

## Update for Boat Owners: Ethanol Blended Fuels for Use in Marine Equipment

Throughout the past year, fuel blenders have extended the availability of fuels containing up to 10% volume ethanol (E10) to many new regions of the U.S., primarily the southeast states. Many areas across the country successfully utilize only ethanol blended fuels year round and across all octane grades, proving that ethanol blended fuels can be used successfully in marine applications. E10 is interchangeable with gasoline and virtually every gallon of gasoline sold in the U.S. today contains a percentage of ethanol up to 10%. As ethanol has entered these new markets, some marine equipment owners and operators have raised questions about ethanol use in their equipment. This bulletin is meant to provide information about successful operation of marine equipment using E10.

Since marine equipment operate and are often stored in a wet environment, engine and fuel system design and operations must preclude any water or moisture introduction to the fuel system. Marine fuel systems are robust in nature, however the fuel system may not be conducive to a visual inspection or identification of any environmental influences that may have resulted in a poor fuel quality condition. All but the latest watercraft models have fuel systems vented to the atmosphere which may require extra precaution.

Boat owners know that following proper storage guidelines and a recommended maintenance schedule will ensure the boat is kept in proper operating condition. Additionally, the following tips should prove helpful for a boating season using E10:



- Follow the engine manufacturer's fuel use recommendations. Today, manufacturers use upgraded materials that are largely unaffected by properly formulated ethanol blends. This is evidenced by their fuel recommendation comments which permit the use of such fuels in their equipment marketed in the U.S.
- Confirm that fuel storage recommendations have been followed. Some boat manufacturers recommend storing the fuel tank full (90-95% to allow room for expansion) and/ or recommend the use of a fuel stabilizing additive if the watercraft will be idle. Today's fuels are more susceptible to degradation and weathering.
- Keep the engine in acceptable operating condition by following the maintenance schedule as recommended by the manufacturer. Simple maintenance programs include the changing of the spark plugs, spark plug wires, fuel filter and any water separating filters.
- Utilize fuel system treatment and additives as recommended. Fuel additives can help maintain fuel quality and fuel system cleanliness and engine operating conditions in many cases. Fuel system cleaners help to remove engine deposits, such as tars and gums, left behind from many years of operating on gasoline. Because of ethanol's solvency effect, extra fuel filters and the tools needed to change the filters may be needed to collect the gasoline deposits, once the equipment first begins operating on ethanol-blended fuels.

- Investigate that the fuel system does not contain any water. If excessive moisture is absorbed, the ethanol and water can phase separate (fall out of suspension) from the gasoline blend. This would result in a mixture of ethanol and water in the bottom of the fuel tank. Aside from the fact that the engine would not operate on this ethanol/water blend, it can also cause corrosion of various metals with which it comes in contact. The potential for phase separation, however, must be put in perspective. It would take almost four teaspoons of water per gallon to phase separate a gasoline-ethanol blend. This is an incredibly large amount of water to be accidentally introduced into the system. To absorb this much moisture from the atmosphere (at a relative humidity of 70%) would take hundreds of days even if the gasoline cap was left off.

To ensure that water is not introduced into the system, use a gasoline tank cap that seals properly and fill the tank before extended storage periods (note that some manufacturers recommend draining of the fuel tank and system before storage).

In rare instances, older marine and two stroke outboard engines and fuel systems have experienced incompatibility with ethanol-blended fuels, resulting in system failures. One way to avoid this situation is to know your equipment and follow the engine manufacturer's recommendations. Special concern pertains to older, in-hull fiberglass tanks. The polyester resins used in the fiberglass of older watercraft (generally prior to 1991) may not be compatible with ethanol blends. Check with the local marina if the possibility exists to retrofit or re-line the fuel tank of concern. Additionally, state regulating agencies may have fuel composition information available for your area.