



**Marathon
Petroleum Company LLC**

Ethanol Retail Tank Conversion Checklist

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Version 3.0



Introduction

This document has been prepared to help in the conversion of retail tanks to ethanol blended gasoline known as E10 which contains up to 10% ethanol. There are other types of tanks and uses where an E10 fuel may be used. We would also like to address these areas:

Farm Tanks – We recommend all fiberglass and lined tanks be checked for compatibility with E10. Farm tanks should be converted to E10 in the same manner as all other tanks. Please follow the guideline set in this checklist for converting a farm tank to E10 service.

Two Cycle Engines – Although many manufacturers of two cycle engines have already approved the use of E10, we recommend that the owner's manual be consulted or the manufacturer be contacted to determine compatibility with E10 before this fuel is used.

Watercraft – According to the Boat Owners Association of the United States, boats with fiberglass fuel tanks made prior to 1990 may not be compatible with E10. Ethanol may degrade the resin, resulting in the weakening of the fuel tanks and the potential for dissolved resin to be carried into the engine. As with all fiberglass fuel tanks, we recommend contacting the boat and engine manufacturer to determine compatibility with E10 before using this fuel. For more information on this topic, visit the Boat US web site at WWW.boatus.com/seaworthy.

Tank Conversion

Pre-Conversion

- ❑ Check the tank material for ethanol compatibility and determine if the tank has been internally lined. Most fiberglass tanks after 1970 are compatible with 10% ethanol blends but it should be confirmed by the tank supplier. Epoxy linings prior to 1980 may not be suitable for E10 blends. Linings installed in 1980 or later may be satisfactory, but compatibility should be confirmed with the lining supplier. In addition, seals, gaskets, piping, meters, pumps, and hoses should be checked for ethanol compatibility.



- Apply water finding paste to a manual stick gauge and check for water at both ends of the Underground Storage Tank (UST). Note which direction the UST is tilting. Compare the water readings taken with the gauge stick to those from your automatic tank gauge and determine if the ATG probe needs servicing. Also, use a bacon bomb to check for particulate levels and for microbial activity at both ends of the UST. If microbes are found, treat with a biocide such as Kathon 1.5 and then remove water after the biocide has had time to work. If high levels of particulate and or microbial activity are discovered, the UST should be cleaned using a professional tank cleaning company. Also, review the history of the UST and insure prior causes of water infiltration have been corrected.
- Compare the water readings taken with the gauge stick to those from your automatic tank gauge (ATG), to determine if the ATG probe needs servicing.
- Remove water from UST (recommend using professional tank cleaning company).
- Inspect tank fill cap and gasket and replace as necessary.
- Inspect the spill bucket cover to ensure it fits properly over the spill bucket. Note: This is the entry point for most water problems. This should be made as water tight as possible.
- Check the fill's brass hookup adapter and replace as necessary.
- Clean spill bucket and inspect plunger to ensure proper operation and seating.
- Check the vapor recovery hookup and verify the spring and gasket are functioning properly.
- Check the STP sump for water and ensure water cannot penetrate the UST from the sump.
- Check for tilted tanks. In un-level tanks, water can collect in areas that are not detected by automatic tank gauge (ATG) or dipstick.



- Order special water detection paste suitable for ethanol fuels. Order and install 10 micron filter specifically designed to detect and shut down delivery if phase separation occurs (see attached list of needed items).
- Procure proper ethanol pump labels if required by your state. Check with State for any additional regulatory compliance requirements.

Dispenser Filters

- Check dispenser filters.
- A 10 micron alert or duo-purpose filter designed for particulates and water or phase separation detection should be used.
- When water or phase separated fuel reaches the filter, the filter should slow dispensing rate to 1 gallon per minute.

Conversion – First Delivery

- Shut pumps down during the initial delivery.
- Allow present tank inventory to be reduced to a maximum of 10% by volume of tank capacity.
- Introduce the blend into the tank as soon as possible. This initial delivery should fill the tank to 90% of capacity to safeguard against phase separation.
- Purge all lines until blend is clear. Check product at all dispenser nozzles for clarity. If product is bright and clear, product can be sold.
- Install ethanol dispenser labels if required by your state.
- Paint manhole covers to proper API recommended color (see attached chart).
- Check product at all dispenser nozzles for clarity. If product is bright and clear, product can be sold.



