INTEGRITY TESTING OF UST SYSTEMS – PEI RP1200

KEVIN HENDERSON CONSULTING, LLC

Petroleum Storage Tank Experts

59 Summit Place
Brandon, MS 39042
Phone: 601-706-4463
Mobile: 601-825-1985
E-mail: Kevin4824@comcast.net

NEIWPCC
UST Inspector Webinar
November 13, 2014

PEI/RP1200-12 ----------

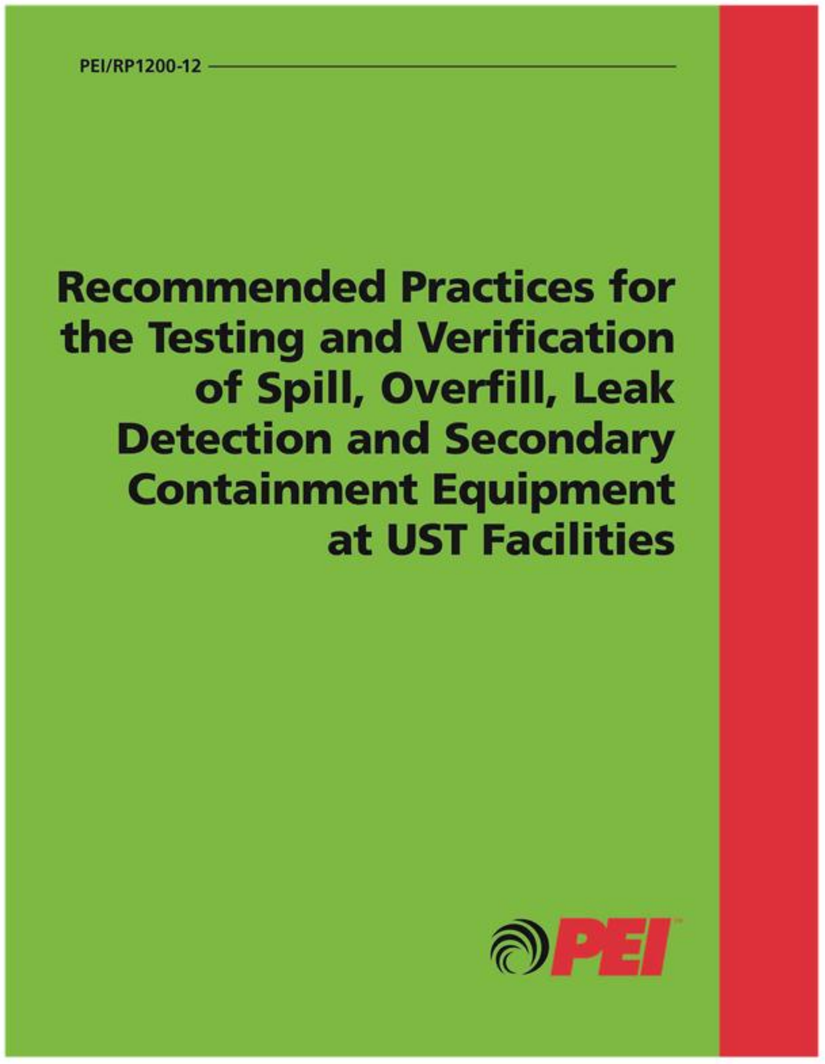
1. **Introduction**
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

1. INTRODUCTION

Origin

- Produced as an industry service
- Prepared in response to requests from UST regulators, testers and operators
- Represents a single authoritative source of information



1. INTRODUCTION

Origin

- Committee is made up of representatives from:
  - Equipment suppliers
  - Tank owners
  - Testing companies
  - Industry associations
  - Regulatory community

1. INTRODUCTION

Public Comments

- Comments can be made by anyone at any time via the world wide web

- www.pei.org
  - Publications & Resources
    - Recommended Practices

1. INTRODUCTION

Background

- Spill, overfill, leak detection and secondary containment equipment required by regulations

- Proposed EPA Rule Changes

  Likely to require operation and maintenance testing/inspection of all this equipment

1. INTRODUCTION

Purpose

- Provide a concise summary of general guidelines for inspection and testing of _____ at UST facilities:
  - Spill prevention
  - Overfill equipment
  - Leak detection
  - Secondary containment
  - Shear valves
  - Emergency stops

1. INTRODUCTION

Purpose

- Intended to provide recommended practices that:

  - Protect human health and the environment
  - Promote safe and reliable operation of UST systems
  - Prevent spills and overfills associated with deliveries
  - Prevent damage to property and equipment

