Steel USTs: History and Trends

Wayne Geyer, STI/SPFA

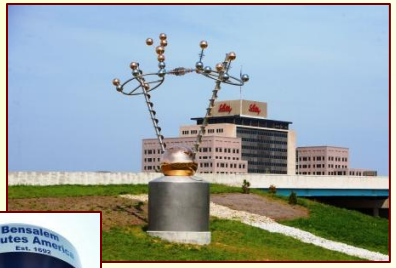
August 1, 2013

Who and What is STI/SPFA?

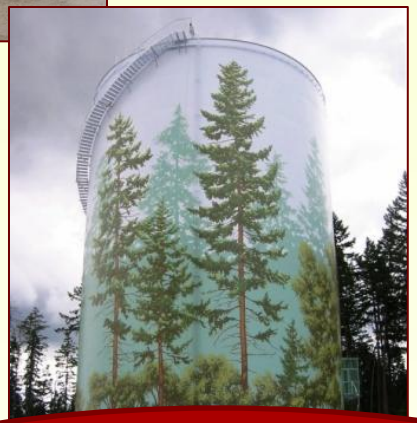
- Association of 180 fabricating and affiliate companies of steel construction products – shop-fab tanks, field erect tanks, pipe, pressure vessels and other special fabricated products
- STI members account for nearly all of the total shop fabricated underground steel storage tank production capacity in North America

2012 Annual Product Awards: Steel Fabricated Products










www.steeltank.com

STI/SPFA Water Storage Tank Century Club

- Dothan, Alabama
- Dixie Tank
- Built in 1897
- City landmark
- Civic pride
- 116 years old
- Remains in operation

Steel Fact Sheets

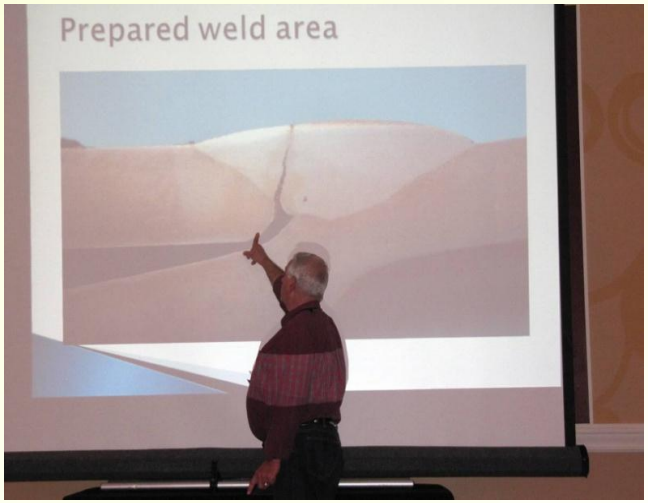
www.steeltank.com

What does the Steel Tank Institute do?

- UST and AST tank technologies
- Industry standards and recommended practices
- Licenses manufacturers to build tanks to STI specifications
- Quality control
- Information resource
- Certification

1985 Sti-P3 Tank Removed in 2013 – No Leaks

Education, Research, & Advocacy



STI Certification Programs

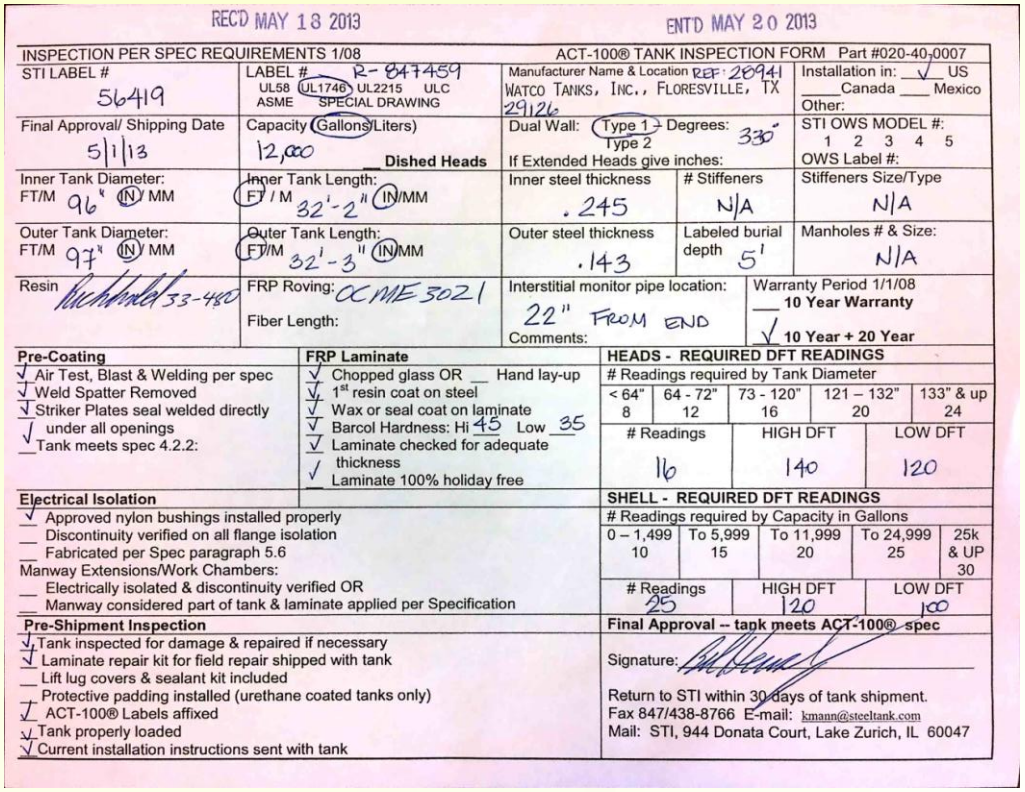
- 927 Certified SP001 Aboveground Storage Tank Inspectors
- 484 Certified Cathodic Protection Testers
- Over 130,000 sti-P3 tanks tested for cathodic protection through WatchDog program
- NEW: On Line Learning Program
  - T*I*M *Tank Integrity Management*

STI Stats: Shop-Fabricated Tanks

- **Over 100 tank shops licensed and inspected**
- **14 tank fabrication standards in place**
  ***NEW:* DEF and CleanSite Containment™**
- **19 recommended practices for testing, installation and inspection**
  ***NEW:* R111 Storage Tank Maintenance**
  Under Development: SP131- UST Inspection, Repair, & Modification
- **6 UL files with hundreds of volumes & 4 SWRI technology programs**

Tank Registration

- Every tank built with an STI label is inspected by tank fabricator to meet STI specification
- Tank is “registered” with STI
- STI maintains database with over 400,000 entries



