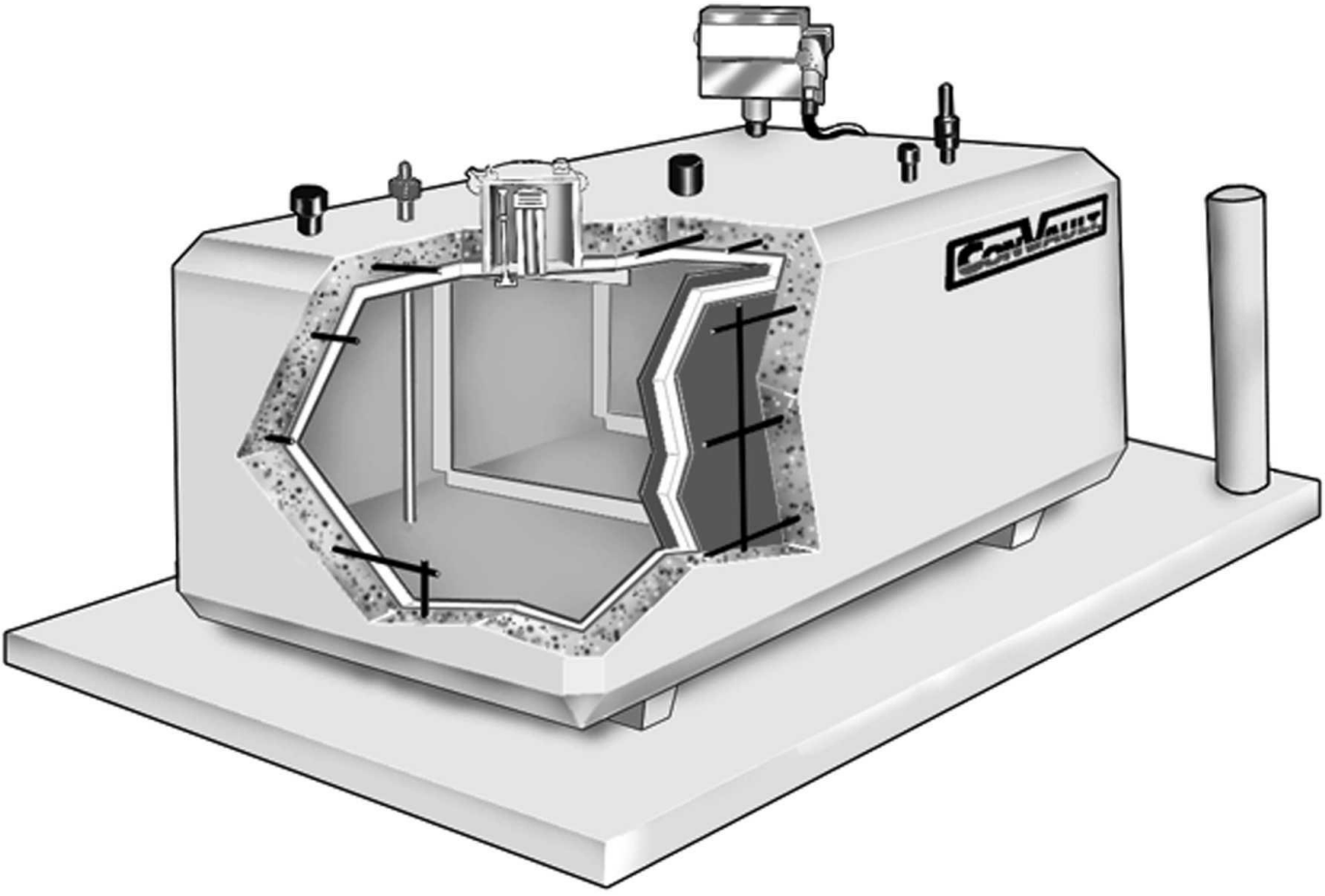
Installation Instructions



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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.

C. TANK SITE

- **<u>NOTE</u>: 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.

