**Section 4.1: Spill Protection**

Spill protection devices are used at fill pipes to catch drips and small spills



that may occur when the delivery hose is disconnected from the fill pipe.

Many spill protection devices are called spill buckets or catchment basins.

* Spill protection is typically not designed to contain product for long periods of time.
* Some spill protection devices are equipped with a drain valve or manual pump which allows you to drain accumulated product into your tank. Be aware that when you drain the contents of a spill bucket into your tank, water and debris may also enter the tank. If spill protection is not equipped with a drain valve or pump, any product or water in your spill bucket will need to be removed manually and disposed of properly.

Sample Spill Bucket/Cross-Section

**Directions For Completing The Spill Protection Section**

|  |
| --- |
| Step 1: Determine if you have spill protection. (If you do not know if you have spill protection, read the information below this box to determine whether or not it has been installed).  Step 2: Read the requirements and best management practices on the next page.  Step 3: Fill out the checklist for spill protection and complete the question at the bottom of the last page of this section that summarizes your compliance with spill protection. |

**Take the following steps to figure out what is at your facility:**

1. Lift each fill port lid and look to see if you have spill

protection around your fill pipe.

1. Look through your old records to check if you had spill

protection installed.

1. Ask the contractor who installed your UST.

Sample Spill Protection



**Requirements And Best Management Practices For Spill Protection**

Sample Fill Area



Any UST that receives more than 25 gallons in a single delivery **must** have spill protection at each fill port where product delivery could occur.

Spill protection must prevent the release of product to the environment when the transfer hose is detached from the fill pipe. The spill protection cannot meet this requirement if it is not able to contain liquid or if it is full of liquid or solid debris when the tank is being filled.

* Periodically check to see if your spill protection will hold liquid.
* Periodically inspect your spill protection for signs of wear, cracks, or holes.
* Make sure your spill protection is empty of liquid and debris before and after each delivery.



Even though tanks that ***never*** receive deliveries of more than 25 gallons of product at a time are not required to have spill protection, you should consider using spill protection as part of good UST system management. Many used oil tanks fall into this category.

**Checklist For Spill Protection**

| **Circle the UST number for each UST that you have identified in the UST identification table in the beginning of chapter 4. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Does your UST ever receive more than 25 gallons of product at a time?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3**  **N** | **4Y** | **4N** | **5Y** | **5N** |
| **If you answered yes for an UST,** you must answer the remaining questions in this checklist for that UST.  **If you answered no for an UST,** you are not required to have spill protection and do not need to answer any additional questions for that UST. That UST is in compliance with the spill protection requirements. | | | | | | | | | | | |
| **2. Do you have spill protection for each tank that receives more than 25 gallons of product at a time?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Have spill protection (such as a spill bucket) properly installed. | | | | | | | | | | | |
| **3. Will your spill protection prevent the release of product to the environment when the transfer hose is detached from the fill pipe?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Have your spill protection emptied, repaired, or replaced so it will prevent a release to the environment when the transfer hose is detached from the fill pipe. | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Spill Protection** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Are all of your USTs in compliance with spill protection?**  To answer **yes** here, you must have either:  a) answered yes to all questions above, or  b) answered no to question 1 above. |  |  |
| **If you answered no,** fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |
| **(Copy your yes or no answer to question 1 of the certification of compliance form in appendix A)** | | |

**Section 4.2: Correct Filling Practices**

**Requirements And Best Management Practices For Correct Filling Practices**

As an owner or operator, you are responsible for any releases of product that occur due to spilling or overfilling during product delivery.

* + You must make sure the amount of product to be delivered will fit into the available empty space in the tank.
* You must make sure the transfer operation is monitored constantly to prevent overfilling and spilling.



A good management practice that will help you meet the correct filling practice requirements is to make sure the activities below are performed each time you have product delivered to your tank. The table below describes activities to perform before, during, and after product delivery.

|  |
| --- |
| Activities To Perform Before, During, And After Product Delivery |

|  |  |
| --- | --- |
| **What To Do Before Your Tanks Are Filled** | 1. Determine and record accurate readings for product and water in the tank before product delivery. 2. Order only the quantity of product to fill 90 percent of the tank. **Remember, the formula for determining the amount of product to order is:**   **[tank capacity (gallons) X 90% ] — gallons of product in tank now = amount to order**  **Example:** You have a 10,000 gallon tank and currently have 2,000 gallons in the tank. **(10,000 gal X 0.9 ) — 2,000 gal = 7,000 gal (amount to order)**   1. Make sure the delivery person knows which type of overfill device is on the tank and what actions to perform if it activates. One way to do this is to post a copy of the appropriate sign provided in appendix G where the delivery person will see it. 2. Review and understand the spill response procedures. 3. Make sure the spill bucket is empty, clean, and will contain spills. |
| **What To Do While Your Tanks Are Being Filled** | 1. Have an accurate tank capacity chart available for the delivery person. 2. Have a person responsible for monitoring the delivery available each time tanks are being filled. The delivery person makes all hook-ups. The person monitoring the delivery should be prepared to stop the flow of product from the truck to the tank at any time and respond to any unusual condition, leak, or spill. 3. Make sure spill response supplies are available in case a spill or overfill occurs. 4. Make sure there are safety barriers around the delivery area. 5. Make sure there is adequate lighting around the delivery area. |
| **What To Do After Your Tanks Are Filled** | 1. Have a person available to monitor the disconnection of hook-ups following delivery. The delivery person disconnects the hook-ups. 2. Determine and record accurate readings for product and water in the tank after delivery. 3. Verify the amount of product received. 4. Make sure fill ports are properly secured. 5. Make sure the spill bucket is free of product and clean up any small spills. |

**Section 4.3: Overfill Protection**

Overfill protection equipment installed on USTs helps prevent your tanks from being overfilled during product delivery. Overfill protection is designed to stop product flow, reduce product flow, or alert the delivery person during delivery **before** the tank becomes full and begins releasing product into the environment.



There are three common types of overfill protection:

1. overfill alarms
2. automatic shutoff devices
3. ball float valves

**Directions For Completing The Overfill Protection Section**

Step 1: Fill out the table on the next page to identify the type of overfill protection you have for each UST.

* **Different tanks at your facility may have different types of overfill protection. Make sure to select the appropriate type of overfill**

**protection for each tank at your facility.**

* **Some of your tanks may have more than one type of overfill protection. Only choose one type of overfill protection for each tank for this workbook. You only need to meet the requirements for one type of overfill protection for each tank.**

Step 2: For each type of overfill protection you checked in the table, go to the

corresponding section listed in the far-right column. Read the requirements and best management practices and fill out the appropriate checklist(s) in that section. You may need to go to more than one section and fill out more than one checklist – each overfill protection type has a separate checklist.

