


Ongoing Precautionary Measures

To ensure the quality of ethanol blended gasoline at retail outlets you should:

- ☑ Order and install the 10 micron filter specifically designed to detect and shut down dispenser if phase separation occurs.*
 - ☑ Daily monitor tanks for water bottoms using an automatic tank gauge (ATG) or with manual gauging using water detection paste.* If using an ATG, a manual stick for water and product levels should be conducted at least monthly to ensure the ATG is working correctly. If water is detected, immediately stop sales from tank and remove the water. Test fuel to verify it meets minimum octane requirements.
 - ☑ Inspect all fill and vapor recovery caps to ensure secure closure and prevention of water entry.
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- ☑ Inspect spill reservoirs and properly dispose of contents in a timely manner. This may require pumping to remove debris and water, rather than flushing contents into the tank.
 - ☑ Remove standing water above underground tank openings as soon as possible and in an environmentally safe manner.
 - ☑ Manually gauge tanks, checking for water after heavy rains or snow melting.
 - ☑ Limit tank filling in times of heavy precipitation.

(*See back of brochure for details.)

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Water Detection Paste:

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Houston, TX
713-926-4780

Sartomer Company

<http://www.sartomer.com/>
Exton, PA
610-363-4100

Dispenser Filters:

BIB Manufacturing Company

800-325-8577

Champion Laboratories, Inc.

<http://www.champlabs.com/>
1-800-882-0890

Cim-Tek Filtration

<http://www.cim-tek.com/>
217-678-2511

Contact manufacturers for a list of suppliers in your area.



90-696-065

Ethanol Blended Gasoline

Bulk Storage & Service Station
Product Quality Assessment



Introduction

Ethanol's history in the automobile industry dates back to the 1880s when Henry Ford built one of his first automobiles and fueled it



with ethanol. Today more than 30 percent of U.S. motor fuels contain ethanol, which is sold primarily as E10 (10 percent ethanol, 90 percent gasoline).

Ethanol is a high octane, biodegradable alcohol produced from renewable resources such as grain or wood. Because ethanol contains 35 percent oxygen by weight, it reduces tail pipe emissions of carbon monoxide. Ethanol is blended with low octane fuel to produce a blend that is comparable to other fuels.

Since the enactments of the Clean Air Act Amendments of 1990, oxygenates (compounds that contain oxygen like ethanol) have been required in RFG gasoline and have met the growing demand for ethanol blended fuel. To properly store and distribute ethanol-blended gasoline, precautionary measures must be taken to prevent product contamination.

Product Contamination

Ethanol mixes with water in all proportions. Conventional gasoline does not have a high tolerance for water, which quickly separates to the tank bottom. In ethanol-blended gasoline, phase separation occurs when the water reaches a saturation point and the ethanol/water mix "falls out" of the gasoline.

Phase Separation

The amount of water that causes phase separation will vary with temperature. At 60 degrees Fahrenheit (F), water can be absorbed by E10 up to 0.5 volume percent before phase separation occurs (about 3.8 teaspoons per gallon or 5 gallons per 1,000 gallons). Once phase separation occurs, the ethanol/water phase will fall to the bottom leaving the low octane blended gasoline at the top.



The ethanol/water phase results in a leaner combustion mixture that will cause engine failure or damage if distributed to the consumer. If the ethanol/water phase is above the UST pump suction, this phase also will be dispensed to consumer vehicles where immediate engine failure will occur.

Because of phase separation, tanks must be properly prepared for conversion and subsequently maintained.

Ethanol Blended Gasoline

- Large amounts of water can cause the ethanol to separate from the gasoline
- When water is present, ethanol can leave the blend and enter the water
 - Water/ethanol mixture does not burn
 - The octane of the remaining gasoline is reduced

Blended Fuel

↓ Ethanol ↓

Water

Phase Separation Timeline



Original sample of ethanol blended fuel.



Added blue dyed water. The water is absorbed by the ethanol blend.



Added water past the saturation point. Phase separation occurs.



Time has passed allowing the ethanol/water to separate to the bottom.

Tank Conversion

Pre-conversion

- ☑ Review history of tank to ensure no prior instances of water contamination.
- ☑ Determine if tank has been internally lined.
- ☑ Epoxy linings installed prior to 1980 are not suitable for gasoline/ethanol blends. Lining installed in 1980 or later may be satisfactory but compatibility should be confirmed with supplier.
- ☑ Fiberglass tanks installed after 1970 are compatible but also should be confirmed by the supplier.
- ☑ Inspect tank fill cap and replace gasket as necessary. Check brass adapter and replace as necessary.
- ☑ Order special water detection paste for ethanol fuels in order to detect water bottoms in ethanol blend tank.*
- ☑ Order and install the 10 micron filter specifically designed to detect and shut down dispenser if phase separation occurs.*



Conversion

- ☑ Allow present tank inventory to be reduced to a maximum of 10 percent by volume of tank capacity.
- ☑ If water/sediment bottoms are present, pump out bottoms to assure complete removal.
- ☑ Introduce the blend into the tank as soon as possible. This initial delivery should fill the tank to 90 percent of capacity to safeguard against phase separation.
- ☑ Purge all lines until blend is clear.
- ☑ Recheck tank for water bottoms with water detection paste within 24 hours.

(*See back of brochure for details.)