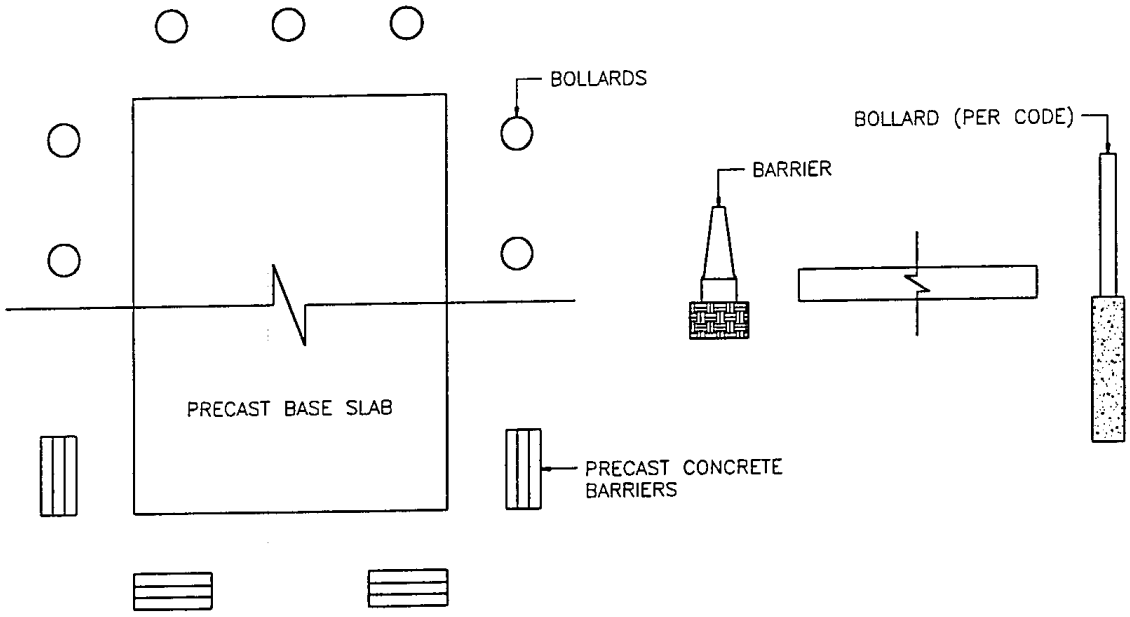
D. BOLLARD INSTALLATION

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



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 overfill 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 2,000 lb. per sq. ft.

    b. Total settlement: 1 inch maximum.

c. Differential settlement: 1/2 inch maximum.

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.**

E. 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.

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.

F. 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 ¾" 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**.

G. 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.

H. 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.

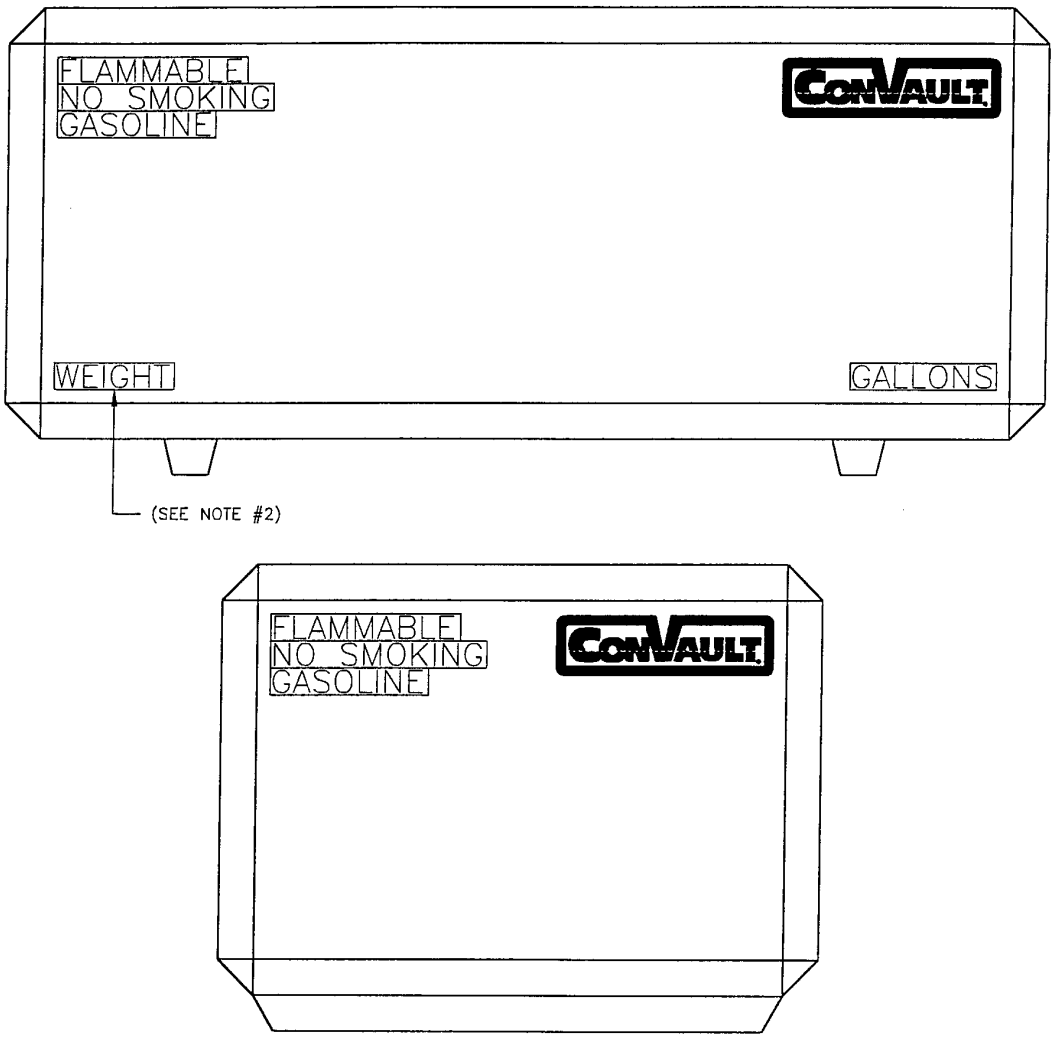
   c. Allow sufficient crane time for installing the load block and organizing the rigging.

