

Underground Storage Tank Critical Installation Requirements

for
Licensed UST System Installers, Removers, and Inspectors

Fifth Edition

State of Montana Department of Environmental
Quality Underground Storage Tank Section

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INTRODUCTION

The “critical installation requirements” contained in this document may not appear on installation and closure permits issued by the department. However, these requirements remain integral to the installation and closure processes and must be followed whenever they are applicable.

This document does not replace or supplement industry standards for installing USTs. Its purpose is to highlight critical installation elements that the Department of Environmental Quality has historically felt a need to stress or clearly communicate. This document is not comprehensive but rather is a compilation of commonly used permit requirements.

Administrative Rules of Montana (ARM), Title 17, Chapter 56 sets forth performance standards for new underground storage tank systems. This document highlights certain industry standards for UST installations as outlined by API Recommended Practice 1615, PEI/RP 100, PEI/RP 1200, and other standards of design and construction delineated by ARM 17.56. These rules may be accessed at <http://www.mtrules.org/gateway/ChapterHome.asp?Chapter=17%2E56>.

CRITICAL INSTALLATION REQUIREMENTS FOR NEW OR MODIFIED UST SYSTEMS

I) PRELIMINARY CONSIDERATIONS

A) Legal

Work must comply with Montana Underground Storage Tank regulations, permit conditions, department-adopted referenced standards, manufacturer specifications, and all other state and local requirements including electrical permits. **Licensed installer and construction permit must be onsite whenever UST work is being conducted.**

B) Local Coordination

Owner and installer must contact the local fire official and the State Fire Marshal at (406) 444-2050 regarding installation of aboveground tanks and components, which are regulated by the Uniform Fire Codes and the Montana Fire Codes. Owner and installer must also contact the local Planning Department, the Local Floodplain Administrator, and the Montana Sage Grouse Habitat Conservation Program for new installations regarding local requirements.

C) Source Water Protection Districts

When installing an underground storage tank system, the owner and installer must contact the applicable source water protection district regarding local requirements.

D) Notification

Notify DEQ at (406) 444-5300 at least one week before starting work. Provide permit and facility numbers. If this project is the site of an active petroleum release and excavation is required, you **must** also contact the case manager at (406) 841-5000 at least one week before starting work.

E) Permit Modification

Permit modification is required by DEQ for any changes from the permitted proposal. Call (406) 444-5300 for any permit modification, including a change of installer.

F) Suspected Contamination

Contact the department within 24 hours at 1-800-457-0568 if suspected contamination (soil staining, soil odors, sheen on water, detectable head space concentrations, lab analysis over DEQ action levels, holes in tanks or piping, or any unusual operating conditions) is discovered, regardless of the suspected source. If a ppm meter is available, collect dual samples and conduct a vapor headspace test on the sample not being submitted to the lab. Call 1-406-324-4777 after hours and on holidays. DO NOT LEAVE A MESSAGE. You must speak to a person in the Waste Management and Remediation Division or the 24-Hour Disaster and Emergency Services duty officer.

G) Release Detection Equipment Performance Claims

The department authorizes equipment for UST system installation that has been tested and evaluated by the National Work Group on Leak Detection Evaluation (NWGLDE). The

primary goal of NWGLDE is the creation of a list of release detection products that have undergone third party evaluations adhering to specified engineering criteria. The list is a compilation of underground storage tank and piping leak detection system evaluations that have met certain criteria developed by the NWGLDE and the performance requirements established by Title 17, Chapter 56, Sub-Chapter 4 of Administrative Rules of Montana.

If equipment not listed by NWGLDE is proposed, then the installer must submit (with the permit application) a written performance claim substantiating the performance and the manner in which the claim was justified or tested by the equipment manufacturer or installer (ARM 17.56.409).

H) Setback Distances

- No part of an underground tank system may be located less than 3 feet from a property line.
- Dispensers must be at least 10 feet from the building and property lines.
- The end of the stretched hose must be at least 5 feet from any building openings (windows, doors, or basement or crawl space wells), and all portions of the vehicle being fueled must be on the property.

