

CHAPTER 19 UNDERGROUND STORAGE TANKS

C19.1 SCOPE

This Chapter contains criteria to control and abate pollution resulting from *petroleum* products and hazardous materials stored in underground storage tanks (USTs). Standards for USTs containing hazardous wastes are addressed in Chapter 6, Hazardous Waste.

C19.2 TERMS AND DEFINITIONS

Determination of Suitability (*Eignungsfeststellung*). The determination of suitability is an acceptance check by the respective State environmental agency (*Landesumweltamt*) on facilities or equipment that is carried out prior to the start-up of an operation. The determination of suitability may be conducted for a facility as a whole and/or for individual facility components. As an example, a filling station may include several underground storage tanks (USTs) and fuel dispensing equipment. In this instance, the USTs and the dispensing equipment can be issued a determination of suitability individually, or the facility can be issued a determination as a whole.

Expert. An individual who is specifically designated as an expert by the authority of a German government or an individual who meets the qualifications of an expert established by a recognized German trade organization or association.

Facility Storing POL, Hazardous Materials, or Hazardous Wastes. Independent, stationary or quasi-stationary units (i.e., POL filling facilities, hazardous materials storage facilities, transshipment area, hard stand and POL separators) that are used for more than a short period of time. There is no established minimum period of time a facility is to be used at any one location to be considered stationary. The temporary storage of these products in areas not normally designated for this purpose (i.e., materials in transit) are not considered facilities storing POL, hazardous materials, or hazardous wastes. The requirements identified for facilities storing and handling water-endangering substances refer to all POL, hazardous material, and hazardous waste facilities, unless stated otherwise. For additional requirements associated with facilities handling water-endangering substances refer to Chapter 5, Hazardous Materials.

Filling Safeguards (*Abfüllsicherungen*). Devices that discontinue the filling procedure by activating a shut-off device in a container or tank truck.

Hazard Class (*Gefahrklasse*). A classification of hazard based on the flammability of substances as outlined below

Hazard Classes (*Gefahrklasse*)

Hazard Class	Flash Point
A I	< 21° C
A II	21-55° C
A III	55-100° C
B	< 21° C and water-soluble at 15° C

Hazardous Materials. Raw materials, commodities, or other manufactured products that exhibit at least one of the hazardous characteristics described in Table C5.T3 of Chapter 5, Hazardous Material. Hazardous materials do not include hazardous wastes.

Leak Detection Device (*Leckanzeigegerät*). Devices that automatically detect leaks in walls and/or floors of containers and pipelines. Leak detection devices include the leak detector, the medium used for detecting the leak, if applicable, and the monitoring space (*Überwachungsraum*).

Leak Detection Sensor (*Leckagesonde*). Devices that automatically detect the leak of liquid substances or the infiltration of liquids (i.e., water) into a controlled area or fluid retention room. Leak detection sensors consist of point sensors (leak sensors), line sensors (cables, hoses), and surface sensors (mats) as well as the associated detection appliance.

Leak Protection Liner (*Leckschutzauskleidung*). Flexible or rigid intermediate layers, which conform to the inner shape of the container, designed to create an operational monitoring space (*Überwachungsraum*) within a single-walled container for the purpose of carrying out leak control.

Ordinary or Conventional Facilities (*einfache oder herkömmliche Anlagen*). See Chapter 5, Hazardous Materials.

Overfill Prevention Devices (*Überfüllsicherungen*). Devices that automatically discontinue the filling procedure or set off an alarm before substances have reached the admissible filling level in the container to be filled.

Piping (*Rohrleitungen*). Rigid or flexible piping used to convey substances. Piping also comprises fittings, flanges, and gaskets. There are several categories of piping: piping within the premises of an installation (i.e., on-site piping) and piping extending outside the premises of an installation (i.e., off-site piping). On-site piping is always part of a facility (e.g., a filling station, a fuel unloading facility, or a stationary airfield tank facility (*Flugbetankungsanlage*)). Piping that extends beyond the site area and connects facilities that are closely related, both physically and operatively, is called connecting piping (*Verbindungsleitung*).

POL. Refined petroleum, oils, and lubricants.

Recognized Rules of Technology (*Allgemein anerkannte Regeln der Technik*). Includes standard equipment, operation, or maintenance of facilities that are generally described in German technical guidelines or rules.

Secondary Containment (*Auffangvorrichtung*). Leak-proof constructions, rooms in buildings (fluid retention rooms), and/or pre-fabricated building components (collecting vats/*Auffangwannen*) that are designed to collect leaking substances from containers or piping, and leak-proof drainage areas designed to channel off leaking substances from containers or pipelines into collection devices (e.g., holding tanks, sumps).