   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 No. 7



NOTES:

1. For best results, attach decals or signs at 60º – 70º 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.

I. 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 <u>Notes</u> on page 27 under FOUNDATIONS**.

⚠WARNING There is potential for serious injury or death should someone access the top of the tank without appropriate ladders, stairs or fall protection. For ConVault tank models with heights above 4 feet, ladders, stairs, guardrails or equivalent fall protection systems must be used if a person accesses the top of the tank.

J. ELECTRICAL

- **<u>NOTE</u>: Our intention is for our tanks to be installed in accordance with national, state and local rules, regulations and fire codes requirements. Please follow the following order of priorities.**

  a) Local jurisdiction codes, rules and regulations.

  b) Applicable state codes, rules and regulations.

  c) Applicable regional and national codes, rules and requirements.

  d) Manufacturer's recommended installation, and operating procedures.

  e) Convault® operating manual.

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.

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.**

K. 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.**

L. 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:

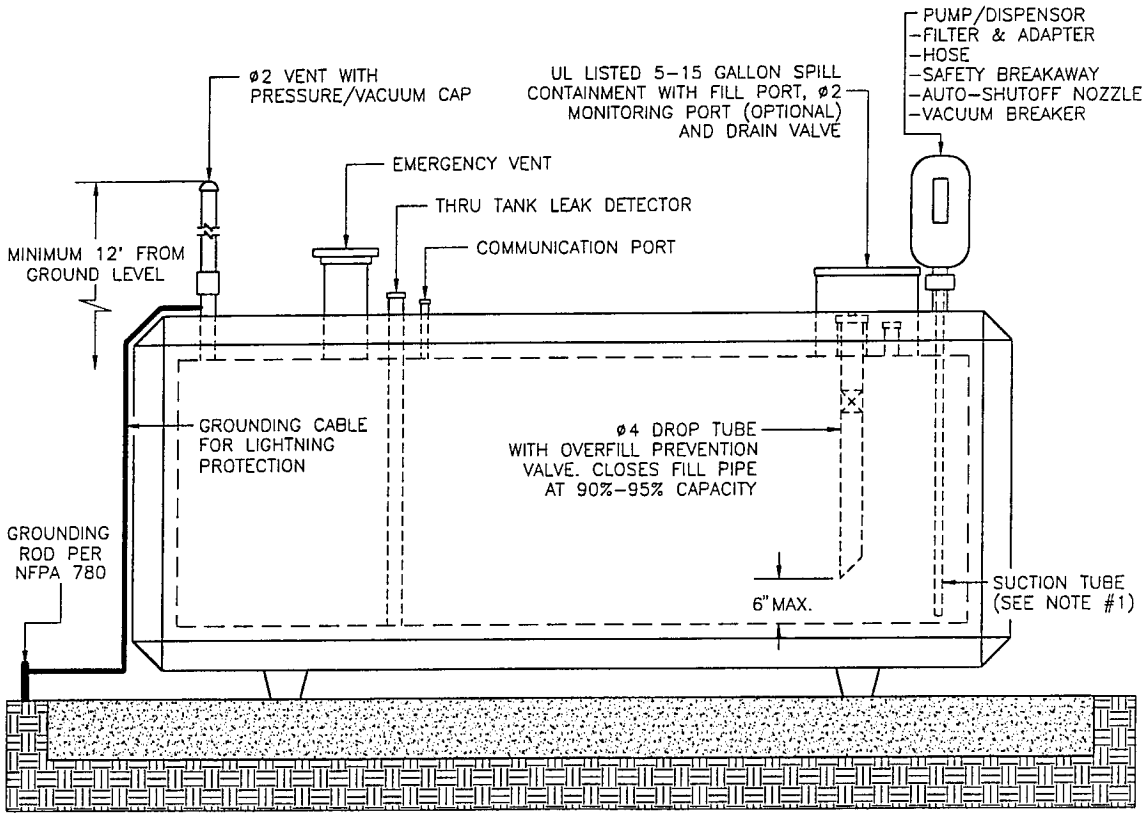
   a) Angle check valve with pressure relief or foot valve, strainer and pressure relief valve.
   b) Shut-off valve with fusible link on supply piping
   c) Anti siphon valve if the level of the suction piping falls below the high level of fuel in the tank.