- Recheck tank bottoms with water/phase separation detection paste within 24 hours.
 - If using Kolor Cut paste, the brown paste will turn yellow if you have phase separation. If it all turns yellow, then apply further up the stick. If it continues to turn yellow all the way up to the product level, then you may not have phase separation, but you should closely monitor flow rates and check regularly with the manual gauge stick. If at some point you get a clear line between brown and yellow, it means you have phase separation up to that point.
 - If using Sargel, you may not see a solid red, but you may see little red dots sprinkled through out the paste. If so, then you have phase separation.
 - If there is still a question if the product has phase separated, a tank bottom sample should be taken. Place the sample in a clear glass cup or beaker. If there are two layers, water and fuel, the product has phase separated? If a single layer is present add a small amount of water to it. If it goes to the bottom and forms a second layer the product is fuel and phase separation has not occurred. If water mixes with the product so it is homogeneous or not layered, the product is water and the product has phase separated.

- Keep tanks as full as possible the first seven to ten days.

- Check flow rate of dispensers regularly and replace if running slow.

- Check each pumps calibration two weeks after the initial load.

Note on Water in Storage Tanks:

Water can enter an underground storage tank in numerous ways:

- Condensation caused by air entering through the air vents.
- Damaged fill cap gaskets or spill buckets.
- Loose fittings or plugs.
- Swings in fuel temperatures (more likely in above ground tanks).

Ongoing Precautionary Measures



- If using an ATG for inventory purposes you should use a manual stick gauge to monitor for water/phase separated product at least weekly to ensure the UST is dry. Because of the specific gravity of phase separated product, the ATG will be slow to register any water in the UST. Consequently, if the ATG shows any water at all, you should investigate further by manually sticking the tank. If water/phase separated product is detected, immediately stop sales, remove and dispose of the phase separated product.
- Monitor dispenser flow rate to detect any slowing. If the flow rate has dropped to the 4 gallon per minute or less rate; check for water/phase separated product before replacing the filter. If slowing occurs shortly after replacing the filter, you should check both ends of the UST for water problems.
- Tanks should be manually gauged checking for water after heavy rains or snow melting.
- Snow and ice can alter the flow of water around the fills and cause the spill buckets to remain underwater which can lead to water incursion into the UST's.
- Limit the filling of tanks in times of heavy precipitation.
- Inspect all fill and vapor recovery caps to insure secure closure and prevention of water entry.
- Inspect and clean the spill buckets daily.
- Standing water above the underground tank openings should be removed as soon as possible in an environmentally safe manner.

Note on Dispenser Filters:

Ethanol acts as a cleaning agent. Rust, dirt, and particulates may break loose from the tank bottom, walls, and piping shortly after conversion. Frequent filter changes are likely after the initial delivery. Once the system is clean, filter life will return to normal.



Phase Separation

Water Tolerance:

Ethanol blended gasoline will absorb water if present. This is unlike conventional gasoline which does not have a high tolerance for water, and the water quickly separates to the bottom.

Ethanol will absorb trace amounts of water and pull it through the fuel system. In ethanol blended gasoline, water can be absorbed to a saturation level, typically around 0.5% (one-half %) before separation will occur. The amount of water absorbed by the ethanol is dependent on the product temperature. At 60 degrees Fahrenheit, an E10 fuel can absorb around 5 gallons of water per 1,000 gallons of fuel.

Once saturation occurs, the ethanol and water will separate from the gasoline forming two separate layers. The gasoline layer left at the top will be lower in octane (due to the loss of the ethanol) and likely will be out of specification. The mixture of ethanol, water, and some hydrocarbon will fall to the bottom of the tank. Depending on the conditions, 30% to 70% of the ethanol could be drawn away from the gasoline by the water.

If the ethanol/water phase is above the UST pump suction, this mixture could be dispensed to a consumer vehicle. Due to the potentially low octane of the product, a vehicle receiving this product could stop running shortly after fueling or experience drivability problems. (NOTE: This potential can be reduced by using the proper filters designed to detect water or phase separation. These filters reduce dispensing rates to 1 gallon per minute when water or phase separation is detected.) In flexible fuel vehicles (FFVs), the presence of water in the fuel mixture can cause the optical fuel sensor to malfunction, which could lead to drivability problems.

If Phase Separation is Suspected or Detected

- Stop sales from tank.
- Check product clarity at the nozzle. Hazy or cloudy product indicates possible phase separation.