RECD MAY 13 2013 ENTD MAY 20 2013

INSPECTION PER SPEC REQUIREMENTS 1/08 — ACT-100® TANK INSPECTION FORM Part #020-40-0007

STI LABEL # 56419	LABEL # R-847459 UL58 (UL1746) UL2215 ULC ASME SPECIAL DRAWING	Manufacturer Name & Location REF: 28941 WATCO TANKS, INC., FLORESVILLE, TX 29126	Installation in: √ US ____Canada ___ Mexico Other:
Final Approval/ Shipping Date 5/1/13	Capacity (Gallons/Liters) 12,000 Dished Heads	Dual Wall: (Type 1) Type 2 Degrees: 330° If Extended Heads give inches:	STI OWS MODEL #: 1 2 3 4 5 OWS Label #:
Inner Tank Diameter: FT/M 96" (IN) MM	Inner Tank Length: FT / M 32'-2" (IN/MM	Inner steel thickness .245 / # Stiffeners N/A	Stiffeners Size/Type N/A
Outer Tank Diameter: FT/M 97" (IN) MM	Outer Tank Length: FT/M 32'-3" (IN/MM	Outer steel thickness .143 / Labeled burial depth 5'	Manholes # & Size: N/A
Resin Hetron 33-480	FRP Roving: OCME 3021 Fiber Length:	Interstitial monitor pipe location: 22" FROM END Comments:	Warranty Period 1/1/08 ___ 10 Year Warranty √ 10 Year + 20 Year

Pre-Coating
- √ Air Test, Blast & Welding per spec
- √ Weld Spatter Removed
- √ Striker Plates seal welded directly under all openings
- √ Tank meets spec 4.2.2:

FRP Laminate
- √ Chopped glass OR __ Hand lay-up
- √ 1st resin coat on steel
- √ Wax or seal coat on laminate
- √ Barcol Hardness: Hi 45 Low 35
- √ Laminate checked for adequate thickness
- √ Laminate 100% holiday free

Electrical Isolation
- √ Approved nylon bushings installed properly
- __ Discontinuity verified on all flange isolation
- __ Fabricated per Spec paragraph 5.6

Manway Extensions/Work Chambers:
- __ Electrically isolated & discontinuity verified OR
- __ Manway considered part of tank & laminate applied per Specification

Pre-Shipment Inspection
- √ Tank inspected for damage & repaired if necessary
- √ Laminate repair kit for field repair shipped with tank
- __ Lift lug covers & sealant kit included
- √ Protective padding installed (urethane coated tanks only)
- √ ACT-100® Labels affixed
- √ Tank properly loaded
- √ Current installation instructions sent with tank

HEADS - REQUIRED DFT READINGS

Readings required by Tank Diameter

< 64"	64 - 72"	73 - 120"	121 – 132"	133" & up
8	12	16	20	24

# Readings	HIGH DFT	LOW DFT
16	140	120

SHELL - REQUIRED DFT READINGS

Readings required by Capacity in Gallons

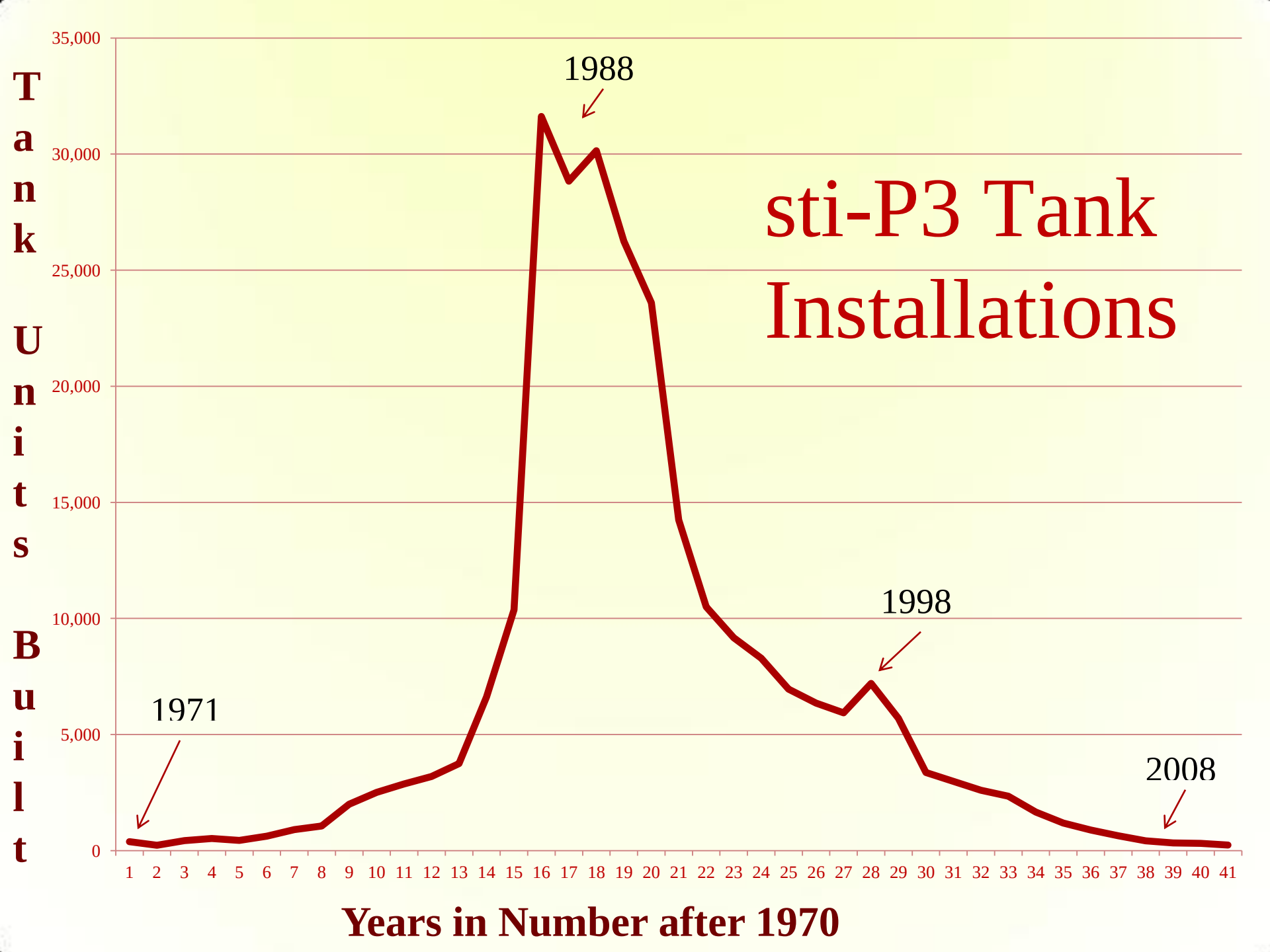
0 – 1,499	To 5,999	To 11,999	To 24,999	25k & UP
10	15	20	25	30

# Readings	HIGH DFT	LOW DFT
25	120	100

Final Approval -- tank meets ACT-100® spec

Signature:

Return to STI within 30 days of tank shipment.
Fax 847/438-8766 E-mail: kmann@steeltank.com
Mail: STI, 944 Donata Court, Lake Zurich, IL 60047


sti-P3 Tank Installations
Tank Units Built
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1988
1998
2008
1971
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
Years in Number after 1970

How many tanks have been built to STI specifications as of June 30, 2103?

