OVERVIEW OF
UNDERGROUND STORAGE TANK CONSTRUCTION, MONITORING, AND TESTING REQUIREMENTS

This document summarizes underground storage tank (UST) system requirements and is not meant to detail all requirements. References to the Health and Safety Code, division 20, chapter 6.7 (H&SC); California Code of Regulations, title 23, division 3, chapter 16 (CCR); and Local Guidance (LG) letters are intended to be useful but are not exhaustive of all requirements that might apply. Statutes, regulations, and guidance documents are subject to change, so the references contained herein are current as of the revision date. For more specific information, refer to the relevant statute and regulations.

Definitions & Acronyms

- ***Buried*** *means covered in earthen material or otherwise concealed from visual observation. For emergency tank systems, "buried" does not include piping in a conduit through building walls or ceilings where both sides of the penetration can be visually observed*
- ***Date of Installation*** *means the date that the tank initially was set in place*
- ***ELD*** *means enhanced leak detection*
- ***LLD*** *means line leak detector*
- ***Fail safe*** *means that a release detection system will shut down the pump in the event of a power outage, or when the release detection system fails or is disconnected*
- ***ICC*** *means International Code Council*
- ***O/O*** *means the UST Owner or Operator*
- ***OPE*** *means overfill prevention equipment*
- ***Operating hours*** *means any time a hazardous substance is transferred out of an underground storage tank other than by suction through the fill riser pipe*
- ***Product tight*** *means impervious to the hazardous substance contained, so as to prevent seepage from containment*
- ***RDE*** *means release detection equipment*
- ***Routinely staffed*** *means there is at least one facility employee with current training from the facility's Designated UST Operator as required by CCR § 2631 physically present on site at the facility during all operating hours*
- ***Type 1 UST*** *means a UST with a date of installation before July 1, 2003*
- ***Type 2 UST*** *means a UST with a date of installation on or after July 1, 2003, and before July 1, 2004*
- ***Type 3 UST*** *means a UST with a date of installation on or after July 1, 2004*
- ***UDC*** *means under-dispenser containment*
- ***Unburied*** *means able to be visually observed*
- ***UPA*** *means Unified Program Agency*
- ***VPH*** *means vacuum/pressure/hydrostatic*

General Construction Requirements for All USTs

Corrosion Protection	Compatibility	Spill Containment	Overfill Prevention Equipment (OPE)	UDC
UST systems constructed of steel must have cathodic protection or be isolated from the backfill, including turbines, risers, and spill containment. *CCR § 2640(c)*	UST systems must be compatible with the stored hazardous substance. Compatibility documentation must be maintained for: • Primary and secondary containment; • RDE; • Spill containment; • OPE; and • Ancillary equipment. At least 30 days before storing or changing the hazardous substance, the O/O must demonstrate compatibility by notifying the UPA in writing. *CCR § 2640(a)*	Each tank fill point must have spill containment that: • Is protected from corrosion; • Has at least 5-gallons capacity; • Has a means to keep the spill containment empty. *H&SC § 25290.1(f), 25290.2(e), 25291(c) & 25292(d); CCR § 2640(e)*	All USTs must have OPE that can not be manually overridden meeting **one** of the following: 1. Alert transfer operator by restricting flow at 90% **or** triggering audible and visual alarm (i.e., ball float[1] or alarm); 2. Restrict flow 30 minutes before overfill (provided at no more than 95% capacity), **and** activate audible alarm 5 minutes before overfill (i.e., ball float and alarm); 3. Provide positive shut-off of flow to tank at 95% (i.e., flapper valve); or 4. Provide positive shut-off before tank top fittings are exposed to hazardous substance (i.e., flapper valve). The UPA may waive or modify the requirement for OPE if all the following conditions are met: 1. The tank inlet is in an observable area; 2. The tank is filled by transfers of no more than 25 gallons at one time; and 3. Vent and riser pipe are secondarily contained (and monitored). *H&SC § 25290.1(f), 25290.2(e), 25291(c) & 25292(d); CCR § 2640(f)*	Required for all dispensers. *CCR § 2640(h)*

[1] Per CCR § 2640(f)(3), effective October 1, 2018, flow restrictors (ball floats) on vent piping cannot be installed or repaired/replaced for use as OPE. Flow restrictors in place prior to that date may be used as OPE provided they have continued to function properly and passed every-36-month testing. If ball floats ever fail to function or pass periodic testing, the UST must be retrofitted with OPE that provides positive shut-off of flow as specified in CCR § 2640(f)(1)(C) or (D).

