



## **It's a Gas: The new EPA fuel systems on recreational boats, portable and permanently installed.**

Boats manufactured in or imported into the US, that have gasoline fuel systems, are required to have fuel systems that comply with the US EPA requirements for evaporative emissions. Evaporative emissions are fuel vapors that escape from gasoline during fueling, from fuel tanks through vents and permeable tank walls, and from the permeable hoses in the fuel system.

The US Coast Guard was primarily concerned about the safety aspects of fuel vapors. In 1978 the Coast Guard established standards for how much vapor could escape from hoses and plastic (polyethylene) gas tanks. These were based on how much vapor it would take to get to the lower explosive limit (LEL), a mix of fuel vapor and air, to cause an explosion if there was a spark or other source of ignition. If the amount was below the LEL, the explosion would not occur. This was part of a three-part system to eliminate fires and explosion by preventing leaks, eliminating sources of ignition, and providing adequate ventilation of areas where fuel vapors could collect.

Additionally, pressurized systems are not allowed in boats. If there is pressure in the system and a leak develops in the fittings or hoses the entire contents of the tank empties into the boats bilge. All that is needed is a spark and the vapor ignites. This is why fuel pumps are required to be within 12 inches of, or mounted on the engine. The fuel is then sucked to the engine. In-tank pumps commonly used in automobiles for pressurized systems, are not allowed on boats.

Enter the EPA, the Clean Air Act, and legitimate concerns over air pollution and global climate change. In the early 2000's the EPA proposed regulations limiting emissions from recreational boats to amounts far less than the USCG allowed. This resulted in much debate, research, and changed manufacturing processes. The new EPA standards went into effect in 2012. See <https://newboatbuilders.com/pages/fuel.html>.

The rules made dramatic changes to fuel systems. They required carbon canisters in the vents, automatic pressure relief valves in the vent to keep below 2 psi, and differences in construction of hoses and tanks. Manufacturers of tanks, hoses, and fuel fittings, found ways to comply with the new rules. ABYC revised fuel system standards to provide ways for manufacturers to comply with the EPA regulations. See [https://newboatbuilders.com/pages/fuel\\_tank.html](https://newboatbuilders.com/pages/fuel_tank.html)

So, what are the issues? The main issue is pressure develops in both permanently installed and portable fuel tank systems. In permanently installed systems the pressure is not supposed to

exceed 2 psi. Under the previous regulations it was purposefully kept at less than 3 psi and preferably at atmospheric pressure, and fuel tanks were directly vented to the atmosphere.

The valves in the fuel tank vents in a permanently installed system which are supposed to keep the pressure below 2 psi, often clog, raising pressure in the system. During filling, fuel backs up, causing overflow of the fill, spilling gasoline. Pressure in the system can cause very slow filling, or incomplete filling. Liquid fuel squirts out of the fuel tank vent spilling fuel, and ruins the carbon canister, requiring an expensive replacement. A clogged vent results in fuel feed issues, causing engines to not start, or to stall when underway. This in itself can be a safety issue if the engine stalls and refuses to restart when the boat is in a perilous position such as entering an inlet, crossing a bar, in a river with a rapid current, when docking or maneuvering, or when in heavy traffic in a narrow channel.

Permanently installed fuel systems are not the only ones affected. Portable fuel tanks, used for outboard motors, are as well.

Portable systems are not regulated by the US Coast Guard, but have long been built to standards published by the NFPA and ABYC. Those standards did not cover emissions, but like the Federal standards for permanently installed systems, were concerned mainly with safety, i.e., prevention of fires and explosions.

Portable tanks are no longer vented. Because of increased pressure, they leak at the fittings, and plastic portable tanks expand in frightening amounts. Manufacturers of portable tanks use push-on type fittings that do not require clamps or swaged fittings to work. Often, they leak at these fittings when pressure develops in the tank. Many dealers and professionals advise using aircraft quality cement to seal the fittings, which, while solving the leak problem, defeats the purpose of the push-on fittings that can be quickly connected or disconnected and easily replaced. Owners have resorted to replacing the caps on these tanks with vented caps used on old portable fuel tanks, defeating the purpose of reducing emissions.

These problems are both a safety and an emissions issue, and they are very frustrating to the boat owner. They recognize the safety issues but do not understand why the emissions issues are appearing to be more important than the safety issues. They want a safe way to get fuel to the engine, so the engine runs reliably. Anything that interferes with that is not good.

So, what are the solutions? At this point, there are none.

The EPA needs to review the regulations, study the problems, and try to find solutions that eliminate the problems while at the same time reducing emissions. The Coast Guard needs to work with the EPA on finding ways to solve the safety issues.

References: <https://www.boats.com/resources/modern-gasoline-fuel-systems-on-boats/>

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