A. 573
B. 9,688
C. 83,248
D. 411,279
E. 1,234,567

Tank Numbers

How many tanks have been built to STI specifications as of June 30, 2103?

A. 573
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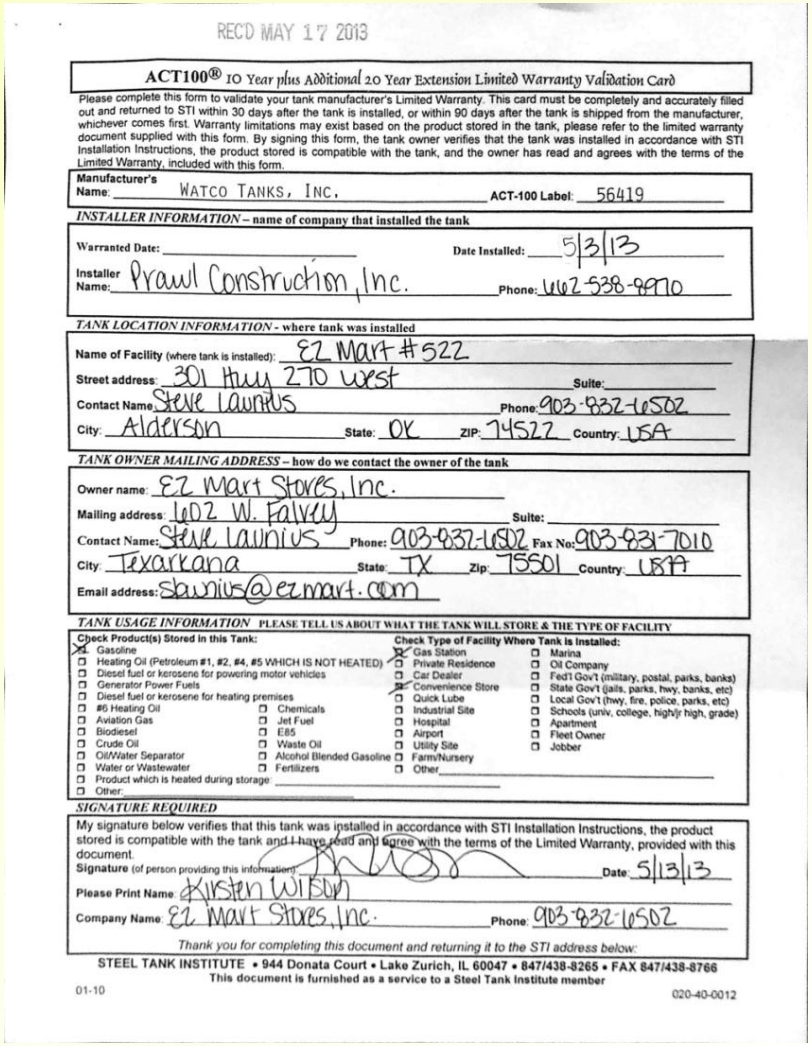
Tank Performance Evaluation

- All STI labeled UST's subject to 3rd party warranty
- STICO Mutual has strong claims management program
- STI gets feedback on quality and performance



RECD MAY 17 2013

ACT100® 10 Year plus Additional 20 Year Extension Limited Warranty Validation Card

Please complete this form to validate your tank manufacturer's Limited Warranty. This card must be completely and accurately filled out and returned to STI within 30 days after the tank is installed, or within 90 days after the tank is shipped from the manufacturer, whichever comes first. Warranty limitations may exist based on the product stored in the tank, please refer to the limited warranty document supplied with this form. By signing this form, the tank owner verifies that the tank was installed in accordance with STI Installation Instructions, the product stored is compatible with the tank, and the owner has read and agrees with the terms of the Limited Warranty, included with this form.

Manufacturer's Name: WATCO TANKS, INC. ACT-100 Label: 56419

INSTALLER INFORMATION – name of company that installed the tank

Warranted Date: Date Installed: 5/3/13

Installer Name: Prawl Construction, Inc. Phone: 662-538-9970

TANK LOCATION INFORMATION - where tank was installed

Name of Facility (where tank is installed): EZ Mart #522

Street address: 301 Hwy 270 West Suite:

Contact Name: Steve Launius Phone: 903-832-6502

City: Alderson State: OK ZIP: 74522 Country: USA

TANK OWNER MAILING ADDRESS – how do we contact the owner of the tank

Owner name: EZ Mart Stores, Inc.

Mailing address: 602 W. Falvey Suite:

Contact Name: Steve Launius Phone: 903-832-6502 Fax No: 903-831-7010

City: Texarkana State: TX Zip: 75501 Country: USA

Email address: slaunius@ezmart.com

TANK USAGE INFORMATION PLEASE TELL US ABOUT WHAT THE TANK WILL STORE & THE TYPE OF FACILITY

Check Product(s) Stored in this Tank:

- ☒ Gasoline
- ☐ Heating Oil (Petroleum #1, #2, #4, #5 WHICH IS NOT HEATED)
- ☐ Diesel fuel or kerosene for powering motor vehicles
- ☐ Generator Power Fuels
- ☐ Diesel fuel or kerosene for heating premises
- ☐ #6 Heating Oil
- ☐ Aviation Gas
- ☐ Biodiesel
- ☐ Crude Oil
- ☐ Oil/Water Separator
- ☐ Water or Wastewater
- ☐ Product which is heated during storage
- ☐ Other:
- ☐ Chemicals
- ☐ Jet Fuel
- ☐ E85
- ☐ Waste Oil
- ☐ Alcohol Blended Gasoline
- ☐ Fertilizers

Check Type of Facility Where Tank is Installed:

- ☒ Gas Station
- ☐ Private Residence
- ☐ Car Dealer
- ☒ Convenience Store
- ☐ Quick Lube
- ☐ Industrial Site
- ☐ Hospital
- ☐ Airport
- ☐ Utility Site
- ☐ Farm/Nursery
- ☐ Other
- ☐ Marina
- ☐ Oil Company
- ☐ Fed'l Gov't (military, postal, parks, banks)
- ☐ State Gov't (jails, parks, hwy, banks, etc)
- ☐ Local Gov't (hwy, fire, police, parks, etc)
- ☐ Schools (univ, college, high/jr high, grade)
- ☐ Apartment
- ☐ Fleet Owner
- ☐ Jobber

SIGNATURE REQUIRED

My signature below verifies that this tank was installed in accordance with STI Installation Instructions, the product stored is compatible with the tank and I have read and agree with the terms of the Limited Warranty, provided with this document.

