

Ethanol and Marine Use: Frequently Asked Questions

For decades, parts of the United States, such as the Midwest, have had access to gasoline blended with ethanol. In fact, all gasoline across all octane grades is blended with ethanol. Avid boaters in these Midwestern states have successfully used E10, a gasoline-ethanol fuel blend with 90% gasoline and 10% ethanol, in their watercraft for nearly three decades. More recently, E10 availability has spread to the East Coast and Southeast, making E10 the most widely available fuel at retail. Boaters using E10 for the first time may be apprehensive with this possibly unfamiliar fuel. With the same due diligence protecting the fuel from contamination and using proper storage techniques, marine engine owners should have a seamless transition to gasoline-ethanol fuel blends. For vintage boat owners, there have been exceptions made to allow for gasoline fuel only for marine and other special applications. More information on the fuels available in the area may be obtained from the regional fuel regulating agency.



The information listed here has been accumulated from marine equipment manufacturers and from many years of ethanol experience. There is no better reference for marine engine and watercraft information than the original manufacturer's published references. Two critical points:

- **Refer to the owner's manual for each specific piece of equipment for all engine and fuel information.**
- **If you do not have access to the owner's manual for your equipment, contact the engine manufacturer or authorized dealer. Remember that a wealth of information on your marine equipment is available to you on the Internet.**

Ethanol Background Information

Q: What is ethanol?

A: Ethanol is ethyl alcohol, the same alcohol contained in alcoholic beverages. However, all the water is removed and it is manufactured to specific fuel use standards.

Q: Why does most of the gasoline sold today contain ethanol?

A: In order to reduce our dependence on foreign oil, the federal government requires that more renewable fuels be used in transportation fuels each year. The most readily available, and economically viable, renewable fuel to meet these requirements is ethanol.

Q: I heard that EPA recently approved E15 fuel blends. Is that true?

A: Yes. In October 2010 and January 2011, EPA announced the limited approval for E15 fuel blends (15% ethanol, 85% gasoline) for strict use in gasoline powered automobiles. The approval came after years of research on the safe and effective use of this fuel in varying model year cars and trucks. This approval is strictly limited to use in automobiles manufactured in model year 2001 and newer, and was



NOT approved for any other engine use. Remember, EPA's E15 approval is not a mandate for use; it's an opportunity for retailers to utilize additional amounts of ethanol in their gasoline. Until fuel blends containing more than 10% ethanol have been tested and approved for use in marine engines, watercraft and boat owners should **not** use these fuel blends.

Manufacturers' Fuel Recommendations

Q: Can I use E10 in an outboard motor? What about an inboard motor?

A: Generally, all manufacturers will allow the use of E10 in the products they have manufactured. Some offer special guidance on E10's use, such as specific storage instructions. Always confirm with your owner's manual from the manufacturer if you are unsure.

Q: Will the use of ethanol-blended fuels void my engine warranty?

A: Fuels containing up to 10% ethanol are generally considered acceptable by most marine engine manufacturers and will not void the engine warranty. There are many conditions that could cause the nullification of a manufacturer's warranty; in fact, too many to mention in this document. Understanding the recommendations from the equipment manufacturer is a critical tool for owners for keeping equipment in its proper working condition.



Q: What about my two-stroke powered engines? Will the ethanol affect the lubricity of my gasoline-oil mixture?

A: To date, tests have shown no problems using E10 in two-stroke equipment when the manufacturer's recommendations are followed.

Q: I see other ethanol blends such as E20 and E85. Can I use these products in my marine engines?

A: No. These fuels are for use in flex-fuel vehicles (FFVs) only. These automobiles are specifically designed to be able to operate on ethanol-

blended fuels ranging from unleaded gasoline to E85 (85% ethanol, 15% gasoline), and all blends in-between.

Equipment Compatibility

Q: Are marine engines compatible with ethanol fuels?

A: Nearly all manufacturers have designed their marine engines to successfully operate on ethanol-blended fuels up to 10%.

Q: What are some common material-compatibility warning signs if I have used the wrong fuel?