Accurate distances for these setbacks must be provided on the redlined drawing if different from the previously submitted site plan.

I) Corrosion Protection Tests

If a cathodic corrosion protection system was installed for any component of an UST system, then a corrosion protection test is required for that component after the UST system has reached polarization equilibrium and within six months of installation (date that the Certification of Compliance is received by the department) by a qualified corrosion protection tester. Refer to department testing standards for details. All cathodic protection tests of tanks must include readings at each end, each side and at the top center of each tank. Piping tests must be done every 20' of piping length. All other metallic components (risers, flex connectors, vent standpipes, etc.) must also be tested.

II) CRITICAL INSTALLATION REQUIREMENTS

The subjects covered below are those identified by the department as critical to a successful installation. For further guidance and a complete list of installation requirements, see the manufacturer's instructions and the appropriate referenced industry standards.

A) Tank Installation Procedures

A tank installation is the installation of any underground storage tank. This includes aboveground storage tanks with underground piping.



i) Tank Anchoring

Tank anchoring must be installed per PEI/RP100. Tank anchoring calculations are to be performed by the manufacturer. All anchors shall be coated with STI approved coating. If tank deadman are used for float-out prevention they must have cathodic protection installed. A cathodic protection design must be submitted before the application may be approved.

ii) Unstable Soils

If unstable soil (or groundwater) is present in the tank basin, then the installer or designer must install geotextile filter fabric on the bottom and sides of the tank hole. Filter fabric must be positioned before the select bedding and backfill is in place.

iii) Bedding And Backfill

For fiberglass tanks, bedding and backfill must be pea gravel, washed naturally and rounded 1/8" to 3/4" with no more than 3% passing a 3/8" sieve.

For STIp3 tanks, bedding and backfill must be pea gravel, with backfill washed naturally and rounded 1/8" to 3/4" with no more than 3% passing a 3/8" sieve. Backfill may also be clean, washed sand. For other types of tanks, contact the manufacturer.

iv) Siphon Tanks

For tanks with piping or dispensers located lower in elevation than the liquid level, (siphon tanks), a solenoid valve must be installed after the submersible pump in the product line to prevent siphoning of the tank in the event of a leak. Refer to the leak detector manufacturer's instructions regarding placement of the solenoid and mechanical or electronic line leak detector. Submit a detail of the installation with the application.

v) Marina Tanks

For marina served underground storage tanks, a normally closed solenoid valve must be installed **after** the submersible pump in the product line and before the electronic line leak detector pressure transducer to prevent siphoning of the tank in the event of a leak in the product line. Use Red Jacket tee housing (part number 038-072-5) to house the pressure transducer. Refer to the leak detector manufacturer's instructions regarding placement and wiring of the solenoid. Provide functionality testing of the ELLD showing that the solenoid is normally closed and is only open when product is being dispensed. All solenoid wiring must be installed with explosion proof conduit and fittings for a Class 1 Div 1 area.

vi) Corrosion Protection

ALL metallic tank risers must be protected from corrosion. If no additional isolation offset is installed, the riser(s) must be made of FRP or stainless steel to meet department requirements. Regular black steel risers require polyethylene or PVC isolation offsets to avoid soil or pea gravel contact. There shall be no underground metallic components in contact with soil. **Tape-wrap or spray on coating is not an acceptable form of corrosion protection.**

A corrosion expert shall use the following criteria for the corrosion protection design for any metal tank anchor components that must be protected:

- Ensure that anode lead wires extend to a surface terminal station from each strap.
- The leads must have two lead wires cad-welded at different locations extending to the surface terminal station.
- For deadman protection, one strap connection connects to the anode and one strap connection lead is used to test the corrosion protection.

vii) Tank Leak Detection

- All new tanks must be double wall with continuous interstitial monitoring.
- The liquid sensing probe series installed must be approved for use with the ATG panel and the liquid stored.
- For interstitial systems using a leak detection panel, the sensor series must be approved for use with the leak detection panel and the liquid stored.
- All tank leak detection installation and maintenance must be conducted by personnel who are certified by the manufacturer for installing the equipment.