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- Check for water in the tank by manually sticking the tank with water-detecting paste. Note: The ATG may not detect water in the tank if the product has already separated. The ATG may give an inaccurate Reading due to the small amount of the hydrocarbon in the water/ethanol phase.
- Remove phase separated product and dispose of entire tank contents in a manner consistent with state and federal guidelines.
- Determine source of water contamination.
- Carefully monitor tank for water bottoms.



State Labeling Information and Websites

This information is current as of July 1, 2008. Please contact your state prior to initiating sales of ethanol fuel (E-10) to obtain current labeling requirements.

STATE	STATE AGENCY	CURRENT LAW OR REGULATION	LAW OR REGULATION ON THE INTERNET
Alabama	Agriculture and Industries	Ala. Admin. Code r. 80-1-16-.09	http://www.alabamaadministrativecode.state.al.us/docs/agr/80-1-16.pdf
Florida	Agriculture and Consumer Services	Fla. Admin. Code Ann. r. 5F-2.003	http://www.doacs.state.fl.us/standard/petro/Downloads/Chapter5F-2.pdf
Georgia	Agriculture	Ga. Admin. Code § 40-20-01(g)(3)	http://rules.sos.state.ga.us/docs/40/20/1/01.pdf
Illinois	Agriculture	815 ILCS 370/4.1	See Endnote ¹ for the hyperlink to the statute.



STATE	STATE AGENCY	CURRENT LAW OR REGULATION	LAW OR REGULATION ON THE INTERNET
Indiana	No labeling law for E-10		The State should be contacted for current labeling requirements before ethanol fuel (E-10) is sold.
Kentucky	No labeling law for E-10		The State should be contacted for labeling requirements before ethanol fuel (E-10) is sold.
Michigan	No labeling law for E-10		The State should be contacted for labeling requirements before ethanol fuel (E-10) is sold.
Minnesota	No labeling law for E-10		The State should be contacted for labeling requirements before ethanol fuel (E-10) is sold.
North Carolina	Agriculture and Consumer Services	02 NCAC 42 .0401	See Endnote ² for a hyperlink to the regulation.
Ohio	Summit County	Summit County ordinance § 745.04 adopts NIST Handbook 130 model fuels regulation § 3.2.6 (2004).	http://ts.nist.gov/WeightsAndMeasures/Publications/upload/13_IV_EngFuelReq04.pdf
Penn - sylvania	No labeling law for E-10		The State should be contacted for labeling requirements before ethanol fuel (E-10) is sold.
South Carolina	Agriculture	S.C. Admin. Code § 5-446 (2)(F)	The regulation is pending, but not yet available online. The State should be contacted for labeling requirements before ethanol fuel (E-10) is sold.



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Tennessee	Agriculture and Consumer Services	Tenn. Comp. R. & Regs. 0080-5-12-.03	http://www.state.tn.us/sos/rules/0080/0080-05/0080-05-12.pdf
Virginia	Agriculture and Consumer Services	2 VAC 5-420-40	http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+2VAC5-420-40
West Virginia	Agriculture	W.V. Code § 47-10-6a	http://www.legis.state.wv.us/WVCODE/code.cfm?chap=47&art=10&section=WVC%2047%20-%2010%20-%20-%2020%206%20A.htm#01
Wisconsin	Commerce	Wis. Admin. Code s Comm 48.580	http://www.legis.state.wi.us/rsb/code/comm/comm048.pdf

¹ **Illinois**

<http://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=2339&ChapAct=815%26nbsp%3BILCS%26nbsp%3B370%2F&ChapterID=67&ChapterName=BUSINESS+TRANSACTIONS&ActName=Motor+Fuel+and+Petroleum+Standards+Act%2E>

² **North Carolina**

<http://reports.oah.state.nc.us/ncac/title%2002%20-%20agriculture%20and%20consumer%20services/chapter%2042%20-%20gas%20and%20oil%20inspection/02%20ncac%2042%20.0401.html>



Decal and Equipment Sources

(We do not recommend any single company or product; this list is being provided for information only)

State required decals

- Signature Graphics (800) 356-3235 (ask for Julie)

Dispenser Filters – Recommend using 10 micron water/phase separated detecting filters

