

# Trends: Underground Storage Tank Systems

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Steel Tank Institute

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# Who is STI/SPFA?



- **Trade Association of Steel Fabricators**
- **Steel Tank Institute & Steel Plate Fabricators Association Merged in 2004**
- **Recognized authority on steel tanks**
- **113 fabrication shops in NA**

# STI Labeled UST's



# STI Labeled AST's

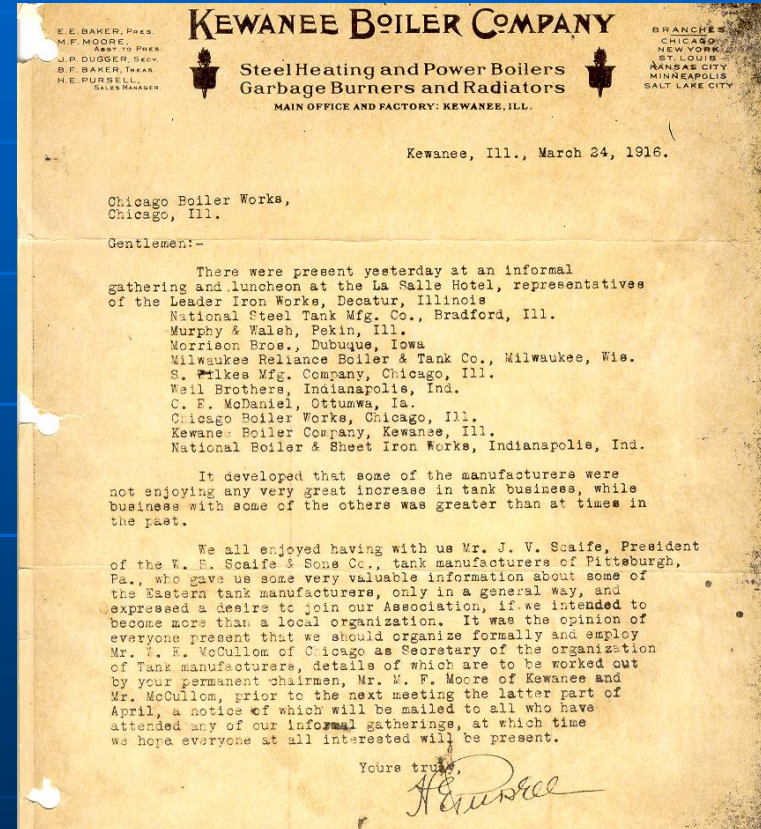


# Before we can establish new trends, what is the history?

- 1859 – Oil Discovered in PA
- 1904 – Flammable Liquids Code
- 1916 - 1919 – STI & API Formed
- 1922 – 1925 – UL 142 & UL 58
- 1930's & 1940's – Welded Tanks
- 1960's – Non-Metallic Tanks
- 1984 – Interim Prohibition



# Tank Transportation!





# Pictures from the 1950's & 1960's

## MIDWEST 56 STANDARD FOR UNDERGROUND GASOLINE TANKS

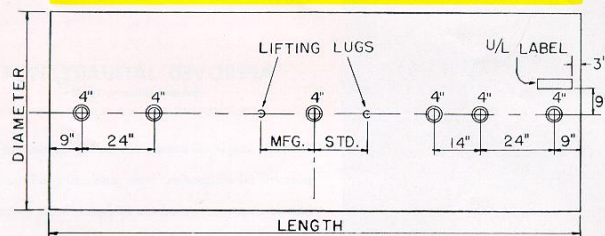
CAPACITIES — SIZES — GAGES — OPENINGS — WEIGHTS

