 1/4” Styrofoam insulation and the six-inch (6”) concrete vault give thermal protection that minimizes temperature change for liquid fuels stored in excessively hot or cold environments. However, the liquid fuel will have some temperature variation at different times of the day. The liquid will expand or contract due to temperature changes and may slightly affect your level gauge indications. You may experience a slight variation in volume measurements for the same amount of liquid in the tank. On average, gasoline and diesel fuel will have about 0.6% and 0.4%, respectively, variation in volume for every 10-degree-F temperature difference. For example for a 6,000-gallon gasoline tank (full), a 10-degree-F temperature change will be equivalent to a 1/2” (or a 36 gallon) difference in liquid level in your tank.

G. OVERFILL PROTECTION

The U.S. EPA requires that the tank have overfill protection measures that include an overfill alarm and an automatic flow restrictor or flow shut-off. Additionally, all product transfers must be constantly monitored.

We recommend a level gauge or level indicator be installed on the tank to meet the fire code requirements. This gauge must be accessible to the delivery operator.

State or local fire or environmental regulations may contain additional requirements. Check with you local Authorities Having Jurisdiction.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

NOTE: Check your tank and make sure which type of overfill protection you have received on your tank and familiarize yourself and your operating personnel with the accessories provided and their operation.

H. VENTING

1. Atmospheric Vent:

ConVault® tanks must be provided with 2 inch vent line for venting into atmosphere in case of a pressure build-up inside the tank. Make sure vent cap is not obstructed to allow free flow of vapors from the vent. Obstruction of 2-inch vent line cap may lead to pressure build-up inside the tank and cause the emergency vent system to open.

2. Primary Tank Emergency Vent:

ConVault® tanks must be provided with emergency pressure relief devices to automatically relieve the pressure of the primary tank before it reaches a maximum of 2.5 psig. Tank sizes from 125 gallon to 12,000 gallon are provided with 2 inch to 8-inch emergency pressure relief nipples and pressure relief devices. See WARNING under testing on page 60. Tanks with over 5,000 gallons capacity may have been provided with a manway cover that has long bolts instead of an emergency vent device. Before the pressure inside the tanks rises to 2.5 psig, the pressure relief device or the long bolt manhole cover rises, allowing the vapor inside the tank to escape and thus relieve the pressure inside the tank. At 2.5 psig pressure, the emergency venting device will be fully open.

3. Secondary Containment Emergency Vent:

The ConVault® Non-Metallic secondary containment tanks have UL listing for emergency venting by "Form of Construction". Therefore, installation of an emergency vent on the secondary containment will not be required. If the Authorities Having Jurisdiction require the tank to be provided with an emergency vent, then the secondary containment may be provided with an emergency venting device as an optional item. Depending on the size of the tank the venting device size will be 4 inch to 8 inch. The emergency venting device will open before the secondary containment internal pressure reaches 2.5 psig. At 2.5 psig pressure, the emergency venting device will be fully open.

- **NOTE:** Familiarize yourself and your operating personnel with the emergency pressure relief systems provided and their operation on your tank. The Uniform Fire Code (UFC) requires the system to be fully operational at all times.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

I. SPILL CONTAINMENT

ConVault® tanks are provided with 5 to 15-Gallon spill containment mounted on top of the tank, surrounding the tank fill-pipe with spill containment except for the remote fill. The containment will catch occasional spills. A hand-activated valve is provided inside the containment to drain the spill back into the primary tank.

J. BACTERIA MONITORING AND CONTROL

Bacterial infestation of fuel tanks and lines, originating from the fuel, chemically alter fuel to produce water, sludge and acids. Water and acids are corrosive and can cause severe corrosion in the tank, especially in the diesel fuel storage, at the bottom part of the tank in the interface between water and fuel. Also, microbial growth can cause fuel filter plugging, injection failing, system deposits, and corrosion of tanks and lines. You should arrange to have your fuel analyzed for microbial growth and to eradicate the infestation, if any. This program will prevent corrosion of your tank and piping and fuel filter plugging. Contact your fuel supplier for the locations and service of research labs that can test the fuel system and help you control bacterial infection. Also, ask your fuel supplier for the frequency of such tests needed to control bacterial infection. Bacteria cannot grow if there is no water in the fuel. Monitoring and controlling of water accumulation in the tank will also prevent bacterial growth. See paragraph K on water monitoring and control.

K. WATER MONITORING AND CONTROL

You may get water in the fuel through condensation of water vapor from the air. Water is heavier than fuel and therefore it settles at the bottom of the tank and causes corrosion. One way of minimizing condensation of water vapor inside the tank is by installing a pressure/vacuum vent (PVV) cap on your tank. The PVV cap normally keeps the vent line closed unless the internal tank pressure or vacuum opens it. The advantage of the PVV cap is that under normal operating conditions it keeps the outside air from entering the tank through the vent. Water may also enter the tank with the fuel delivered to you. You should regularly monitor the tank and make sure that there is no water accumulated at the tank bottom. If there is water at the tank bottom, you should pump it out with a small hand held pump called a "Thief Pump". If you do not monitor and pump out the water from the tank bottom, the useful life of your tank may be reduced dramatically.

CAUTION Water and bacteria monitoring and control are essential to preventing internal corrosion of steel tanks. Lack of such control measures by the owner and operator may invalidate the ConVault® Limited Warranty.