Signature (of person providing this information): Date: 5/13/13

Please Print Name: Kirsten Wilson

Company Name: EZ Mart Stores, Inc. Phone: 903-832-6502

Thank you for completing this document and returning it to the STI address below:

STEEL TANK INSTITUTE • 944 Donata Court • Lake Zurich, IL 60047 • 847/438-8265 • FAX 847/438-8766

This document is furnished as a service to a Steel Tank Institute member

01-10 020-40-0012

STI Quality Control Program

- Random inspections performed by qualified STI inspectors on quarterly basis
- Mandatory attendance at Quality Control meeting
- Quality awards

Tank Capacity: True or False?

1. Over 2 billion gallons of underground storage tanks have been built and installed with the STI label.
2. The average sized ACT-100 composite underground storage tank capacity built in 2011 was 14,042 gallons.
3. The average sized Permatank jacketed steel underground storage tank built thru June 2013 is over 16,000 gallons.
4. Fireguard AST's are larger on average than STI labeled UST's.

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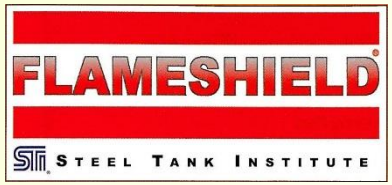
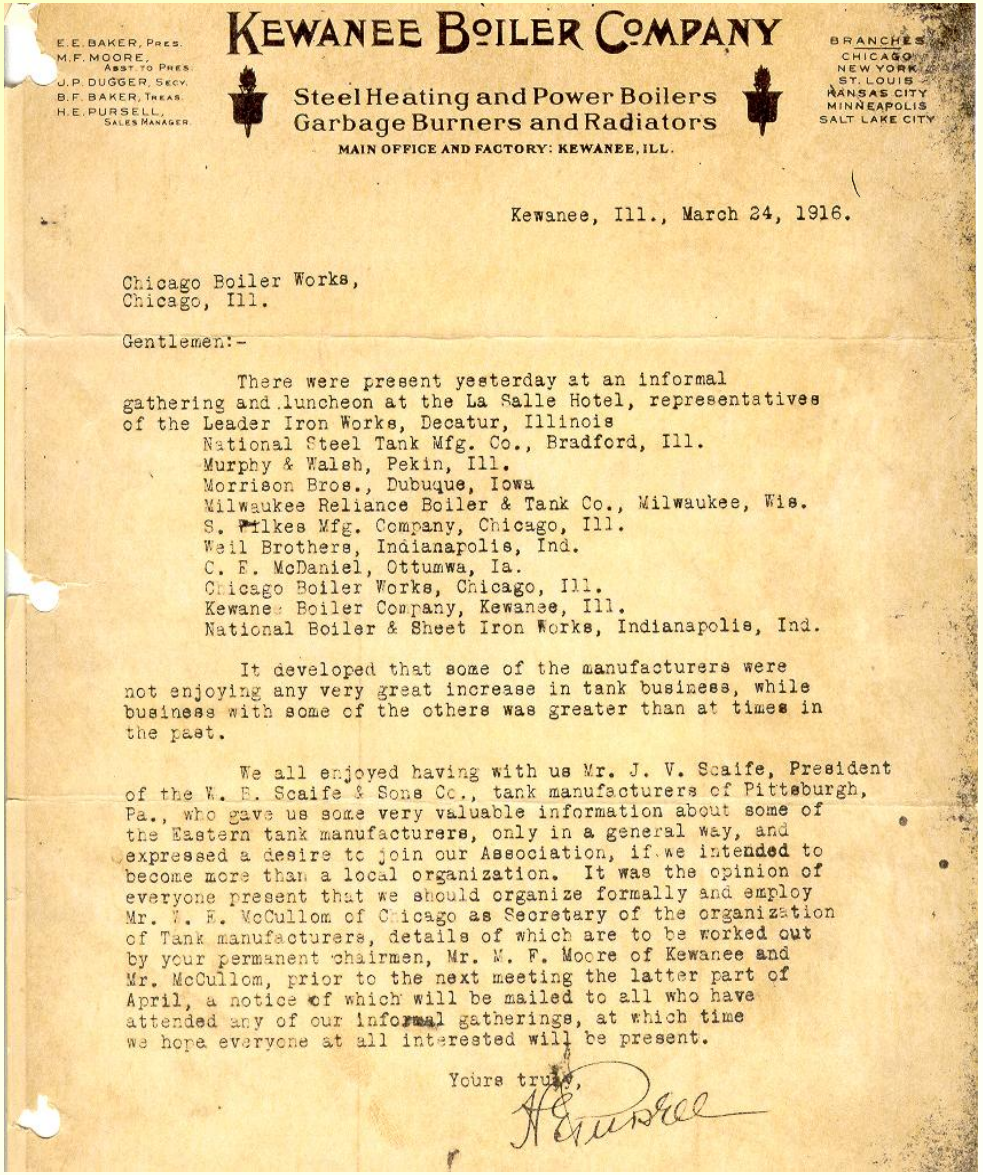
3. The average sized Permatank jacketed steel underground storage tank built thru June 2013 is over 16,000 gallons ***True***
4. Fireguard AST's are larger on average than UST's. ***False***



USA History

- 1859 - Oil Found
- 1904 - NBFU 30 Rules for Petro
- **1916 – STI**
- 1919 – API
- 1922 - UL 142
- 1925 - UL 58
- 1969 – sti-P3
- 1989 – UL 1746



E. E. BAKER, Pres.
M. F. MOORE, Asst. to Pres.
J. P. DUGGER, Secy.
B. F. BAKER, Treas.
H. E. PURSELL, Sales Manager

KEWANEE BOILER COMPANY

Steel Heating and Power Boilers
Garbage Burners and Radiators

MAIN OFFICE AND FACTORY: KEWANEE, ILL.

BRANCHES
CHICAGO
NEW YORK
ST. LOUIS
KANSAS CITY
MINNEAPOLIS
SALT LAKE CITY

Kewanee, Ill., March 24, 1916.

Chicago Boiler Works,
Chicago, Ill.

Gentlemen:-

There were present yesterday at an informal gathering and luncheon at the La Salle Hotel, representatives of the Leader Iron Works, Decatur, Illinois
National Steel Tank Mfg. Co., Bradford, Ill.
Murphy & Walsh, Pekin, Ill.
Morrison Bros., Dubuque, Iowa
Milwaukee Reliance Boiler & Tank Co., Milwaukee, Wis.
S. Pilkes Mfg. Company, Chicago, Ill.
Weil Brothers, Indianapolis, Ind.
C. E. McDaniel, Ottumwa, Ia.
Chicago Boiler Works, Chicago, Ill.
Kewanee Boiler Company, Kewanee, Ill.
National Boiler & Sheet Iron Works, Indianapolis, Ind.