M. 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:

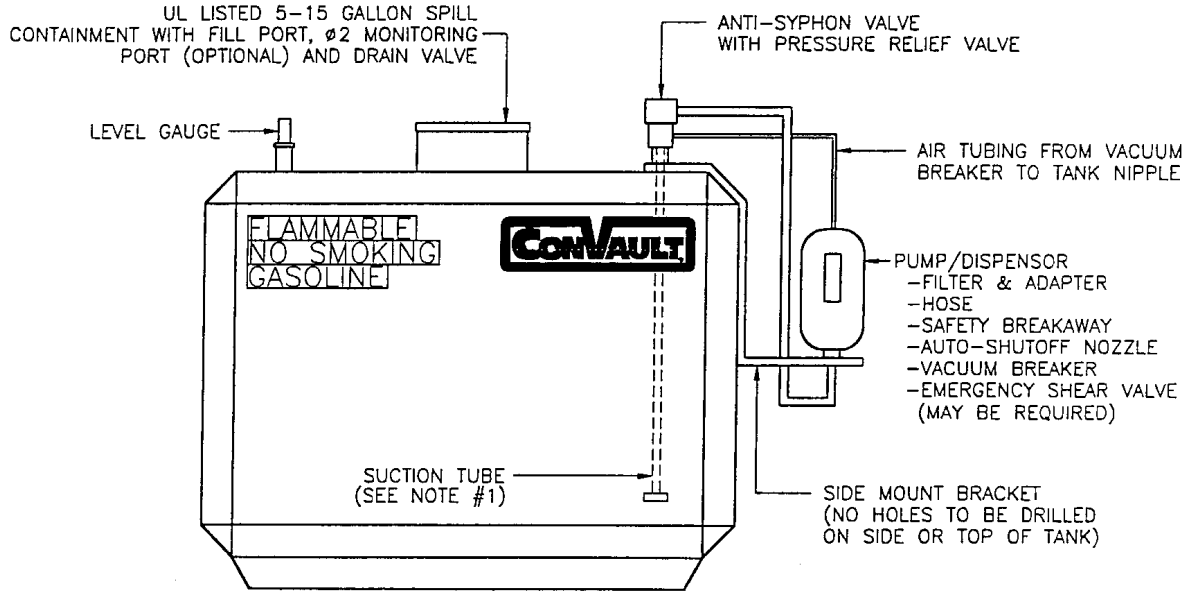
1. Bottom of foot valve/strainer to be 1" from bottom of steel tank
2. Stairway assembly to fill port (optional)