### Data on Black Steel Underground Tanks

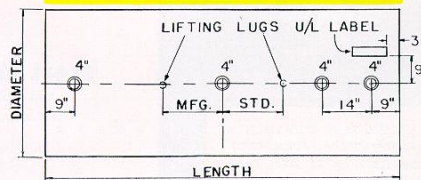
CAPACITY GALLONS	U.S.S. GAGE	APPROX. THICKNESS	DIAMETER	LENGTH	WEIGHT EST.
560	12	7/64"	4'-0"	6'-0"	480
1000	10	9/64"	4'-0"	11'-0"	968
1000	10	9/64"	5'-4"	6'-0"	875
560	7	3/16"	4'-0"	6'-0"	828
1000	7	3/16"	4'-0"	11'-0"	1325
1000	7	3/16"	5'-4"	6'-0"	1180
2000	7	3/16"	5'-4"	12'-0"	1980
3000	7	3/16"	5'-4"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



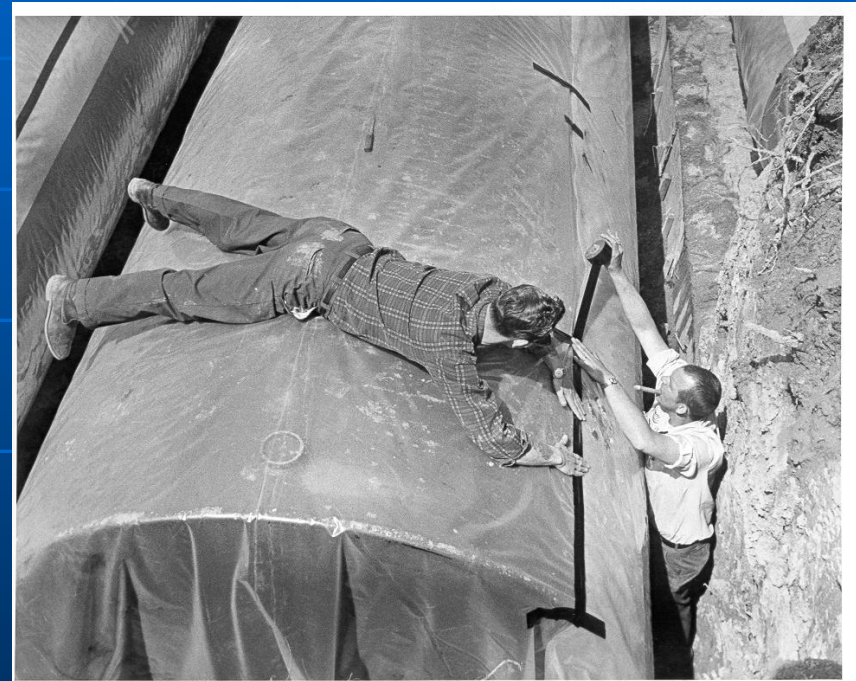
#### NOTES

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)



# Pictures from the late 1960's

**STI** **STEEL TANK INSTITUTE**  
THE NATIONAL ORGANIZATION SERVING THE TANK INDUSTRY  
FOUNDED 1946

..... **MINUTES** .....