It developed that some of the manufacturers were not enjoying any very great increase in tank business, while business with some of the others was greater than at times in the past.

We all enjoyed having with us Mr. J. V. Scaife, President of the W. E. Scaife & Sons Co., tank manufacturers of Pittsburgh, Pa., who gave us some very valuable information about some of the Eastern tank manufacturers, only in a general way, and expressed a desire to join our Association, if we intended to become more than a local organization. It was the opinion of everyone present that we should organize formally and employ Mr. W. E. McCullom of Chicago as Secretary of the organization of Tank manufacturers, details of which are to be worked out by your permanent chairmen, Mr. M. F. Moore of Kewanee and Mr. McCullom, prior to the next meeting the latter part of April, a notice of which will be mailed to all who have attended any of our informal gatherings, at which time we hope everyone at all interested will be present.

Yours truly,

Pre WWII - Riveted Tanks

1956 Standardized Tank Fitting Location

MIDWEST 56 STANDARD FOR UNDERGROUND GASOLINE TANKS

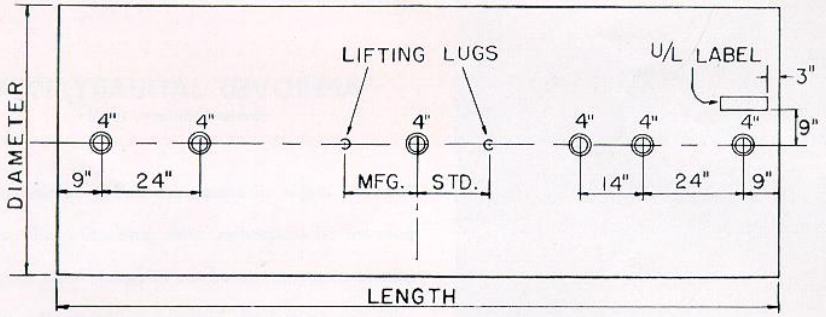
CAPACITIES — SIZES — GAGES — OPENINGS — WEIGHTS

Data on Black Steel Underground Tanks

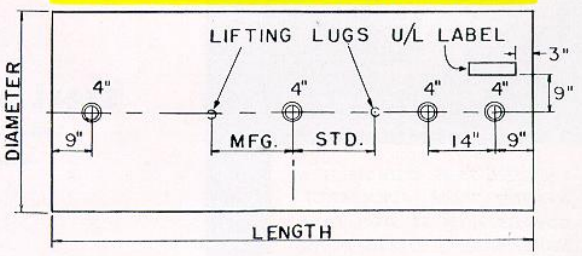
CAPACITY GALLONS	U.S.S. GAGE	APPROX. THICKNESS	DIAMETER	LENGTH	WEIGHT EST.
560	12	7/64"	4'-0"	6'-0"	480
1000	10	9/64"	4'-0"	11'-0"	968
1000	10	9/64"	5'-4"	6'-0"	875
560	7	3/16"	4'-0"	6'-0"	828
1000	7	3/16"	4'-0"	11'-0"	1325
1000	7	3/16"	5'-4"	6'-0"	1180
2000	7	3/16"	5'-4"	12'-0"	1980
3000	7	3/16"	5'-4"	18'-0"	2765
3000	7	3/16"	6'-0"	14'-0"	2565

CAPACITY GALLONS	U.S.S. GAGE	APPROX. THICKNESS	DIAMETER	LENGTH	WEIGHT EST.
4000	7	3/16"	5'-4"	24'-0"	3560
4000	7	3/16"	6'-0"	19'-0"	3310
4000	7	3/16"	7'-0"	14'-0"	3150
5000	3	1/4"	6'-0"	24'-0"	5400
6000	3	1/4"	6'-0"	29'-0"	6380
6000	3	1/4"	8'-0"	16'-0"	5370
8000	3	1/4"	8'-0"	21'-0"	6685
10000	3	1/4"	8'-0"	27'-0"	8260
10000	3	1/4"	10'-0"	17'-0"	7340

2000 GALLON CAPACITY AND LARGER



UNDER 2000 GALLON CAPACITY



NOTES

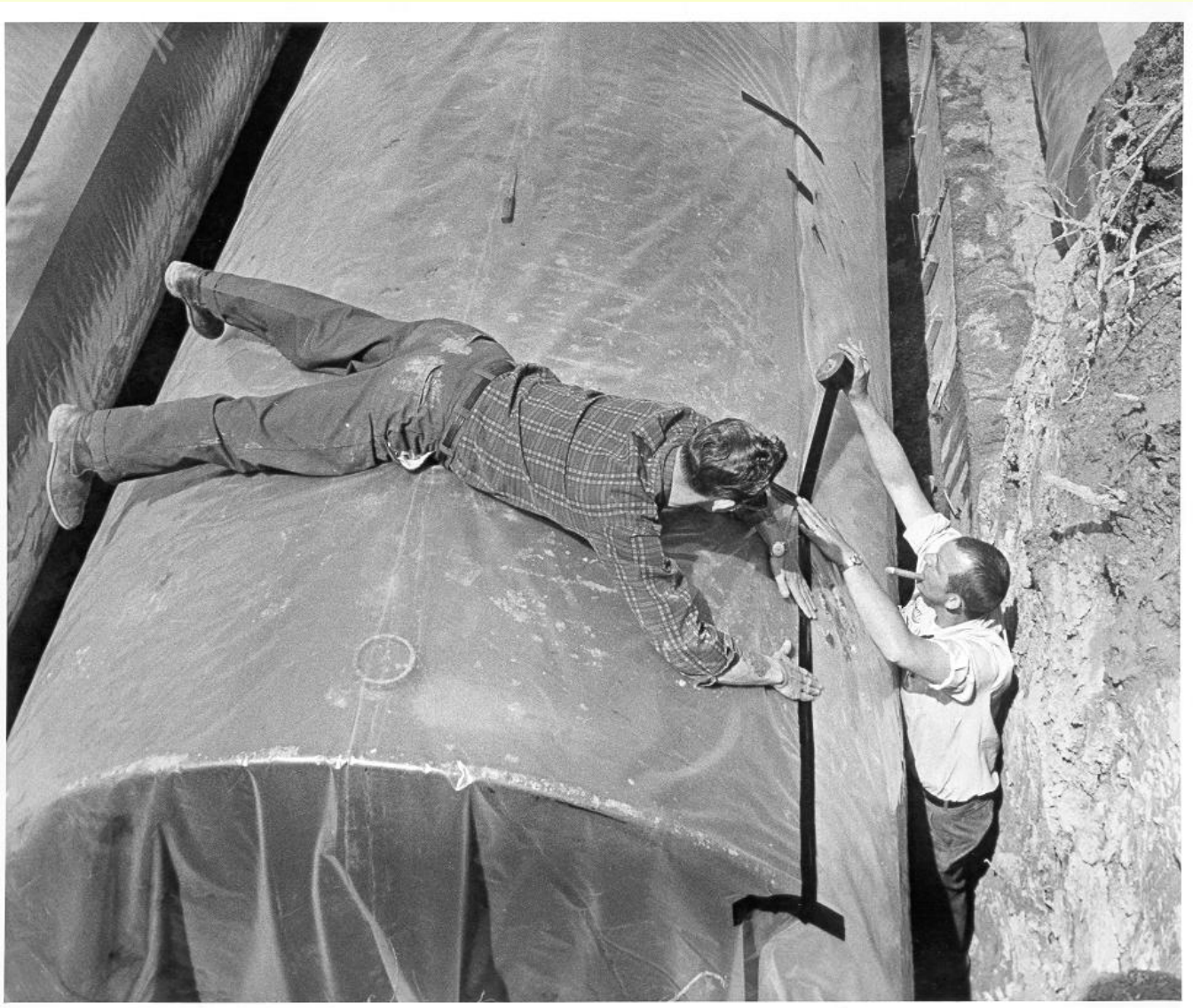
1. TANKS SHALL BE MADE TO THE INSIDE DIMENSIONS SHOWN IN TABLE.
2. TANKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH UNDERWRITERS LABORATORIES, INC. STANDARDS FOR UNDERGROUND STORAGE TANKS, SUBJECT 58, LATEST REVISION, UNDERWRITERS LABEL APPLIED IN POSITION SHOWN.
3. OPENING SIZES AND SPACING AS SHOWN ARE STANDARD; OTHER SIZES OR SPACING WILL BE CONSIDERED AS SPECIAL.
4. PAINT; ONE SHOP COAT.
5. ALL OPENINGS SHALL BE COVERED WITH METAL CAP TO PREVENT ENTRANCE OF DIRT AND MOISTURE DURING SHIPMENT.