1. INTRODUCTION

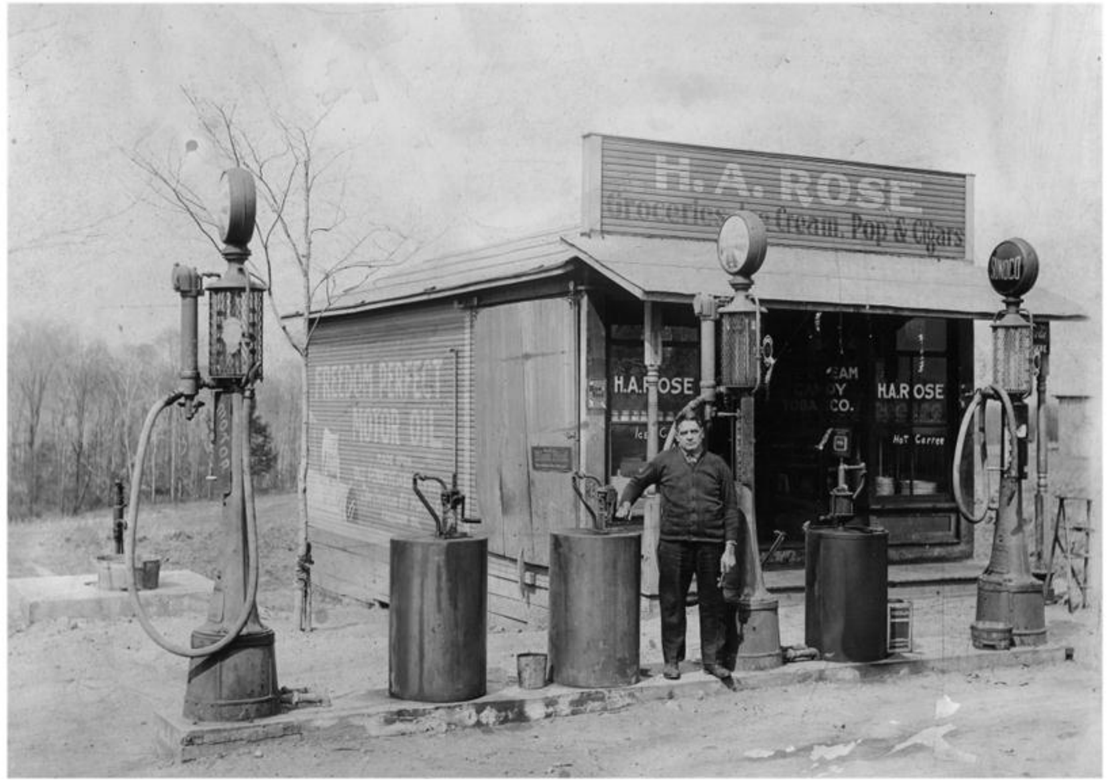
Purpose

- Not intended to:
  - Endorse or recommend particular materials, equipment, suppliers or manufacturers
  - Discourage the development or installation of new equipment
  - Discourage the development of new or improved testing procedures and equipment

1. INTRODUCTION

Scope

- RP/1200 applies to UST facilities that store_____
  - Motor fuels
  - Jet fuels
  - Distillate fuel oils
  - Residual fuel oils
  - Lubricants
  - Petroleum solvents
  - Oils
  - Other petroleum products



1. INTRODUCTION

Scope

- Recommended Practices apply to:
  - Underground storage tanks
  - Connected underground piping
  - Underground ancillary equipment
  - Secondary containment systems

1. INTRODUCTION

Scope

- Test methods based on current industry practices
- Intended to demonstrate that a leak from the primary containment will be detected before it reaches the environment
- If AHJ requires testing to meet specific leak detection standards – follow the regulatory requirements

1. INTRODUCTION

Scope

- RP/1200 is not meant to provide interpretation of regulatory or legislative requirements related to UST systems

- Does not require testing of anything

- Just tells you how to do it

PEI/RP1200-12 ----------

1. Introduction
2. **Definitions**
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

2. DEFINITIONS

- <u>Tight Wrap Tank</u> – A type of tank construction that consists of a primary tank wrapped by a secondary containment that is structurally supported by the primary tank.
  - Interstitial space is very small

- <u>110% Containment Tank</u> – A tank with secondary containment where the interstitial space volume is 10% of the total primary containment volume.
  - Interstitial space is large

PEI/RP1200-12 ----------

1. Introduction
2. Definitions
3. **Safety**
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

3. SAFETY

- "Only properly trained individuals should inspect or test overfill, leak detection and release prevention equipment."

- "These individuals are responsible for their own safety, and should take reasonable precautions to ensure the safety of facility employees, customers, and any other personnel in the work area."

- "Refer to Appendix D for related safety publications."

PEI/RP1200-12 ----------

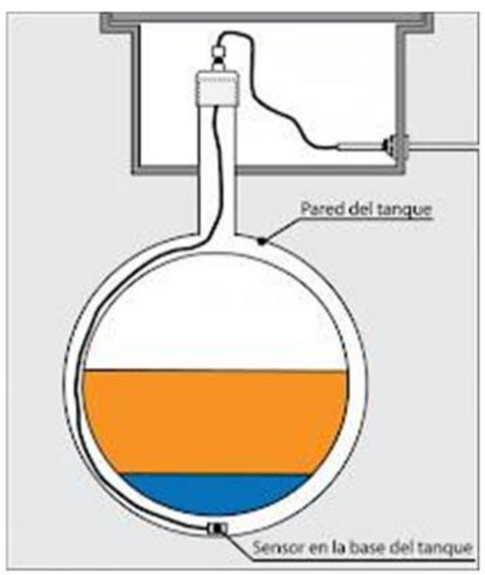
1. Introduction
2. Definitions
3. Safety
4. **Tank Secondary Containment Integrity Testing**
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

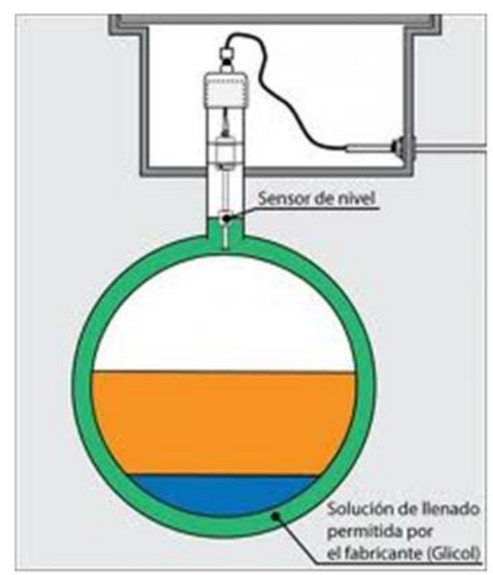
4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.1 General - Interstice may be dry or liquid filled

