Compatibility

Flammable, combustible and hazardous substance storage rules (state and federal) and national standards require all components of the storage and dispensing system to be compatible with the product stored. Components and equipment used for storing/dispensing conventional motor fuels do not have adequate compatibility with many of the new motor fuels, such as gasoline-ethanol blends. Soft metals such as zinc, brass or aluminum, which are commonly found in conventional fuel storage and dispensing systems, are not compatible with ethanol, especially at the higher concentration found in E85 motor fuel. Steel, fiberglass (FRP) and plastic composite tanks and pipe must be certified by the manufacturer for ethanol compatibility. Some nonmetallic materials used in connections or components of the system may also degrade when materials, such as natural rubber, polyurethane, cork, adhesives (used in older fiberglass piping), pipe thread compounds, certain elastomers and polymers used in flex piping, bushings, gaskets, meters, and filters come in contact with ethanol. In order to store and dispense high percent ethanol, fiberglass and steel UST systems, system components must be listed by Underwriters Laboratories, Inc., or certified by the manufacturer for the concentration of ethanol that will be stored in the system. There are numerous variables associated with internal linings, ranging from what is or is not known about the lining material to existing cracks and abrasions in the lining wall that act as a conduit to expose ethanol to the surface of the tank wall. Lined tanks will not be approved for E85 service.

Affinity for Water

Ethanol blends well with gasoline, but it also is completely miscible (mixable) in water. When water infiltrates a tank, (e.g., through sump covers and loose fittings at the top of the tank), the ethanol in the ethanol-gasoline blend will absorb the water, which, if enough is present, will overwhelm the ethanol’s ability to remain blended with the gasoline. Because it mixes easier with water than gasoline, the ethanol will be drawn from the gasoline into the water at the bottom, separating from the gasoline. The product in the tank is no longer a homogeneous blend of ethanol and gasoline, but two layers of product—a layer of gasoline on top and an ethanol layer on the bottom referred to as “phase separation.” Phase separation can be a problem for vehicles’ fuel lines and ignition system as the product is no longer an ethanol-gasoline blend.

Degradation and Conductivity

Ethanol can accelerate problems in UST systems by scouring or loosening deposits on the internal surfaces of tanks and piping. If a corrosion cell or rust plug exists, the ethanol may scour the corrosion cell or plug resulting in a leak. As mentioned above, ethanol is not compatible with soft metals such as zinc, brass, copper, lead, and aluminum. These metals will degrade or corrode in contact with ethanol and possibly contaminate a vehicle’s fuel system. Tank leak detection equipment composed of polymers, elastomers and...
certain metals (mentioned above), may not be compatible with ethanol. Because ethanol has a higher conductivity than gasoline, capacitance probes will not work in ethanol-blend fuels. Verify that the floats used in magnetostrictive probes are alcohol compatible and that the ATG system is properly calibrated for ethanol.

Ethanol Blends greater than 10%

2. You will need to verify that your dedicated fuel path is compatible with the percent of ethanol to be stored and dispensed. Contact your petroleum equipment supplier to discuss converting requirements and dispenser labeling requirements before putting gasoline-ethanol blended fuel in your storage system.

First Delivery and Ongoing Maintenance

a. Follow normal delivery procedures for the first delivery of E85 blend. The Renewable Fuels Association (RFA) Renewable Fuels Association (RFA), Fuel Ethanol, Industry Guidelines, Specifications and Procedures, December 2003, (available at: http://www.ethanolrfa.org/Final960501.pdf) recommends filling the tank to 80 percent capacity and to keep the tank as full as possible for 7 to 10 days.

b. As soon as product stabilizes, a tightness test (0.1 gph leak rate) is recommended using your ATG system to make sure your system is tight and the leak detection equipment is operating properly. Report any “Fail” results.

c. You must test for water (use alcohol compatible paste if you stick your tanks) at the beginning of each shift for the first 48 hours after delivery. Checking for water regularly is a part of the ongoing maintenance with ethanol storage. Ethanol compatible water detect paste must stay in contact with the product for the time specified by the manufacturer. This is generally a period of 10 to 30 seconds.

d. Dispenser fuel filters may have to be changed at more frequent intervals during the first few months of storage.

Financial Responsibility

Federally regulated USTs, which include almost every UST containing motor fuel, are required to have financial responsibility (FR). The most common mechanism for FR is pollution insurance. Insurance writers assess the FR coverage on product, type of system, age of tanks, overall risk, etc. Owners considering converting to ethanol blends above 10% ethanol should consult with their FR provider prior to committing to the actions and costs associated with preparing a tank for ethanol blended fuels.