MIDWEST 56 STANDARD FOR UNDERGROUND GASOLINE TANKS

STEEL TANK INSTITUTE
120 So. LaSalle Street
Chicago 3, Illinois

APPROVED
January, 1954
(Revised January, 1956)

1960's: Search for Corrosion Control



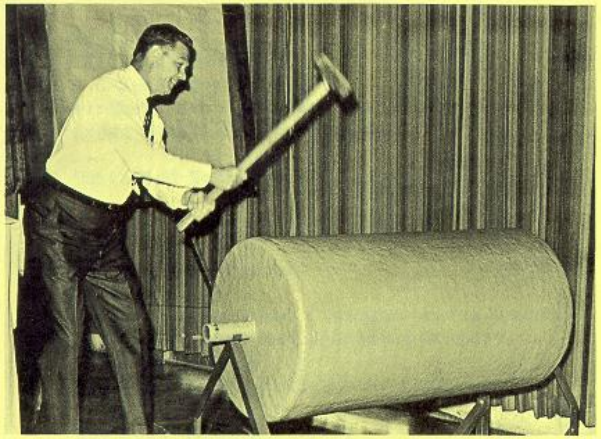
FRP

Coatings

STEEL TANK INSTITUTE

THE NATIONAL ORGANIZATION SERVING THE TANK INDUSTRY

MINUTES



Robert Mason, Chairman S.T.I. Promotion Committee versus Sti*life steel tank. Sti*life is the WINNER.

SEMI-ANNUAL MEETING

June 19-20-21, 1968

THE LODGE of THE FOUR SEASONS

LAKE OZARK, MISSOURI

1969:

sti-P3

Pre-Engineered

Cathodic

Protected

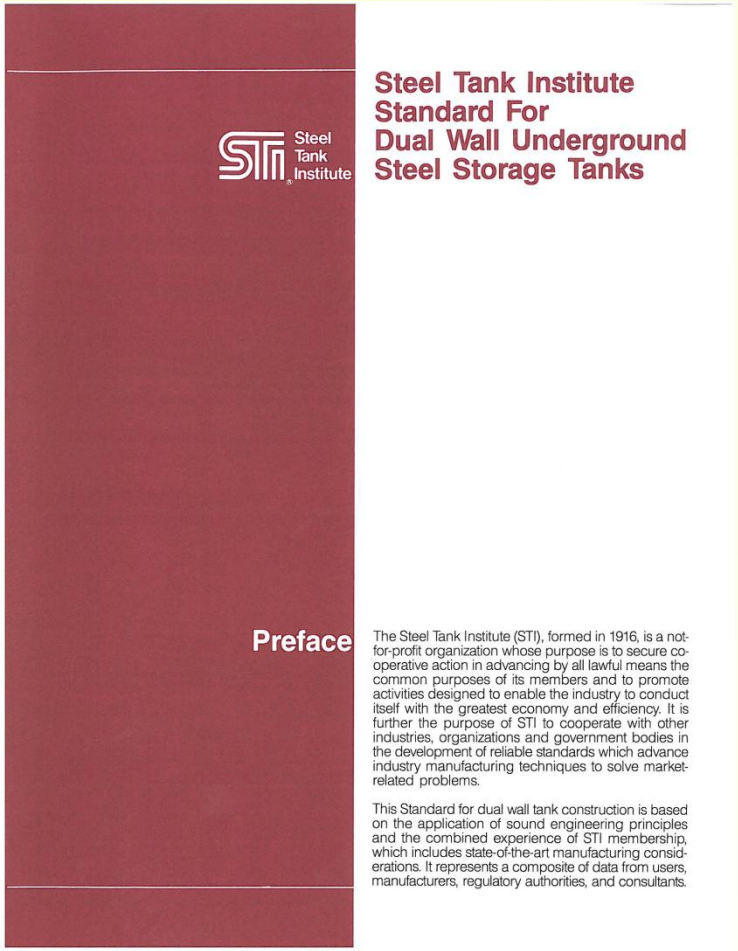
Steel Tanks

1970's: Touch It, Feel It!! Dielectric Coatings are Here

In what year was the first standard published in the United States for secondary contained underground storage tanks?

A. 1989
B. 2005
C. 1984
D. 1969

C) **1984** – STI Dual Wall Tank Standard



Steel Tank Institute

Steel Tank Institute Standard For Dual Wall Underground Steel Storage Tanks

Preface

The Steel Tank Institute (STI), formed in 1916, is a not-for-profit organization whose purpose is to secure co-operative action in advancing by all lawful means the common purposes of its members and to promote activities designed to enable the industry to conduct itself with the greatest economy and efficiency. It is further the purpose of STI to cooperate with other industries, organizations and government bodies in the development of reliable standards which advance industry manufacturing techniques to solve market-related problems.