State of the Art Technology (*Stand der Technik*). Includes equipment, operation, and maintenance of facilities based on the current German technological knowledge. Generally, the state of the art technology contains more technological progressive requirements than the recognized rules of technology. For example, facilities using and storing flammable liquids (Al,

All, B and AIII substances) must be constructed and operated according to the state of the art technology.

Tank Tightness Test. A test which must be capable of detecting a 0.38 liter (0.1 gallon) per hour leak from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

Underground Storage Tank (UST) (*Unterirdische Tankanlage*). Any tank wholly or partially embedded in the ground, including underground piping connected thereto, used to contain POL products or hazardous material. This definition does not include storage tanks located in an accessible underground area (such as a basement or vault) if the storage tank is situated upon or above the surface of the floor.

C19.3 REQUIREMENTS

C19.3.1 UST INVENTORY

All installations will maintain a UST inventory.

C19.3.2 UST INSTALLATION AND CERTIFICATION

UST systems will be properly installed by an individual or company certified in Germany (*Fachbetrieb*), protected from corrosion, provided with spill/overflow prevention, and incorporate leak detection as required by these FGS.

- C19.3.2.1 UST systems must be constructed and operated in accordance with generally recognized rules of technology (*allgemein anerkannte Regeln der Technik*).
- C19.3.2.2 UST systems not classified as facilities of ordinary or conventional construction type (*Anlagen einfacher oder herkömmlicher Art*) require a certification from the competent authority (*Bauartzulassung*) or a determination of suitability (*Eignungsfeststellung*) prior to installation. The certification or determination of suitability also applies to protection devices (*Schutzvorkehrungen*) associated with the UST such as leak detection devices or overflow prevention devices. Reference should be made to Chapter 1, Overview for procedures associated with obtaining approvals and certifications.
- C19.3.2.3 UST systems storing flammable liquids of all Hazard Classes (i.e., A1, AII, B, or AIII) must be designed, installed, and operated according to the state of the art technology (*Stand der Technik*).

C19.3.3 CORROSION PROTECTION

USTs and piping must be provided with corrosion protection unless constructed of fiberglass or other non-corrodible materials. The corrosion protection system must be installed by an individual or company certified in Germany (*Fachbetrieb*) and certified by a German expert (*Sachverständiger*) and the German competent authority (*Bauartzulassung*).

C19.3.4 SPILL AND OVERFLOW PREVENTION

USTs will be provided with spill and overflow prevention equipment.

C19.3.4.1 A spill containment box must be installed around the fill-pipe.

C19.3.4.2 Overflow prevention will be provided by one of the following methods:

C19.3.4.2.1 Automatic shut-off device (set at 95% of tank capacity).

C19.3.4.2.2 High level alarm (set at 90% of tank capacity).

C19.3.4.3 USTs will only be emptied or filled using rigid piping connections.

C19.3.5 LEAK DETECTION

USTs will use interstitial monitoring as leak detection systems. Leak detection devices must be designed to automatically detect leaks in the walls and floors of containers and piping and detect leaks above and below the liquid level.

C19.3.5.1 USTs and underground piping storing hazardous materials or water-endangering substances must be double-walled and equipped with leak detection devices.

C19.3.5.2 The interstitial space (i.e., the space between the primary and secondary containment walls) for USTs and piping storing hazardous materials must be monitored at least monthly for liquids or vapors via a leak detection device or other appropriate method.

C19.3.5.3 Pressurized UST piping must be equipped with automatic line leak detectors and utilize an annual tightness test.

C19.3.5.4 Suction piping will have a line tightness test conducted every 3 years, or 2.5 years if the piping is located in a water protection or spring protection zone.

C19.3.5.5 Suction piping must be constructed so that the liquid column breaks away if a leak occurs. The suction channel must be protected to exclude the siphon effect. Detachable connections and mountings of underground piping must be fitted in leak-proof control shafts and monitored by regular visual inspections or by means of an approved leak detection sensor (*Leckagesonde*).

C19.3.5.6 Underground piping conveying water-endangering substances is only permitted if it is determined to be safer than above-ground piping. Detachable connections and mountings of underground piping must be fitted in leak-proof control shafts that are monitored by regular visual inspections or by means of a leak detection sensor (*Leckagesonde*).