Dry = Vacuum Test



Wet = Hydrostatic Test



4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.2 Dry Test Method

- Test procedure is general in nature
  - Represents the consensus view of the committee
- Vacuum is pulled and monitored for a period of time
  - Test duration depends on size of tank
  - Amount of vacuum depends on type of tank

4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.2.5 Dry Test Method – Steel Tanks

- Must determine if tank is a “tight wrap” or 110% containment design

  - If tank is tight wrap – RP/1200 test procedure may be followed

  - If tank is 110% - Follow Steel Tank Institute R012 “Recommended Practice for Interstitial Tightness Testing of Existing Underground Double Wall Steel Tanks”

4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.2.6 Dry Test Method – Fiberglass Tanks

- May use RP/1200 test procedure

OR

- Fiberglass Tank & Pipe Institute "Field Test Protocol for Testing the Annular Space of Installed Underground Fiberglass Double and Triple-wall Tanks with Dry Annular Space"

4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.2.6 Dry Test Method

Table 4.1	Test Parameters		
Tank Type	Vacuum, inches Hg	Capacity, gallons	Duration, hours
Fiberglass	10	<20.000	1
		20,000+	2
Steel	6	<20.000	1
		20,000+	2

4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.2.6 Dry Test Method

Pass = No loss of vacuum and no ingress of fluids

Fail = Any loss of vacuum or any ingress of fluids

4. TANK SECONDARY CONTAINMENT INTEGRITY TESTING

4.3 Hydrostatic testing

- RP defers to the manufacturers' test procedure
  - Variables must be considered
  - Too many differences between manufacturers procedures
- These tests, when conducted according to the manufacturers' protocol, are "precision" tightness tests (0.1 gph)
- Manufacturers' checklist/data log included as appendix

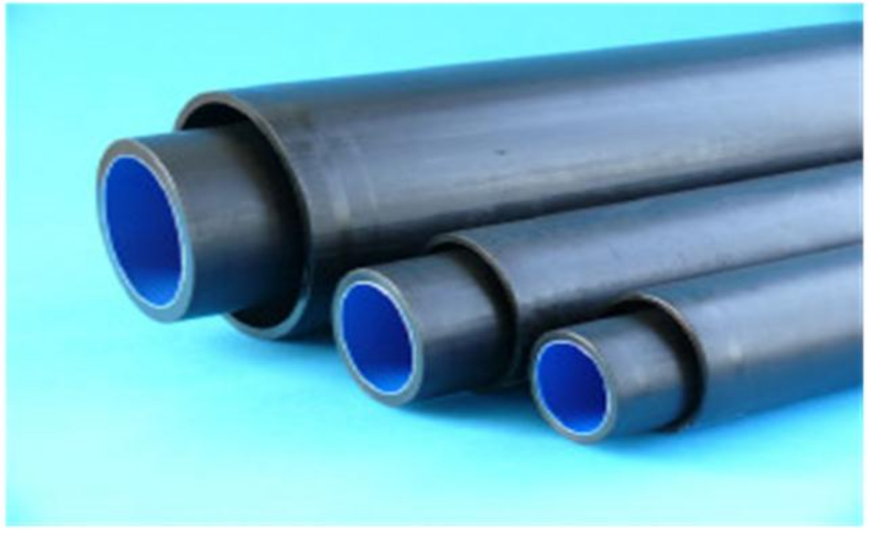
PEI/RP1200-12 ----------

1. Introduction
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. **Piping Secondary Containment Integrity Testing**
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

5. PIPING SECONDARY CONTAINMENT INTEGRITY TESTING

- Only tests the outer wall of double-walled pipe
  - Containment sumps are tested separately
- RP/1200 test procedure is general in nature (no established leak rate)



5. PIPING SECONDARY CONTAINMENT INTEGRITY TESTING

- Piping interstice is pressurized with an inert gas to 5 psi and monitored for 1 hour
  - Piping tested as one continuous system or in sections
  - "Sealing" interstitial space of some piping systems (particularly older ones) can be problematic

5. PIPING SECONDARY CONTAINMENT INTEGRITY TESTING

- Pass = No pressure change
- Fail = Any pressure change
  - If pressure increases – repeat the test

Note: Piping secondary containment testing is conducted only after the primary pipe has been precision tightness tested

PEI/RP1200-12 ----------

1. Introduction
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. **Spill Bucket and Containment Sump Testing**
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.1 General

- Spill bucket and sump testing is grouped together since the test procedure is the same
- Spill buckets and containment sumps can be single-walled or double-walled

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.1 General

- Spill Buckets - Test procedures for both single and double-walled spill buckets
  - Single-walled = Hydrostatic OR Vacuum test
  - Double-walled = Vacuum test of interstice
- Containment Sumps – Test procedure for single-walled containment sumps only
  - Single-walled = Hydrostatic test

Why spill buckets must be tested

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.2 Single-Walled Spill Bucket – Hydrostatic Test

- Clean and examine the spill bucket
- Fill with water to within 1 ½ inches of top
- Measure water depth to nearest 1/16 inch
- Monitor for 1 hour