Step 3: Once you have completed the checklists for all of your overfill protection type(s), turn to the last page of this section and complete the question that summarizes your compliance with overfill protection.

**Identifying The Types Of Overfill Protection You Have**

|  |
| --- |
| Identify the type of overfill protection you have for each UST in the table below and proceed as instructed in the far-right column.    **If you do not know the type of overfill protection you have**, read the information below the table to help you. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Choose the type of overfill protection used for each tank by checking the appropriate boxes** | | | | | | **Go to these sections for information and compliance checklists** |
| **UST Number:** | **1** | **2** | **3** | **4** | **5** |
| Overfill Alarm |  |  |  |  |  | Section 4.3.1 |
| Automatic Shutoff Device |  |  |  |  |  | Section 4.3.2 |
| Ball Float Valve |  |  |  |  |  | Section 4.3.3 |
| No Overfill Protection |  |  |  |  |  | Section 4.3.4 |

**Take the following steps to figure out what is at your facility.**

1. Read the descriptions below to determine if you have overfill protection.
2. Look through your old records to see if you had overfill protection installed. Check for the names of the overfill protection type.
3. Ask the contractor who installed your UST.

Sample Schematic For An Overfill Alarm



**Descriptions Of Different Types Of Overfill Protection**

**Overfill Alarms** - An overfill alarm has a sensor in the tank. The sensor is typically connected to a monitoring device such as an automatic tank gauge (ATG). An overfill alarm provides a warning that can be seen or heard (or both) by the person delivering the product when the tank is close to being full.



Sample Overfill Alarm

**Automatic Shutoff Devices** - An automatic shutoff device is located at the fill pipe of your tank. Look down your fill pipe to see part of this device. You will see what appears to be a line cutting through your fill pipe (or a half moon shape in your fill pipe).



Diagram Of An Automatic Shutoff Device





Looking Through The End Of Automatic Shutoff Device

Looking Down A Fill Pipe At

An Automatic Shutoff Device



**Ball Float Valves** – A ball float valve is located

Sample Ball Float Valves

inside the tank where the vent line exits the tank. You might find it difficult to determine whether or not you have this device because of where it is located. You might be able to find an extractor port for the ball float valve (see picture below). Otherwise, you will need to look through your paperwork to determine whether your tank has this device; or you should ask the contractor who installed your tanks.





Closeup Of Extractor Port

Sample Extractor Port

Sample

Ball Float

Valve



|  |
| --- |
| **4.3.1 Overfill Alarms** |

Overfill alarms send a warning that can be seen or heard by the person responsible for monitoring the delivery of product to your tank. The warning activates when the UST is approaching tank capacity and warns the delivery person to stop delivery. When the alarm activates, the delivery person should immediately stop the flow of product to the tank.



**Requirements And Best Management Practices For Overfill Alarms**

You must have overfill protection (for example, an overfill alarm) for every UST that is filled with more than 25 gallons of product at one time.



The overfill alarm must activate when the product in the tank reaches 90 percent of the tank capacity or is within one minute of being overfilled.



The overfill alarm must be located so it can be seen and/or heard from where the UST is filled. This ensures that the person responsible for monitoring the delivery will know when the tank is almost full.





A qualified UST contractor should periodically check your overfill alarm to make sure it is functioning properly.

You should inform your delivery person you have an overfill alarm.



1. You could place a durable sign near each fill pipe. The sign should be **in clear view of the delivery person.** It should say there is an overfill alarm for this tank, what occurs when the alarm activates, and indicate the necessary actions to take. See the sample sign in appendix G as a reference.

# Overfill Protection Checklist For USTs With Overfill Alarms

| **Circle the UST number for each UST that has an overfill alarm. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | | **Yes (Y) or No (N)** | | | | | | | | | |
| **1. Is your UST ever filled with more than 25 gallons of product at one time?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If you answered yes for an UST,** you must answer the remaining questions in this checklist for that UST.  **If you answered no for an UST,** you are not required to have an overfill device. This UST is in compliance with the overfill requirements. Skip questions 2 and 3 below. | | | | | | | | | | | |
| **2. Does your overfill alarm activate at 90 percent of tank capacity or at least one minute before being overfilled?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Have a qualified person adjust your overfill alarm so it activates at 90 one of tank capacity or at least one minute before being overfilled. | | | | | | | | | | | |
| **3. Can your overfill alarm be seen and/or heard from the delivery location so it will alert the delivery person that the tank is almost full?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Have a qualified person fix your overfill alarm so it can be seen and/or heard from the delivery location. | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Overfill Alarms** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Are all of your USTs with an overfill alarm in compliance with overfill protection?**  To answer **yes** here, you must have either:  a) answered yes to all questions above, or  b) answered no to question 1 above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

|  |
| --- |
| **4.3.2 Automatic Shutoff Devices** |

The automatic shutoff device slows down and stops the flow of product during delivery when the product has reached a certain level in the tank.



**Requirements And Best Management Practices For Automatic Shutoff Devices**



You must have overfill protection (for example, an automatic shutoff device) for every UST that is filled with more than 25 gallons of product at one time.



Automatic shutoff devices must activate when the product in the tank reaches 95 percent of the tank capacity or before the fittings at the top of the tank are exposed to product.

* There must not be anything in the fill pipe that would keep the shutoff mechanism from working properly.
* The automatic shutoff device must be placed so the float arm is not blocked and can move through its full range of motion.

A qualified UST contractor should periodically check your automatic shutoff device to make sure it is functioning properly.



You should inform your delivery person you have an automatic shutoff device.



1. You could place a durable sign near each fill pipe. The sign should be **in clear view of the delivery person.** It should say there is an automatic shutoff device for this tank, what occurs when the device activates, and indicate the necessary actions to take. See the sample sign in appendix G as a reference.



You should not use an automatic shutoff device for overfill protection if your tank receives pressurized deliveries because it might create dangerous situations (such as pressure building up in the tank) and result in gasoline spraying onto the delivery person or into the environment.

# Overfill Protection Checklist For USTs With Automatic Shutoff Devices

| **Circle the UST number for each UST that has an automatic shutoff device. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Is your UST ever filled with more than 25 gallons of product at one time?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If you answered yes for an UST,** you must answer the remaining questions in this checklist for that UST.  **If you answered no for an UST,** you are not required to have an overfill device. This UST is in compliance with the overfill requirements. Skip question 2 below. | | | | | | | | | | | |
| **2. Does your automatic shutoff device properly activate at 95 percent of tank capacity or before the fittings at the top of the tank are exposed to product?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Have a qualified person adjust your automatic shutoff device to properly activate at 95 percent of the tank capacity or before the fittings at the top of the tank are exposed to product. | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Automatic Shutoff Devices** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Are all of your USTs with automatic shutoff devices in compliance with overfill protection?**  To answer **yes** here, you must have either:  a) answered yes to all questions above, or  b) answered no to question 1 above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

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| --- |
| **4.3.3 Ball Float Valves** |

The ball float valve (also called a flow vent valve) is installed at the vent line in the tank. The valve restricts vapor flow from the UST as the tank gets close to full. As the tank fills, the ball in the valve rises, restricting the flow of vapors out of the UST during delivery. The flow rate of the delivery will decrease noticeably and should alert the person responsible for monitoring the delivery to stop the delivery.