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



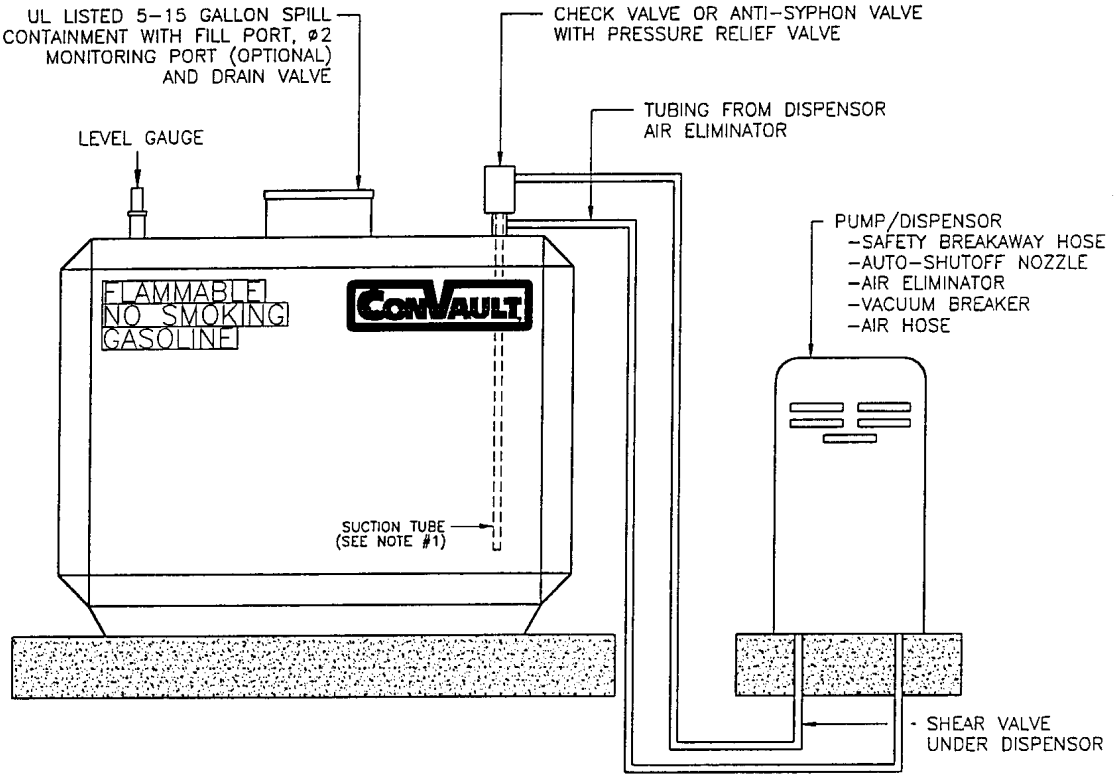
Notes:
1. Bottom of foot valve/strainer to be 1" from bottom of steel tank
2. Stairway assembly to fill port (optional)

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



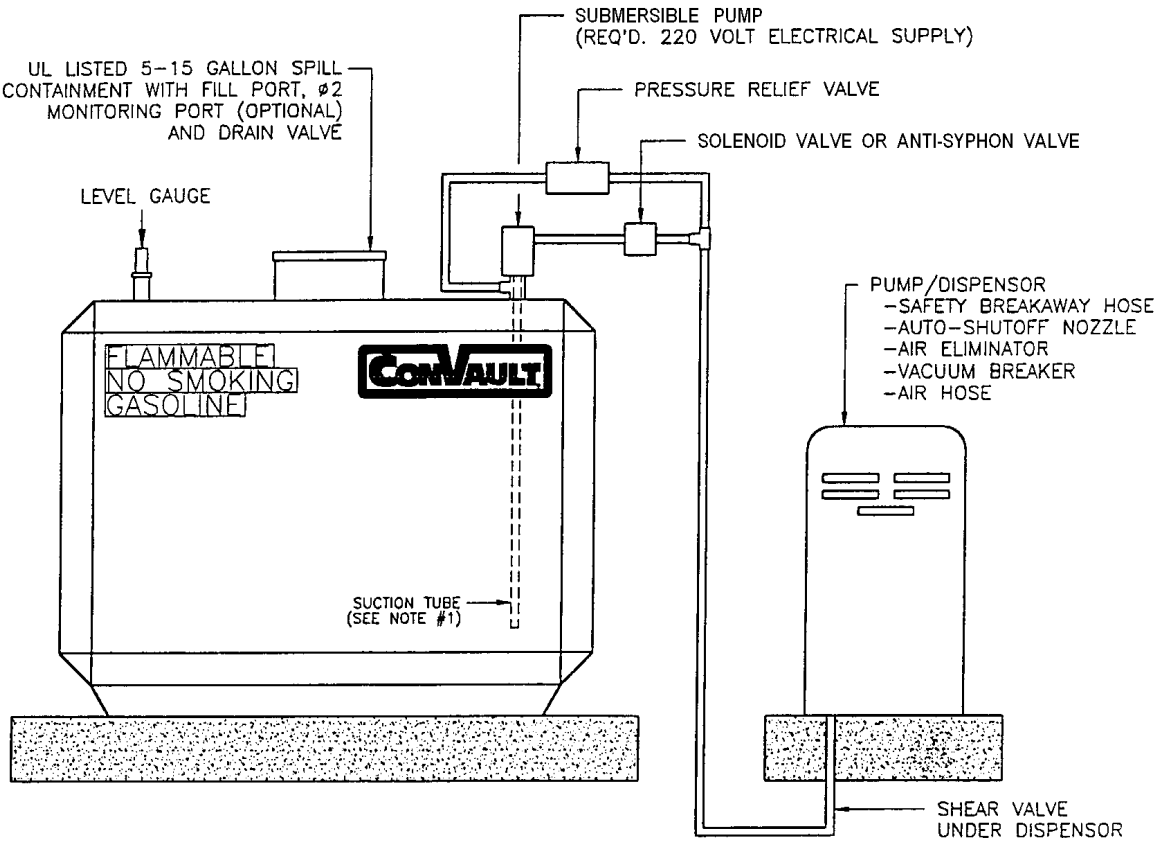
Notes:
1. Bottom of foot valve/strainer to be 1" from bottom of steel tank
2. Stairway assembly to fill port (optional)

