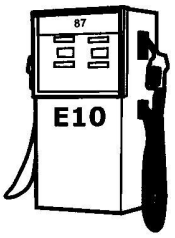
VOLVO PENTA

Ethanol Blended Gasoline and your Volvo Penta engine



Ethanol Blended Gasoline (E10)

Gasoline is distributed throughout the world that contains ethanol. Volvo Penta gasoline engines may be operated using gasoline blended with a maximum of 10% ethanol and that meets the minimum octane specification (see operator's manual). Gasoline blended with 10% ethanol is referred to as E10.

Do not use ethanol blends greater than 10%, especially E85 (85% ethanol, flex fuel). Volvo Penta engines are not designed to run on high percentages of ethanol. Loss of performance, increased fuel consumption and decreased mileage/range will occur.

NOTICE! Engine damage may occur; damage caused by fuel with too much ethanol is not covered by warranty.

Ethanol has several characteristics that can create problems in marine fuel systems. It acts as a solvent and it attracts and holds water, in a much higher percentage than earlier fuels.

NOTICE! **Fuel system or engine damage caused by contamination from water, varnish, foreign particles, sludge, or gums entering or forming in the fuel system is not covered by the warranty.**

Water, varnish, foreign particles, sludge, and gums are created or freed by the ethanol and can enter or form in the fuel system. These contaminants can clog fuel filters and damage fuel system components: pumps, injectors, carburetors. The contaminants must be prevented from entering the engine's fuel system.

Recommendations for E10 fuel

1. Add a second water separating fuel filter between the fuel tank and the engine. Volvo Penta gasoline engines (except 3.0GL) are equipped with a water separating fuel filter. A second filter adds extra protection from water and contaminants in the gasoline.

The filter must be approved for gasoline inboard applications (USCG, EU 94/25/EC) and installed in accordance with boat building standards (ABYC, EU 94/25/EC). The filter must have a minimum rating of 50 gallons (189L) per hour.

2. Water separating fuel filters should be checked frequently for water and contaminants in accordance with the filter manufacturer's recommendations. Check and/or replace the filters if engine performance is poor. Carry spare filters and needed tools and supplies to change filters while boating.

3. Use a fuel stabilizer such as STA-BIL®, if the vessel's fuel will not be used within 30 days. Marine fuel stabilizer provides the best results. Add the stabilizer according to the stabilizer manufacturer's instructions. This will help prevent the formation of fuel contaminants.

NOTICE! If the boat will not be used for two months or longer, the fuel system must be properly prepared for this storage period. See your dealer for details.

Fuel Additives

Avoid any fuel additives and fuel system treatments that contain ethanol or are alcohol-based.

Fiberglass Fuel Tanks

⚠ **WARNING! Fuel leak, explosion/fire may result from continued use of ethanol fuels in polyester resin fiberglass fuel tanks.**

Some older boats (mid-80's and earlier) may have polyester resin fiberglass fuel tanks. Ethanol can **dissolve the resin in the tank walls,** forming contaminants in the fuel and eventually fuel leakage. Volvo Penta does not recommend the use of ethanol blended fuels in fuel tanks constructed of polyester resin fiberglass.

VOLVO PENTA

Volvo Penta of the Americas
1300 Volvo Penta Drive
Chesapeake, Virginia 23320-9810

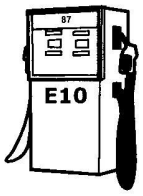
Service Bulletin

Group	Number	Version
18-8	7	02

Ethanol Blended Gasoline

Gas Engines

Distribution: M Date: 09-2009 Binder: C



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Do not use ethanol blends greater than 10%, especially E85 (85% ethanol, flex fuel). Volvo Penta engines are not designed to run on high percentages of ethanol. Loss of performance, increased fuel consumption and decreased mileage/range will occur.

NOTICE! Engine damage may occur; damage caused by fuel with too much ethanol is not covered by warranty.

Ethanol has several characteristics that can create problems in marine fuel systems. It acts as a solvent and it attracts and holds water, in a much higher percentage than earlier fuels.