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

MAINTENANCE MANUAL

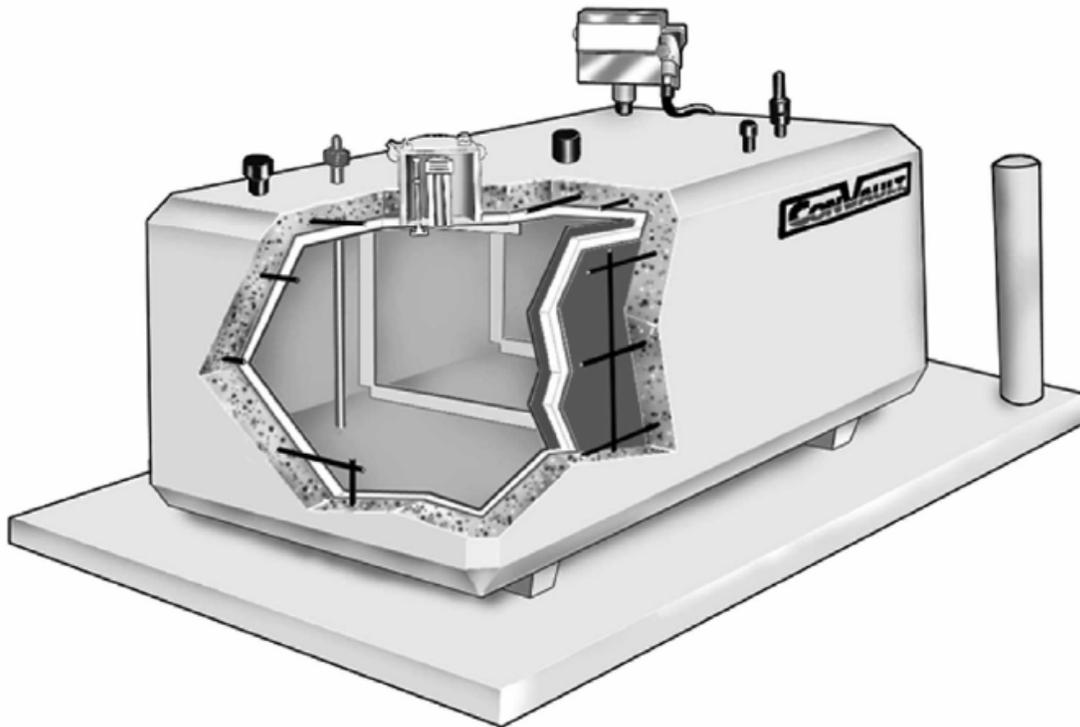


Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

A. FUEL TANK-CONVAULT® (ALL SIZES)

▲WARNING Never enter a tank without proper equipment. Provide proper equipment and proper procedures for operation and maintenance personnel for entering a confined space. Entering a tank without proper equipment may result in injury or death.

The owner/operator is required to inspect the tank visually on a regular basis, at least once a week. Visual inspection is the primary form of maintenance required. The inspection and maintenance should include the following:

1. Check for small cracks, and any signs of leakage. Fill and repair the small cracks. The touch-up paint provided at the time of delivery, for paint coated tanks, can be used for repair of the chipped paint.
2. Inspect all decals and signs and replace if not readable. Extra decals can be purchased through your local distributor. All decals must be on the tank before filling it.
- **NOTE:** Multi-Compartment tanks must be carefully labeled to prevent cross-filling the individual tanks; e.g., a D500 should be respectively labeled as diesel and gasoline to insure that each compartment can be easily identify by fuel truck driver or by the system operator.
3. Inspect the leak-detector tube for any signs of leakage from the primary steel tank into the secondary containment. See specific instruction for leak detection under paragraph D, page 45 and paragraph G, page 55.
4. Inspect nipples; spill containment and manholes for any sign of powder coating deterioration and corrosion. Remove the deteriorated and chipped off coating. Then sand, clean, and paint in accordance with the paint manufacturer's recommendation.
5. Confirm with your local fuel supplier the need to utilize additives for seasonal variances or to reduce corrosion of the inner steel tank due to local fuel impurities / intermittent moisture. Your local fuel supplier should be able to provide this guidance.
6. For Tank Maintenance Checklist, see Appendix A

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



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B. FUEL PUMPS

- **IMPORTANT NOTE:** Any pump described as “remote” must be authorized by the Authorities Having Jurisdiction in advance of its installation. Pump manufacturer’s operating and maintenance instructions must be followed. The ConVault® distributor can advise you how to contact the manufacturers for more details on fuel dispensing equipment and their maintenance procedures.

⚠ DANGER To avoid fire, electric shock, and injury or death, turn off power at circuit breaker or fuse. Test that power is off before servicing electrical wiring.

1. Follow pump manufacturer’s recommendation for the procedure and frequency of maintenance.
2. Disconnect electrical equipment from the main electric power to eliminate electrical shocks.
3. Check the motor for any sign of over-heating or excessive wear.
4. Check the meter and reset.
5. Have your electrical wiring connections checked by a qualified person.

C. NOZZLES

1. Visually inspect the nozzle for wear and tear.
2. Inspect the trigger mechanism for any sign of metal fatigue and mechanical failure.
3. Check for leaks around connection to hose.

D. FILTER

1. Replace the filter every six (6) months or as needed. Mark the date changed on the filter.
2. Check all fittings for leaks. Tighten or adjust the fittings as needed.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



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E. MISCELLANEOUS VENTS, HOSES, AND GAUGES

1. Visually inspect all vents, vent caps, hoses, level indicators and gauges at least once a week. Check hoses for leaks at least once a week.
 2. Check, all hoses and fittings for excessive wear--replace, if needed.
 3. Check fuel gauge for proper operation. Level indicator should indicate approximate amount of fuel in the tank. If gauge is not reading the proper amount of fuel, test fuel level manually with wooden stick gauge and compare it with automatic gauge. If gauge is not indicating the correct amount of fuel, remove and inspect the float assembly. If damaged, replace defective parts.
- **NOTE:** The minimum 1/4" Styrofoam insulation and the six (6") concrete vault give thermal protection that minimize temperature change for liquid fuels stored in excessively hot or cold environments. However, the liquid fuel will have some temperature variation at different times of the day. The liquid will expand or contract due to temperature changes and may slightly affect your level gauge indications. You may experience a slight variation in volume measurements for the same amount of liquid in the tank. On average, gasoline and diesel fuel will have about 0.6% and 0.4% respectively, variation in volume for every 10-degree-F temperature difference. For example for a 6,000-gallon gasoline tank (full), a 10-degree-F temperature change will be equivalent to a 1/2" (or a 36 gallon) difference in liquid level in your tank.

F. EMERGENCY RELIEF VENT

1. Check the operation of emergency relief vent of the primary tank (and the secondary containment venting device if provided) at least once a year by lifting top cap and releasing it. Emergency relief vent cap should operate free from any restrictions and reseal upon release. Emergency relief vent caps should not be propped open, as this action will facilitate loss of fuel through vaporization.
 2. Check atmospheric vent cap for proper operation and ensure that it is not obstructed or prevented from venting into atmosphere.
- **NOTE:** Familiarize yourself with the emergency pressure relief system provided on your tank. The Uniform Fire Code (UFC) requires the system to be fully operational at all times. See paragraph H.2 on page 48 and WARNING on Page 60.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

G. LEAK DETECTOR PADLOCK

Inspect the lock on the leak detector tube cap for corrosion. Oil the lock in key slot with lightweight lube oil, when required. The lock should always be attached to the cap to prevent accidental filling of leak detector with fuel.

- **NOTICE:** See CAUTION under paragraph B, FILLING THE TANK, of OPERATING MANUAL, page 44 and paragraph D, LEAK DETECTOR, page 45.

H. BACTERIA MONITORING AND CONTROL

Bacterial infection on fuel tanks and lines, originating from the fuel, chemically alter fuel to produce water, sludge and acids. Water and acids are corrosive and can cause severe corrosion in the tank, especially in the diesel fuel storage and at the bottom part of the tank. Also, microbial growth can cause fuel filter plugging, injection failing, system deposits, and corrosion of tanks and lines. You should arrange to have your fuel analyzed for microbial growth and to eradicate the infestation, if any. This program will prevent corrosion of your tank and piping and fuel filter plugging. Contact your fuel supplier for the locations and service of research labs that can test the fuel system and help you control bacterial infection. Also, ask your fuel supplier for the frequency of such tests needed to control bacterial infection. Bacteria cannot grow if there is no water in the fuel. Monitoring and controlling of water accumulation in the tank will also prevent bacterial growth. See paragraph I on Water Monitoring and Control.