Construction and Monitoring Requirements for Tanks

UST Type	Tank Construction	Tank Monitoring
Type 3 UST	• Secondary containment is required. Non-integral secondary containment must be constructed, operated, and maintained in accordance with an engineering specification approved by an independent testing organization or approval by a California registered professional engineer. • Primary and secondary containment must be constructed, operated, and maintained product tight for both liquid and vapor. • Secondary containment must be constructed, operated, and maintained to prevent water intrusion. *H&SC § 25290.1; CCR § 2640(b) & 2641(b)*	**Buried Tank:** • Provide continuous VPH interstitial release detection system with audible and visual alarm. *H&SC § 25290.1(d) & (e); CCR § 2651(f)* **Unburied Tank:** • Continuous interstitial release detection system that activates audible and visual alarm or stops the flow of hazardous substance at the dispenser when it detects a release from the piping. *H&SC § 25290.1(d)*
Type 2 UST	• Secondary containment is required. Non-integral secondary containment must be constructed, operated, and maintained in accordance with an engineering specification approved by an independent testing organization or approval by a California registered professional engineer. • Primary and secondary containment must be constructed, operated, and maintained product tight for both liquid and vapor. • Secondary containment must be constructed, operated, and maintained to prevent water intrusion. *H&SC § 25290.2(a); CCR § 2640(b) & 2641(b)*	• Provide continuous interstitial release detection system with audible and visual alarm. *H&SC § 25290.2(d); CCR § 2651(e)*

Construction and Monitoring Requirements for Tanks *(continued)*

UST Type	Tank Construction	Tank Monitoring
Type 1 UST	• Secondary containment is required. Non-integral secondary containment must be constructed, operated, and maintained in accordance with an engineering specification approved by an independent testing organization or approval by a California registered professional engineer. • Primary containment must be product tight for liquid. • Secondary containment must be constructed to prevent structural weakening as a result of contact with hazardous substances, and capable of storing hazardous substance for the maximum anticipated time necessary for recovery of released hazardous substance. *H&SC § 25291(a)(1) & (2) & 25292.05; CCR § 2640(b)*	• Provide continuous interstitial release detection system with audible and visual alarm; **or** • Perform visual monitoring, if all specified conditions are met. *(See page 10.)* *H&SC § 25291(b); CCR § 2651(e) & (g)*

Construction Requirements for Piping

UST Type	Hazardous Substance Piping	Vent, Vapor, and Riser Pipe
Type 3 UST	• Secondary containment is required. • Primary and secondary containment must be constructed, operated, and maintained product tight for both liquid and vapor. • Secondary containment must be constructed, operated, and maintained to prevent water intrusion. *H&SC § 25290.1(a) & (c); CCR § 2640(b)(10) & 2641(b)*	For buried piping: • Secondary containment is required. • Primary and secondary containment must be constructed, operated, and maintained product tight for both liquid and vapor. • Secondary containment must be constructed, operated, and maintained to prevent water intrusion. *H&SC § 25290.1(a), (c) & (k); CCR § 2640(b)(10)*
Type 2 UST	• Secondary containment is required. • Primary and secondary containment must be constructed, operated, and maintained product tight for both liquid and vapor. • Secondary containment must be constructed, operated, and maintained to prevent water intrusion. *H&SC § 25290.2(a) & (c); CCR § 2640(b)(10) & 2641(b)*	For buried piping: • Secondary containment is required. • Primary and secondary containment must be constructed, operated, and maintained product tight for both liquid and vapor. • Secondary containment must be constructed, operated, and maintained to prevent water intrusion. *H&SC § 25290.2(j); CCR § 2640(b)(10)*