Pass = Difference < 1/8 inch

Fail = Difference ≥ 1/8th inch

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.2 Single-Walled Spill Bucket – Hydrostatic Test

- Be sure tank fill cap seals properly
- Be sure drain valve seals properly

If these components don't seal properly - water may enter tank

Alternatively, you may temporarily install a plumber's plug in the fill riser and remove/plug the drain valve

Sometimes just a visual inspection is sufficient to "test"

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.3 Single-Walled Spill Bucket – Vacuum Test

- Clean and examine the spill bucket
- Install special test cover
- Pull a vacuum of 30” H_2O column
- Monitor vacuum for 1 minute

Pass = Ending vacuum level ≥ 26” H_2O column

Fail = Ending vacuum level < 26” H_2O column

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.4 Double-Walled Spill Bucket - Vacuum Test

- Clean and examine the spill bucket
- Pull a vacuum of 15” H_2O column on interstice
- Monitor vacuum for 1 minute

Pass = Ending vacuum ≥ 12” H_2O colu

Fail = Ending vacuum < 12” H_2O column

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.4 Double-Walled Spill Bucket - Vacuum Test

Testing the interstice of a double-walled spill bucket simultaneously tests both the primary and secondary

6. SPILL BUCKET & CONTAINMENT SUMP TESTING

6.5 Single-Walled Containment Sump – Hydrostatic Test

- Clean, examine and prepare the containment sump
- Fill with water to 4” above the highest sump penetration or sidewall seam – whichever is higher
- Measure water level to the nearest 1/16 inch
- Monitor water level for 1 hour

Pass = Difference < 1/8 inch

Fail = Difference ≥ 1/8th inch

Be sure water level is 4” above highest joint

PEI/RP1200-12 ----------

1. Introduction
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. **UST Overfill Equipment Verification, Inspection and Testing**
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

7. OVERFILL PREVENTION INSPECTION

Federal Rule (40 CFR 280) Overfill Prevention Options:

- Shutoff flow at:
  a. 95% tank capacity <u>OR</u>
  b. before tank top fittings are wetted
- Restrict flow at:
  a. 90% tank capacity <u>OR</u>
  b. 30 minutes prior to overfilling
- Alert the operator at:
  a. 90% tank capacity <u>OR</u>
  b. 1 minute prior to overfilling

United States
Environmental Protection
Agency

Office of Solid Waste and
Emergency Response
Washington, DC 20460
OS-420 (WF)

Office of Underground Storage Tanks August 5, 1991

EPA

Environmental Fact Sheet

Technical Standards And Corrective Action Requirements For Owners And Operators Of Underground Storage Tanks: Final Amendment Of The Overfill Requirements

Background

On September 23, 1988, the Environmental Protection Agency promulgated technical requirements (53 FR 37082) under Subtitle I of the Resource Conservation and Recovery Act (RCRA) for underground storage tanks containing petroleum or substances defined as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), except any substance defined as hazardous waste under Subtitle C of RCRA. Those rules went into effect 90 days later on December 22, 1988. The final rule remains unchanged; this amendment adds to the UST overfill prevention requirements by allowing alternative uses of overfill prevention equipment located closer to the tops of larger tanks as long as specified minimum levels of performance are achieved.

Overfilling UST systems is a common source of petroleum releases onto the surface of the ground. EPA studies have found that UST owners and operators without overfill prevention equipment on their USTs often inadvertently force product into the environment through tank bung holes, vent lines, or fill ports when the volume of liquid delivered exceeds the tank's storage capacity. Sections 280.20(c) and 280.30 of the final regulations provide requirements for spill and overfill prevention that mandate UST owners and operators use prevention equipment as well as follow procedures for preventing spillage and overfills into the environment during each tank in-filling operation. More specifically, section 280.20(c)(1)(ii) of the existing rule requires that owners and operators prevent overfills by installing equipment with a design that will either: (1) alert the transfer operator when the tank is up to 90 percent full by restricting the flow into the tank or triggering an alarm, or (2) automatically shut off flow into the tank when the tank is up to 95 percent full.

Action Taken Today

This final amendment allows overfill equipment to be used closer to the top of larger bulk storage tanks (e.g., those tanks frequently located at retail gasoline stations) because it acknowledges that sufficient volumes to receive excess product would still be available there. The existing overfill prevention design standards will most likely still be implemented by

7. OVERFILL PREVENTION INSPECTION

Committee decided to develop protocols reflective of the more conservative application of the rules

- Overfill prevention devices must be set to:
  - Shutoff at 95% tank capacity
  - Restrict flow at 90% tank capacity
  - Alert the operator at 90% tank capacity

7. OVERFILL PREVENTION INSPECTION

Shutoff

Restrict

Alarm

7. OVERFILL PREVENTION INSPECTION

7.1 Automatic Shutoff Devices (Flapper Valves)

- Remove from the tank
- Visually inspect
- Manually operate valve to ensure it is functional
- Measure length to ensure complete shutoff occurs when the tank is no more than 95% full

Note: Ensure that <u>complete</u> shutoff point occurs at 95%


Why overfill device must be removed for inspection

7. OVERFILL PREVENTION INSPECTION

7.2 Restriction Devices (Ball Float Valves)

- Remove from the tank
- Visually inspect
- Measure length to ensure flow restriction occurs when the tank is no more than 90% full

Note: All tank top fittings must be tight in order for the ball float valve to effectively restrict the flow