I. WATER MONITORING AND CONTROL

You may get water in the fuel through condensation of water vapor from the air. Water is heavier than fuel and therefore it settles at the bottom of the tank and causes corrosion. One way of minimizing condensation of water vapor inside the tank is by installing a pressure/vacuum vent (PVV) cap on your tank. The advantage of the PVV cap is that it normally keeps the vent line closed unless the internal tank pressure or vacuum opens it, thus reducing the amount of moist air entering the tank through the vent. You should regularly monitor the tank and make sure that there is no water accumulated at the tank bottom. If there is water at the tank bottom, you should pump it out with a small hand held pump called a "Thief Pump". If you do not monitor and pump out the water from the tank bottom, the useful life of your tank may be reduced dramatically.

CAUTION Water and bacteria monitoring and control are essential to preventing internal corrosion of steel tanks. Lack of such control measures by the owner and operator may invalidate the ConVault® Limited Warranty.

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

J. PREVENTIVE MAINTENANCE

1. Preventive maintenance can be less expensive compared to the cost of system shutdown and repairs. In the long run, preventive maintenance will save you money.
 2. See Appendix A for suggested Maintenance Checklist and Maintenance Procedures.
 3. Always be looking at how you can implement a preventive maintenance program.
-
- **FINAL NOTE:** Should you require any assistance in the aforementioned maintenance instructions on Convault® aboveground fuel storage tanks, please call (800) 222-7099 for details or email us at info@convault.com.

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

TESTING MANUAL

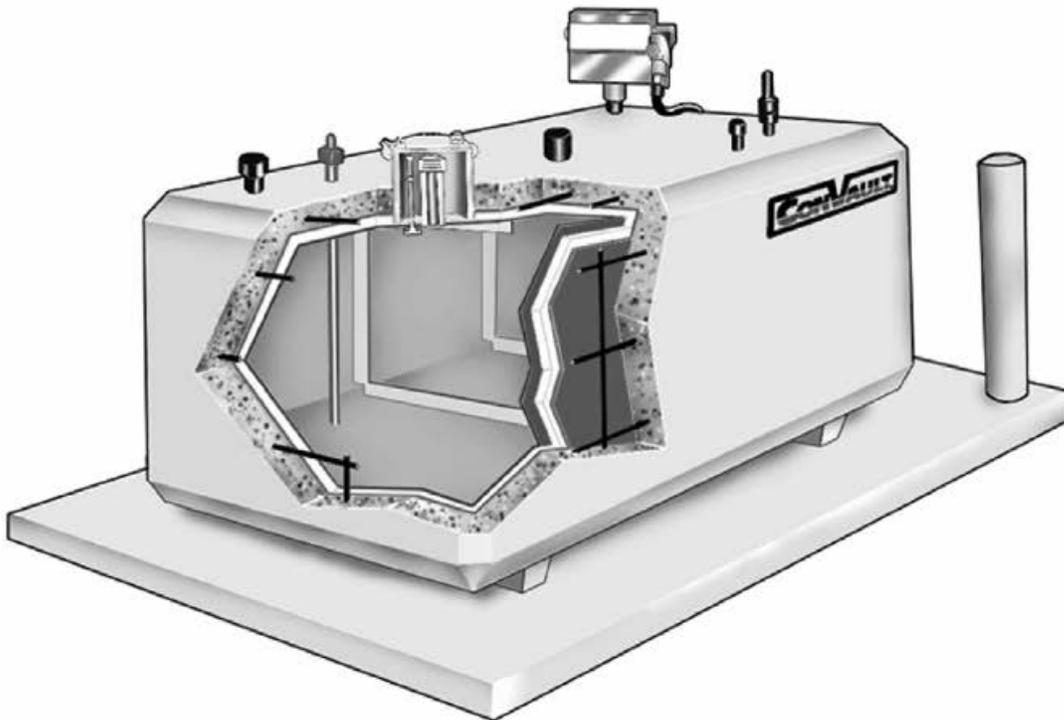


Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

A. GENERAL

ConVault® tanks are shipped pre-assembled and shop-tested. Generally, this eliminates the need for site testing of the tanks. However, some fire and local authorities may require the tanks to be pressure tested on site. It may be required to test the primary steel tank or both the primary steel tank and the secondary containment. If such tests are required on site, proceed with the following instructions. Make sure every step of the test procedure is carried out according to the instructions and pay careful attention to the **Cautions** and **Warnings** in the procedure.

▲WARNING Using air, never pressure test a tank that contains flammable and combustible material. If the tank contains flammable or combustible material, it should be tested using inert gases such as Carbon Dioxide or Nitrogen. Improperly testing a tank containing flammable and combustible materials may cause an explosion in the tank resulting in death or serious injury.

CAUTION The secondary containment should not be tested unless the test is coordinated with and supervised by ConVault® or its authorized representative. Inexperienced testing personnel can cause severe structural damage to an otherwise functional AST. Several methods are available to conduct the test of annular space. The tests should always be performed under the direct supervision of a ConVault® representative. Failure to observe this measure could void the warranty.

B. AIR PRESSURE TEST PROCEDURE FOR PRIMARY STEEL TANK

Install test piping as shown in **Figure No. 16**, page 61 and proceed as follows:

1. Temporarily plug, cap, or seal off remaining primary tank openings to hold the pressure.
2. If tank is equipped with a long-bolt manway for emergency venting, replace manway long-bolts with short-bolts and tighten them securely.
3. If the tank is equipped with standard emergency vent, remove the emergency vent and cap the opening to hold pressure as required.
4. If the tank is equipped with 1-inch communication nipple, remove the cap from the communication nipple for the secondary containment.
5. If the tank is not equipped with a communication nipple, remove or open the cap on the leak detector tube.
6. If leak detector tube is equipped with mechanical or electronic level detection equipment, remove the equipment to allow the air to freely escape from the annular space.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



The Industry Leader In Aboveground Fuel Storage Systems

CAUTION The test air supply should not be more than 3 psig. Use only calibrated diaphragm type air pressure gauges with a zero to 10-psig dial span. Set pressure relief valve in test air supply line at 3 psig. Over pressurization of a tank may burst the tank and cause injury.

7. Close valve A.
8. Connect regulated test air supply line to test piping as shown in Figure No. 16 for single compartment tank. If the tank contains more than one primary compartment tank, use the same piping arrangement for each compartment and pressure test them all. The vault may contain up to 4 primary tank compartments.

CAUTION Verify that the test air supply line pressure regulator is properly set at 3 psig before proceeding.

9. Slowly open valve A to pressurize the primary tank. Close valve B. Pressure gauge should indicate a pressure of 3 psig.

CAUTION Never leave a pressurized tank unattended. The air inside the tank may heat up and gently cause the pressure inside the tank to rise above 3-psig maximum pressure. If pressure in the tank rises, the pressure should be reduced to 3 psig by opening the valve B. Failure to constantly monitor the tank internal pressure may damage the tank.