Construction Requirements for Piping *(continued)*

UST Type	Hazardous Substance Piping	Vent, Vapor, and Riser Pipe
Type 1 UST	• Secondary containment is required, except: 1. Unburied fuel piping in an emergency tank system; 2. Unburied fuel piping at a marina; and 3. Suction piping meeting all conditions specified in CCR § 2640(b)(10)(C). *(See Page 10)* *H&SC § 25281.5(b)(2) & (3), 25291(a), 25292.05; CCR § 2640(b)(10)*	• Secondary containment is **not** required for: 1. Vent and tank riser piping provided the tank is equipped with OPE which either restricts flow 30 minutes before overfill (provided at no more than 95% capacity) and activates an audible alarm 5 minutes before overfill (i.e., flow restrictor and ATG), **or** positively shuts off flow to the tank at 95% of capacity, (i.e., flapper valve); and 2. Vapor recovery piping if constructed to not contain liquid-phase hazardous substance. *H&SC § 25281.5(a)(4) and (b)(1); CCR § 2640(b)(10)(A) & (B)*

Monitoring Requirements for Type 3 UST Piping

Piping Type	Suction and Gravity Piping	Pressurized Piping	Emergency Tank System Pressurized Piping
Buried	• Provide continuous **VPH** interstitial release detection system that activates audible and visual alarm or stops the flow of hazardous substance at the dispenser when it detects a release from the piping.[2] *H&SC § 25290.1(d) & (e); CCR §2652(a)(1)(A), 2652(b)*	• Provide continuous **VPH** interstitial release detection system that activates audible and visual alarm or stops the flow of hazardous substance at the dispenser when it detects a release from the piping; and • LLD that restricts or shuts off flow when it detects a 3 gph release; **or** continuous VPH interstitial release detection system is programmed to shut off flow when it detects a release from the piping or the release detection system malfunctions. *H&SC § 25290.1(d) & (e); CCR § 2652(a)(1)(A), 2652(a)(2), 2652(b)*	• Provide continuous **VPH** interstitial release detection system that activates audible and visual alarm when it detects a release from the piping; and • LLD that activates audible and visual alarm when it detects a 3 gph release or the LLD or release detection system malfunctions; **or** continuous VPH interstitial release detection system is programmed to shut off flow when it detects a release or the release detection system malfunctions. *H&SC § 25290.1(d) & (e); CCR § 2652(a)(1)(A), 2652(a)(2), 2652(b)*
Unburied	• Provide continuous interstitial release detection system that activates audible and visual alarm or stops the flow of hazardous substance at the dispenser when it detects a release from the piping. *H&SC § 25290.1(d); CCR § 2652(a)(1)(A)*	• Provide continuous interstitial release detection system that activates audible and visual alarm or stops the flow of hazardous substance at the dispenser when it detects a release from the piping. *H&SC § 25290.1(d); CCR § 2652(a)(1)(A)*	• Provide continuous interstitial release detection system that activates audible and visual alarm or stops the flow of hazardous substance at the dispenser when it detects a release from the piping. *H&SC § 25290.1(d); CCR § 2652(a)(1)(A)*

[2] CCR § 2652(c) requires that **any** piping monitored by continuous VPH interstitial monitoring be configured to facilitate testing of release detection equipment in accordance with CCR § 2663(a) and verification of continuity to the extent practical as approved by the UPA in the case of every 12 month testing, and between all points in the zone in the case of installation or repair testing, as required by CCR § 2642(f) and 2663(a). This includes VPH monitored piping in Type 1 and Type 2 UST systems.

Interstitial Monitoring Options for Type 3 UST Buried Piping

The following options may be used to satisfy Type 3 UST interstitial monitoring requirements for riser pipes and other piping inside UDC and containment sumps.