**Requirements And Best Management Practices For Ball Float Valves**

You must have overfill protection (for example, a ball float valve) for every UST that is filled with more than 25 gallons of product at one time.



Ball float valves must begin restricting vapor flow out of the tank when product in the tank reaches 90 percent of tank capacity or at least 30 minutes before the tank will be overfilled. For ball float valves to work properly:



1. the air hole in the ball float valve must be open,
2. the ball cage must be intact,
3. the ball must move freely in the cage,
4. the ball must seal tightly on the pipe, and
5. the top of the tank must be air tight during delivery so vapors cannot escape from the tank. Everything in the tank (such as other tank access ports, fittings, and drain mechanisms on spill buckets) must be tight and able to hold the pressure created when the ball float valve engages.

A qualified UST contractor should periodically check your ball float valve to make sure it is functioning properly.



You should inform your delivery person you have a ball float valve.



1. You could place a durable sign near each fill pipe. The sign should be **in clear view of the delivery person.** It should say there is a ball float valve for this tank, what occurs when the device activates, and indicate the necessary actions to take. See the sample sign in appendix G as a reference.



You should not use a ball float valve for overfill protection if any of the following conditions apply because you could create overfills or dangerous situations (such as pressure building up in the tank) and result in gasoline spraying onto the delivery person or into the environment.

Do not use ball float valves if:

1. Your UST receives pressurized deliveries
2. Your UST has suction piping
3. Your UST has coaxial stage I vapor recovery

**Overfill Protection Checklist For USTs With Ball Float Valves**

| **Circle the UST number for each UST that has a ball float valve. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Is your UST ever filled with more than 25 gallons of product at one time?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If you answered yes for an UST,** you must answer the remaining questions in this checklist for that UST.  **If you answered no for an UST,** you are not required to have an overfill device. This UST is in compliance with the overfill requirements. Skip question 2 below. | | | | | | | | | | | |
| **2. Does your ball float valve slow the flow of product when the tank is 90 percent full or at least 30 minutes before the tank will be overfilled?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Have a qualified person adjust your ball float valve to the right height so it restricts flow at 90 percent of tank capacity or at least 30 minutes before the tank will be overfilled. | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Ball Float Valves** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Are all of your USTs with ball float valves in compliance with overfill protection?**  To answer **yes** here, you must have either:  a) answered yes to all questions above, or  b) answered no to question 1 above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

|  |
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| **4.3.4 No Overfill Protection** |

**Requirements And Best Management Practices For USTs With No Overfill Protection**

An UST that is **never** filled with deliveries of more than 25 gallons of product at one time does not need overfill protection. **You must have overfill protection for every UST that is filled with more than 25 gallons of product at one time.**



Consider using overfill protection for USTs that never receive deliveries of more than 25 gallons of product at one time. Overfill protection is part of good UST system management.



**Overfill Protection Checklist For USTs Without Overfill Protection**

| **Circle the UST number for each UST that does not have overfill protection. This means the UST does not have an overfill alarm, automatic shutoff device, or ball float valve. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Question** | | **Circle Yes (Y) or No (N** | | | | | | | | | |
| **1. Does each UST circled above only receive product in amounts of 25 gallons or less?** | | **1Y** | **1N** | **2Y** | **2N** | **3Y** | **3**  **N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Have a qualified person properly install an overfill protection device. | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance For USTs With No Overfill Protection** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Are all of your USTs with no overfill protection in compliance?**  To answer **yes** here, you must have answered yes to the question above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

**Summary Of Compliance With Overfill Protection**

Make sure you read and complete the checklists in the appropriate overfill protection sections for all of your USTs before answering the question below.

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Overfill Protection** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Are all of your USTs in compliance with overfill protection?**  To answer **yes** here, you must have answered yes to all summary questions for each overfill protection device you use for compliance at your facility. |  |  |
| **If you answered no**, complete and submit a return to compliance plan addressing each area of non-compliance. A return to compliance plan form is in appendix B. | | |
| **(Copy your yes or no answer to question 3 of the certification of compliance form in appendix A)** | | |

**Section 4.4: Corrosion Protection For Tanks**

All of your regulated tanks that are underground and routinely contain product



must be protected from corrosion.

You can protect your underground tanks from corrosion in several ways. Your tanks may be:

* made of fiberglass reinforced plastic (FRP),
* steel that is coated and cathodically protected,
* steel that is jacketed or clad with a non-corrodible material (such as fiberglass),
* steel that is cathodically protected and/or internally-lined (this option is only allowed for older tanks installed on or before December 22, 1988), or
* metal without additional corrosion protection (if specific criteria are met).

Internal lining and cathodic protection require periodic operation and maintenance activities.

All underground tanks installed after December 22, 1988 need to meet all appropriate construction standards and must be installed according to a standard code of practice and manufacturer’s instructions.



All tanks must be made of or lined with materials that are compatible with the substance stored in the UST.





Keep all paperwork related to your corrosion protected tanks (examples include paperwork related to: installation, cathodic protection, integrity assessment, repair, and internal lining).

**Directions For Completing The Corrosion Protection For Tanks Section**

Step 1: Fill out the table on the next page to identify the type of tank you have for each

UST.

If you have **compartmentalized tanks**, treat each compartment as a separate UST. If you have **manifolded tanks**, treat each tank as a separate UST.

Step 2: For each type of tank you checked in the table, go to the corresponding section listed in the far-right column. Read the requirements and best management practices and fill out the appropriate checklist(s) in that section. You may need to go to more than one section and fill out more than one checklist – each tank type has a separate checklist.

Step 3: Once you have completed the checklists for all of your tank types, turn to the last page of this section and complete the question that summarizes your compliance with tank corrosion protection.

**Identifying The Types Of Tanks You Have**

|  |
| --- |
| Identify the type of tank you have for each UST in the table below and proceed as instructed in the far-right column.  **If you do not know the types of tanks you have,** read the information below the table to help you. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Choose the type of tank you have for each UST by checking the appropriate boxes** | | | | | | **Go to these sections for information and compliance checklists** |
| **UST Number:** | **1** | **2** | **3** | **4** | **5** |
| Fiberglass Reinforced Plastic (FRP) Tank |  |  |  |  |  | Section 4.4.1 |
| Jacketed Steel Tank |  |  |  |  |  | Section 4.4.1 |
| Clad Steel Tank |  |  |  |  |  | Section 4.4.1 |
| Coated And Cathodically Protected Steel Tank |  |  |  |  |  | Section 4.4.2 |
| Cathodically Protected Steel Tank |  |  |  |  |  | Section 4.4.3 |
| Internally-Lined Steel Tank |  |  |  |  |  | Section 4.4.4 |
| Internally-Lined And Cathodically Protected Steel Tank |  |  |  |  |  | Section 4.4.5 |
| Metal Tank With No Additional Corrosion Protection |  |  |  |  |  | Section 4.4.6 |

If your tank type is not listed above, contact {state} to determine what you must do.