10. Close valve A. Disconnect test air supply line from test piping.
11. Hold test pressure in primary tank for 1-hour minimum. A steady drop in pressure gauge reading indicates that there may be a leak in the plumbing or in the primary tank. Make sure that plumbing is airtight.
12. If no leaks are found and the tank passes the test, then open valve A and B and let the air out of the primary tank.
13. With tank de-pressurized, remove test piping, temporary plugs, caps and seals. Reinstall the cap on the communication nipple or the level indication equipment on the leak detector tube. Reinstall emergency relief vents. If tank is equipped with an emergency vent long-bolt manway, reassemble manway cover with bolts supplied by tank manufacturer.

WARNING Reassemble manway cover with proper size and type of long-bolt, with a minimum unthreaded length of 2 inches, so that when cover is fully raised, there is a 1-1/2 inch minimum space between manway cover and frame. Failure to properly assemble cover of a long-bolt manway used for emergency venting may make vent inoperable causing bodily injury or damage to the tank.

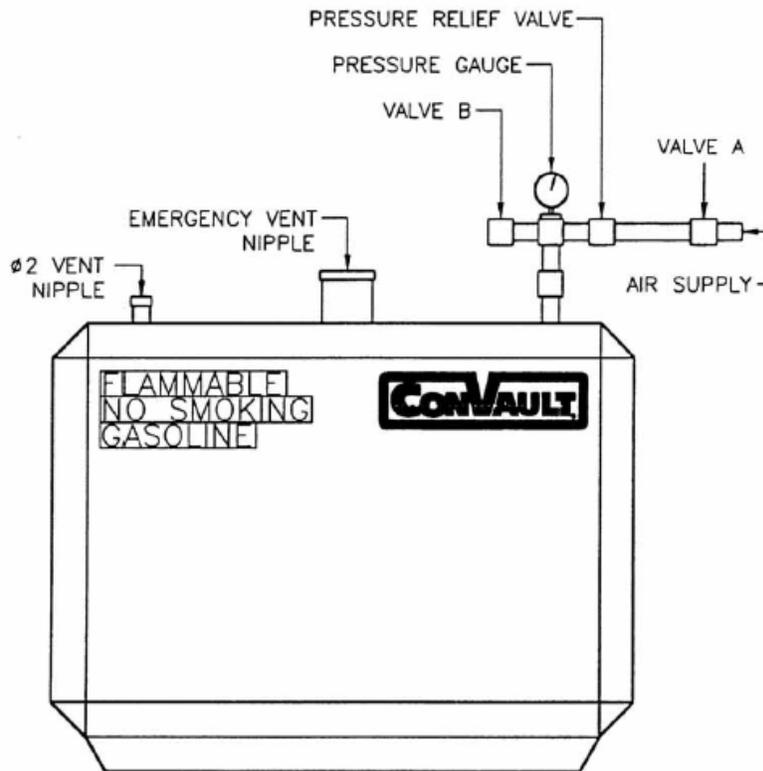
Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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C. Test Piping Diagram

Figure No. 16



NOTE:

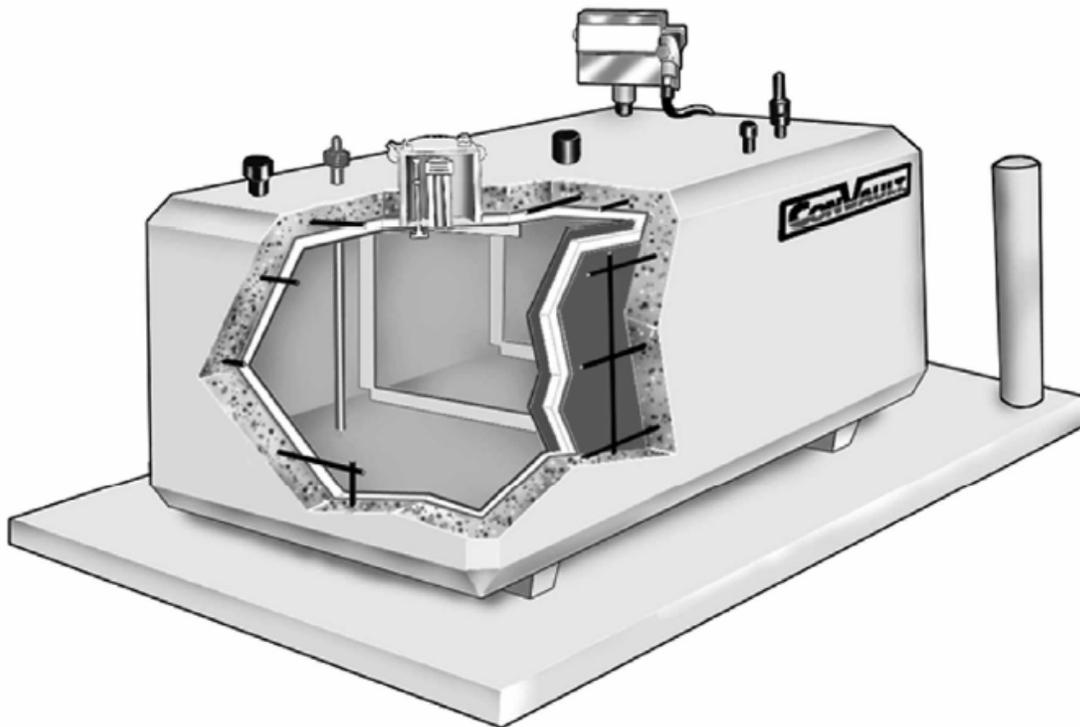
PLUG, CAP OR SEAL OFF ALL PRIMARY TANK OPENINGS.

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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APPENDIX A



April 2007

Appendix A

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



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Maintenance Checklist

Inspection Date _____

Inspector _____

Note: This checklist is designed for general use. Some items may not apply. All equipment inspections and maintenance should be documented. You are encouraged to make copies of this checklist. See the corresponding maintenance procedures and your owner's manual for corrective actions and more details.

Weekly Maintenance:

- 1. Check leak detector for indication of fluid in interstice. (This is required by warranty.) If checked with a stick gauge, ensure the stick is clean and dry before insertion.
- 2. Check for leaks on the pumps, filters, hoses, nozzles, joints and fittings.
- 3. Check nipples, spill containment and manholes for paint or powder coating decay (required by warranty). Check piping and fittings for rust.
- 4. Check pump meter and reset button.
- 5. Check fuel gauge for proper operation. If you have a Kruger At-A-Glance Gauge, check the clear cap for weathering or cracks.
- 6. Check spill containment for debris.
- 7. Check for small cracks in concrete.
- 8. Check readability of signs and decals.