A: If rubber components are suspected to be incompatible, check with the manufacturer for advice or frequently inspect these fuel system components for signs of swelling or deterioration. Replace these materials if problems are noted. Since the 1980s, many rubber and elastomer engine components were designed to be compatible with gasoline blended with up to 10% ethanol. The U.S. Coast Guard has provided guidance for watercraft owners seeking a replacement for the fuel hose applications. Retrofit model J1527USCG Type A1 is the highest performance hose with the best compatibility with ethanol blends.

Following recommended maintenance programs can help to extend the life of your marine engine. Additional routine maintenance, such as replacing soft or brittle fuel system hoses may also provide benefit.

Equipment Storage

Q: Should I take any fuel-related precautions for storing my equipment?

A: Yes. There are several things that should be considered. All but the latest watercraft models have fuel systems vented to the atmosphere which may require extra precaution. First, during the in-season use, it is best not to buy more than a 30- to 60-day supply of any type of gasoline. Proper storage preparation is essential for keeping your outboard motor trouble free and looking good. Fuel deterioration and oxidation can begin in as little as 15 days and may cause damage to the fuel system. Second, during the offseason, or when equipment is to be stored for extended periods of time, additional steps are recommended. Most manufacturers recommend one of two storage methods:

Dry Storage Method: Drain all the fuel from the fuel tank and operate the equipment until it stops due to lack of fuel*.

**Never start or run your marine engine without water circulating through the cooling water intake in the gear case. Cooling water prevents damage to the water pump and overheating the engine.*

Wet Storage Method: Treat the fuel with a fuel stabilizer to extend the fuel's storage life. Many equipment manufacturers sell such products under their own brand name. 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. Fuels of any composition can weather or deteriorate in storage.

Once the fuel is treated, fill the equipment fuel tank to 90–95% full. This will minimize in-tank water condensation and accumulation while allowing room for temperature expansion. After filling the tank, run the engine to be sure that the treated fuel has replaced the untreated fuel.

A partially full tank is not recommended because the air space above the fuel allows air movement that can introduce water through condensation with changes in outside ambient temperature. Water introduced through this condensation action can build to a level that can cause phase separation of the fuel in both gasoline and gasoline that is blended with ethanol. Additional fuel storage recommendations specifically for your geographic location may be available from the local authorized, marine servicing dealer.

Fuel Deterioration

Q: Can gasoline degrade in storage?

A: All gasoline, whether blended with ethanol or not, will degrade over time due to evaporation, contamination and oxidation. A fuel system that has used only gasoline may have deposits built up from the oxidation and contamination. Introducing E10 to this engine system introduces a solvent action to the tank which may dissolve some of the deposits moving them forward to the engine. Check the fuel tank for water and inspect the water-separating filter (on large engines.) Take the necessary corrective actions if water is found. Also, visually check the fuel for clarity. If the fuel is cloudy or contain particulate, corrective action such as removing the fuel and cleaning the fuel tank may be needed.

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Q: Can the ethanol separate from the gasoline?

A: Ethanol and gasoline are completely miscible. However, if excessive moisture is introduced to a gasoline-ethanol fuel mixture, the water will phase separate (fall out of suspension) from the fuel blend taking the ethanol with it. This would result in a mixture of ethanol and water in the bottom of the fuel tank, separate from the gasoline. Aside from the fact that the engine would not operate on this ethanol/water blend, water can also cause corrosion of the various metals with which it comes in contact. Such occurrences are rare especially if proper maintenance and storage recommendations are followed. As a regular maintenance item and prior to a boating trip, check for water contamination in the fuel tank. If any water is found, remove all water and dry the fuel tank completely before re-fueling.

All gasoline and gasoline-ethanol fuel blends can oxidize and deteriorate in storage leading to gummy deposits in the fuel system. Old gasoline can cause hard starting due to “weathering of the fuel,” meaning a loss of the easier vaporizing components of the fuel from evaporation. Very warm storage temperatures accelerate this type of fuel deterioration. If the gasoline in your fuel tank and carburetor deteriorates during storage, you may need to have the carburetor and other fuel system components serviced or replaced.

Boat owners know that following proper storage guidelines and a recommended maintenance schedule will ensure the boat is kept in proper operating condition. Additional fuel storage recommendations may be available from the local authorized, marine servicing dealer.

More information on ethanol-blended fuels is available at www.EthanolRFA.org.