7. OVERFILL PREVENTION INSPECTION

7.2 Restriction Devices (Ball Float Valves)

Be aware that there are two different kinds of ball float valves

1. “Standard” – Set @ 90% (16” in a 8’ diameter tank)
2. “Precision” – 30 minutes prior to overfill

- RP1200 only considers “Standard” ball float valves

7. OVERFILL PREVENTION INSPECTION

7.3 Alert Devices (Electronic Alarms)

- Electronic alarms typically part of ATG system
  - Remove from the tank
  - Visually inspect
  - Measure length to ensure that alarm occurs when the tank is no more than 90% full

Note: Overfill alarms must provide an audible and/or visible warning to the fuel delivery driver


EMERGENCY
SHUT-OFF
SWITCH
CKNOWLEDGED
TEST
RESET
VLEDER-ROCT

PEI/RP1200-12 ----------

1. Introduction
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. **Electronic Monitoring System Inspection and Testing**
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

8. ELECTRONIC MONITORING SYSTEM INSPECTION

- Test/Inspection of ATG system:
  - Console
  - In-tank probes
  - Interstitial sensors (tanks & piping)

- Test is general in nature – Not intended as calibration of ATG system

8. ELECTRONIC MONITORING SYSTEM INSPECTION

8.1 ATG Console

- Verify system is properly configured (setup)
- Verify all site specific parameters are correct
- Verify that indicator lamps function
- Verify that printer functions
- Verify that LCD display functions

Component Testing & Verification

8.2 ATG Probes

- Remove probe from tank
- Visually inspect probe tank cap assembly
- Visually inspect probe and floats
- Verify that floats move freely
- Verify all floats indicate the correct fluid levels and indicated fluid levels correspond with programming

Why the ATG probe must be removed for inspection

8. ELECTRONIC MONITORING SYSTEM INSPECTION

8.3 Interstitial Sensors

- RP only considers sensors that function by detecting the presence of liquids (both discriminating and non-discriminating)
- RP only considers float switch type sensors as these are the most common
  - For other types of sensors – consult manufacturer

8. ELECTRONIC MONITORING SYSTEM INSPECTION

8.3 Interstitial Sensors

- Verify that sensor is properly installed
- Remove sensor from tank interstice or piping sump
- Visually inspect
- Submerge sensor in appropriate test fluid (water for non-discriminating type)
- Verify proper alarm condition and/or STP shutdown
- Verify sensor is properly labeled in ATG console setup

Why electronic alarms must be tested

PEI/RP1200-12 ----------

1. Introduction
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. **Automatic Line Leak Detectors**
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

9. AUTOMATIC LINE LEAK DETECTORS

General

- Two types of automatic line leak detectors

Mechanical

Electronic

9. AUTOMATIC LINE LEAK DETECTORS

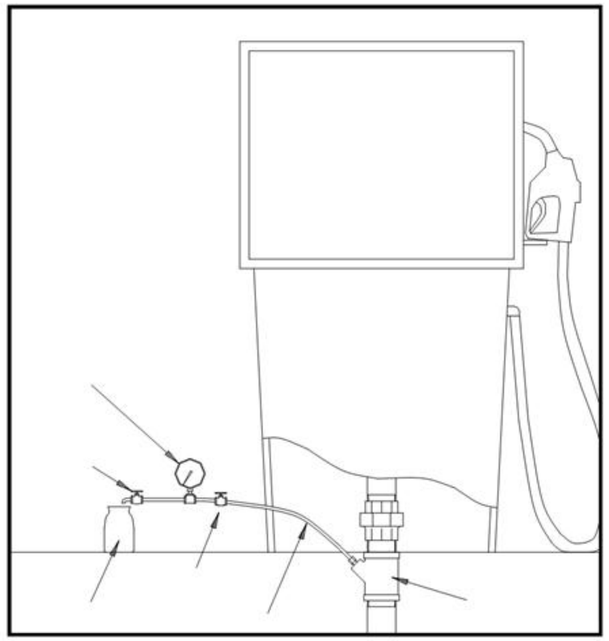
General

- Test procedures verify that the ALLD is capable of detecting a leak equivalent to 3 gph @ 10 psi
- Test apparatus must have an adjustable orifice to properly simulate a leak equivalent to 3 gph @ 10 psi
- Calibration of the adjustable orifice may be accomplished with or without the use of a pressure regulator – Both procedures are described