Monthly Maintenance:

- 9. Check for water in the primary tank bottom under the fuel (required by warranty).
- 10. Visually check the tank, including under the tank for any signs of leakage as required by the Environmental Protection Agency 40 CFR 112.
- 11. Check leak detector tube cap for corrosion and proper operation. If a Kruger manual leak indicator is installed, remove the red ring and clear cap and check to see that the red indicator moves up and down about 1 inch freely. Also, check for weathering or cracks in the clear cap. If electronic leak detection is installed, check it by using the test button.
- 12. Check all nozzles, hoses and fittings for wear and tear.
- 13. Check trigger mechanism on nozzle for metal fatigue or mechanical failure.
- 14. Check pump motor for signs of over-heating or excessive wear.
- 15. Check body of tank for cleanliness, need of paint, or rusting where applicable. Check signs and decals for need of replacement. Check slab and supports of unit for structural soundness.
- 16. Visually check grounding wires to see that they are properly attached to the tank terminals and grounding rod.

Other Periodic Maintenance:

- 17. Replace the dispenser filter at least every six (6) months or as needed (mark the date replaced on the filter).
- 18. Check fuel for bacterial infestation or microbial growth.
- 19. Have a qualified person periodically check all electrical wiring.
- 20. Check the emergency relief vent at least once a year by lifting the top cap and releasing it to ensure freedom of movement.
- 21. At least once a year, remove the leak detection device and check for proper operation.
- 22. At least once a year, check the calibration of the fuel gauge.
- 23. Follow the pump manufacturer's recommendation for frequency and procedures of maintenance.
- 24. Document significant storage events per 40 CFR 112 and your state regulations.

Figure B-3 (continued) ConVault® Aboveground Storage Tanks



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Maintenance Procedures

Please note that item numbers on this sheet correspond to the item numbers on the Maintenance Checklist. Most of the maintenance requirements and procedures are also covered in the ConVault® owner's manual.

Weekly Checks:

1. If leak detector indicates fluid in the interstice, remove any devices and determine what the fluid is. Call your ConVault® representative.
2. If fuel leaks are detected, contact the appropriate authorities as necessary. Tighten, repair as necessary, replace components, or contact your installer or service company.
3. If paint or powder coating deterioration occurs on nipples, spill containment or manholes, clean to bare metal, prime with a good quality zinc based primer, and repaint. If corrosion is severe, contact your ConVault® representative as soon as practical.
4. If dispenser meter is not working or will not reset, call your service company or installer.
5. If the fuel gauge fails to operate properly, repair/replace it, or call your service company before the next delivery. (It is the owner/operator's responsibility to prevent the overfilling of the tanks. The gauge is part of the required system to prevent overfilling.) If the Kruger gauge cap has deteriorated, it could be allowing rainwater into the primary tank and should be replaced.
6. Keep spill containment clear of debris at all times. A contaminated spill containment will cause the fuel to be contaminated when any spill is released through the drain into the primary tank. Materials such as rags or paper products used to clean the spill containment must be disposed of properly, as they will usually contain fuel from the spill containment.
7. If there are small cracks in the concrete, fill and repair them. If you have questions, call your local ConVault® representative.
8. If signs or decals lose visibility, order replacements from your local ConVault® representative before the next time the tank is filled.

Monthly:

9. If there is water in the tank it will collect at the bottom, under the fuel. Water in the tank will cause increased corrosion. If you discover water in the primary tank it must be removed. One method is to pump it out with a "Thief Pump", a small pump that pulls the water from the bottom 1/8" of the tank. Check tank openings for possible water entry points. If you find that you are pumping out more than one half gallon of water for every 1000 gallons of product stored, see your fuel dealer, or call your ConVault® representative. Also consult paragraph I in the maintenance section of the owner's manual.
10. If you detect leakage, determine what the liquid is, if possible. If it is fuel, call your ConVault® representative and appropriate authorities as necessary. If it is water, seal the top using the ConVault® repaint guidelines.
11. If there are problems with the leak detector tube or lock, clean and lubricate them as necessary. See paragraph G in the maintenance section of the owner's manual. If the Kruger leak indicator does not function properly, remove it and repair or replace it. Due to ultraviolet radiation, the clear cap on the Kruger leak indicator will deteriorate over time. If it has deteriorated, it could be allowing rainwater into the interstitial area and should be replaced. New caps and rings or entire units can be purchased from Kruger, your service company, or your ConVault® representative. Kruger now offers a guard, which will prolong the life of the cap. If electronic leak detection test fails, call your service company.

Figure B-3 (continued)
ConVault® Aboveground Storage Tanks



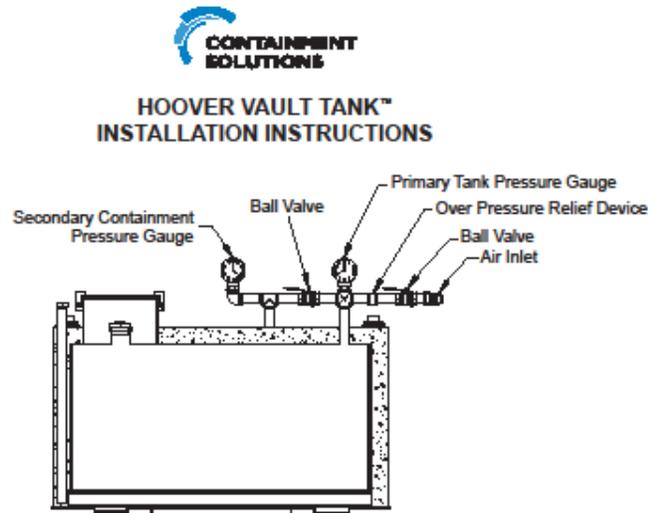
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12. If nozzles, hoses or fittings exhibit signs of wear and tear, repair/replace as necessary or call your service company.
13. If trigger mechanism on nozzle exhibits signs of metal fatigue or mechanical failure, replace nozzle or call your service company.
14. If pump motor shows signs of overheating such as housing discoloration or excessive wear such as bearing noise, repair as necessary or contact your service company.
15. Clean, paint, and repair problem areas as necessary. Order replacements signs or decals from your local ConVault® representative. If the slab is cracking or settling, contact your local ConVault® representative and your slab installer. If you have questions, call your local ConVault® representative.
16. Make a visual inspection of grounding wires. If they are not attached properly, make appropriate changes or call your installer or your service company.

Other Periodic Maintenance:

17. Filters can be purchased from your ConVault® representative or local service company. The date can be scratched on with a sharp object, or written with a permanent marker.
18. If bacterial infestation is detected, consult paragraph H in the maintenance section of the owner's manual.
19. Repair as necessary. Wiring (other than intrinsically safe items) in a class 1 area requires special sealing to prevent explosions.
20. If the emergency relief vent exhibits signs of motion restriction, promptly call your installer, your service company, or your ConVault® representative. Proper operation of this device is critical as most injuries and fatalities that happen in conjunction with fuel fires are due to improper, non-functional emergency relief vents or emergency relief vents replaced with normal pipe caps.
21. Most leak detection devices use a float. By removing the device from the leak detector tube and turning it upside down (simulating a floating situation) you can easily check for movement of the float and proper mechanical or electronic indication. If the leak detection device fails to operate properly, call your installer or your service company.
22. The fuel gauge can be checked by "sticking" the tank and comparing it to the gauge reading. Some gauges are more accurate than the stick. If the gauge reading varies substantially from the stick reading, contact the gauge manufacturer or service company. If your stick reads in inches only and you need a calibration/conversion chart, contact your ConVault® representative or download a copy from the ConVault® website.
23. Pump maintenance requirements vary by manufacturer. If you have questions, contact your installer, local service company, or the manufacturer of the equipment.
24. If you have a warranty or environmental problem down the road, documentation will be very helpful. We recommend that you keep a copy of the "Maintenance Checklist" with items marked for every maintenance inspection. Notes about problems and corrections can be written on the back of the sheet and used for future reference. Many sites are now required to have a SPCC plan for emergencies on file. If you need a recommendation for companies that do this, please call your ConVault® representative. **The name, phone number and location of your local representative can be obtained from the ConVault® web site by clicking on "Local Distributor" and your state or country at <http://www.convault.com>.**