**Take the following steps to figure out what is at your facility.**

1. Read the descriptions below to determine which tank types you have.
2. Look through your old records to see if you have tank installation information. Check for the names of the tank types.
3. Ask the contractor who installed your tank.

**Tank Type Descriptions**

**Fiberglass Reinforced Plastic (FRP) Tank** - This tank is made of fiberglass reinforced plastic. Examples of current and past FRP tank makers include Owens Corning, Xerxes, Cardinal, Fluid Containment, and Containment Solutions.

**Jacketed Steel Tank** - This is a steel tank that is encapsulated (or jacketed) in a non-corrodible, nonmetallic material such as fiberglass or polyethylene. This tank is secondarily contained. There is a space between the steel wall and the jacket material. This space may be monitored for a breach of either the inner wall or outer jacket. Examples of jacketed tank brands include: Permatank®, Glasteel II®, Titan®, Total Containment®, and Elutron®.

**Clad Steel Tank** - This tank is a steel tank that has a thick layer of non-corrodible material such as fiberglass or urethane that is mechanically bonded (clad) to the outside of the steel tank. This cladding helps protect the outside of the steel wall from corroding. Examples of clad tank brands include: ACT-100®, ACT-100-U®, Glasteel®, and Plasteel®.

**Coated And Cathodically Protected** **Steel Tank** - This is a steel tank that has both an external coating and cathodic protection. An example of a coated and cathodically protected tank brand is the sti-P3® tank. This type of tank is usually installed with galvanic (sacrificial) anodes for cathodic protection. However, these tanks may have an impressed current cathodic protection system if the galvanic (sacrificial) anodes no longer protect the tank from corrosion. **If you are not sure whether you have a cathodic protection system, see the *Determining If You Have Cathodic Protection* section below.**

**Cathodically Protected Steel Tank** - This is a steel tank that has a cathodic protection system but does not have an external coating. Typically, this type of tank was originally installed as a bare steel tank before December 22, 1988 and had cathodic protection installed at some later date. Tanks installed after December 22, 1988 are required to be both coated and cathodically protected. Usually this type of tank will have an impressed current cathodic protection system. **If you are not sure whether you have a cathodic protection system, see the *Determining If You Have Cathodic Protection* section below.**

**Internally-Lined Steel Tank** - This is a steel tank with an internal lining. Typically, this type of tank was originally installed as a bare steel tank before December 22, 1988 and had an internal lining installed at some later date.

**Internally-Lined And Cathodically Protected Steel Tank** - This is a steel tank that has both an internal lining and cathodic protection. Typically, this type of tank was originally installed as a bare steel tank before December 22, 1988 and had cathodic protection and internal lining installed at some later date. Usually this type of tank will have an impressed current cathodic protection system. **If you are not sure whether you have a cathodic protection system, see the *Determining If You Have Cathodic Protection* section below.**

**Metal Tank With No Additional Corrosion Protection** - This is a tank made of metal such as steel or copper. It does not have cathodic protection, internal lining, or any non-corrodible material that encapsulates or bonds to the outside of the tank.





Sample Rectifier

**Determining If You Have Cathodic Protection** - There are two types of cathodic protection systems commonly used to protect your steel tank from corrosion - impressed current and galvanic (sacrificial) anodes.



Sample Rectifier

**Impressed Current System** - If you have an impressed current system, you will have a rectifier (a device for converting alternating current into direct current) located somewhere at your facility.

**Galvanic (Sacrificial) Anode System** - It is more

difficult to tell if you have this type of cathodic protection system because the anodes are buried and attached to the tank. You cannot see the anodes and there is no rectifier. Look at any installation paperwork you have or ask the contractor who installed the tank or cathodic protection system to determine if you have a galvanic (sacrificial) anode system. For example, a sti-P3® tank commonly uses a galvanic (sacrificial) anode system.

Fiberglass reinforced plastic (FRP) tanks, jacketed steel tanks, and clad steel tanks meet the corrosion protection requirements without additional equipment or operation and maintenance.



**4.4.1: Fiberglass Reinforced Plastic Tanks**, **Jacketed Steel Tanks, And Clad Steel Tanks**

**Best Management Practices For Fiberglass Reinforced Plastic Tanks**





Sample FRP Tank

Have your fiberglass reinforced plastic tanks periodically checked for deflection (deflection is a measure of the roundness of your tank). Since these tanks are made from materials considered to be sensitive to flexing, over deflection may result in cracking and a leak. Allowable deflections vary with tank diameters and may be measured by following the manufacturer’s installation checklist.

**Best Management Practices For Jacketed Steel Tanks**





Sample Piece Of A Jacketed Tank

Have your jacketed steel tanks periodically tested by a qualified contractor to make sure the space between the steel tank and secondary jacket is tight. This space is known as the interstitial space or secondary containment area. If your primary tank wall would leak and the secondary containment jacket was not tight, a release could get into the environment and result in cleanup that could be costly and time-consuming.

**Best Management Practices For Clad Steel Tanks**



Sample Clad Tank

Some clad steel tanks may also have cathodic protection. If you have clad steel tanks that have cathodic protection, then consider having your cathodic protection system tested periodically to make sure it is operating properly.



**Corrosion Protection Checklist For Fiberglass Reinforced Plastic Tanks, Jacketed Steel Tanks, And Clad Steel Tanks**

| **Circle the UST number for each clad steel tank, jacketed steel tank, or fiberglass reinforced plastic tank.** | **UST # =** | **1** | **2** | **3** | **4** | **5** |
| --- | --- | --- | --- | --- | --- | --- |
| **There are no corrosion protection questions for fiberglass reinforced plastic tanks, jacketed steel tanks, and clad steel tanks.** | | | | | | |
| Fiberglass reinforced plastic tanks, jacketed steel tanks, and clad steel tanks are in compliance with corrosion protection requirements. | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Corrosion Protection For Fiberglass Reinforced Plastic, Jacketed Steel, And Clad Steel Tanks** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Do your fiberglass reinforced plastic tanks, jacketed steel tanks, and clad steel tanks meet the corrosion protection requirements?** |  |  |

**4.4.2: Coated And Cathodically Protected Steel Tanks**



This type of tank has both a coating and cathodic protection on the outside wall of the tank. The coating is typically applied to the tank at the factory. The cathodic protection may be either impressed current or galvanic (sacrificial) anodes. **See section 4.4.3 if you have a steel tank that is cathodically protected but is not coated.**

**Requirements For Coated And Cathodically Protected Steel Tanks**

The coating must be made of a suitable dielectric material (a material that isolates the tank from the surrounding soil and does not conduct electricity). Coal tar epoxy, urethane, and isophthalic polyester resins are examples of generic types of coatings used on coated and cathodically protected steel tanks.