- Excel Equipment (800) 392-3513
Recommend - Petro Clear 40510A or 40510D

Water Finding Paste

- Excel Equipment (800) 392-3513
Should be phase separated detecting paste designed for oxygenated Fuels
- Kolor Kut Product Co. (713) 926 – 4780
Kolor Kut Modified Water Paste
Houston, TX
- Gasoila (800) 846 - 7325
Gasolia All Purpose Water Finding Paste
www.gasoila.com
- Sartomer Co. (610) 363 - 4100
Sargel SR 160 Water Indicating Paste
Exton, PA
www.sartomer.com



☐ Bacon Bomb (Sample Thief)

- W.L. Walker Company (918) 583-3109
1009 South Main Street
Tulsa, OK 74119
www.sales@walker.com

☐ Biocide for Treatment of Fungus or Algae (Microbes)

- Fuel Quality Services (518) 887-3024
http://www.fgsinc.com/kathon_general.php
Kathon® FP 1.5 is available in Quart, 1-gallon, 5-gallon, 30-gallon, and 55-gallon containers. Kathon® FP 1.5 has a curative treat rate of 1 gallon to 10,000 gallons of fuel.
- Baker Petrolite – (856) 582-0008
Brian Hills
12645 W. Airport Blvd.
Sugarland, TX 77478
www.brian.kills@bakerpetrolite.com
- BCA Microbial Contamination Control Service
(609) 716-0200
Fredrick Passman
P.O. Box 3659
Princeton, NJ 08543-3659
www.bca-fip@ix.netcom.com



Tank Cleaning Services

(We do not recommend any single company, this list is being provided for information only)

- Clean Fuels of Indiana – (260) 346-2500
www.cleanfuelsindiana.com
- Refuel Environmental Services - (614) 863-9724
www.refuel.com
- US Tank Alliance – (866) 878-2667
www.ustankalliance.com
- Tanknology – (800) 964 – 0010
www.tankology.com/contact.html
- FeeCorp – (614) 837-3010
- Kleentek Environmental – (330) 874-7103
- Fluid Control System – (888) 344-3451



API Spill Bucket Cover Color Chart

GASOLINES		DISTILLATES			
Unleaded		Ultralow Sulfur	Low Sulfur	High Sulfur	
High grade				Diesel	
Middle grade				No. 1 fuel oil	
Low grade				No. 2 fuel oil	
				Kerosine	
ALCOHOL-BASED FUELS			BIODIESEL		
E85 Note: See 2.5.1 for specific labeling requirements			B2 Note: See 2.4.1 for specific labeling requirements		
USED OIL	OBSERVATION OR MONITORING WELL		VAPOR RECOVERY		



Transmix (Phase Separated) Facilities

(We do not recommend any single facility; this list is being provided for information only.)

Alabama

- Aaron Oil – SW, Alabama (251) 591-1510 Brandon Davis

Florida

- FCC Environmental (Formally -Hydrocarbon Recovery Services, Inc.) – Plant City, FL (813) 754-1504 Ext 3132 Tom Burdeshaw

Georgia

- STUSCO – Bainbridge, GA (713) 230 – 1829 Shannon Recore

Illinois

- STUSCO – Hartford, IL (713) 230 – 1983 Lorraine Phillips

Indiana

- Gladieux – Huntington, IN (800) 837-4676 x -223 Dave Sordalet
- Phillips – Hammond, IN (219) 397-6666 x-306 Carla Stanish
- ConocoPhillips – E. Chicago, IN (281) 293 – 1011 Tracy Leatherman

Louisiana

- Placid Refining – Zachary, LA (225) 346-7404 Matt Pfister or (225) 346 – 7447 Randy Thomas



Michigan

- Gladieux – Detroit, MI (800) 837-4676 x -223 Dave Determine

Ohio

- Central Ohio Oil – (614) 443-9728 Tom Phillips

Pennsylvania

- Danco Industries – Barkeyville, PA (724) 272-2486 Randy Roble
- Indianola (Shell) – Western, PA (412) 767-0418 Mike Vandenberg
- STUSCO – Kinder Morgan Indianola, PA (713) 230 – 1983 Lorraine Phillips

Texas

- STUSCO – Pasadena, TX (713) 230 – 1983 Lorraine Phillips

Virginia

- STUSCO – Kinder Morgan Richmond, VA (713) 230 – 1829 Shannon Recore or (804) 291 - 3291

West Virginia

- Gladieux – Charleston, WV (260) 417 – 6767 Dave Sordelet.