

Description

Volumetric Tank Tightness Testing Method

This section describes briefly the important aspects of the volumetric tank tightness testing method. It is not intended to provide a thorough description of the principles behind the method or how the equipment works.

Method Name and Version

Alert Technologies Model 1000-X Tank Testing System

Product

> Product type

For what products can this method be used? (check all applicable)

- gasoline
- diesel
- aviation fuel
- fuel oil #4
- fuel oil #6
- solvents
- waste oil
- other (list): all chemical compounds compatible with the sensors

> Product level

What minimum product level is required to conduct a test?

- above grade
- within the fill pipe
- greater than 90% full
- greater than 50% full
- empty
- other (specify): Any level in the tank to above grade. Tests tank below product level.

Is a method used to add or withdraw product to maintain a constant level of product?

- yes
- no

Does the method measure inflow of water as well as loss of product (gallon per hour)?

- yes (inflow of water is measured as a product increase)
- no

Does the method detect the presence of water in the bottom of the tank?

- yes
 - no
-

Level Measurement

What technique is used to measure changes in product volume?

- directly measure the volume of product change
- changes in head pressure
- changes in buoyancy of a probe
- mechanical level measure (e.g., ruler, dipstick)
- changes in capacitance

- ultrasonic
 change in level of float (specify principle, e.g. capacitance, magnetostrictive, load cell, etc.) _____
 other (describe briefly): _____
-

Temperature Measurement

If product temperature is measured during a test, how many temperature sensors are used?

- single sensor, without circulation
 single sensor, with circulation
 2-4 sensors
 5 or more sensors
 temperature-averaging probe

If product temperature is measured during a test, what type of temperature sensor is used?

- resistance temperature detector (RTD)
 bimetallic strip
 quartz crystal
 thermistor
 other (describe briefly): N/A based on mass measurement principles.

If product temperature is not measured during a test, why not?

- the factor measured for change in level or volume is independent of temperature (e.g., mass)
 the factor measured for change in level or volume self-compensates for changes in temperature
 other (explain briefly):
-

Data Acquisition

How are the test data acquired and recorded?

- manually
 by strip chart
 by computer
-

Procedure Information

> Waiting times

What is the minimum waiting period between adding a large volume of product to bring the level to test requirements and the beginning of the test (e.g., from 50% to 95% capacity)?

- no waiting period
 less than 3 hours
 3-6 hours
 7-12 hours
 more than 12 hours
 variable, depending on tank size, amount added, operator discretion, etc.

What is the minimum waiting period between "topping off" the tank (adding a small amount of product to fine tune the desired level for testing, e.g., from 2 inches to 5 inches above grade) and beginning the test?

- no waiting period - Not applicable
 less than 1 hour

- 1-2 hours
- more than 2 hours
- variable, depending on the amount of product added

> Test duration

What is the minimum time for collecting data?

- less than 1 hour
- 1 hour
- 2 hours
- 3 hours
- 4 hours
- 5-10 hours
- more than 10 hours
- variable

> Total time

What is the total time needed to test with this method?

(setup time plus waiting time plus testing time plus time to return tank to service)

_____hours _____ minutes

What is the sampling frequency for the level and temperature measurements?

- more than once per second
- at least once per minute
- every 1-15 minutes
- every 16-30 minutes
- every 31-60 minutes
- less than once per hour
- variable

> Identifying and correcting for interfering factors

How does the method determine the presence and level of the ground water above the bottom of the tank?

- observation well near tank
- information from USGS, etc.
- information from personnel on-site
- presence of water in the tank
- other (describe briefly): _____
- level of ground water above bottom of the tank not determined

How does the method correct for the interference due to the presence of ground water above the bottom of the tank?

- head pressure increased by raising the level of the product
- different head pressures tested and leak rates compared
- method tests for changes in water level in tank
- other (describe briefly): testing occurs at multiple levels
- no action

How does the method identify the presence of vapor pockets?

- erratic temperature, level, or temperature-compensated volume readings
- sudden large changes in readings
- statistical analysis of variability of readings
- other (describe briefly): _____

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not identified

not applicable; underfilled test method used

How does the method correct for the presence of vapor pockets?

bleed off vapor and start test over

identify periods of pocket movement and discount data from analysis

other (describe briefly): _____

not corrected

not applicable; underfilled test method used

How does the test method determine when tank deformation has stopped following delivery of product?

wait a specified period of time before beginning test

watch the data trends and begin test when decrease in product level has stopped

other (describe briefly): Wait for acceleration of the slope of the calculated leak rate to equal zero.

no procedure

Are the temperature and level sensors calibrated before each test?

yes

no

If not, how often are the sensors calibrated?

weekly

monthly

yearly or less frequently

never

> Interpreting test results

How are level changes converted to volume changes (i.e., how is height-to-volume conversion factor determined)?

actual level changes observed when known volume is added or removed (e.g., liquid, metal bar)

theoretical ratio calculated from tank geometry

interpolation from tank manufacturer's chart

other (describe briefly) _____

not applicable; volume measure directly

How is the coefficient of thermal expansion (Ce) of the product determined?

product sample taken for each test and Ce determined from specific gravity

value supplied by vendor of product

average value for type of product

other (describe briefly): **N/A**

How is the leak rate (gallon per hour) calculated?

average of subsets of all data collected

difference between first and last data collected

from data of last _____ hours of test period

from data determined valid by statistical analysis

other (describe briefly): _____

What threshold value for product volume change (gallon per hour) is used to declare that a tank is leaking?

0.05 gallon per hour

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0.10 gallon per hour

0.20 gallon per hour

other (list): Depends on Federal, State, City, County Regulations where test is conducted.

Under what conditions are test results considered inconclusive?

ground-water level above bottom of tank

presence of vapor pockets

too much variability in the data (standard deviation beyond a given value)

unexplained product volume increase

other (describe briefly) _____

Exceptions

Are there any conditions under which a test should not be conducted?

ground-water level above bottom of tank

presence of vapor pockets

large difference between ground temperature and delivered product temperature

extremely high or low ambient temperature

invalid for some products (specify): _____

soil not sufficiently porous

other (describe briefly): Groundwater level in hydrostatic equilibrium with tank product.

What are acceptable deviations from the standard testing protocol?

none

lengthen the duration of test

other (describe briefly): _____

What elements of the test procedure are left to the discretion of the testing personnel on-site?

waiting period between filling tank and beginning test

length of test

determination of presence of vapor pockets

determination that tank deformation has subsided

determination of "outlier" data that may be discarded

other (describe briefly) _____

none