You must comply with specific testing and record keeping requirements for cathodic protection. Descriptions of cathodic protection, requirements and best management practices, and checklists for cathodic protection are in section 4.6. **Before completing the checklist on the next page, you will need to read the cathodic protection section and fill out the checklists in that section.**



An example of a commonly used coated and cathodically protected steel tank is the sti-P3® tank. This tank has a dielectric coating on the outside and has galvanic (sacrificial) anodes attached to the outside of the tank. You may have had impressed current added to your sti-P3® tank at some time in the past – this tank is still considered to be coated and cathodically protected.

Sample Coated And Cathodically Protected Tank

**Corrosion Protection Checklist**



**For Coated And Cathodically Protected Steel Tanks**

| **Circle the UST number for each steel tank that is coated and cathodically protected. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Is your tank coated with a suitable dielectric material?**  If you don’t know whether your tank is coated with a suitable dielectric material, try to determine if your tank is a sti-P3® tank or determine if you meet the requirements for cathodically protected steel tanks in section 4.4.3. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |
| **2. Do you meet the requirements for your cathodic protection system?** Complete section 4.6, *Cathodic Protection* to answer this question. Copy the answer from the summary of compliance question in section 4.6 to this table. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** You must take action to comply with the requirements in section 4.6, *Cathodic Protection*. | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Corrosion Protection For Coated And Cathodically Protected Steel Tanks** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Do your coated and cathodically protected steel tanks meet corrosion protection requirements?**  To answer **yes** here, you must have answered yes to all questions above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

**4.4.3: Cathodically Protected Steel Tanks**

This type of tank has cathodic protection on the outside of the tank. There is no coating (or no known coating) on this tank. The cathodic protection may be either impressed current or galvanic (sacrificial) anodes. **See section 4.4.2 if you have a steel tank that is coated and cathodically protected.**



**Requirements And Best Management Practices For Cathodically Protected Steel Tanks**

Only steel tanks that were installed on or before December 22, 1988 may use cathodic protection without a dielectric coating to comply with the corrosion protection requirements. If you have a coated and cathodically protected steel tank, go to section 4.4.2.



An integrity assessment of the tank must have been conducted before adding cathodic protection. Examples of methods of integrity assessment of a steel tank include:



* An internal inspection of the tank – a trained professional enters your tank to determine if it is structurally sound and free of corrosion holes.
* A video camera inspection of the tank combined with checking soil characteristics around the tank – the tank is emptied and a trained professional places a video camera into the fill ports of a tank to determine if the tank has any holes. The professional also takes some soil measurements to determine the corrosive characteristics of the soil around your tank. All of the information is used to determine whether the tank is structurally sound and free of corrosion holes.
* A detailed site evaluation is performed at your facility – a trained professional evaluates the site characteristics and places the information into a model that statistically determines the time it would take a steel tank to corrode through at that specific location. This information is compared to the age of the tank to statistically determine whether the tank is structurally sound and free of corrosion holes.



A code of practice must be followed when adding cathodic protection to a tank.

You must comply with specific testing and record keeping requirements for



cathodic protection. Descriptions of cathodic protection, requirements and best management practices, and checklists for cathodic protection are in section 4.6. **Before completing the checklist on the next page, you will need to read the cathodic protection section and fill out the checklists in that section**.

Keep records of your integrity assessment and cathodic protection installation. These records may be useful in determining whether your tank is in compliance with the corrosion protection requirements.



**Corrosion Protection Checklist For Cathodically Protected Steel Tanks**

| **Circle the UST number for each steel tank that is cathodically protected. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | | **Circle the Yes (Y) or No (N)** | | | | | | | | | |
| **1. Did the installation of this UST begin on or before December 22, 1988?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Cathodic protection without a coating is not an option for meeting the corrosion protection requirements for this tank. Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |
| **2. Did this tank pass an integrity assessment before cathodic protection was installed?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |
| **3. Do you meet the requirements for your cathodic protection system?** Complete section 4.6, *Cathodic Protection* to answer this question. Copy the answer from the summary of compliance question in section 4.6 to this table. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** You must take action to comply with the requirements in section 4.6, *Cathodic Protection*. | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Corrosion Protection For Cathodically Protected Steel Tanks** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Do your cathodically protected steel tanks meet corrosion protection requirements?**  To answer **yes** here, you must have answered yes to all questions above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

This tank is made of steel and has a lining attached to the inside wall of the tank. **See section 4.4.5 if you have a steel tank that is internally-lined and cathodically protected.**



**Requirements And Best Management Practices For Internally-Lined Steel Tanks**



Only steel tanks that were installed on or before December 22, 1988 may use internal lining alone to comply with the corrosion protection requirements.



If any repairs are performed when your tank is internally-lined, you must keep all records of those repairs for the life of the tank.

**4.4.4: Internally-Lined Steel Tanks**



A code of practice must be followed when adding an interior lining to a tank.

Within 10 years of lining, lined tanks must be internally inspected by a qualified contractor and found to be structurally sound with the lining still performing in accordance with original design specifications. After the initial 10 year inspection, these inspections must be conducted at least every 5 years.



Keep records of your lining installation and lining inspections. These records may be useful in determining whether your tank is in compliance with the corrosion protection requirements.



Even though a tank that has internal lining is not required to have external corrosion protection, you should consider adding cathodic protection as part of good UST system management. Note that if you add cathodic protection on your internally-lined tank, you must meet the inspection and testing requirements in section 4.6.



Sample Of A Tank’s Interior Being Lined



**Corrosion Protection Checklist For Internally-Lined Steel Tanks**

| **Circle the UST number for each steel tank that is internally-lined. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Insert the date of your lining installation for each tank you circled above (mm/dd/yy).** | |  | |  | |  | |  | |  | |
| **Questions** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Did the installation for this UST begin on or before December 22, 1988?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Internal lining is not an option for meeting the corrosion protection requirements for this tank. Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |
| **2. Do you have all records of repairs for your lined tank?**  If your lined tank has never been repaired, then answer yes to this question – you will not have any repair records. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Contact the inspector or repair company that worked on your tank lining. Obtain a record of any repairs completed on your lined tank. | | | | | | | | | | | |
| **3. Was your lined tank inspected within 10 years of lining installation and then every 5 years?** If your tank was lined less than 10 years ago and you have not had an inspection conducted, this question does not apply. Skip this question. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If your lined tank has been inspected, insert the date of your most recent inspection.** | |  | |  | |  | |  | |  | |
| **If no, then to return to compliance:** Have a lining inspection conducted on your lined tank. | | | | | | | | | | | |
| **4. Did your lined tank pass its most recent inspection?** If your tank was lined less than 10 years ago and you have not had an inspection conducted, this question does not apply. Skip this question. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Corrosion Protection For Internally-Lined Steel Tanks** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Do your internally-lined steel tanks meet corrosion protection requirements?**  To answer **yes** here, you must have answered yes to all applicable questions above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

This tank is made of steel, has a lining attached to the inside wall of the tank and cathodic protection on the outside wall of the tank. The cathodic protection may be either impressed current or galvanic (sacrificial) anodes.