NOTICE! **Fuel system or engine damage caused by contamination from water, varnish, foreign particles, sludge, or gums entering or forming in the fuel system is not covered by the warranty.**

Water, varnish, foreign particles, sludge, and gums are created or freed by the ethanol and can enter or form in the fuel system. These contaminants can clog fuel filters and damage fuel system components: pumps, injectors, carburetors. The contaminants must be prevented from entering the engine's fuel system.

Recommendations for E10 fuel

1. Add a second water separating fuel filter between the fuel tank and the engine. Volvo Penta gasoline engines (except 3.0GL) are equipped with a water separating fuel filter. A second filter adds extra protection from water and contaminants in the gasoline.

The filter must be approved for gasoline inboard applications (USCG, EU 94/25/EC) and installed in accordance with boat building standards (ABYC, EU 94/25/EC). The filter must have a minimum rating of 50 gallons (189L) per hour.

2. Water separating fuel filters should be checked frequently for water and contaminants in accordance with the filter manufacturer's recommendations. Check and/or replace the filters if engine performance is poor. Encourage boat owners to carry spare filters and needed tools and supplies to change filters.

3. Use a fuel stabilizer such as STA-BIL®, if the vessel's fuel will not be used within 30 days. Marine fuel stabilizer provides the best results. Add the stabilizer according to the stabilizer manufacturer's instructions. This will help prevent the formation of fuel contaminants.

NOTICE! If the boat will not be used for two months or longer, the fuel system must be properly prepared for this storage period. See service bulletin 23-0-2, version 04 for details on storage procedures and use of fuel stabilizer.

Fuel Testing

The mixing of ethanol and gasoline at the distributor can be inaccurate. At delivery, test gasoline for ethanol level to insure it is 10% or below. Also consider testing the fuel in boats with complaints of poor performance and that show symptoms of

poor fuel quality. Inexpensive test kits can be purchased locally or found on the internet.

Fuel Additives

Avoid any fuel additives and fuel system treatments that contain ethanol or are alcohol-based.

Fiberglass Fuel Tanks

⚠ **WARNING! Fuel leak, explosion/fire may result from continued use of ethanol fuels in polyester resin fiberglass fuel tanks.**

Some older boats (mid-80's and earlier) may have polyester resin fiberglass fuel tanks. Ethanol, as a solvent can **dissolve the resin in the tank walls**. The result is formation of sludge and gum in the fuel that can clog fuel filters and damage fuel system components. Volvo Penta does not recommend the use of ethanol blended fuels in fuel tanks constructed of polyester resin fiberglass.

Methanol

Do not use any gasoline containing methanol in Volvo Penta engines. Serious engine damage may result from the continued use of fuel containing methanol. Any resulting engine damage is not covered by the warranty.

The next page may be posted and made available to Volvo Penta engine users to provide them with information regarding ethanol blended fuels.

Service Bulletin

Group	Number	Version
23-0	2	04

VOLVO PENTA

Volvo Penta of the Americas
1300 Volvo Penta Drive
Chesapeake, Virginia 23320-9810

Storage Requirements for Fuel Systems

Gas Engines

Distribution: M Date: 09-2009 Binder: C

This bulletin clarifies our requirements for fuel and fuel system treatment during storage or other periods of limited use. Current fuel is not as stable as in years past, this must be addressed whenever the boat is stored or not used for periods of time.

Electric Fuel Pumps and Fuel Cells

Preventing Failures

Failure analysis on pumps returned to us indicates that a large percentage of these parts failed due to varnish build up. Varnish build up is significantly reduced by following the fuel stabilizer and storage procedures that follow.

NOTICE! **Failure to follow the fuel stabilzer and storage procedures below can damage fuel system components and is not considered as warrantable.**

Use of Fuel Stabilizer

Use a fuel stabilizer such as STA-BIL®, if the vessel's fuel will not be used within 30 days. Marine fuel stabilizer provides the best results. Add the stabilizer according to the stabilizer manufacturer's instructions. This will help prevent the fuel from breaking down, which can lead to reduced engine performance and engine damage.