Figure B-4
Containment Solutions, Inc Hoover Vault Tank



Containment Solutions, Inc. (CSI), in accordance with all state, national and provincial codes requires testing at the jobsite by the installing contractor. This test should be accomplished after the tank has been placed at the location where it will be operating, and BEFORE any product is introduced into the tank. CSI strongly recommends that this work be performed by a trained and licensed AST installer. At a minimum, tanks should be tested to the written procedures presented below as well as applicable instructions outlined in the Petroleum Equipment Institute recommended practice RP200. The below presented guidelines do not alleviate the installer from insuring that all tanks are installed in strict accordance with NFPA 30, NFPA 30A and/or NFPA 31 codes at a minimum, in addition to all applicable state or local codes that may be more stringent.

1.0 Tank Site

- 1.1 The foundation for the tank must be designed to support the total tank weight plus 100% of the weight of the maximum amount of product the tank will be storing. The foundation may be comprised of concrete, asphalt, gravel or other stable material and must include provisions in its design to prevent tank movement. The foundation design must also include provisions for draining surface water away from the tank to minimize corrosion.
- 1.2 This tank must be installed in accordance with all applicable federal, state and local environmental regulations and safety codes.
- 1.3 Tank must be grounded per local codes.
- 1.4 Tanks located in areas subject to flooding must be protected against flotation.
- 1.5 The tank shall be protected and secured from vandalism. The tank shall also be protected from accidental damage, such as from vehicular impacts, in accordance with all applicable codes.

2.0 Tank Handling

- 2.1 Equipment for handling the tank shall be of adequate size to lift and set the tank. For some tank sizes, a fork-lift may be used for tank movement. Do not drop or drag the tank.
- 2.2 Tanks shall be carefully handled to prevent damage to the tank coating. The use of nylon straps is preferred to prevent damage to the tank coating. When using cables or chains, they shall be padded, and of adequate length and size.
- 2.3 It is the responsibility of the buyer to touch-up and repair any damage to the coating that occurs during transportation, installation or piping installation.
- 2.4 The inner tank must be empty before the tank is moved.

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Figure B-4 (continued) Containment Solutions, Inc Hoover Vault Tank

3.0 Testing

The following air pressure testing shall be performed at installation.

- 3.1 Install test piping as shown in Figure 1. Temporarily plug, cap or seal off remaining tank openings to hold pressure. If tank is equipped with standard emergency vents, remove emergency vents and cap openings to hold tank pressure as required.
- 3.2 The air pressure used for this test must not exceed 3 psig (21 kpa). Use a gauge with a 0 to 15 psig dial span. Set pressure relief valve in test air supply line at 3 psig.
Do not leave pressurized tank unattended.
Do not stand in front of tank heads or fittings when pressurizing tank.
- 3.3 The inner tank shall be pressurized to a maximum 3 psig air pressure.
 - 3.3.1 While maintaining this air pressure, the outer tank shall be tested to a maximum 3 psig in the interstitial space. Pressurize the interstice with air from the primary tank to avoid overpressurization of the interstice.
NOTE: The inner tank will drop in pressure when the interstitial space is pressurized, but should hold steady at the lower pressure. If test pressure drops below 3 psig, close off the air supply to the annular space. Then reconnect the air supply line to the primary tank and increase the pressure to 3 psig maximum. Then continue testing the annular space per these instructions.
 - 3.3.2 All visible seams and welds are to be covered with a leak testing solution or equivalent material for the detection of leaks. Hold test pressure in interstitial space for one hour minimum. A steady drop in gauge pressure, or a stream of bubbles, indicates there may be a leak in the interstitial space.
 - 3.3.3 If any leaks are detected, notify the tank manufacturer. If no leaks are found, testing of the tank is complete.
- WARNING:** To avoid damage to the tank, do not apply air pressure to the interstitial space between the walls of a double wall tank without air pressure in the primary tank. Do not apply air pressure to the interstitial space that is higher than the air pressure in the primary tank.
- 3.4 With tank depressurized, remove test piping, temporary plugs, caps and seals.
- 3.5 Reinstall emergency relief vents, etc. If tank is equipped with an emergency vent long bolt manway, reassemble manway cover with long bolts supplied by tank manufacturer as noted below. An emergency vent is required on both the primary tank and the interstice.
WARNING: Remove temporary manway cover short bolts and reassemble manway cover with proper size and type of long bolt with a minimum unthreaded length of 2 inches, so that when cover is fully raised, there is a 1-1/2 inch minimum space between manway cover and frame. Failure to properly assemble cover of a long bolt manway used for emergency venting may make vent inoperable, causing tank failure by over-pressurization.
- 3.6 Installation of pumps, dispensers and electrical wiring shall follow the applicable requirements of codes and zoning ordinances.

4.0 Tanks

- 4.1 Install all permanent piping and fittings using suitable thread sealant material.
- 4.2 All unused tank openings must be properly sealed using threaded pipe plugs, flanges or caps using suitable thread sealant material.
- 4.3 Do not weld on the tank, modify, or penetrate the tank structure in any way without the express written permission of the tank manufacturer.

5.0 Labeling

- 5.1 Tanks shall be labeled in accordance with all applicable codes.

Figure B-4 (continued)

Containment Solutions, Inc Hoover Vault Tank

6.0 Tank Accessories

- 6.1 All tank accessories shall be installed as required per local codes. Anti-siphon devices, overflow shut-off and alarms, vents, gauges, emergency vents, etc. are common requirements for tanks storing motor fuels for the purpose of being dispensed into motor vehicles.
- 6.2 Manual liquid level gauges may require adjustment before initial start-up and before each refueling of the tank.
- 6.3 Adjustment of liquid level gauge:
 - 1) Visually inspect the moving parts of the gauge through tank top to ensure free full movement. If operation is obstructed, then gauge removal is needed.
 - 2) Remove gauge from fitting, realign the swing arm and reinstall in fitting in the correct direction allowing for proper operation of the gauge.

7.0 Factory Installed Equipment And Accessories

- 7.1 Factory installed equipment and accessories are susceptible to loosening during transit due to vibration. This could result in minor leaks at threaded connections.
- 7.2 At time of site installation and start-up, the installer or end user will be responsible for a visual inspection and repair of loose or leaking connections.