B) Pipe Installation Procedures

A pipe installation includes new installations, re-piping, connecting to existing pipe, and installation of vents and siphon lines.



i) Joints

- Pipe being installed must be the same manufacturer as the existing pipe, or the connection to the existing pipe must be a threaded joint. All threaded joints must have surface access or be in liquid tight sumps.
- Unions should be avoided. If unions are unavoidable, they must be rated at a minimum of 250 psi.
- Glued joints for fiberglass piping must be cured with heat packs if the ambient temperature is less than 60 degrees Fahrenheit or in accordance with manufacturer's specifications.
- All connections for double-wall flexible piping must be made in sumps and must include a liquid sensor unless continuous double wall containment is provided by UL listed manufacturers' fittings.

ii) Double Wall or Secondary Containment Piping

- All new piping must be double wall and installed with continuous interstitial monitoring.
- Secondary containment piping and sump must be liquid tight.
- Secondary containment piping must be sloped back to a containment sump and sealed on the upper end (only applicable to European or U.S. suction systems installed with heating oil and emergency generator tanks).
- Double wall product piping must have a continuous slope at a minimum of 1/8" per foot to each containment sump with no sags or traps. If a consistent elevation drop of 1/8" per foot cannot be maintained between the sumps, a transition sump and sensor must be installed so that this elevation drop can be maintained.

iii) Single Wall or Double Wall Suction Piping

Suction piping must slope at least 1/8" per foot back to the tank without any sags or traps.

iv) Single Wall or Double Wall Pressurized Piping

An EPA approved 0.1 gph tightness test **must** be conducted on all single wall and double wall product piping after the installation (including surface concrete) is complete and before the UST system is put into service. This test must be submitted to the department with the completed permit paperwork.

v) Vapor Recovery Piping

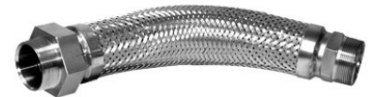
Stage 1 vapor recovery is required to be installed with all new gasoline tanks. Installation and testing of Stage 2 vapor recovery piping is suggested to be in accordance with PEI RP300-97. This is to ensure that the vapor recovery system can be put into use with a minimum of re-certification.

vi) Backfill

Pea gravel bedding and backfill must be washed and naturally rounded 1/8" to 3/4" with no more than 3% passing a 3/8 sieve. Alternative backfills must be approved by the manufacturer before installation.

vii) Flex Connectors

- Install flex connectors in the rigid product and vapor recovery piping at the tank, base of dispensers, and anywhere a direction change of 30 degrees or more occurs with less than a 4' straight run on either side of it.
- Flex connectors in contact with soil must be protected from corrosion by heat shrink sleeves, watertight boots, or STI coating and anodes.
- Flex connectors must be UL listed for hydrocarbons.
- Flex connectors exposed to the atmosphere must be fire rated.



viii) Pipe Leak Detection Equipment

Liquid sensors must be installed in all tank turbine sumps where there is piping between the turbine housing and the leak detector housing.

For continuous interstitial monitoring of double-wall piping, interstitial monitoring liquid sensors must be installed in all product-piping sumps resting on the bottom of the sumps at the lowest level and must be approved for use with the leak detection panel.

All pressurized piping must have an ALLD installed for catastrophic leak detection.

Liquid sensors and pressurized line leak detectors must:

- Sound a continuous alarm that is responded to within 1 hour, 24 hours a day, seven days a week, 365 days a year,
- Close a solenoid valve at the tank if product is detected in any sump or,
- De-energize the turbine or pumping system.

ix) Vent Lines

- Tank vents that are installed within or attached to a canopy shall extend a minimum of 5 feet above the highest projection of the canopy (NFPA 30A 5.6.3). If free standing, vents must extend a minimum of 12' aboveground.
- Flex connectors must be installed in the rigid vent piping at the tank, base of vent riser, and anywhere a direction change of 30 degrees or more occurs with less than a 4' straight run on either side of it.
- Vent piping must slope at least 1/8" per foot back to the tank without any sags or traps.
- Stage 1 vapor recovery vent standpipes must have a pressure/vacuum cap installed.
- Manifolding of vents is not recommended. See Program for additional information and guidance.
- For tanks having dual fill points, a 2" vent is required for each fill point. A single 3" vent line and standpipe will suffice for this requirement.

x) Master-Slave Dispenser Installation

A master and slave dispenser arrangement utilizing mechanical or electronic line leak detectors must be installed with a continuous (no solenoids or check valves) piping system from the submersible pump to the satellite dispenser. Functionality testing of the product piping must be conducted at the slave dispenser.

