

STEEL AND ALTERNATIVE FUELS

- Steel tanks are compatible with all ethanol and biodiesel blends.
- Steel tanks are the most versatile for storing all fuel types.
- Steel tanks are strong, impermeable and accommodate almost any design.
- Steel does not degrade or soften when exposed to ethanol at any concentration.
- Steel tanks safely store any fuel above-ground or underground.
- Steel tanks, whether buried or exposed, have a long history of safe storage for all fuel types.
- Steel tanks are recyclable, helping to protect the environment.

ON THE OTHER SIDE...

- Consistent physical properties of steel



Steel Facts

NUMBER 2

Steel Tanks: Compatible with All Biofuel Blends

More and more, traditional fuels are blended with ethanol or biodiesel derived from non-petroleum sources. At both the federal and state level, regulation of emissions and concern about crude oil availability are driving this trend.

What material is best to transport, store and dispense these new fuels? Steel has been the top choice of the petroleum industry for decades and is now also required by the US military for its ethanol fuel tanks. Steel remains the best choice to contain today's biofuels.



The steel tank that's compatible with today's biofuels is the same steel tank that was compatible 30 years ago—and will continue to be compatible in the future.

Independent testing has proven again and again that steel is compatible with high-percentage

ethanol and biodiesel blends.

Studies demonstrate steel's compatibility

In 2010, the US Department of Energy (DOE) funded a study conducted in collaboration with Underwriters Laboratory (UL), Oakridge National Laboratory (ORNL) and other entities.

Steel coupons were evaluated for corrosion when immersed in ethanol blend fuels with added contaminants, to mimic real-life conditions and steel's long-term response.

Assuring compatibility

The Steel Tank Institute (STI) licenses several types of tanks, including sti-P3[®], ACT-100[®] and ACT-100-U[®], and Permatank[®].

In its *Statement of Compatibility*, STI asserts that these tanks and "all makes and models of steel tanks manufactured in any

time period...are suitable for use with all blends of fuels meeting ASTM standards."

STI Members certify compatibility

In July 2011, EPA issued its *Guidance on Compatibility of Underground Storage Tank*

Systems with Biofuel Blends. The Guidance requires owners and operators of UST systems storing 10%+ ethanol or 20%+ biodiesel blend fuels to:

- "Use components that are...listed by a nationally-recognized, independent testing

continued over

Steel Tanks: Compatible with All Biofuel Blends *continued*

ORNL's study report states that, "...mild steel...and stainless steel were found to be essentially immune to corrosion..." Further, in tests on in-use equipment, the study says that, "...there was no noted effect on metallic parts or equipment..." by ethanol blends.

In another study, conducted by Det Norske Veritas (DNV), an independent research foundation, steel corrosion rates for E30, E70 and E95 were "below detectable limits."

The Southwest Research Institute (SwRI) measured the corrosion rate of steel exposed to various biodiesels and biodiesel/petroleum blends under conditions simulating 12 months of storage.

SwRI "found no significant level of corrosion and no formation of pits," according to the Steel Tank Institute,

which co-funded the study.

UL listing includes high-percentage blends

Steel tanks that meet standards set by organizations such as UL, SwRI, API and STI are covered for higher ethanol blends, as well. UL states that its "general listing for flammable and combustible liquids ...includes high-percentage blend ethanol fuels such as E85."

Further, NFPA's Flammable and Combustible Liquids Code requires aboveground storage tanks, including those for flammable ethanol fuel blends, to be constructed of steel.

Does FRP make the grade for biofuel storage?

According to the American Coalition for Ethanol, "...fiberglass storage tanks manufactured prior to 1992 MAY NOT be able to handle E85." Even some FRP tanks made since 1992 have needed modifications to accommodate higher ethanol percentage fuels.

In contrast, metal composition for steel tanks has not changed significantly in recent years. E85 has been stored in carbon steel tanks successfully for over 25 years.

STEEL-COMPATIBLE FUEL BLENDS

ETHANOL	BIODIESEL
<input type="checkbox"/> E10	<input type="checkbox"/> B5
<input type="checkbox"/> E15	<input type="checkbox"/> B20
<input type="checkbox"/> E85	<input type="checkbox"/> B100

Assuring compatibility *continued*

- Or use components "approved by the manufacturer to be compatible with the fuel stored."

EPA says these manufacturer approvals must be in writing; confirm "an affirmative statement of compatibility" for the range of fuels; and be presented by

the manufacturer, not an entity such as the installer or distributor.

STI's tank manufacturer Members have posted their Letters of Compatibility online at www.steeltank.com, where STI's own *Fuel Compatibility Statement* is also available.

STEEL: CONSISTENT MATERIAL PERFORMANCE

The evidence is all around us: Steel's consistent performance makes it the dominant material used in our nation's infrastructure. More than 360,000 carloadings of ethanol were transported in 2009—in steel tank railcars. In the petroleum and petrochemical industries, pipelines, holding tanks, terminal tanks, and dispensing equipment are all made of steel.

STEEL IS...

- ▶ **COMPATIBLE**—with all ethanol and biodiesel fuel blends.
- ▶ **IMPERMEABLE**—to fluids of all types.
- ▶ **STRONG**—able to handle stresses from soil loads, wind and seismic activity.
- ▶ **FLEXIBLE**—to adapt to tank designs of virtually unlimited shape and capacity.
- ▶ **HIGH IN LIFE-CYCLE VALUE**—steel recycles repeatedly for sustainability.

LEARN MORE AT WWW.STEELTANK.COM