**SEMI-ANNUAL MEETING**  
June 19-20-21, 1968

THE LODGE *of*   
**THE FOUR SEASONS**  
LAKE OZARK, MISSOURI

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

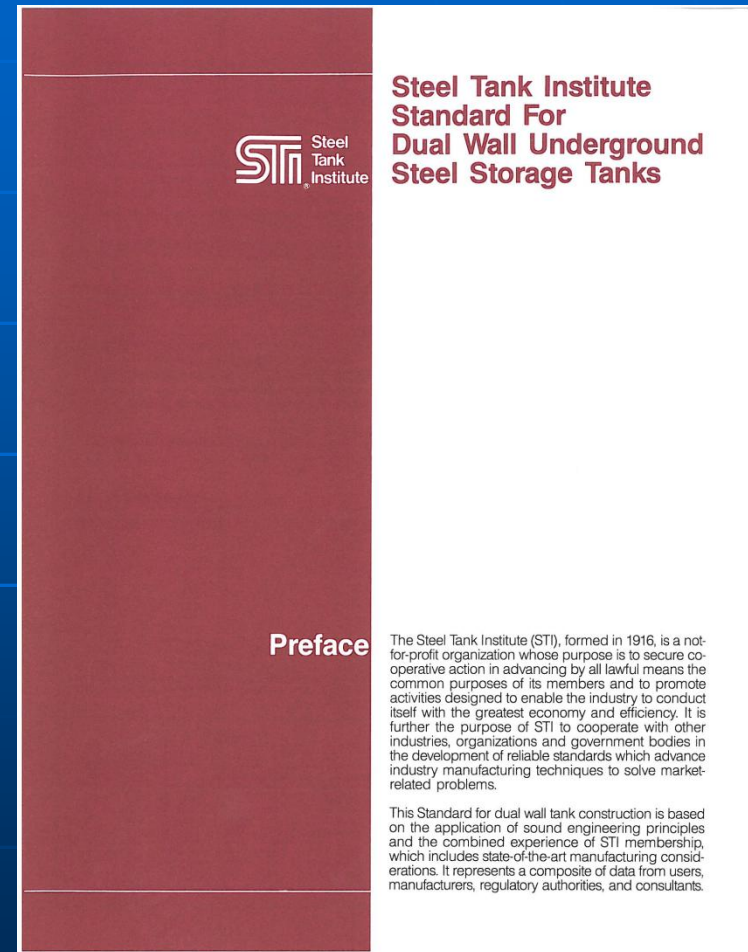






# 1984 -1985

- STI Dual Wall Tank
- Tank Tightness Tests
- NFPA 329
- Overfill tightness tests
  - Kent Moore
  - PetroTight
  - Ainlay



# 1985 - 1990

- 40 CFR Part 280
- Corrosion Protection
  - Cathodic Protection
  - UL 1746 (1989)
- Inventory Control
- Leak Detection
- Sumps (STI 86)
- FRP Pipe
- Flex Connectors
- Contaminated Soil



Sti-P3 Tank Created in 1969, in 1988 UST Regulations and NFPA 30 Fire Code, w/30,000+ Built in 88-89

# Early 1990's: AST Acceptance



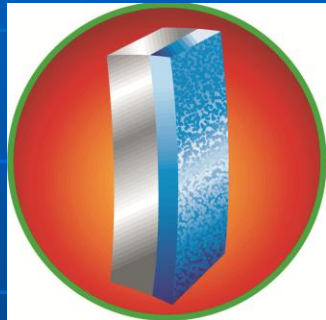


# 1988 – 1998

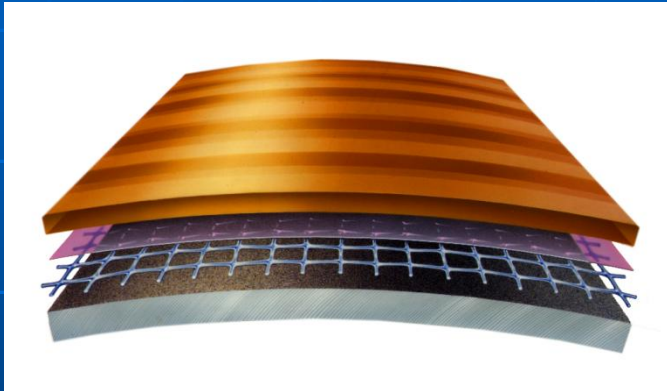
## New forms of corrosion protection

- Composite Tanks
- Jacketed Steel Tanks
- UL Listings for Ethanol Fuel Blends
- Flexible Pipe
- Non-metallic sumps
- Tank Upgrades to meet EPA
  - Internal Linings
  - Field Installed Impressed Current

# Thick Coatings Can Provide Corrosion Protection ACT-100 and ACT-100-U



# FRP Jacketed Steel Tanks





# 2000 to the Present

- Energy Act
- 48 States Mandate Secondary Containment
- Biofuels
  - E10, E85, and Biodiesel
- Ultra Low Sulfur Diesel
- EPA OUST Proposes Revisions

# Secondary Containment UST's



# TRENDS OF THE CURRENT AGE



# Bigger Underground Tanks

- 1985: 8000 Gallons
- 1992: 10,000 – 12,000 Gallons
- Today: 20,000 – 30,000 Gallons
  - Tank Talk Article