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



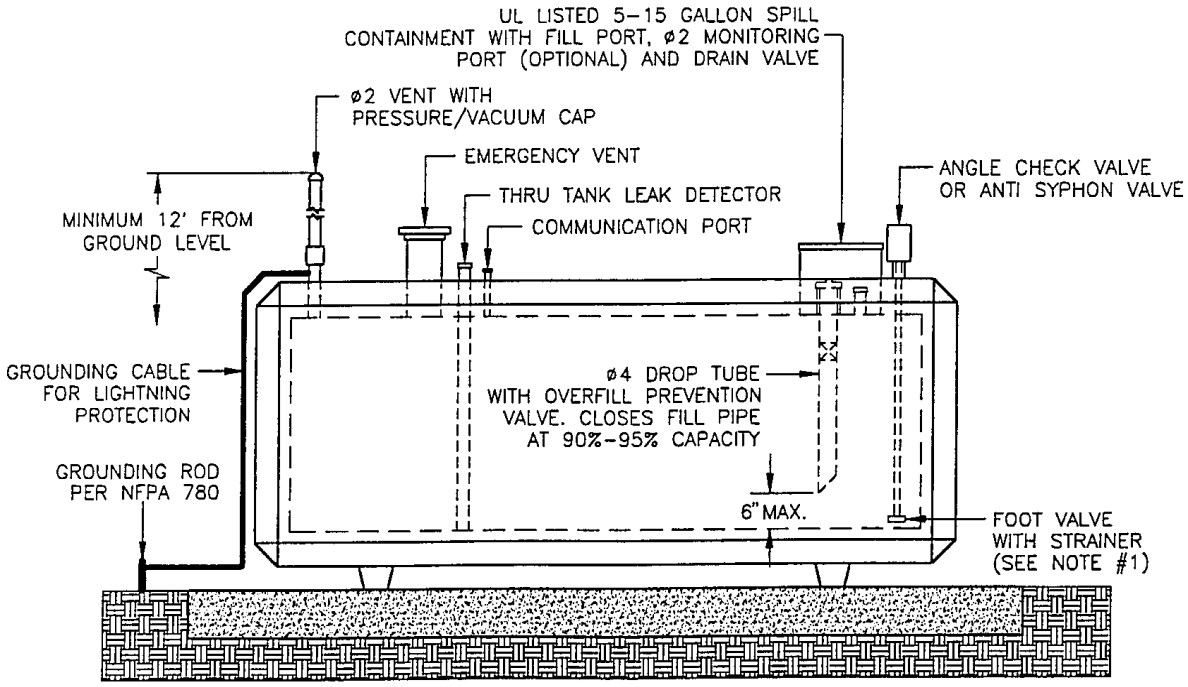
Notes:
1. Bottom of suction stub extended to 1" to 4" from bottom of steel tank
2. Stairway assembly to fill port (optional)