9. AUTOMATIC LINE LEAK DETECTORS

General

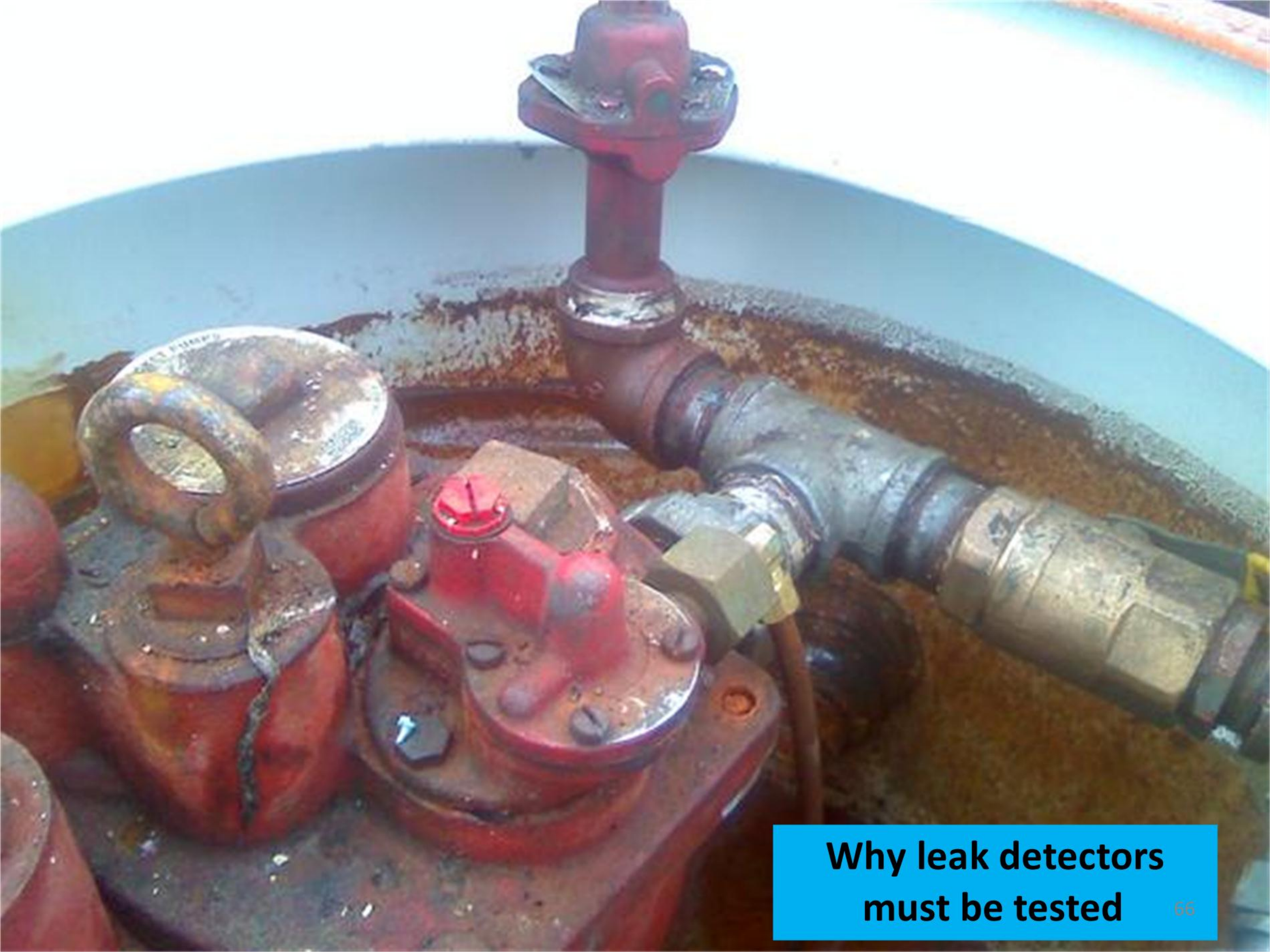
- Test must confirm that the STP properly cycles on/off (verifies STP relays are functioning)
- Simulated leak must occur at the dispenser that is at the highest elevation above the STP
- If piping system has master/satellite configuration, simulated leak must occur at the farthest satellite dispenser



9. AUTOMATIC LINE LEAK DETECTORS

9.1 Mechanical Leak Detectors

- Visual inspection
- Verify leak detector “trips” when line pressure nears zero
- Verify leak detector sees a simulated leak equivalent to 3 gph @ 10 psi
  - “Slow flow” condition exists



Why leak detectors must be tested

9. AUTOMATIC LINE LEAK DETECTORS

9.2 Electronic Line Leak Detectors

- Visual inspection
- Verify system setup parameters are correct
- Verify leak detector searches for leak
- Verify leak detector sees simulated leak equivalent to 3 gph @ 10 psi
  - Causes alarm condition
  - Causes STP shutdown if required by AHJ

PEI/RP1200-12 ----------

1. Introduction
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. **Shear Valve Inspection and Testing**
11. Emergency Stop
12. Documentation

Appendices

10. SHEAR VALVE INSPECTION & TESTING

- Two types of shear valves

Product Shear Valve

Vapor Shear Valve

10. SHEAR VALVE INSPECTION & TESTING

10.2 Product Shear Valves

- Visual inspection
- Verify anchored securely and at correct height
- Confirm trip mechanism is functional
- Manually close the valve poppet
- Verify that no product flow occurs

Why shear valves must be tested

10. SHEAR VALVE INSPECTION & TESTING

10.3 Vapor Shear Valves

- Visual inspection
- Verify anchored securely and at correct height

PEI/RP1200-12 ----------

1. Introduction
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. **Emergency Stop Switches**
12. Documentation

Appendices

11. EMERGENCY STOPS

General

- May be more than one e-stop switch at the facility
- Must test every e-stop switch individually
- Verify e-stop is clearly labeled
- Verify easily accessible

Why E-Stops must be tested

11. EMERGENCY STOPS

- Manually activate switch to confirm power has been disconnected to:
  - All dispensers
  - All STPs
  - All power, control and signal circuits associated with dispensers and STPs
  - All other non-intrinsically safe electrical equipment in the classified areas of the UST system and dispensers

PEI/RP1200-12 ----------

1. Introduction
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. **Documentation**

Appendices

12. DOCUMENTATION

- Sample forms are provided for every test
- Proper documentation of testing is essential

PEI/RP1200-12 ----------

1. Introduction
2. Definitions
3. Safety
4. Tank Secondary Containment Integrity Testing
5. Piping Secondary Containment Integrity Testing
6. Spill Bucket and Containment Sump Testing
7. UST Overfill Equipment Verification, Inspection and Testing
8. Electronic Monitoring System Inspection and Testing
9. Automatic Line Leak Detectors
10. Shear Valve Inspection and Testing
11. Emergency Stop
12. Documentation