# Secondary Containment

## Aboveground Tanks



## Underground Tanks



# Leak Detection

- As the population of secondary containment tanks, pipes, sumps, and overflow containment expands, new regulations will assure the need for continued service
- Monthly monitoring of secondary containment
- Annual verification of equipment operations



# Tanks with Compartments

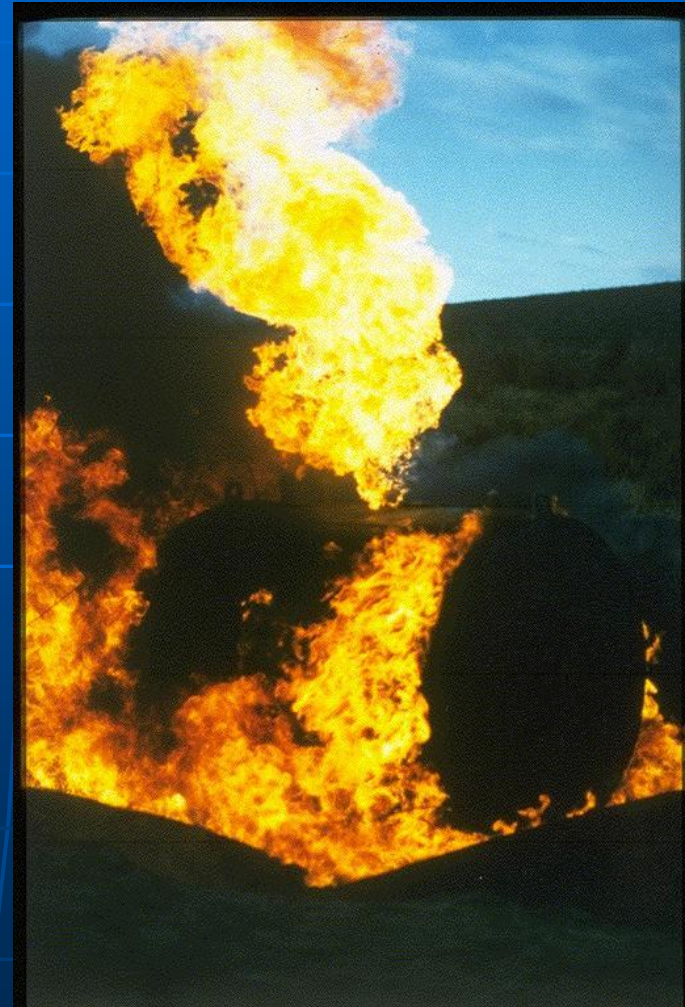
## Aboveground Tanks



## Underground Tanks



# AST's with 2-Hr Fire Test Ratings





# Tank Compatibility





# **STI/SPFA WEB SITE CERTIFICATION STATEMENT**

## **STEEL TANK INSTITUTE**

### **ETHANOL FUELS**

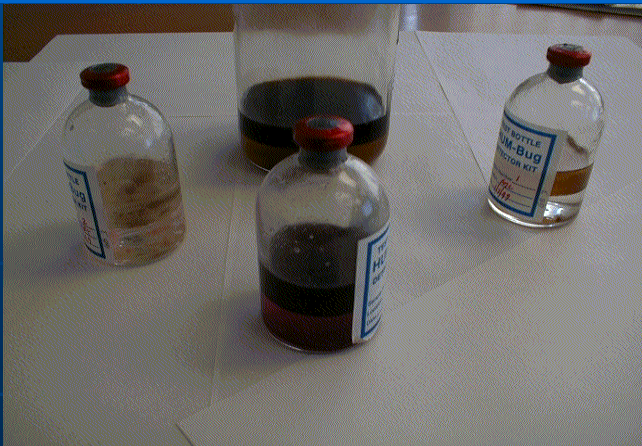
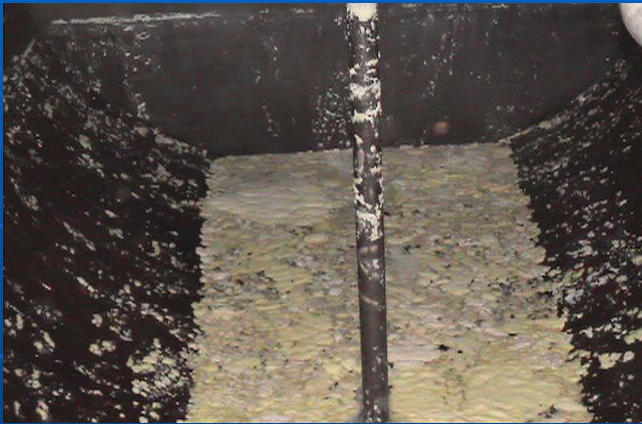
- 20 Years Proven Performance