N. 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

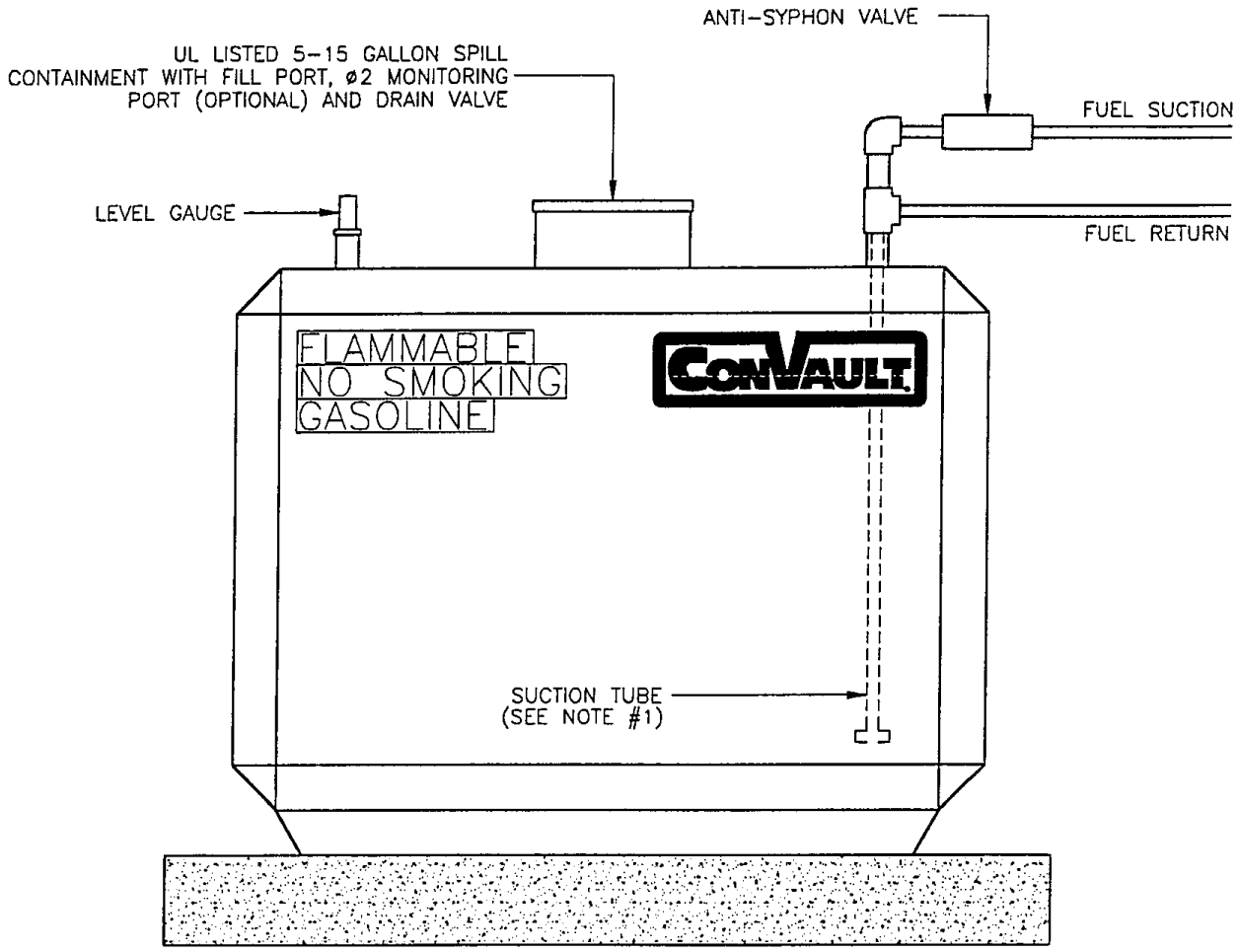


Notes:

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

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

Figure No. 13
Generator Fuel Supply
End View



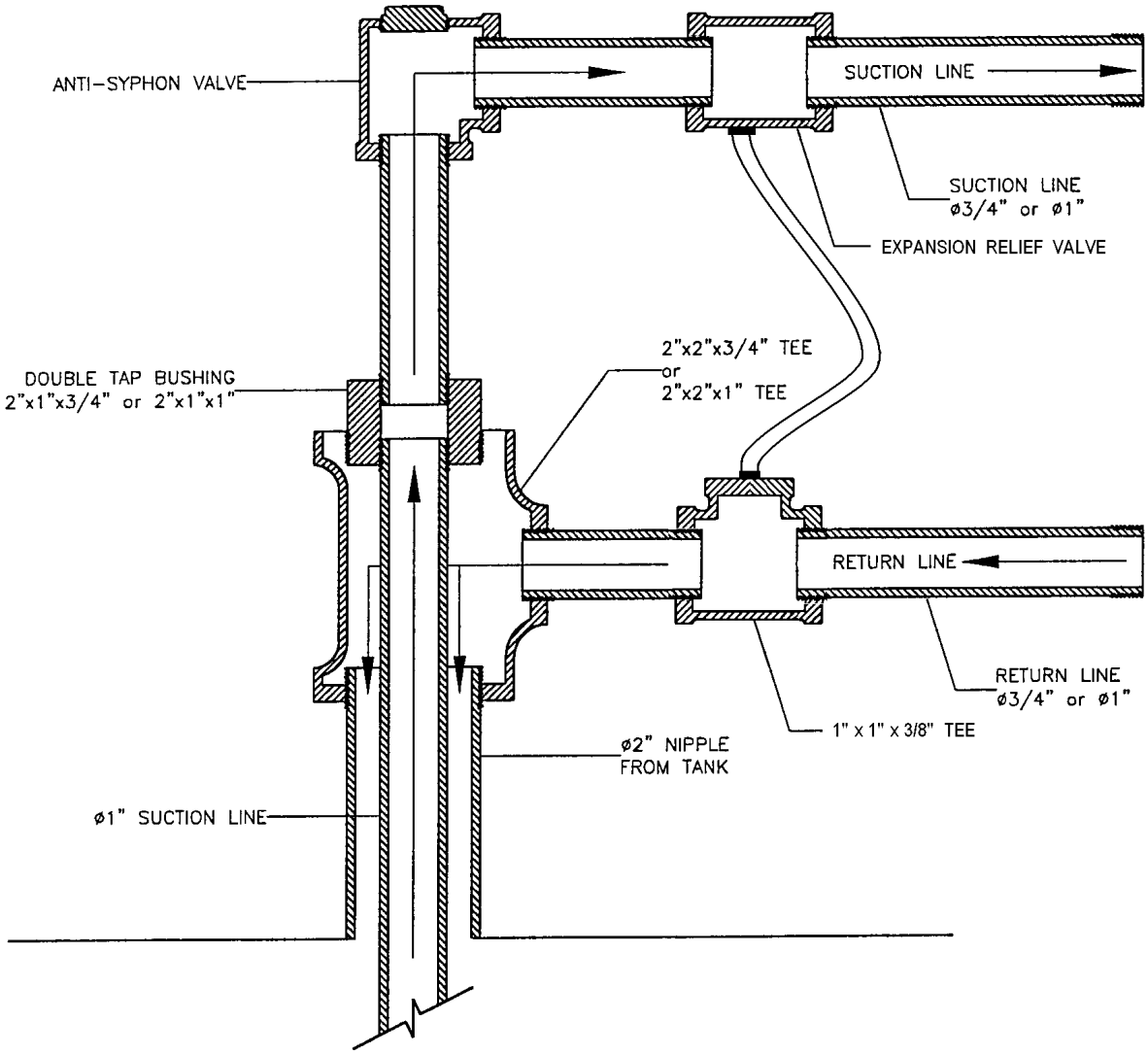
NOTES:
1. Bottom of foot valve/strainer to be 1" from bottom of steel tank
2. Stairway assembly to fill port (optional)