Appendices

APPENDIX A – FRP Tank Manufacturer's Test Checklists/Data Logs

- Appendix A-1 & A-2

  - Fiberglass tank manufacturers' precision tank tightness testing procedure for brine filled double-walled tanks

Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities

APPENDIX A-1

CONTAINMENT SOLUTIONS

HYDROSTATIC PRECISION TANK TEST CHECKLIST

NWGLDE Category: INTERSTITIAL TANK TIGHTNESS TEST METHOD

Job Name: _____

Address: _____ City: _____ State: _____

_____ / _____ Record date / time when tank was last filled (wait 24 hours from last delivery)

_____ / _____ Record today's date / time

Time	Testing Procedures	Groundwater Level	Tank #1	Tank #2
	Record tank ID, Number (if known)		_____	_____
	Product stored		_____	_____
	Tank nominal capacity (gallons)*		_____	_____
	Preparation:			
	1. Measure and record groundwater table level.	_____		
	2. Fill reservoir riser pipe approximately 12" over reservoir cap. The level in the riser pipe must be at least 12" higher than the groundwater table.			
	3. Diameter of reservoir riser pipe.		_____	_____
	4. Inspect all exposed monitoring fitting plugs for leaks.		_____	_____
	Begin test:			
_____	5. Record time (wait 3 hours after step #2).			
	6. Measure and record liquid level in reservoir riser pipe.		_____	_____
	7A. Measure and record groundwater table level.	_____		
	7B. Record dispenser meter readings.		_____	_____
_____	8. Record time (wait 4 hours after completing both steps #6 and #7).			
	9. Measure and record liquid level in reservoir riser pipe.		_____	_____
	10A. Measure and record groundwater table level.	_____		
	10B. Record dispenser meter reading.		_____	_____
	End test:			
	Calculate changes:			
	11A. Reservoir riser pipe level (step#9 minus step #5).		_____	_____
	11B. Groundwater level (step #7 minus step #10A).	_____		
	11C. Dispensed product (step #7 minus step #10B).		_____	_____

Results Interpretation – The calculated changes (from 11A, 11B, and 11C) must meet all of the criteria in column "B" below to pass the tightness test of .05 gallons per hour with a 95% probability of detection and a 1% probability of false alarm.

	(A) Criteria	(B) Tank passes test if...	(C) Tank test is inconclusive if...
	Line #11A	Less than 1"	More than 1"***
	Line #11B	and less than 10"	or more than 10"**
	Line #11C	and less than 800 gallons	or more than 800 gallons ***

*Measure tank diameter (ID). Max capacity 20,000 gallons.
** Repeat test steps 6-11
*** Re-inspect and accuracy check/retest dispensing. Then repeat test steps 6-11

_____ / _____ / _____
Date

_____
CSI Technician's Name

APPENDIX A-2

TRUCHEK DATA LOG

Fill out the site location, tank information and test boxes below. Be sure to choose the correct test box according to the diameter of the tank being tested. Follow the test procedures on the other side of this form. A separate test form is needed for every tank. For additional copies of the form, contact the UST coordinator at the Xerxes manufacturing facility nearest you. (See back cover for information.)

SITE LOCATION AND TANK INFORMATION

Site Location:

Address: _____

_____

Phone: _____

Contact name: _____

Tank Information:

Nominal Gallons: _____

Diameter: _____

Approximate standpipe length: _____

Product type: _____

Test Date: _____ Person Performing Test: _____

4-FOOT-, 6-FOOT- AND 8-FOOT-DIAMETER DOUBLE-WALL TANKS

95% – 5% TEST

1a. Start level (inches in standpipe) _____
2a. End level after 6 hours - _____
3. Difference (subtract 2a from 1a)+ _____
4. Calibration factor × 20
5. Volume change = _____
6. Test hours ÷ 6
7. Gallons-per-hour loss = _____

(If 0.05 gallons/hour or less, tank passed.)

Note: maximum allowable dispensing volume during test:
4-foot-diameter tank – 1,200 gallons maximum
6-foot-diameter tank – 500 gallons maximum
4-foot-diameter tank – 300 gallons maximum

99% – 1% TEST

1b. Start level (inches in standpipe) _____
2b. End level after 10 hours - _____
3. Difference (subtract 2b from 1b)+ _____
4. Calibration factor × 10
5. Volume change = _____
6. Test hours ÷ 10
7. Gallons-per-hour loss = _____

(If 0.05 gallons/hour or less, tank passed.)

Note: No product dispensing allowed.

10-FOOT-DIAMETER DOUBLE-WALL TANKS

95% – 5% TEST

1a. Start level (inches in standpipe) _____
2a. End level after 6 hours - _____
3. Difference (subtract 2a from 1a)+ _____
4. Calibration factor × 20
5. Volume change = _____
6. Test hours ÷ 6
7. Gallons-per-hour loss = _____

(If 0.05 gallons/hour or less, tank passed.)

Note: maximum allowable dispensing volume during test:
10-foot-diameter tank – 750 gallons maximum

99% – 1% TEST

1b. Start level (inches in standpipe) _____
2b. End level after 10 hours - _____
3. Difference (subtract 2b from 1b)+ _____
4. Calibration factor × 10
5. Volume change = _____
6. Test hours ÷ 10
7. Gallons-per-hour loss = _____

(If 0.05 gallons/hour or less, tank passed.)