Option 1	Option 2	Option 3
• Monitor interstitial space for entire length of double-wall piping, and spaces between the inner and outer walls of double-wall UDC and containment sumps, including those for fill, vent, and vapory recovery piping, up to surface of the ground (or up to a VPH monitored product tight double-wall UDC/sump lid) using continuous VPH interstitial monitoring. • Install liquid sensor at low point of each UDC and containment sump. *H&SC § 25290.1(e); CCR § 2652(b)*	• Monitor interstitial space for entire length of double-wall piping, and entire area inside UDC and containment sumps containing single-wall piping (including turbine heads, fill, vent, and vapor recovery piping, and associated fittings such as elbows and flex connectors), and inner walls of UDC and containment sumps using continuous vacuum or pressure interstitial monitoring. (This requires UDC and containment sumps to have product tight lids isolating them from the backfill and maintaining their interiors under constant vacuum or pressure.) *(Since interiors of all UDC and containment sumps are maintained under constant vacuum or pressure, they may be single-wall and liquid sensors are not required in UDC or containment sump bottoms.)* *H&SC § 25290.1(e); CCR § 2652(b)*	• Equip all piping inside UDC and containment sumps (including turbine heads, fill, vent, and vapory recovery piping, and associated fittings such as elbows and flex connectors) with secondary containment product tight for both liquid and vapor (i.e., secondary piping or enclosures). Monitor interstitial space(s) for all piping using continuous VPH interstitial monitoring. *(Since all piping is secondarily contained and VPH monitored, UDC and sumps may be single-wall and liquid sensors are not required in UDC or containment sump bottoms.)* *H&SC §25290.1(e); CCR § 2652(b)*

Monitoring Requirements for Type 1 UST[3] & Type 2 UST Piping

Suction and Gravity Piping	Pressurized Piping	Emergency Tank System Pressurized Piping
Provide continuous interstitial release detection system that activates audible and visual alarm or stops the flow of hazardous substance at the dispenser when it detects a release from the piping. *H&SC § 25290.2(d), 25291(b), 25292.05; CCR §2652(a)(1)(A)* *Exception: Type 1 UST suction piping meeting all conditions specified in CCR § 2640(b)(10)(C).* *(See Page 10.)*	Provide continuous interstitial release detection system that activates audible and visual alarm or stops the flow of hazardous substance at the dispenser when it detects a release from the piping.[4] **And for Buried Piping:** • LLD that restricts or shuts off flow when it detects a 3 gph release; **or** continuous VPH interstitial release detection system that shuts off flow when it detects a release from the piping or the release detection system malfunctions. • 0.1 gph line tightness test performed at least once every 12 months by licensed tank tester or LLD; **or** continuous release detection system shuts down pressure pump or stops flow at dispenser when a release is detected in the UDC and release detection system for all buried pressurized hazardous substance piping other than that in UDC is fail safe and shuts down the pressure pump when it detects a release from the piping. *H&SC § 25290.2(d) & (g), 25291(b) & (f), 25292.05; CCR § 2652(a)(1)(A), 2652(a)(2)-(4)*	Provide continuous interstitial release detection system that activates audible and visual alarm when it detects a release from the piping. **And for Buried Piping:** • LLD that activates audible and visual alarm when it detects a 3 gph release or the LLD or release detection system malfunctions; **or** continuous VPH interstitial release detection system that shuts off flow when it detects a release from the piping or the release detection system malfunctions. • 0.1 gph line tightness test performed at least once every 12 months by licensed tank tester or LLD; **or** continuous release detection system that is fail safe and shuts down the pressure pump when it detects a release from the piping. *H&SC § 25290.2(d) & (g), 25291(b) & (f), 25292.05; CCR §2652(a)(1)(A), 2652(a)(2)-(4)*

[3] Interstitial monitoring for Type 1 USTs may be done by visual monitoring if specified conditions are met. *(See Page 10.)*

[4] At facilities that are not routinely staffed, CCR § 2652(a)(1)(C) requires USTs with pressurized piping that are not emergency tank systems to have a fail safe continuous interstitial release detection system that shuts off the flow of hazardous substance through the piping when it detects a release from the piping.

