



BP UNLEADED WITH 10% ETHANOL IN OUTBOARD MOTORS

Outboard Motor Fuel Recommendations

HONDA

Normal Recommendation: 91 octane regular unleaded petrol
E10 compatibility: Manufacturer's guidelines include petrol with up to 10% ethanol

YAMAHA

Normal Recommendation: 91 octane regular unleaded petrol (except >93 octane for F250)
E10 compatibility: Do not recommend E10
Premium fuel: Satisfactory performance obtained using 95 octane petrol. Issue is no increase in performance with changes in fuel.

JOHNSON EVINRUDE

Normal Recommendation: 91 octane regular unleaded petrol
E10 compatibility: Manufacturer's guidelines include petrol with up to 10% ethanol
Premium fuel: Satisfactory performance obtained using 95 octane petrol.

MERCURY MARINE

Ref <http://www.mercurymarine.com/ethanol>

The following is an extract from the website referred to above,

Are Mercury engines compatible with ethanol fuels?

The fuel-system components of Mercury engines will withstand up to 10 percent alcohol content in gasoline – the maximum level currently allowed by the EPA in the U.S and permitted in Australian petrol..

Will the use of fuels containing ethanol void my engine warranty?

Fuels containing up to 10 percent ethanol are considered acceptable for use in Mercury engines. Fuels containing higher levels of ethanol are not considered acceptable for use, and the use of fuels containing ethanol higher than 10 percent can void the warranty.

OTHER CONSIDERATIONS

What about the fuel-system components on the boat?

It is important to follow boat manufacturers' recommendations when selecting appropriate fuels. Use of an inappropriate fuel can result in damage to the engine and boat components that may require repair or replacement. Fuels with ethanol can attack some fuel-system components, such as tanks and lines, if they are not made from acceptable ethanol-compatible materials. This can lead to operational problems or safety issues such as clogged filters, leaks or engine damage.

Can ethanol-blended fuels affect the performance of two-stroke engines?

Two-stroke outboards should experience little or no decrease in performance due to fuels containing up to 10-percent ethanol when operated according to Mercury's standard recommendations. When petrol with ethanol is used for the first time after a fuel changeover from ordinary petrol, the tank must be completely dry prior to introduction of petrol with ethanol. Otherwise, phase separation could occur that could cause filter plugging or damage to the engine. If an engine is a 1990 or older model frequent inspections of all fuel-system components are advised to identify any signs of leakage, softening, hardening, swelling or corrosion. If any sign of leakage or deterioration is observed, replacement of the affected components is required before further operation.

How does ethanol affect my fiberglass fuel tank?

Older fiberglass tanks manufactured prior to 2000 may not be compatible with gasoline containing ethanol. It has been reported that, in the presence of ethanol, some resins may be drawn out of fiberglass and carried into the engine where severe damage could occur. If an older fiberglass tank is used, check with the manufacturer to determine if petrol with ethanol can be safely used.

Are older fuel lines prone to failure? What about gaskets?

During the 1980s, many rubber components for use in fuel systems were developed to withstand exposure to fuels containing ethanol. If rubber components in a fuel system are suspected to be of this vintage or older it may be advisable to replace them with newer ethanol-safe components before using fuels containing ethanol. Check with the manufacturer for advice or frequently inspect these fuel-system components for signs of swelling or deterioration and replace if problems are noted.

What is phase separation, and how do I deal with it?

If significant amounts of water are present in a fuel tank with petrol that contains ethanol, the water will be drawn into the fuel until the saturation point is reached for the three-component mixture of water + gasoline + ethanol. Beyond this level of water, phase separation could cause most of the ethanol and water to separate from the bulk fuel and drop to the bottom of the tank, leaving petrol with a significantly reduced level of ethanol in the upper phase (see Figure 1 below). If the lower phase of water and ethanol is large enough to reach the fuel inlet, it could be pumped directly to the engine and cause significant problems. Even if the ethanol water phase at the bottom of the tank is not drawn into the fuel inlet, the reduced ethanol level of the fuel reduces the octane rating by as much as 3 octane numbers, which could result in engine problems.

The level at which phase separation can occur is determined by a number of variables, including the amount of ethanol, the composition of the fuel, the temperature of the environment and the presence of contaminants. It is very important (A) that the system is inspected for significant quantities of water in the tank before using gasoline with ethanol and (B) to limit exposure of the fuel tank to excess water. If phase separation has occurred, it is necessary to completely remove all free water from the system and replace the fuel before continuing operation. Otherwise, engine problems could occur.

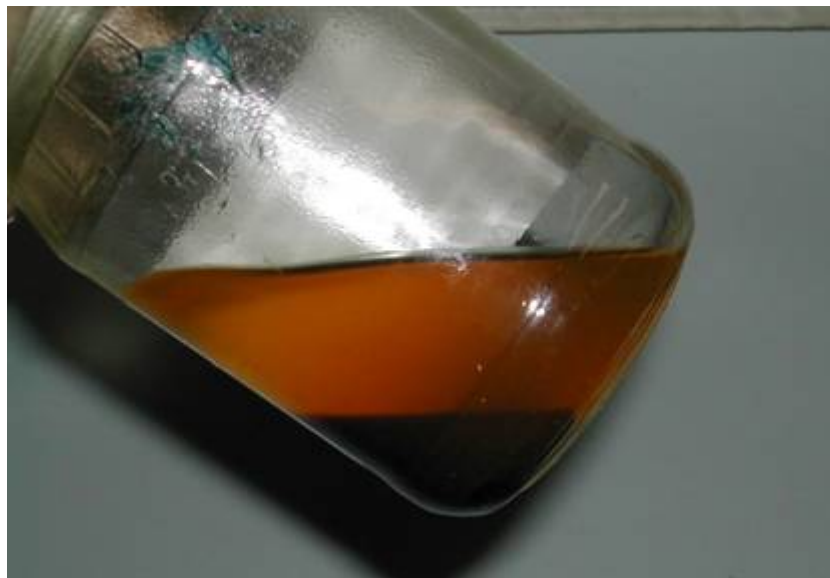


Figure 1: Sample of fuel from fuel tank in which phase separation has occurred. The upper phase is petrol with a reduced level of ethanol. The lower level is a mixture of ethanol and water.

Is an additive available that can prevent phase separation?

There is no practical additive that can prevent phase separation from occurring. The only practical solution is to keep water from accumulating in the tank in the first place.

Are there any additives that can allow the phase-separated mixture to remix when added to the fuel tank?

No, the only way to avoid further problems is to remove the water, dispose of the depleted fuel, clean the tank and start with a fresh, dry load of fuel.

Is there a simple solution to water condensation in the tank as a result of ethanol?

It is best to maintain a full tank of fuel when the engine is not in use. This will reduce the void space above the fuel and will reduce the flow of air in and out of the tank with changes in temperature. This will reduce condensation on the internal walls of the tank and will limit exposure of the ethanol in the fuel to humidity and condensation.

What should be done when storing boats with ethanol-blended fuels for extended periods?

When preparing to store a boat for extended periods of two months or more, it is best to completely remove all fuel from the tank. If it is difficult or not possible to remove the fuel, maintaining a full tank of fuel with a fuel stabilizer added to provide fuel stability and corrosion protection is recommended. A partially full tank is not recommended because the void space above the fuel allows air movement that can bring in water through condensation as the temperature cycles up and down. This condensation potentially becomes a problem.

**For further information, please call the
BP Lubricants and Fuels Technical Helpline
1300 139 700
freecall**