**4.4.5: Internally-Lined And Cathodically Protected Steel Tanks**

**Requirements And Best Management Practices For Internally-Lined And Cathodically Protected Steel Tanks**

Only steel tanks that were installed on or before December 22, 1988 may use the combination of an internal lining and cathodic protection without a dielectric coating to comply with the corrosion protection requirements. **If you have a coated and cathodically protected steel tank, go to section 4.4.2.**



When you combine the use of internal lining and cathodic protection, you must meet specific testing and record keeping requirements for cathodic protection, which are in section 4.6. **Before completing the checklist on the next page, you will need to read the cathodic protection section and fill out the checklists in that section.**



You must also meet the lining requirements in section 4.4.4. **Before completing the checklist on the next page, you will need to read the internally-lined steel tank section and fill out the checklist in that section.**



You do not need inspections of the lined tank if both of the following apply to your lined and cathodically protected tank:

* the integrity of the steel tank was ensured when cathodic protection was installed, **and**
* the method of integrity assessment determined the steel tank shell was structurally sound and free of corrosion holes.

Examples of integrity assessments are provided in section 4.4.3.



Have your internal lining checked periodically even if the inspections are not required.



Keep records of your integrity assessment, lining, and cathodic protection installations. These records may be useful in determining whether your tank is in compliance with the corrosion protection requirements.

**Corrosion Protection Checklist**

**For Internally-Lined And Cathodically Protected Steel Tanks**

| **Circle the UST number for each steel tank that is internally-lined and cathodically protected. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Do you meet the requirements for your cathodic protection system?** Complete section 4.6, *Cathodic Protection* to answer this question. Copy the answer from the summary of compliance question in section 4.6 to this table. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** You must take action to comply with the requirements in section 4.6, *Cathodic Protection*. | | | | | | | | | | | |
| **2. Did this tank pass an integrity assessment when cathodic protection was installed?**  Information about the integrity assessment is in section 4.4.3. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If yes, then** answer question 4 for that tank (skip question 3).  **If no, then** answer question 3 for that tank (skip question 4). | | | | | | | | | | | |
| **3. Do you meet the lining requirements in section 4.4.4?**  To answer yes here, you must be in compliance with all of the lining requirements in section 4.4.4. Complete the internally-lined tank checklist in section 4.4.4 before answering this question. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** You must take action to meet the requirements described in section 4.4.4. | | | | | | | | | | | |
| **4. Do you meet the lining requirements for the first two questions in section 4.4.4?** To answer “Yes” here, you must be able to answer yes to the first two questions in section 4.4.4. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** You must take action to meet the requirements described in questions 1 and 2 of the checklist in section 4.4.4. | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Corrosion Protection For Internally-Lined**  **And Cathodically Protected Steel Tanks** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Do your internally-lined and cathodically protected steel tanks meet corrosion protection requirements?**  To answer **yes** here, you must have either:  a) answered yes to questions 1 and 3 above, or  b) answered yes to questions 1, 2, and 4 above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

**4.4.6: Metal Tanks With No Additional Corrosion Protection**

Buried metal tanks with no additional corrosion protection are not commonly used to meet the tank corrosion protection requirements. However, if your tanks meet the criteria below, this option may be used.



**Requirements For Metal Tanks With No Additional Corrosion Protection**

If you have a regulated underground metal tank without additional corrosion protection, you must either:



* have the record of a corrosion expert’s determination that your UST site is not corrosive enough to cause the tank to have a release due to corrosion during the operating life of the tank, or
* have evidence to indicate {state} made a determination the tank construction and corrosion protection were designed to prevent the release or threatened release of any stored product.

**It is unusual to have a metal tank without additional corrosion protection.**

**Corrosion Protection Checklist**

**For Metal Tanks With No Additional Corrosion Protection**

| **Circle the UST number for each tank that is a metal tank with no additional corrosion protection. Answer the question below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Question** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Do you have a record or evidence a determination was made either by a corrosion expert or the state UST agency that your metal tank will not have a release due to corrosion during its operating life?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If you answered no, then to return to compliance:** Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Corrosion Protection For Metal Tanks**  **With No Additional Corrosion Protection** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Do your metal tanks meet corrosion protection requirements?**  To answer **yes** here, you must have answered yes to the question above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

Make sure you read and complete the checklists in the appropriate tank corrosion protection sections for all of your underground tanks before answering the question below.

**Summary Of Compliance With Tank Corrosion Protection**

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Tank Corrosion Protection** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Do all of your underground tanks meet corrosion protection requirements?**  To answer **yes** here, you must have answered yes to all previous summary questions for each type of tank at your facility. |  |  |
| **If you answered no**, complete and submit a return to compliance plan addressing each area of non-compliance. A return to compliance plan form is in appendix B. | | |
| **(Copy your yes or no answer to question 4 of the certification of compliance form in appendix A)** | | |

**Section 4.5: Corrosion Protection For Piping**

All of your regulated piping that is in contact with the ground and routinely contains product must be protected from corrosion – **this piping is often underground or buried**. Note: fill pipes and vent lines do not usually need corrosion protection because these components do not routinely contain product.



You can protect your piping from corrosion in several ways. It may be:

* made of a non-corrodible material (such as fiberglass or flexible plastic),
* steel that is coated and cathodically protected,
* metal that is cathodically protected (this option is only allowed for older piping that was installed on or before December 22, 1988), or
* metal without additional corrosion protection (if specific criteria are met).

**Cathodic protection requires periodic operation and maintenance.**

All of your piping that is in contact with the ground and routinely contains product that was installed after December 22, 1988 needs to meet all appropriate construction standards and be installed according to a standard code of practice and the manufacturer’s instructions.





All of your underground piping must be made of or lined with materials that are compatible with the substance that is stored in the UST.



Keep all paperwork related to your corrosion protected piping (examples include paperwork related to: installation, cathodic protection, and repair).

**Directions For Completing The Corrosion Protection For Piping Section**

Step 1: Fill out the table on the next page to identify the types of piping you have for each UST.