Secondary Containment and Monitoring Exceptions

Type 1 UST Visual Monitoring	Type 1 UST "Safe Suction" Piping
Type 1 UST interstitial monitoring may be done by visual monitoring rather than by a continuous interstitial release detection system if all the following conditions are met: 1. All exterior surfaces of the UST (tank and piping), and the surface of the secondary containment directly below, is able to be observed directly or using mirrors or cameras; 2. Visual monitoring must be performed at least once each day, except on weekends and recognized state or federal holidays and occur when the liquid level in the tank is at its highest;[5] 3. If liquid is seen around or beneath primary containment, the O/O must have it analyzed using a method approved by the UPA; 4. If necessary to determine if primary containment is no longer product tight, the O/O must have an integrity test done by a licensed tank tester; 5. Visual monitoring results and the liquid level in the tank at the time of monitoring must be recorded in the facility's monitoring records, which must be maintained in accordance with CCR § 2613(c); and 6. If an unauthorized release is confirmed, the O/O must comply with CCR articles 4 and 7. *H&SC § 25291(b); CCR § 2651(g)* *(Type 2 and Type 3 USTs can not be visually monitored.)*	Type 1 UST suction piping that meets all the following conditions is exempt from secondary containment and monitoring: 1. The piping must operate at less than atmospheric pressure; 2. The piping must be sloped so the contents drain back into tank if suction is released; 3. No valves or pumps may be installed in the suction line other than one check valve located directly below and as close as practical to the suction pump; and 4. An inspection method approved by the UPA must have demonstrated compliance with the requirements specified above, and documentation of the inspection must be maintained in accordance with CCR § 2613. The inspection method must be configured such that compliance with the above requirements can be periodically demonstrated. *CCR § 2640(b)(10)(C)*

[5] Per CCR § 2651(g)(2), the UPA may require more frequent monitoring or reduce the frequency to not less than once every seven days at facilities where facility employees are not normally present and inputs to and withdrawals from the UST are infrequent. The monitoring frequency must consider the minimum anticipated time during which secondary containment is capable of containing any unauthorized release and the maximum length of time any hazardous substance released from primary containment will remain observable on the surface of secondary containment.

Secondary Containment and Monitoring Exceptions *(continued)*

Emergency Tank System Unburied Fuel Piping	Unburied Fuel Delivery Piping at Marinas
Unburied fuel piping connected to an emergency tank system is exempt from secondary containment if the O/O: 1. Conducts visual inspections of the fuel piping primary containment each time the tank is operated, but no less than monthly; and 2. Maintains a log of inspection results for review by the UPA in accordance with CCR § 2613(c). *H&SC § 25281.5(b)(3); CCR § 2612(o)*	Unburied fuel delivery piping at marinas is exempt from secondary containment if the O/O: 1. Conducts visual inspections of the fuel piping primary containment each time the tank is operated, but no less than monthly; and 2. Maintains a log of inspection results for review by the UPA in accordance with CCR § 2613(c). *H&SC § 25281.5(b)(2); CCR § 2612(n)*

Testing Requirements

Notification	Periodic Testing Frequency	Test Results	Test Equipment
• The O/O must notify the UPA in writing at least 72 hours prior to testing UST components or systems unless the notification requirement is waived by the UPA. *CCR § 2614 & 2660(a)*	• Testing frequency must not exceed the number of months prescribed in CCR; • Testing must be completed during the calendar month due; • Periodic test dates may be moved forward by completing the test in an earlier month; • Testing performed late does not change the periodic test due dates; • Components must be tested within 30 days of repair; • Testing conducted after repair does not change the periodic test due date. *CCR § 2660(b) & (c)*	• Completed test results must be submitted to the UPA within 30 days of performing the test; and • Maintained by the O/O on site, or off site at a readily accessible location if approved by the UPA, for no less than 36 months. *CCR § 2613(c) & 2660(d)*	• Equipment used to administer a test must be maintained and calibrated in accordance with manufacturer's standards;[6] • If there are no manufacturer standards available, the equipment must be calibrated by the National Institute of Standards and Technology (NIST) or replaced; • Documentation demonstrating the test equipment is in proper operating condition must be available upon request of the UPA. *CCR § 2660(e)*

[6] This applies to test equipment with moving parts (e.g., gauges, LLD testing units, etc.), where a device's accuracy may be affected by environmental factors or changes over time, not static devices such as rulers, tape measures, or graduated beakers or cylinders.