NOTE: Do not attempt to retighten all fittings before a fluid start-up test. Breaking the seal of the sealant during tightening could result in leaks.
- 7.3 To repair a loose or leaking threaded connection, disassemble the connection, clean threads and reinstall fittings using the proper pipe sealant. (Ref. Gasola, Blue Block or Loctite {2 part-pipe sealant and primer})

8.0 Maintenance

- 8.1 Aboveground tanks are subject to basic maintenance requirements during the service life. The tank vessel is subject to accidental damage, vandalism, and atmospheric degradation of the coating.
- 8.2 The tank operator should perform periodic visual inspections to identify areas of damage to the vessel or the coating itself. Such damage should be repaired.
- 8.3 Periodic repainting of the surface will be required. The frequency of this maintenance procedure will be based upon the environmental factors in the geographic area where the tank is located. The operator is responsible for the selection of the paint, surface preparation and coating application. Local codes may require that the tank be relabeled.
- 8.4 Proper site preparation is vital to ensure proper draining of surface water (see paragraph 1.0 Tank Site). Over time, settlement may occur which alters the effectiveness of the initial surface water drainage provisions. Visual inspection of the vessel and surrounding foundation should identify any change in the drainage pattern. Should stagnant surface water be discovered against the surface of the vessel, the tank operator should consult the installation contractor.

Requirements:

- 1) The Authority Having Jurisdiction shall be contacted prior to installing this tank.
- 2) This tank is intended to be installed in accordance with NFPA 30, NFPA 30A, Uniform Fire Code or International Fire Code.
- 3) This tank shall be investigated to determine acceptability for use after fire exposure damage, other physical damage, or misuse.
- 4) Flame arresters shall be installed in the normal vent lines when required by the Authority Having Jurisdiction.
- 5) The monitoring port on the secondary containment should be checked monthly for accumulation of liquid. If liquid is detected, test for the presence of hydrocarbons.
- 6) The primary tank should be checked monthly for the accumulation of water. All water shall be removed from the primary tank if detected.

Figure B-5
Jensen Precast Armor Cast® Tank



Installation Procedures

General Instructions

These instructions apply to concrete vaulted above ground petroleum fuel storage tanks. The tanks sizes range from 300 gallons to 15,000 gallons and contain either single or combination primary tanks. The installation requires qualified installers, with specialized skills and equipment, to insure safe and proper operation.

Important Note: Consult with and obtain proper permits from local, state and federal authorities before installation of this tank.

Applicable Documents and Specifications

To assist in the field evaluation process, UL has developed a Code Compliance Verification List (CCVL) for UL listed above ground fuel tank systems. This fuel tank system was designed and tested in strict accordance with UL 2085. Armor Cast® fuel tank systems comply with NFPA 30, Flammable and Combustible Liquids and NFPA 30A, Automotive and Marine Service Stations and the Uniform Fire Code (UFC). In addition, this fuel containment system meets all local, state and federal codes pertaining to above ground storage of flammable and combustible liquids. Numbered brass plaques issued by Underwriters Laboratories confirm UL 2085 approval; have been installed on this vault. It is clearly visible to inspectors and identifies the plant location and the approved manufactures listed code.

Note: This tank has not been investigated to determine acceptability for use after fire exposure.

This tank is intended for installation in accordance with NFPA 30, NFPA 30A, and the Uniform Fire Code and shall be protected from vandalism and accidental damage if installed in accordance with the aforementioned documents.

Guard Posts

Guard Posts or other barriers, if required, should be installed in accordance with local codes to provide protection from vehicle impact.

Periodic Inspections

The owner of this tank should perform periodic walk around inspections to identify areas of damage due to exposure to the elements and environment. Inspecting, testing and servicing of this tank are mandatory. Damaged tanks must be repaired using material and methods recommended only by Jensen Precast. Do not handle or move the tank unless it is empty. Moving may require special precautions and/or preparation per the UFC and State Transportation Regulations.

Figure C-5 (continued) Jensen Precast Armor Cast® Tank

Site Testing of Armor Cast® Tanks

The primary and secondary containment on this tank has been tested at the factory per UL 2085. If factory-testing certifications are not sufficient, a Factory Authorized Testing Company may perform field-testing in accordance with the manufacturer procedures.

Pressure Vacuum Vents

This vent valve is used on underground and low volume above ground tanks and in conjunction with a “normal” vent on above ground storage tanks.

Note: P/V vent must only be used in conjunction with motor fueling and/or low capacity flow. Fluid handling in lines larger than that used for retail service station can cause tank to rupture or implode.

Spill Prevention Control and Countermeasure Plan

The Federal EPA and your state regulatory agency requires that all facilities with onsite fuel storage, implement a written Spill Prevention Control and Countermeasure Plan in compliance with the provisions of Federal Regulations, Volume 40, Section 112.

Note: SPC Corporation specializes in drafting spill prevention plans. For more information, Contact: Todd McWhorter at 209/556-0400 or fax requests to 209/556-0404.

Restrictions and Warnings

Do not use with acetylene, carbon disulfide, etheleneoxide or hydrogen gases with this tank. For use only with normal hydrocarbon fuels, such as gasoline or diesel.

Routine inspection is required to insure airways are clear and free of debris. Blocked airways can cause structural deformation of the tank.

The interstitial space of each tank must be monitored for leakage. A Krueger or similar gauge is used to detect such leaks. Contact Jensen Precast for information on these gauges. This gauge has a vertical flotation, which creates a direct mechanical action to detect a leak of the inner tank. This gauge should be checked on a regular basis. This direct mechanical action is used to detect any liquid in the secondary containment.

Guard Post or other barriers, if required, should be installed in accordance with local codes to provide protection from vehicle impact.

Emergency Vents

The emergency vent must be properly sized and selected for each specific tank application in order to meet proper Venting Capacity. Vent devices must be installed on the tank at the time of shipment, or assembled in the field. Assembly of the Emergency Vent Devices, according to Armor Cast® procedures, must adhere to the following instructions:

1. NFPA 30, 30A, UL142, API 2000 and PEI RP200
2. The Emergency Vents are to be designed at a higher release rate than the normal vents. This is to insure the normal vents operate first.
3. Emergency Vents must be used in conjunction with a “Normal Vent”

Figure C-5 (continued)
Jensen Precast Armor Cast® Tank

4. Obstruction of airflow can result in structural deformation of the tank. Quarterly inspection by someone familiar with the proper operation of the Emergency Vent Valve is required.
5. A screen on the Emergency Vent is not intended to function as a flame arrester.
6. The Emergency Vent Cover must be free to lift open to full capacity without restriction beyond its own weight.

Grounding

All Armor Cast® Tanks must be grounded.

Note: Grounding is the responsibility of the tank installer and shall be in strict accordance with local and state codes. All installations shall be done in conformance with NFPA 780.