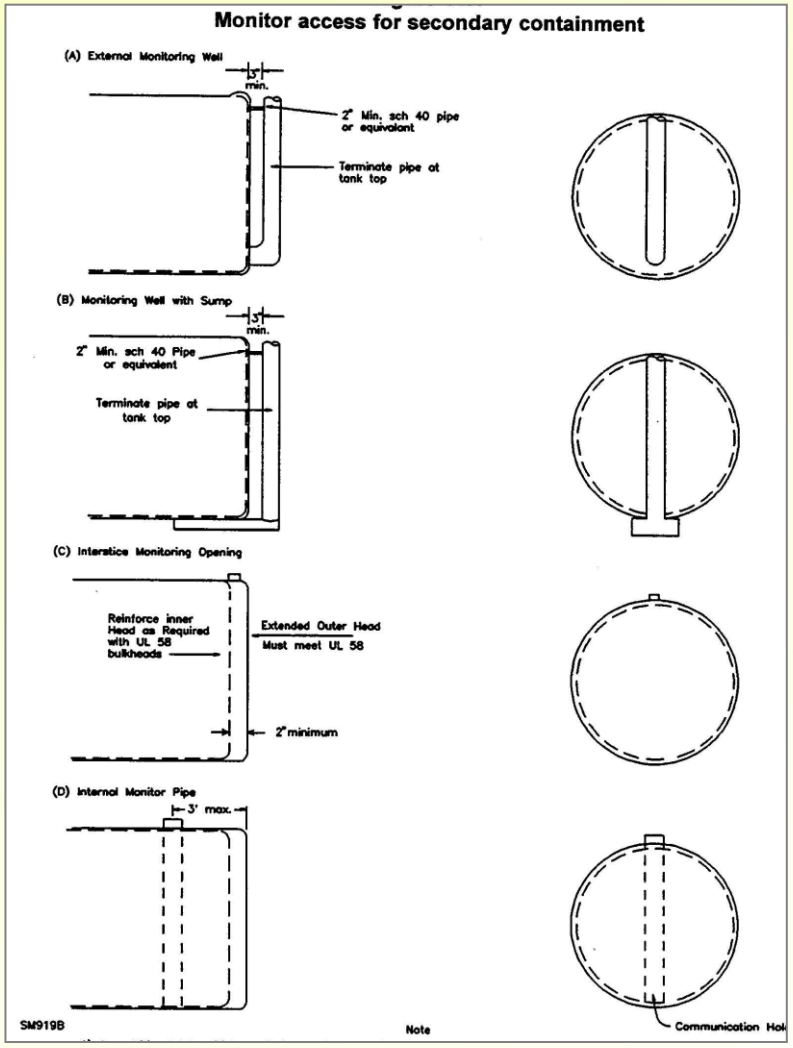
This Standard for dual wall tank construction is based on the application of sound engineering principles and the combined experience of STI membership, which includes state-of-the-art manufacturing considerations. It represents a composite of data from users, manufacturers, regulatory authorities, and consultants.

STI's Standard for Dual Wall Tanks recommends which form of interstitial space monitoring?

A. Electronic monitoring (constant)
B. Regular sticking
C. Mechanical (float devices)
D. Pressure or vacuum
E. None of the above
F. Answers A, B, C, and D
G. Answers A, B, and C

Answer “F”

- **F: All four of the methods mentioned.**
- STI felt that the tank operator/owner should be able to freely choose the best method of leak detection that the market permitted.



1986 Fittings Contained within a Common Sump

STI 86

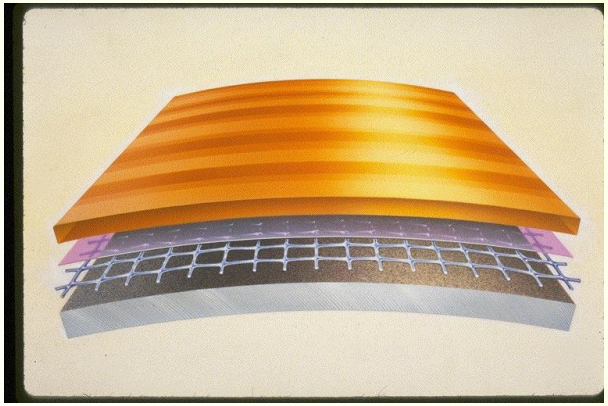
Coatings Provide Corrosion Protection

1987 – Composite Steel Tank

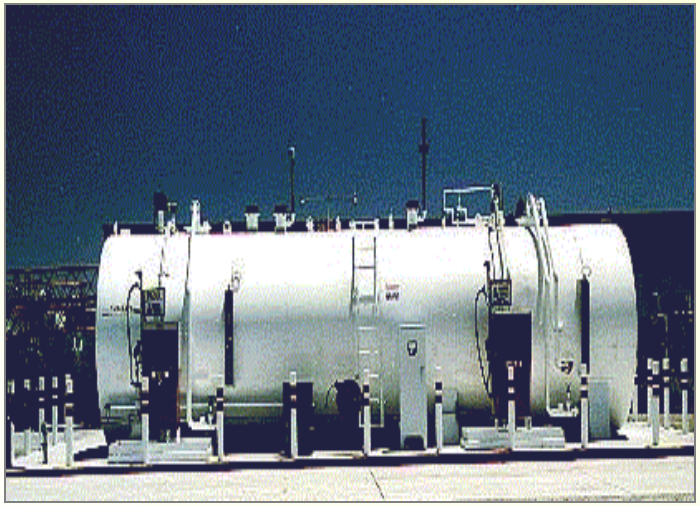
1990 – STI takes over ACT-100 tank program

1996 – ACT-100-U

1991 - Jacketed Steel Tanks



Early 1990's: AST Acceptance



21st Century Trends

Larger Capacity Tanks

Secondary Containment AST's

Secondary Containment UST's

How have secondary contained underground steel tanks performed?

A. Secondary containment eliminates external corrosion failures of the primary tank due to soils.

B. There have been no pollution incidents from secondary contained steel tanks.

C. A and B

D. None of the above

How have secondary contained steel tanks performed?