Note: No product dispensing allowed.

XERXES®
a dci company

APPENDIX B – Pressure & Vacuum Conversion Tables

- Convert Units for Measuring Pressure

  PSIG - Inches HG – Mbar – Bar

- Convert Units for Measuring Vacuum

  Inches H_2O – Inches HG – PSIG – Mbar - Bar

APPENDIX C – SAMPLE TEST DATA SHEETS

C-1 Tank Secondary Containment Integrity Testing Dry Test Method

C-2 Piping Secondary Containment Integrity Testing

C-3 Spill Bucket Integrity Testing Hydrostatic Test Method Single and Double-Walled Vacuum Method

C-4 Containment Sump Integrity Testing Hydrostatic Testing Method

C-5 UST Overfill Equipment Inspection Automatic Shutoff Device and Ball Float Valve

C-6 Overfill Alarm Operation Inspection

C-7 Automatic Tank Gauge Operation Inspection

C-8 Liquid Sensor Functionality Testing

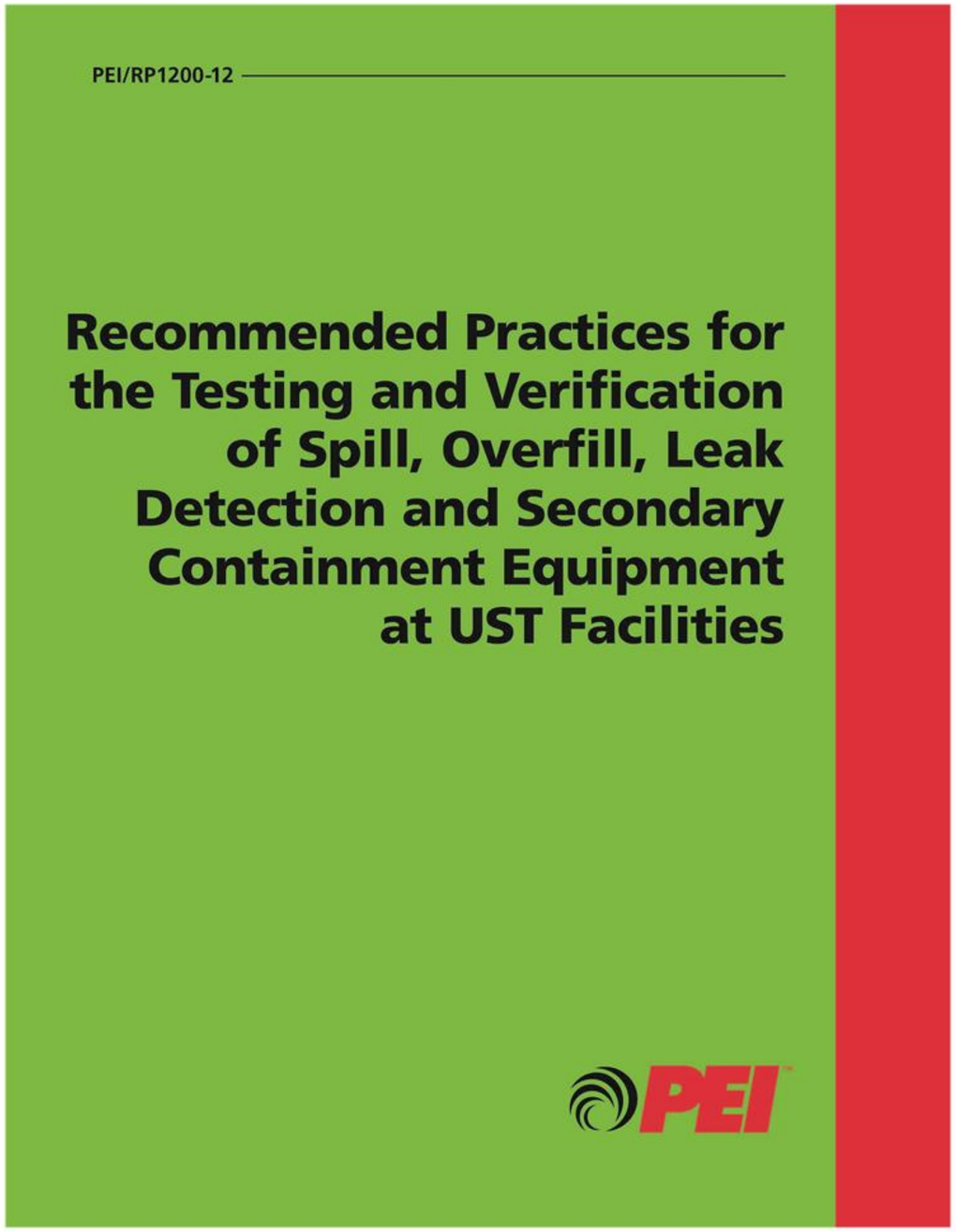
C-9 Mechanical and Electronic Line Leak Detectors Performance Test

C-10 Shear Valve Operation Inspection

C-11 Emergency Stop Switch Operation Inspection

APPENDIX D – PUBLICATION REFERENCE

- API
- FT&PI
- ICC
- NFPA
- PEI
- STI
- UL
- OSHA
- EPA



KEVIN HENDERSON CONSULTING, LLC

Petroleum Storage Tank Experts

59 Summit Place
Brandon, MS 39042
Phone: 601-706-4463
Mobile: 601-825-1985
E-mail: Kevin4824@comcast.net