Testing Requirements (continued)

Test Type	Minimum Frequency	Documentation
Release Detection Equipment	Test upon installation, at least once every 12 months, and following repair by ICC Certified Service Technician with training obtained from the manufacturer of the monitoring equipment. *CCR § 2633(a)(3)(A), 2660(c) & 2663(a)*	Testing must be recorded on the *"Release Detection Equipment Testing Report Form."* *CCR § 2663(e)*
Spill Containment	Test upon installation, at least once every 12 months, and following repair by ICC Certified Service Technician with training obtained from the manufacturer of the spill containment or through the developer of the testing equipment or method.[7] *H&SC § 25284.2; CCR § 2633(a)(3)(B), 2660(c) & 2664(a)*	Testing must be recorded on the *"Spill Container Testing Report Form."* *CCR § 2664(d)*
Overfill Prevention Equipment	Test upon installation, at least once every 36 months, and following repair by ICC Certified Service Technician with training obtained from the manufacturer of the overfill prevention equipment or through the developer of the testing equipment or test method. *CCR § 2633(a)(3)(C), 2660(c) & 2665(a)*	Testing must be recorded on the *"Overfill Prevention Equipment Testing Report Form."* *CCR § 2665(c)*
Secondary Containment	Test upon installation, six months after installation, at least once every 36 months, and following repair by ICC Certified Service Technician with training through the developer of the testing equipment or method. *CCR § 2633(a)(3)(D), 2660(c) & 2666(a)*	Testing must be recorded on the *"Secondary Containment Testing Report Form."* *CCR § 2666(d)*
Cathodic Protection Systems	Test by cathodic protection tester (see CCR § 2611) within six months of installation or repair and at least once every 36 months per code of practice developed in accordance with voluntary consensus standards.[8] *CCR § 2661(a)*	No specific format specified by CCR.

[7] Per CCR § 2633(b), if no training or certification exists that would satisfy the requirements of CCR § 2633(a)(3) for testing spill containment, OPE, or secondary containment, the UPA may approve comparable alternate training, certification, or an applicable method specified in an industry code or engineering standard.

[8] Additionally, per CCR § 2661(b), impressed-current cathodic protection systems must be inspected at least once every 60 days per the manufacturer's instructions or industry or engineering standard to ensure that the system is in proper working order and the O/O must maintain a log of inspection results for review by the UPA.

Testing Requirements (continued)

Test Type	Frequency	Test Types	Documentation
Integrity Testing	Integrity testing must be: • Performed after installation, replacement, or repair of UST primary containment components that are not located in UDC or a containment sump; • Done by a licensed tank tester in accordance with the manufacturer's written guidelines; • Completed before the system becomes operational. *H&SC §25289, 25290.2(i), 25290.1(j), and 25291(h); CCR 2662(a) & (b)*	**Standard Integrity Test:** Type 1 UST tanks and piping must be integrity tested using a method capable of detecting a liquid release of 0.1 gph from any portion of the UST system primary containment with a probability of detection of at least 95% and a probability of false alarm no greater than 5%. *CCR § 2662(b)(1)* **Enhanced Leak Detection Test:** Type 2 UST and Type 3 UST tanks and piping must be integrity tested using a method capable of detecting both liquid and vapor phase releases at a leak rate of at least 0.005 gph, with a probability of detection of at least 95% and a probability of false alarm no greater than 5%. *CCR § 2662(b)(2)*	Standard integrity test results and ELD test results must be: • Submitted to the UPA; and • Maintained by the O/O on site, or off site at a readily accessible location if approved by the UPA, for no less than 36 months. *CCR § 2613(c) & 2660(d)*