See Service Bulletin 18-8

Volvo Penta has discontinued fuel stabilizer 3855832, noted in earlier manuals. Many brands of stabilizer are available and can be obtained locally.

Storage

If the boat will not be used for two months or longer, the boat and engine must be prepared for this storage period. This procedure has been covered in many earlier bulletins and operator's and workshop manuals. This bulletin clarifies the storage preparations needed for the **fuel system** and replaces any earlier information.

Both the fuel in the tank(s) and the engine must be treated.

Tank

If the boat is being stored, the fuel must be treated with fuel stabilizer. Add stabilizer according to the manufacturer's instructions.

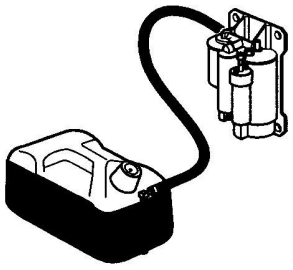
Engine and fuel system

If the boat is being stored, engine and fuel system internal components should be coated with a light film of oil to prevent corrosion. This was previously accomplished by "fogging" the engine. The design of multi-port fuel injected engines does not permit the introduction of fogging oil through the intake system. The following **Fuel Storage Mixture** procedure introduces the oil through the fuel system, protecting both the fuel system and engine during storage. This procedure applies to all gas engines, carburetted or fuel injected.

Fuel Storage Mixture

1. Prepare the storage mixture:

Using a six-gallon portable fuel tank, add:
One pint two-cycle motor oil
Fuel stabilizer, per manufacturer's instructions
Six gallons fresh fuel (50:1 ratio to two-cycle oil)



⚠ **DANGER! Fuel and vapors will be present during procedure, provide ventilation and eliminate spark/flame sources.**

2. Disconnect the fuel line at the inlet fitting of the engine's fuel pump. Connect a line from the portable tank (with storage mixture) to the fuel pump inlet.

⚠ **CAUTION!Engine must be run to complete process. Take precautions to ensure safety and prevent engine damage:**
- run engine with drive out of gear and in trim position
- boat must be properly supported
- must have adequate cooling water, monitor engine temperature gauge
- do not run fuel pumps dry

3. Run the engine on the storage mixture for five minutes at 1500 RPM. This will ensure that all fuel system and internal engine components are protected.
4. Reduce the engine speed to idle and stop the engine.
5. Reconnect the boat fuel line to the fuel inlet fitting and check for fuel leaks. Do not start engine.

DANGER! Any fuel leaks should be corrected immediately to prevent possible fire and/or explosion.

6. Continue with storage (winterization) procedures.

Other Storage Requirements

Storage time limit

Fuel storage times are extended by the use of stabilizer, however the storage time is still limited. See the stabilizer manufacturer's instructions for specifics. If this time limit is exceeded varnish and other problems may occur. The fuel should be removed from the boat and the **Storage** procedure above should be repeated to protect the engine and fuel system.

Boat manufacturers

Fuel systems on Volvo Penta engines are sealed with stabilized fuel prior to shipment. If the engine was run after it was recieved from Volvo Penta, follow the **Storage** section above prior to storage or shipment of the boat or engine.

Boats in inventory

Boats and engines should be protected by stabilized fuel, however the same storage limitations apply. If the boat is still in inventory six months after boat build date, the **Storage** procedure should be performed.

Pumps from Volvo Penta Parts

NOTICE! To extend pump shelf life, replacement fuel cells and pumps are sealed with testing fluid. The testing fluid is flammable, safety regulations prohibit shipment via air freight.

Noisy Pumps

Electric pumps will often cavitate and become noisy if they are starving for fuel.

Before replacing noisy fuel pumps

Before replacing low-pressure pumps (carbureted engines, fuel cells) check the fuel supply, condition of the fuel hose, anti-siphon valve operation, and fuel filter before replacing the fuel pump.

A noisy high-pressure pump on a fuel cell may indicate a low fuel level in the reservoir. Check the fuel supply and low pressure pump operation to be sure the reservoir is receiving the correct volume of fuel.

This information may prevent needless pump replacement and reduce the down time for the boat owner.