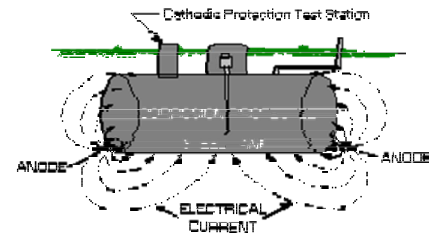
xi) Dispenser Shear Valves installation

The scored "shear section" of the valve must be positioned within 1/2 inch (above or below) of the finished top of the concrete dispenser island or the surface to which the dispenser is anchored. The valve body (the portion below the shear section) must be rigidly secured to a structural member, such as a stabilizer bar or bracket, within the dispenser island. Failure to anchor it properly can prevent the valve from shearing or closing during an impact.

Note: the UST Program is **recommending** double-poppet shear valves be installed in accordance with NFPA 30a (2018 version) which requires all shear valves to be of double-poppet construction. However, the UST Program **requires** that all Master to Satellite piping have a double-poppet shear valve installed at the base of the Master dispenser supplying the Satellite dispenser.

C) Cathodic Protection Procedures

The addition of corrosion protection to new or existing installations is the addition of an impressed current system, anodes, heat shrink sleeves, non-corrodible offset sleeves, watertight boots or STI coating.



i) Impressed Current Installation Procedures

- Anodes must be located as shown on the corrosion protection design proposal.
- Anodes cannot be repositioned more than 2' laterally to accommodate underground obstructions. Any repositioning beyond this requires prior review and approval from the department (406) 444-5300.
- Anodes must be located 10-15 feet from the tank for optimum current and ion

distribution. Location outside of this area requires prior review and approval from the department (406) 444-5300.

- The centerline of the vertical anodes must be at least as deep as the centerline of the tank. Horizontal anodes must be placed at or below the centerline of the tank or the historical frost line, whichever is deeper.
- Wires must be placed below the surface concrete or asphalt with aggregate or other cushioning material between the wires and the concrete or asphalt whenever possible. If there is no concrete or asphalt present, wires must be at least 24" below the surface.
- Anodes must have coke breeze backfill placed at least 6" below the anode, 6" above the anode, and completely filling the interstitial space around the anode without any voids.
- Any below-grade structure connection must be coated with either a waterproof or STI approved type coating.
- Soil potentials must be provided after cathodic protection is installed. After the UST system has reached equilibrium, and within 6 months, a qualified corrosion protection tester must perform a comprehensive corrosion protection test according to department criteria on the [Montana CP Test Form](#).

ii) Magnesium Anode Installation Procedures

- Anodes cannot be repositioned more than 2' laterally to accommodate underground obstructions. Repositioning beyond this requires prior department review and approval.
- Except for spike anode installation, the centerline of the anodes must be below the historical frost line.
- Any below-grade connection to a structure must be coated with either a waterproof or STI-approved coating.
- Wires must be placed below the surface concrete or asphalt with aggregate or other cushioning material between the wires and the concrete or asphalt whenever possible. If there is no concrete or asphalt present, wires must be at least 24" below the surface.
- Soil potentials must be provided after cathodic protection is installed. After the UST system has reached equilibrium and within 6 months, a qualified corrosion protection tester must perform a comprehensive corrosion protection test according to department criteria on the [Montana CP Test Form](#).