**Your UST may have different types of piping. For example, part of the piping that goes from the tank to the dispenser may be made of nonmetal and part of it may be made of metal. In addition, you may have piping that goes from one tank to another (such as piping between manifolded tanks). Make sure that you select all types of piping associated with each UST.**

Step 2: For each type of piping you checked in the table, go to the corresponding section listed in the far-right column. Read the requirements and best management practices and fill out the appropriate checklist(s) in that section. You may need to go to more than one section and fill out more than one checklist - each piping type has a separate checklist.

Step 3: Once you have completed the checklists for all of your piping types, turn to the last page of this section and complete the question that summarizes your compliance with piping corrosion protection.

**Identifying The Types Of Piping You Have**

|  |
| --- |
| Identify the types of piping you have for each UST in the table below and proceed as instructed in the far-right column.  **If you do not know the types piping you have,** read the information below the table to help you. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Choose the types of piping you have for each UST by checking the appropriate boxes.** | | | | | | **Go to these sections for information and compliance checklists** |
| UST Number | **1** | **2** | **3** | **4** | **5** |
| Fiberglass Reinforced Plastic Piping |  |  |  |  |  | Section 4.5.1 |
| Flexible Plastic Piping |  |  |  |  |  | Section 4.5.1 |
| Coated And Cathodically Protected Steel Piping |  |  |  |  |  | Section 4.5.2 |
| Cathodically Protected Metal Piping |  |  |  |  |  | Section 4.5.3 |
| Metal Piping With No Additional Corrosion Protection |  |  |  |  |  | Section 4.5.4 |
| No Piping In Contact With The Ground |  |  |  |  |  | No Requirements |

If your piping type is not listed above, contact {state} to determine what you must do.

**Take the following steps to figure out what is at your facility.**

1. Read the descriptions below to determine which types of piping you have.
2. Look in your dispenser sumps and turbine sumps (these are areas under your dispenser and above your tank where piping and other equipment are located) to see if you can identify the piping. Some piping may have metal flexible connectors in these areas. Look for the piping beyond the metal flexible connectors.
3. Look through your old records to see if they match any of the names in the descriptions.
4. Ask the contractor who installed your piping.

**Piping Type Descriptions**



Sample FRP Piping

**Fiberglass Reinforced Plastic (FRP) Piping** - This piping is nonmetal and is made of fiberglass reinforced plastic. It is a rigid piping (not flexible). Examples of FRP piping makers include Ameron and Smith Fiberglass Products Inc. This piping type may also have metal connectors associated with it.

**Coated And Cathodically Protected Steel Piping** - This is steel piping that has both an external coating and cathodic protection. **If you are not sure whether you have a cathodic protection system, see the *Determining If You Have Cathodic Protection* section on the next page.**

**Cathodically Protected Metal Piping** - This is metal piping without an external coating that has a cathodic protection system. Typically, this type of piping was originally installed as a bare metal before December 22, 1988 and had cathodic protection installed at some later date. Piping installed after December 22, 1988 must be both coated and cathodically protected. **If you are not sure whether you have a cathodic protection system, see the *Determining If You Have Cathodic Protection* section below.**

**Metal Piping With No Additional Corrosion Protection** - This is metal piping that does not have any additional corrosion protection.

**Flexible Plastic Piping** - This type of piping is made of plastic that is flexible. Examples of nonmetal flexible piping brand names include: Poly-Tech, Dualoy 3000, EnviroFlex, GeoFlex, Perma-Flexx, Omniflex, and Co-FlexTM. This piping type may also have metal connectors associated with it.





Sample Flexible Piping

Sample Flexible Piping







Sample Flexible Piping

Closeup Of Flexible Piping In A Sump

Sample Flexible Piping

In A Sump

**Determining If You Have Cathodic Protection**

There are two types of cathodic protection systems commonly used to protect your metal piping from corrosion - impressed current and galvanic (sacrificial) anodes.

**Impressed Current System** - If you have an impressed current system, you will have a rectifier (a device which converts alternating current into direct current) located somewhere at your facility. Sample pictures of rectifiers are provided in section 4.4.

**Galvanic (Sacrificial) Anode System** - It is more difficult to tell if you have this type of cathodic protection system because the anodes are buried and attached to the piping. You cannot see them and there is no rectifier. Look at any installation paperwork you have or contact the contractor who installed the piping or cathodic protection system to try to determine if you have a galvanic (sacrificial) anode system.

**4.5.1: Fiberglass Reinforced Plastic Piping And Flexible Plastic Piping**

**Fiberglass reinforced plastic (FRP) piping** and **flexible plastic piping** are made of non-corrodible materials and both meet the corrosion protection requirements without additional equipment or operation and maintenance. However, these types of piping may have metal joints and connectors that are in contact with the ground and routinely contain product. These metal components must be protected from corrosion.



**Requirements For Fiberglass Reinforced Plastic (FRP) Piping And Flexible Plastic Piping**

Any metal piping components associated with these types of piping that are in contact with the ground and routinely contain product, such as turbine pump heads, metal flexible connectors, and metal swing joints must be protected from corrosion by one of the following:



1. Isolating the metal component from direct contact with the ground (for example: by putting a protective covering or boot on a flexible connector or by moving the soil so it is not in contact with the metal component).
2. Cathodically protecting metal components in contact with the ground. If you cathodically protect the metal component, you must meet the cathodic protection requirements in section 4.6. **Before completing the checklist on the next page, you will need to read the cathodic protection section and fill out the checklists in that section.**

**Corrosion Protection Checklist For Fiberglass Reinforced**

**Plastic Piping And Flexible Plastic Piping**

| **Circle the UST number for each UST that has FRP or flexible plastic piping. Answer the questions below for each UST you circled.** | **UST# =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Are all of your buried metal piping components associated with your fiberglass reinforced plastic piping or flexible plastic piping isolated so that no metal is in contact with the soil (for example, your metal piping components may have a protective covering or are not in contact with the ground)?** If you have no metal piping components, answer yes to this question. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| For each UST for which you answered yes to this question, skip questions 2 and 3. That UST is in compliance with piping corrosion protection. | | | | | | | | | | | |
| For each UST for which you answered no to this question, proceed to question 2 and answer it. | | | | | | | | | | | |
| **2. Are all of your buried metal components associated with your fiberglass reinforced plastic piping or flexible plastic piping cathodically protected?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If you answered no to both questions 1 and 2 for a given UST, then to return to compliance:** Have your metal piping components isolated from the soil, cathodically protected, or have the soil removed so they are no longer in contact with the ground. | | | | | | | | | | | |
| **3. Do you meet the requirements for your cathodic protection system?** Complete section 4.6, *Cathodic Protection* to answer this question. Copy the answer from the summary of compliance question in section 4.6 to this table. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** You must take action to comply with the requirements in section 4.6, *Cathodic Protection*. | | | | | | | | | | | |

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| **Summary Of Compliance With Corrosion Protection For Fiberglass Reinforced**  **Plastic And Flexible Plastic Piping** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Does your fiberglass reinforced plastic piping or flexible plastic piping (and any associated metal piping components) meet corrosion protection requirements?**  To answer **yes** here, you must have either :  a) answered yes to question 1 above, or  b) answered yes to questions 2 and 3 above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

This type of piping has a coating on the outside of the piping and cathodic protection on the outside of the piping. Cathodic protection may be either impressed current or galvanic (sacrificial) anodes. **See section 4.5.3 if you have metal piping that is cathodically protected but is not coated.**



**4.5.2: Coated And Cathodically Protected Steel Piping**

**Requirements For Coated And Cathodically Protected Steel Piping**

The coating is on the outside of the piping and must be made of a suitable dielectric material (a material that isolates the piping from the surrounding soil and does not conduct electricity).