C19.3.5.6.1 Underground piping conveying water-endangering substances must be designed and constructed according to one of the following provisions:

- Underground, pressurized piping which is double-walled and equipped with an approved automatic line leak detector; or
- Underground, pressurized piping which is fitted with a leak-proof protective sheathing (*Schutzrohr*) or installed in a crawlspace. Escaping substances must be detectable with a monitoring or control device. This type of construction is not permitted if the substance transported is a flammable liquid, classified as Hazard Class A1, AII, or B; or
- Suction piping designed so that the transportation of a liquid is stopped in the event of leaks.

C19.3.5.7 In **Bayern** and **Hessen**, underground piping is generally permitted for filling stations, heating oil facilities, and piping conveying gaseous substances.

C19.3.5.8 In **Bayern**, double-walled USTs and pipelines containing water-endangering substances must fulfill the following requirements.

- C19.3.5.8.1 In the case of containers, no connection pieces or penetrations impairing the protection provided by the double walls may be lower than the height corresponding to that of the permitted filling ratio.
- C19.3.5.8.2 No connection pieces or penetrations impairing the protection provided by the double walls may be present in the monitoring space of pipelines.
- C19.3.5.8.3 The impermeability of the outer and inner wall or the leak protection lining must be guaranteed for at least six months in the event of leaks in the respective wall. A shorter time may be stipulated if the detection of leaks and the emptying of the container or the pipeline is ensured in a correspondingly shorter time.
- C19.3.5.8.4 Underground piping is only admissible if above-ground construction is impossible, especially due to safety reasons. Underground piping is permitted for conveying substances that are not water-endangering or gaseous substances.

C19.3.6 EXISTING UST SYSTEMS

- C19.3.6.1 Existing UST systems that do not meet the UST system requirements as indicated in criteria C19.3.2 to C19.3.5 will be properly closed if not needed, or be upgraded or replaced to meet the UST system requirements.
- C19.3.6.2 Closed or upgraded USTs must be inspected by an expert (*Sachverständiger*).
- C19.3.6.3 Leaking USTs will be immediately removed from service. If the leaking UST is still needed, it will be repaired or replaced. If the UST is no longer needed, it will be removed from the ground. Under extenuating circumstances (e.g. where the UST is located under a building), the UST may be cleaned and filled with an inert substance, and left in place.

- C19.3.6.3.1 When a leaking UST is removed, exposed free product and/or obviously contaminated soil in the immediate vicinity of the tank will be appropriately removed and managed. Contaminated soil and any remaining free product must be analyzed to determine whether it requires disposal as a hazardous waste (see Chapter 6, Hazardous Waste).
- C19.3.6.3.2 In **Hessen**, after removal of an UST, an inspection of the area where the UST was located, including an assessment of potential soil and groundwater contamination, must be conducted.
- C19.3.6.3.3 In **Hessen**, decommissioned USTs that present a danger of fire or explosion must be removed from the ground and not closed in-place by filling with an inert material.
- C19.3.6.4 Prior to the decommissioning or removal of an UST, the UST must be emptied and cleaned by an individual or company certified in Germany and inspected by an expert (*Sachverständiger*).
- C19.3.6.5 When an UST has not been used for a period of one year, the UST must be emptied and cleaned by an individual or company certified to perform such work in Germany.
- C19.3.6.6 If an UST storing Class AI, AII, B, or AIII flammable liquids has not been used for at least six months, the competent German authority (*Aufsichtsbehörde*) must be notified prior to recommencing operations. Procedures for providing notification are addressed in Chapter 1, Overview of these FGS.
- C19.3.6.7 USTs storing water-endangering liquids or Class AI, AII, B, or AIII flammable liquids, which have not been used for more than one year, require an inspection by an expert (*Sachverständiger*) prior to recommencing operations.
- C19.3.7 NOTIFICATION AND PERMITTING**
- C19.3.7.1 USTs storing flammable liquids of Hazard Classes AI, AII, or B require notification (*Anzeigepflicht*) to the competent authority (see Table C19.T2) prior to commencing operations. Refer to Chapter 1, Overview for guidance regarding notification procedures.
- C19.3.7.2 USTs storing flammable liquids (Hazard Classes AI, AII, or B) require a permit (*Erlaubnis*) from the competent authority (see Table C19.T2) for their installation and operation when the storage quantities listed in Table C19.T1 are exceeded. Refer to Chapter 1, Overview for guidance regarding procedures for obtaining a permit.
- C19.3.7.3 In **Bayern**, **Hessen**, and **Rheinland-Pfalz**, a notification to the competent authority (see Table C19.T2) is required prior to commencing operations of USTs containing water-endangering substances. Refer to Chapter 1, Overview for procedures on notifying the competent authorities.