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 No. 14

Generator Fuel Supply

Optional use of one connection for both suction and fuel return line.

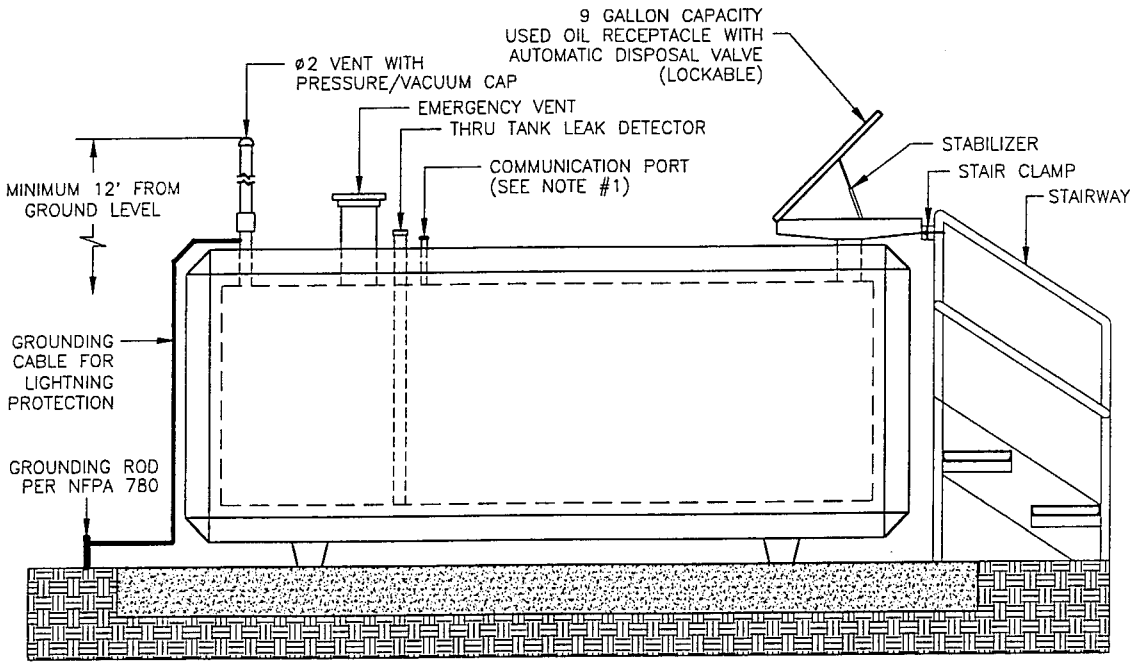


O. USED OIL APPLICATION

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)