Make sure that metal piping components such as pump heads, flexible connectors and swing joints are either isolated from the soil or are cathodically protected.

You must comply with specific testing and record keeping requirements for cathodic protection. Descriptions of cathodic protection, requirements and best management practices, and checklists for cathodic protection are in section 4.6. **Before completing the checklist on the next page, you will need to read the cathodic protection section and fill out the checklists in that section.**



**Corrosion Protection Checklist For Coated And**

**Cathodically Protected Steel Piping**

| **Circle the UST number for each UST that has coated and cathodically protected steel piping. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Is your piping coated with a suitable dielectric material?**  If you don’t know whether your piping is coated with a suitable dielectric material, see if you can meet the requirements for cathodically protected metal piping in section 4.5.3. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |
| **2. Are all of your buried steel piping and metal components cathodically protected?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |
| **3. Do you meet the requirements for your cathodic protection system?** Complete section 4.6, *Cathodic Protection* to answer this question. Copy the answer from the summary of compliance question in section 4.6 to this table. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** You must take action to comply with the requirements in section 4.6, *Cathodic Protection*. | | | | | | | | | | | |

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| **Summary Of Compliance With Corrosion Protection For Coated**  **And Cathodically Protected Steel Piping** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Does your coated and cathodically protected steel piping meet corrosion protection requirements?**  To answer **yes** here, you must have answered yes to all questions above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

**4.5.3: Cathodically Protected Metal Piping**

This type of piping is metal with cathodic protection on the outside of the piping. There is no coating (or no known coating) on this piping. Cathodic protection may be either impressed current or galvanic (sacrificial) anodes. **See section 4.2 if you have steel piping that is coated and cathodically protected.**



**Requirements For Cathodically Protected Metal Piping**

Only metal piping that was installed on or before December 22, 1988 may use cathodic protection without a dielectric coating to comply with the corrosion protection requirements.



Make sure that metal piping components such as pump heads, flexible connectors and swing joints are either isolated from the soil or are cathodically protected.



You must comply with specific testing and record keeping requirements for cathodic protection. Descriptions of cathodic protection, requirements and best management practices, and checklists for cathodic protection are in section 4.6. **Before completing the checklist on the next page, you will need to read the cathodic protection section and fill out the checklists in that section.**



**Corrosion Protection Checklist For Cathodically Protected Metal Piping**

| **Circle the UST number for each UST that has cathodically protected metal piping. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Did the installation for this UST begin on or before December 22, 1988?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Cathodic protection without a coating is not an option for corrosion protection on this piping. Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |
| **2. Are all of your buried metal piping and metal components cathodically protected?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |
| **3. Do you meet the requirements for your cathodic protection system?** Complete section 4.6, *Cathodic Protection* to answer this question. Copy the answer from the summary of compliance question in section 4.6 to this table. | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** You must take action to comply with the requirements in section 4.6, *Cathodic Protection*. | | | | | | | | | | | |

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| **Summary Of Compliance With Corrosion Protection For Cathodically Protected Metal Piping** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Does your cathodically protected metal piping meet corrosion protection requirements?**  To answer **yes** here, you must have answered yes to all questions above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

**4.5.4: Metal Piping - No Additional Corrosion Protection**

Metal piping that routinely contains product and is in contact with the ground and has no additional corrosion protection is not commonly used to meet the piping corrosion protection requirements. However, if your piping meets the requirements below, this option may be used.



**Requirements For Metal Piping With No Additional Corrosion Protection**

If you have metal piping without additional corrosion protection and the piping is in contact with the ground and routinely contains product, you must either:



* have the record of a corrosion expert’s determination that your UST site is not corrosive enough to cause the piping to have a release due to corrosion during the operating life of the piping, or
* have evidence to indicate {state} made a determination that the piping construction and corrosion protection was designed to prevent the release or threatened release of any stored product.

**It is unusual to have metal piping without additional corrosion protection.**

**Corrosion Protection Checklist**

**For Metal Piping Without Additional Corrosion Protection**

| **Circle the UST number for each UST that has metal piping with no additional corrosion protection. Answer the questions below for each UST you circled.** | **UST # =** | **1** | | **2** | | **3** | | **4** | | **5** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Question** | | **Circle Yes (Y) or No (N)** | | | | | | | | | |
| **1. Do you have a record or evidence that a determination was made either by a corrosion expert or the state UST agency that your buried metal piping will not have a release due to corrosion during its operating life?** | | **1**  **Y** | **1N** | **2Y** | **2N** | **3Y** | **3N** | **4Y** | **4N** | **5Y** | **5N** |
| **If no, then to return to compliance:** Contact {state} to determine how you may return to compliance. | | | | | | | | | | | |

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| --- | --- | --- |
| **Summary Of Compliance With Piping Corrosion Protection For Metal Piping Without Additional Corrosion Protection** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Does your metal piping without additional corrosion protection meet corrosion protection requirements?**  To answer **yes** here, you must have answered yes to the question above. |  |  |
| **If you answered no**, fill out a return to compliance plan and submit it with your certification of compliance.  A return to compliance plan form is in appendix B. | | |

**Summary Of Compliance With Piping Corrosion Protection**

Make sure you read and complete the checklists in the appropriate corrosion protection for piping sections for all of your piping in contact with the ground and routinely contains product before answering the question below.

|  |  |  |
| --- | --- | --- |
| **Summary Of Compliance With Piping Corrosion Protection** | | |
| **Answer the following question:** | **Yes** | **No** |
| **Does all of your piping that is in contact with the ground and routinely contains product meet corrosion protection requirements?**  To answer **yes** here, you must have answered yes to all previous summary questions for each type of piping at your facility. |  |  |
| **If you answered no**, complete and submit a return to compliance plan addressing each area of non-compliance. A return to compliance plan form is in appendix B. | | |
| **(Copy your yes or no answer to question 5 of the certification of compliance form in appendix A)** | | |