The Steel Tank Institute has researched compatibility issues concerning the storage of ethanol based fuels. STI labeled steel underground and aboveground storage tanks, when used for the storage of ethanol based fuels, have exhibited no detrimental structural or permeation issues. As with all fuels, STI recommends that tank owners implement a maintenance program for all tanks and associated equipment.

# STI Website for more Information on Biofuel Compatibility

- <http://www.steeltank.com/FabricatedSteelProducts/STITankTechnologies/E85BioDieselandAlternativeFuels/tabid/465/Default.aspx#ethanol>
- Ethanol and Biodiesel Information
- Links to State Regulatory Web Sites
- Access to Steel Tank Manufacturers' Statement of Compatibility
- Statements from UL, EPA, & ASTM Fuels
- Ongoing Research

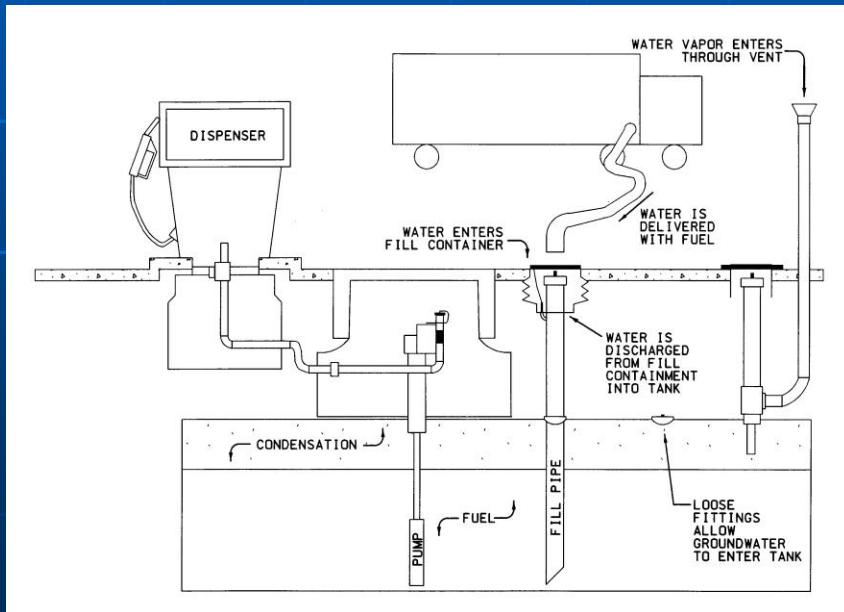
# Fuel Cleanliness





# Inspection and Maintenance

## Keeping Water Out of Your Storage System



## SP001 AST Inspection



# Compatibility Chart

Manufacturer	Dates Manufactured	Type of UST Construction	Applicable for use with 10% ethanol (E10)	Applicable for use with 30% ethanol (E30)	Applicable for use with 100% ethanol (E100)
All STI Technologies	1969 - Present	Sti-P3®, SW & DW	×	×	×
All STI Technologies	1991 - Present	ACT-100®, SW & DW	×	×	×
All STI Technologies	1992 - Present	Permatank®, DW	×	×	×

# Sustainability

- Steel is “green” due to recyclability
- Structural Integrity
- Ductility
- Versatility and ease in fabricating to customer specification & installation needs





# The Versatility of Steel

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