C19.3.8 RESTRICTIONS FOR WATER PROTECTION ZONES AND FLOOD AREAS

- C19.3.8.1 The installation of USTs storing water-endangering substances is prohibited in a well head protection area (*Fassungsbereich*, Zone I) or water protection zone II.
- C19.3.8.2 USTs and associated piping may only be located in flood areas when the following are avoided and/or prevented: buoyancy and movements of the USTs, water penetrating into the USTs (i.e., through ventilation systems), and potential mechanical damages caused by flotsam, jetsam, and ice.
- C19.3.8.3 In **Bayern**, **Hessen**, and **Rheinland-Pfalz**, the operation of USTs classified under Water Hazard Category C and D is only permitted in the outer water protection zone (*weitere Zone*, Zone III).
- C19.3.8.4 In **Baden-Württemberg**, the operation of USTs storing water-endangering substances is prohibited in the outer water protection zone (*weitere Zone*, Zone III) for the maximum storage quantities identified in Table C19.T3.

C19.3.9 OPERATIONAL REQUIREMENTS

- C19.3.9.1 USTs containing Hazard Classes A1, A2, or B flammable liquids must be labeled with tank specifications in German.
- C19.3.9.2 USTs must be labeled in English and German with clearly legible, permanent labels, which indicate the substances contained therein. In addition, operators must permanently affix the officially published leaflets "*Betriebs- und Verhaltensvorschriften beim Umgang mit wassergefährdenden Stoffen*" (Instructions for the Use and Safe Handling of Water-endangering Substances) at conspicuous locations near the USTs and must inform the operating personnel of the leaflet contents.
- C19.3.9.3 Filling or emptying of USTs storing water-endangering substances must be supervised. Designated personnel must verify that the safety equipment is in proper condition prior to commencing filling or emptying operations. Safety equipment includes all devices that minimize the risk of a spill, leakage, or which indicate that, for example, a tank or hose is defective (e.g., filling safeguards, leak detection devices, sensors).
- C19.3.9.4 Operating instructions (*Betriebsanweisung*), to include an operational monitoring plan, a maintenance plan, and an alarm plan, must be developed and implemented for USTs containing water-endangering substances (see also Chapter 18, Spill Prevention and Response Planning). These operating instructions must be in both the German and English languages.
- C19.3.9.5 Operating instructions (*Betriebsanweisung*) must be developed and implemented for USTs containing flammable liquids. These operating instructions must be displayed at conspicuous locations near the USTs.

- C19.3.9.6 In **Bayern** and **Rheinland-Pfalz**, USTs classified under Water Hazard Category A (see Chapter 5, Hazardous Materials) are exempt from requirements to prepare operating instructions and labeling to indicate the substance stored.
- C19.3.9.7 In **Hessen**, piping within control shafts (*Kontrollschächte*) or manholes (*Domschächte*) must be color-marked in accordance with the technical standard DIN 2403 to indicate the medium or substance flowing inside the piping or below the manhole (*Kontroll- oder Domschacht*).

C19.3.10 INSPECTIONS

- C19.3.10.1 UST systems must be inspected by an expert (*Sachverständiger*) prior to initial operation and reinspected every 5 years thereafter. The reinspection frequency is reduced to every 2.5 years thereafter, if underground facilities are located in a water protection or spring protection zone.
- C19.3.10.2 UST systems must also be inspected by an expert (*Sachverständiger*) in the following cases: after a major modification, after remaining out of service for more than 1 year, or during the closure of an UST prior to its removal.

Table C19.T1 USTs Requiring a Permit

Storage Condition	Storage Volume in Liters by Hazard Class	
	AI	All or B
USTs with a maximum earth cover of 0.8 m	>1,000	>5,000
USTs with an minimum earth cover of 0.8 m	>10,000	>30,000

Table C19.T2 Competent Authorities for USTs Storing Flammable Liquids or Water-Endangering Substances

	Operator	Baden- Württemberg	Bayern	Hessen	Rheinland-Pfalz
Flammables	U.S. and/or Host Nation Civilians	<i>Gewerbe- aufsichtsamt</i>	<i>Gewerbeauf- sichtsamt</i>	<i>Staatliches Amt für Arbeitsschutz und Sicherheits- technik</i>	<i>Gewerbe-aufsichts- amt</i>
Flammables	Military	<i>Regional Wehrbereichsverwaltung</i>			
Water- Endangering Substances	U.S. and/or Host Nation Civilians and Military	None	<i>Kreis- verwaltung</i>	<i>Local Untere Wasserbehörde</i>	

Table C19.T3 Water Hazard Classes of USTs in Baden-Württemberg

Water Hazard Class (WGK)	Volume (m ³)
1	1,000
2	10
3	1