



Department of  
**Environment &  
Conservation**



# **Tank Tightness Testing**

## **Standardized Inspection Manual**

### **Technical Chapter 3.7**

Tennessee Department of Environment & Conservation | Division of Underground Storage Tanks | October 2015

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**STATE OF TENNESSEE  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DIVISION OF UNDERGROUND STORAGE TANKS**

**TECHNICAL CHAPTER 3.7  
TANK TIGHTNESS TESTING**

**EFFECTIVE DATE - October 1, 2015**

**PURPOSE**

The purpose of this technical chapter is to assist Division of Underground Storage Tanks (Division) staff in understanding the regulatory requirements for frequency of and performance standards for precision testing of petroleum underground storage tanks in accordance with the Underground Storage Tank (UST) regulations.

This technical chapter contains the current policy of the Division based on the statute and regulations governing the Tennessee Petroleum Underground Storage Tank program. This document supersedes all previously published versions. The most current version of this technical chapter will be posted and always available on the Division's website.

**AUTHORITY**

All rules referred to in this technical chapter are contained in Chapter 0400-18-01 and are available on the Division of Underground Storage Tanks website <http://www.state.tn.us/sos/rules/0400/0400-18/0400-18-01.20130121.pdf>

**APPLICABILITY**

Tank tightness testing is utilized for release confirmation, following new tank installations and repairs. For the purpose of release detection, tank tightness testing may **only** be used in combination with certain types of manual tank gauging and shall be conducted every five (5) years as required by rules .04(3)(b)1.(i) and .04(2)(a)1. See Technical Chapter 3.1 for Requirements for Manual Tank Gauging.

**INTRODUCTION**

The primary uses of tank tightness testing include providing owner/operators with a more precise method of monitoring their tanks, or to assist in confirming the integrity of an underground storage tank system. The two types of tightness tests are volumetric and non-volumetric.

Volumetric tank tightness tests, as the name implies, operate by applying slight pressure to the tank and then carefully measuring for any change in volume over time. Depending upon the method, volumetric tests may be performed on either partially full or overfilled tanks. Some volumetric test providers also employ a non-volumetric method of testing to determine tightness of the empty (ullage) portion of the tank. Volume varies with the temperature of the product, so temperature readings must be taken continuously. Another volumetric method measures the mass of the product to detect a volume change. A volumetric test method will yield a quantitative result with a leak rate.



**EXAMPLES OF VOLUMETRIC TESTING**



Overfill Volumetric Method (Petro-Tite)



Volumetric Underfill Method (Alert 1000)

Non-volumetric tightness tests use other principles and methods to determine a leak instead of measuring volume. For instance, one method puts a slight vacuum on the tank and then uses acoustic sensors and tank bottom water level sensors to listen for the sound of air bubbling through the product or the sound of air entering the ullage portion of the tank. Another method places a chemical marker into the product in the tank and checks for its presence outside the tank. If the tank is leaking, the chemical marker, a volatile liquid, will be detected outside the tank. Non-volumetric test methods will yield qualitative results only as "Pass" or "Fail".

**EXAMPLES OF NON-VOLUMETRIC TESTING**



Non-Volumetric Vacuum Test



Ultrasonic Leak Detector

Line tightness tests may be conducted at the same time as the tank tightness test or tested individually. See Technical Chapter 3.5 for line tightness testing requirements.

## REQUIREMENTS

All equipment used to perform tank tightness tests must be properly calibrated, operated, and maintained in accordance with the equipment manufacturer's specifications as required by rule .04(1)(a)2. and 3. All tank tightness test methods must be third party approved and must appear on the list maintained by the National Work Group on Leak Detection Evaluations (NWGLDE) which is posted on their website at [www.nwglde.org](http://www.nwglde.org). The methods published on the website will always be current and will be acceptable to the Division as long as they are properly applied. Any test method not listed on the NWGLDE website has not been properly evaluated and test results from any of those methods will not be acceptable to the Division. In addition, test results from any method that is listed but is no longer supported by the manufacturer will not be acceptable to the Division. If required by the manufacturer, the technician performing the test must hold a current manufacturer's certification of training to perform the testing.

## TANK TIGHTNESS TESTING

A tank tightness test must be capable of detecting at least a 0.1 gallon per hour (gph) leak rate from any portion of the tank that routinely contains petroleum while accounting for the effects of thermal expansion or contraction of the petroleum, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table as required by rule .04(3)(c)1. The test method must have a probability of detection of at least 95% and a probability of false alarm of 5% or less. At installation, the entire tank must be tightness tested, including the ullage space as required by rule .02(1)(d)6. All other tightness tests must test the portion of the tank that routinely contains product unless otherwise directed by the Division. "Routinely" means the highest product level since the last required tightness test supported by documentation.

**In the past, the Division allowed Automatic Tank Gauging (ATG), in certain situations, to be used to perform tank tightness tests. The Division no longer allows ATG systems to be used to conduct tank tightness testing.**

## RECORDKEEPING

Rule .04(5)(b) requires that tank tightness test results be maintained until the next test is performed. However, the following activities in which tank tightness testing is conducted require that results be maintained for the operational life of the UST system:

- After UST system installation in accordance with rule .02(1)(d)6.;
- After lining or repair in accordance with rule .02(4)(a)3.(i)(VI) and .02(7)(d) and (e).

If tank ownership changes, then the tank tightness test records shall be transferred to the new owner at the time of ownership transfer as required by rule .03(2)(d).

Records must be kept at the UST site and immediately available for inspection by the Division, or at a readily available alternative site and be provided for inspection to the Division upon request as required by rule .03(2)(c)1.

## **REPORTING**

Rule .04(3)(c)3. requires "information relating to the tank tightness test shall be reported in a format established by the division." The tank tightness test results shall contain, at a minimum, the following information:

1. Information which identifies the tank and the facility;
2. Information which identifies the test method and test conditions established by the manufacturer's specifications and/or required by the third party certification of the method;
3. Information which identifies the person and/or company performing the test;
4. Information which indicates that the tester is certified for the type of equipment used and their certification number with expiration date;
5. Ullage space was properly tested;
6. Duration of the test is appropriate for the testing method;
7. Data gathered during the performance of the test;
8. Water in tank or outside of tank is reported;
9. Appropriate calculations for test; and
10. Results expressed as leak rate in gallons per hour and as "Pass" or "Fail" (for non-volumetric, leak rate is not required)

If test results indicate the UST system failed, then the owner and/or operator shall in accordance with rule .04(3)(c)4. and .05(1)(a)3. notify the Division within 72 hours of a confirmed release. Owners and/or operators must take immediate action to prevent any further release of petroleum into the environment, and take immediate action to identify and mitigate fire, explosion, and vapor hazards as required by rule .06(3)(b) and (c).

## **REFERENCES**

Tennessee Underground Storage Tank Regulations, Chapter 0400-18-01 et. seq.

Minnesota Pollution Control Agency, Tightness Testing for Underground Storage Tanks

U.S. Environmental Protection Agency - Office of Underground Storage Tanks