D) Monitoring Wells Procedures

Monitoring wells can no longer be used for leak detection. They can be installed and used as observation wells if installed according to the construction standards for monitoring wells shown below.



i) Observation/Monitoring Well Installation

- No adhesives may be used on the well casings.
- The middle and lower portion of the well casing is slotted to allow vapors or groundwater into the well.

- The well head must have a surface can set in concrete and raised at least 2” above the surrounding ground or concrete surface.
- There must be a 12” to 24” bentonite seal around the solid portion of the PVC casing below the surface can concrete.

ii) Monitoring Well Abandonment

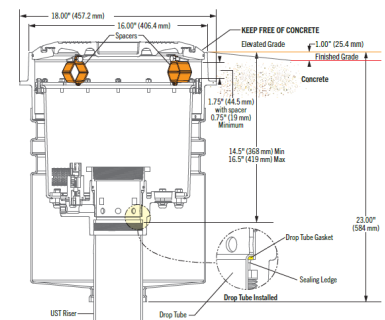
Monitoring well method of abandonment: cut off casing 2-3’ below the surface, fill with an inert material (pea gravel, bentonite chips, etc.), fill from cut-off point to 6” below the surface with bentonite or another sealing material, and cap with concrete (or as required by the site). Submit cross-section to the department with completed paperwork.

E) Tank Lining Installation Procedures

- Any holes, perforations, or rust plugs that penetrate through the metal must be immediately reported to the department (406) 444-5300 and must be repaired according to the manufacturer’s recommendation and under the supervision of a manufacturer’s authorized representative or the tank manufacturer must certify that the repaired tank meets the manufacturer’s design standards. Provide the manufacturer’s certification to the department.
- Lining is to be a nominal 125-mil thickness.
- After lining, conduct a “Barcol” hardness test, an Elcometer lining thickness test, and either a tank tightness test to the overfill level or a high voltage holiday test. Submit results to the department.
- Contact the department at (406) 444-1435 or (406) 444-5345 to discuss disposal options for the sludge and the spent sandblast material.

F) Spill Protection Installation Procedures

- Spill buckets must be thread-on design, not slip over, and must be UL listed.
- Install the surface concrete with sufficient slope such that surface water is prevented from entering the spill containment manhole.
- After installation, all spill buckets must be tested triennially in accordance with PEI RP 1200 to confirm liquid tightness of each newly installed spill container using the [Montana Spill Containment Testing Form C-3](#).
- Stage 1 vapor recovery spill containment is required for all new gasoline storage tanks (not required for diesel storage tanks).



G) Overfill Protection Installation Procedures

- Ball float vent valves may no longer be installed as overfill devices. Ball float vent valve overfill devices may not be used on suction systems or on systems that receive pressurized delivery. Ball floats that have been paved over must be inspected. If a ball float fails an overfill inspection, it cannot be replaced, it must be removed, and another approved device must be installed. Vent ball extractor fittings must have access risers extending to the surface and have a cap that is removable without wrenches or special tools.
- External overfill alarms must be set at 90% of the tank volume (or less) and must be

audible to the delivery driver at all times.

- Drop tube shut off overflow protection valves must be set at 95% of the tank volume (or less). They may ONLY be used with tight-fill gravity delivery.
- All overflow devices must be tested triennially in accordance with PEI RP 1200 Overflow Prevention Device Function Test Requirements to confirm functionality and proper installation of each newly installed overflow device.

This table is to be used to design the proper overflow method to be used on underground storage tanks.

| Delivery Method | Overflow Method | | |
|---|-----------------------|--------------------|------------------|
| | Ball Float Vent Valve | Drop Tube Shut Off | High Level Alarm |
| Pressurized Tight Fill Delivery (1) | NO | NO | OK |
| Gravity Feed to UST Systems with Pressurized Piping | OK | OK | OK |
| Gravity Feed to Suction UST Systems (2) | NO | OK | OK |
| “Stinger” Delivery (3) | NO | NO | OK |
| Dual Fill Delivery to Pressurized or Suction Piping UST Systems | NO | OK | OK |
| Stage 1 Dual Point Vapor Recovery | OK | OK | OK |
| Coaxial Vapor Recovery (4) | NO | OK | OK |