Figure C-5 (continued)
Jensen Precast Armor Cast® Tank



Standard Specification for
ARMOR CAST® Above Ground Vaulted Fuel Storage Tanks

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Revised April 2000

1. **General**

This specification covers concrete, vaulted, above ground petroleum fuel storage tanks for standard sizes ranging from 250 to 15,000 gallons, containing either single or combination primary tanks. Larger containment systems are available and covered by a separate specification.

1.1 The tank system shall be designed and tested in strict accordance with UL 2085. The UL 2085 listing for insulated secondary containment above ground tanks for flammable liquids shall encompass both fire protected and fire resistant approvals.

1.2 The containment system shall meet all local, state, and federal codes pertaining to above ground storage of flammable and combustible liquids including N.F.P.A 30 and 30A and the Uniform Fire Code 79-7.

1.3 Numbered brass plaques issued by Underwriters Laboratories, Inc. confirming UL 2085 approval shall be installed on the vault and be clearly visible to inspectors.

1.4 The fuel tank shall be delivered to the jobsite complete, requiring no additional concrete or subsequent construction. Equipment, venting, electrical and mechanical connections may be required.

1.5 The containment system shall be produced by a concrete manufacturing plant having a current certification by the National Precast Concrete Association Certification Program.

Accepted Manufactures:



S. California
14221 San Bernardino Ave.
Fontana CA 92335-5232
(800) 545-5930

N. California
5400 Raley Blvd.
Sacramento CA 95838-1700
(800) 843-9569

Figure C-5 (continued)

Jensen Precast Armor Cast® Tank

5. Tertiary Concrete Encasement

5.1 The concrete encasement shall be of two piece construction containing no joints or seams below the level of 110% secondary containment. The concrete and the steel tank shall be completely independent of each other allowing for expansion and contraction of the tank components.

5.2 The concrete encasement shall be a minimum of 6" thick and have a minimum compressive strength of 4,000 psi @ 28 days.

5.3 The concrete encasement reinforcement shall be in accordance with ASTM A615 and/or ASTM A185.

5.4 The concrete encasement shall be designed and tested to provide a minimum 2-hour fire protection for the primary tank; in strict accordance with UL 2085.

5.5 The sealant securing the lid to the concrete encasement shall be a UL rated system providing a minimum 4 hour fire protection and conform to the uniform fire code standards for rapid rise fire tests.

5.6 The containment system shall allow for the introduction of monitoring (leak detection) devices in the tertiary containment space by means of a 3/4" diameter leak detection tube.

5.7 Seismic restraints shall be installed where required by code.

6. Exterior Protection

6.1 The concrete surface shall be clean, dry, completely cured, and free of any form release agents prior to the application of any coatings, paints, stains or sealant.

6.2 The typical finish is a lightly sandblasted exposed aggregate surface with the following:

The primer coat shall be a clear high solid epoxy mastic such as Ocon Plugger.

The finish coat shall be a high solid polyurethane enamel such as Ultra Shield and be resistant to petroleum products. Standard color shall be white unless noted otherwise.

6.3 Painted tank finish available as an optional finish and must be specified prior to production.

The filler coat shall be a cementitious acrylic such as Intercryl 320.

The finish coat shall be a high gloss waterborne epoxy topcoat such as Intergard 735 and be resistant to petroleum products. Standard color shall be white unless noted otherwise.

6.6 Most labels or safety decals shall be applied at the factory in controlled conditions ensuring proper adhesion.

7. Auxiliary Equipment and Accessories

7.1 The type of fuel, site conditions, and owner requirements make equipment and accessories site specific, but the containment system shall provide for:

A. Top fill installations that incorporate an internal 15 gallon steel spill container with internal drain.

Figure C-5 (continued) Jensen Precast Armor Cast® Tank

- B. Remote fill installations - several types available.
- C. A patented overfill system that directs overfills into the containment space.
- D. Overfill prevention fuel shut off valves.
- E. Appropriate venting to meet federal, state, and local codes. Both the primary tank and the secondary containment space shall be vented per NFPA 30 Section 2-3.4.1 and 2-3.6.
- F. Leak detection gauges; either mechanical or electronic.
- G. Tank capacity gauges (gallon gauges).
- H. Fuel pumps and or fuel management systems.
- I. Stage I and II vapor recovery.
- J. Tank heaters.

Equipment specifications vary as job conditions warrant. Please contact the manufacturer or distributor for details.

7.2 Steel stairs or ladders shall be available as shown on drawings or as site conditions warrant.

7.3 A protective coating shall be applied to all equipment hardware to prevent corrosive bleeding onto the tank.

8. Concrete Foundation Bases

8.1 The containment system must be set on a completely level concrete foundation in strict accordance with the manufacturer's recommendations. Length, width, and thickness will vary depending upon vault size and site conditions.

8.2 The foundation base may be either precast or cast at the jobsite. Bearing pads or non-shrink grout shall be placed between the support legs and the concrete foundation base to ensure uniform bearing. Failure to place the tank on foundation base or bearing pads will void the warranty. Bearing pads will be supplied by the tank manufacturer.

8.3 The foundation base shall be placed on a level soil subbase capable of withstanding a minimum of 3000 psf bearing pressure. Soils shall be sloped away from the base providing adequate drainage.

8.4 When a precast foundation base is used, the area under the base shall be graded to ensure uniform bearing of the base.

9. Miscellaneous

9.1 Grounding of the concrete vaulted containment system shall be in strict accordance with local and state codes.

Figure C-5 (continued) Jensen Precast Armor Cast® Tank

9.2 Any warranty shall apply for the concrete vaulted containment system only. Dispensing and or accessory equipment shall be warranted by the manufacturer of that equipment. Please contact the vault manufacturer for full details concerning the terms of the warranty.

9.3 Hurricane restraints can be installed on the Armor Cast tank if required by local regulations. A design drawing is available upon request.

10. Tertiary Testing

10.1 On-site vacuum testing is not required by Underwriters Laboratories (U.L.) as part of the U.L. 2085 tank listing. Vacuum testing is completed at the factory per U.L. requirements and test results are maintained at the manufacturing facility. A copy of testing results can be obtained upon request. If local authorities require on-site testing, the tertiary space can be vacuum tested as follows:

- A. Inspect tank top to base joint to verify integrity of seal. Contact the manufacturer if any questions arise.
- B. Properly cap the secondary monitoring port and the secondary emergency vent to make an air tight seal between the cap and the riser pipe by using Teflon tape or pipe sealant.
- C. Remove the tertiary cap, attach a vacuum pump line with gauge and shut off valve to the riser pipe, and pull a vacuum of 3 inches of mercury from the tertiary space. (Be sure all components selected are rated for vacuum use.)
- D. Turn the shut valve to the closed position as soon the gauge reads 3 inches of mercury (vacuum). Do not draw more than 3" of mercury vacuum. This process may need to be repeated several times in order to assure consistent vacuum within the tertiary containment space.
- E. Vacuum should be maintained for 15 minutes to verify integrity of the tertiary containment space.
- F. After 15 minutes release vacuum, disconnect pump and recap monitoring port.
- G. Important Note: Do not at any time pressurize the primary steel tank, secondary, or tertiary space.