A. The secondary containment eliminates external corrosion failures of the primary tank from soils.

B. There have been no pollution incidents from secondary contained steel tanks.

C. A and B

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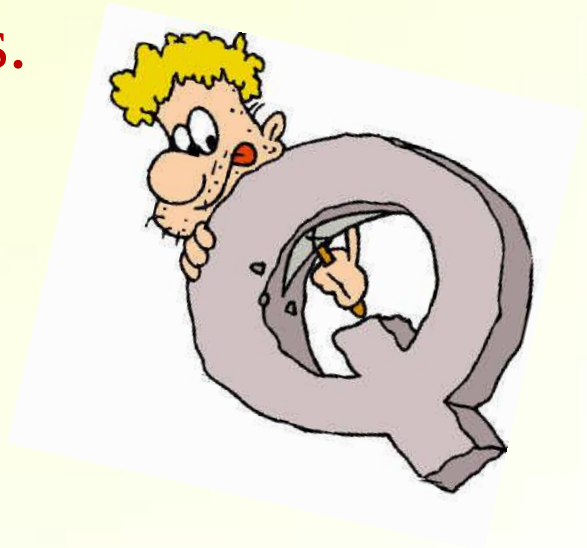
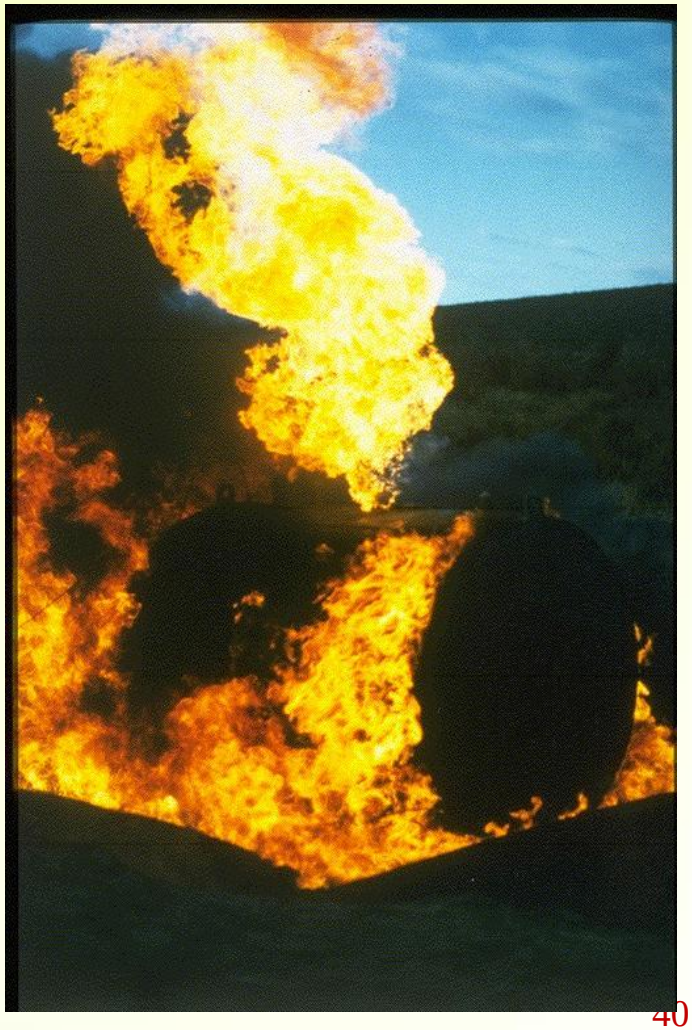


Tanks with Compartments

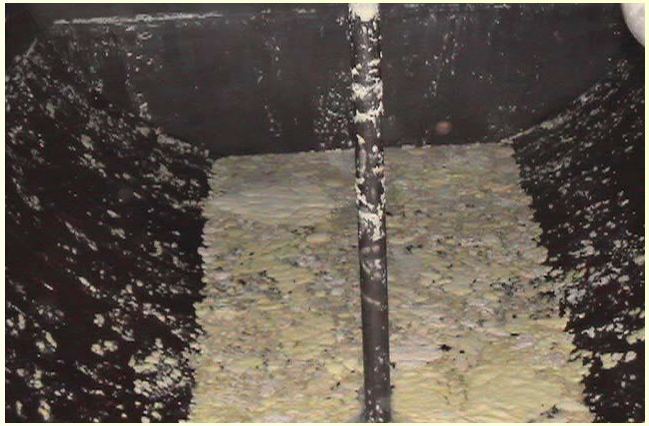
AST's with 2-Hr Fire Test Ratings



What is this?

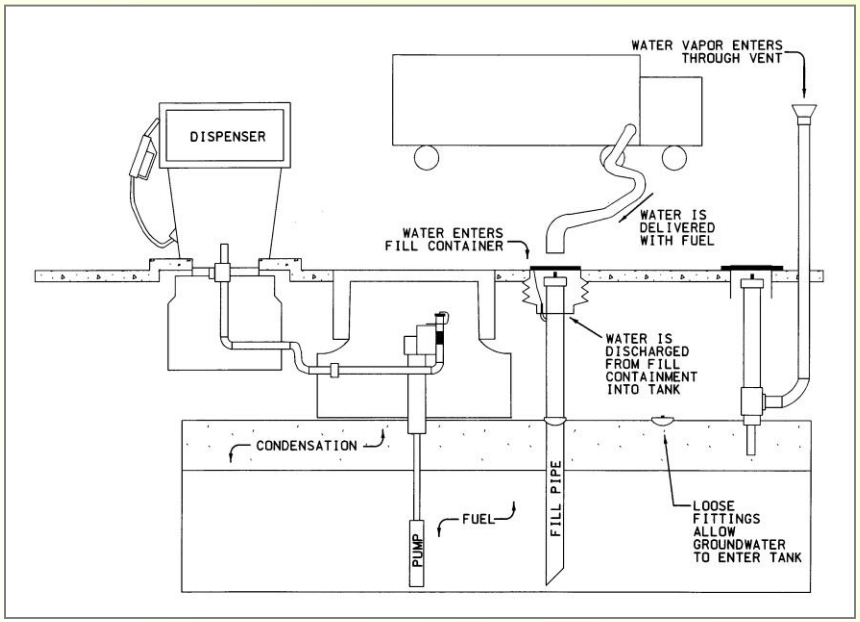
Tank Compatibility

Inspection and Maintenance



Inspection and Maintenance

STI R111: Tank Maintenance Keeping Water Out of Your Storage System



STI SP001 AST Inspection

UST explosions due to lightning: Norfolk, NE, September 2, 2011

Which statements **Do Not** describe industry trends?

A. UST's are getting larger
B. UST's are gaining popularity with the private fleet fueling market
C. Compartment tanks
D. Two-hour fire tested or protected tanks for aboveground fueling systems and generator fuel storage

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Steel
Steel Tank Institute
ACT-100-U


PERMATANK
DOUBLE-WALL
Steel Tank Institute
QUALITY ASSURANCE


Steel
TANK INSTITUTE
P3
ENGINEERED
PROTECTION


Steel
Steel Tank Institute
ACT-100


F911


F921


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Wayne Geyer
wgeyer@steeltank.com
847-438-8265

www.steeltank.com