

Spill? What Spill?

Products that keep fuel where it belongs — in your tank

You're at the fuel dock, pumping fuel as fast as you can, when your grandson tugs on your arm, begging for an ice cream sandwich. Momentarily distracted by your search for change, and before you can say "Eskimo Pie," fuel is tumbling out of your tank vent and down the side of the hull. While a sheen starts to spread, you try to play it cool. It's just a couple of drops, right?

Fuel tanks on boats are not pressurized like they are in automobiles, so inboard boat tanks have an air vent to relieve the pressure that builds during fueling. Unfortunately, when your tanks are filled quickly or overfilled, these vents are notorious for burping fuel out into the water.

Are you worried about the effects of careless fueling on the environment? Do you have an aversion to retouching your gel coat, or for writing checks for pollution fines like the ones you could get under federal law for causing a fuel sheen on the water?

If so, the BoatU.S. Foundation has tested 10 products that promise fewer fueling spills, or could help you avoid overfilling.

The Hardware

Using products obtained from manufacturers, we tried out four "inline fuel-air separators" from Attwood and Racor, rang-

ing in price from about \$20 up to \$110. Next we tested three varieties of deck fill-vent combinations, also called "vented fills," from Attwood and Perko, which retail from \$20 to \$60. Last in this category, we tested a unique device called the Seacurefill Fuel Recovery System which retails for about \$139.

In separate tests, we obtained electronic fuel management systems (also called fuel computers or flow meters) and installed them on boats borrowed for this test. We tried the FloScan Series K9000 with GPS interface, which runs for about \$1,400 per engine, and the Navman TrackFish 6600, a unit which includes a chart plotter, fish finder, and fuel computer in one. This loaded unit retails for about \$1,900. Without all the fancy features, however, a basic fuel flow meter can cost as little as \$200.

To test the hardware, we built a mock-up of a boat fuel tank system, complete with a tank vent. On the "deck" of our model, we installed the vented deck fills. Below deck, accessible hoses allowed staff members to install the inline devices. For inline device testing we used a regular deck fill like you might find factory-installed. One product was tested at a time; there were no

combinations of products, such as a deck fill and inline separator.

Due to obvious hazards, we did not use real gas or diesel for our testing, but instead used carefully-formulated solutions of soapy water to mimic the foaming quality and viscosity of both gas and diesel. To pump our "fuels," we used two actual fuel nozzles — one standard (3/4") and one



To test the hardware, we built a mock-up of a boat fuel tank system, complete with a tank vent.

large (1-1/4") — which we attached to an electric water pump and pumped at both 10 gallons per minute and 20 gallons per minute. During testing, we pumped at full force every time until the nozzle automatically cut off. We did not top off.

To test the fuel management systems, we installed the Navman TrackFish 6600 on a 21-foot Stratos center console, powered with a single 200-hp gas outboard. We then took the boat on trial runs on Chesapeake Bay, varying the throttle, trim, and tilt settings to monitor fuel usage. We also had two FloScan Series K9000 professionally-installed on a 55-foot Fleming power cruiser with twin Caterpillar engines and monitored its readouts during a 1,500 mile snowbird voyage down the Intercoastal Waterway.

All Wet

After 24 different tests on the mock-up, on both inline fuel-air separators and



Using products like this nozzle bib and No Spill catchment device can also help prevent accidental spills.



While inline separators and vented deck fills minimized fuel coming out of the tank vent, there was a greater likelihood of it spurting out of the fill instead.

vented deck fills, we noticed a definite trend. In test after test, overflow bubbled out of the deck fill when the tank became full, often before the nozzle's auto shut-off even had a chance to engage. In other words, the pressure created by pumping fuel at a high rate of speed caused fuel to escape if not from the vent, then from somewhere, and in many cases, that somewhere was on deck.

There was one positive exception. The Racor Lifeguard Fuel/Air Separator for gas/diesel (Model LG-100), an inline separator shaped like a small football, worked perfectly during every test, with no fuel escaping from either the vent or the deck fill. We believe it worked so well because of its large size, which allowed plenty of room for foamy fuel to bubble up, functioning like an expansion reservoir, without cutting off the air vent too quickly and causing back-splash from the fill. To confirm our findings about the inline fuel-air separators, we installed each of them individually on a colleague's Tiara Pursuit 24-foot center console so we could try them with actual fuel. In these tests, the Racor Model LG-100 was again the only unit that did not permit a single drop of fuel to escape when fueling rapidly.

Another exception was the Seacurefill Fuel Recovery System. It did the job, but requires an extra hole being cut in your boat, plus cumbersome additional steps during fueling.

Staff Pick: For cost, convenience, and reliability, our staff chose the Racor Lifeguard Fuel/Air Separator for gas /diesel (Model LG-100) as the best venting product. Whether it's a small tank on a sailboat, or a large tank on a powerboat, we think it would work well. They retail for a little over \$100.



Knowledge is Power

Electronic fuel management systems will tell you how much fuel you have used and how much you need to take on — usually within 5% accuracy. The idea is once you've taken on as much fuel as you need, you will stop refueling and therefore, not push your tanks to the point where they have to vent. But that's just part of what they do. An advanced fuel computer, like the Navman tested, will constantly update you about your estimated range and your miles

Inline Fuel/Air Separators



Models tested: Racor Lifeguard Fuel/Air Separator for gas /diesel, Model LG-100, \$109.99, Racor Lifeguard Fuel/Air Separator for gas only, Model LG-50, \$92.99, Attwood Fuel Vent Line Surge Protector, Model 1675, \$23.99, Attwood P-Trap Fuel Surge Protector, Model 1680, \$21.54

What it is: An inline fuel separator is installed by cutting the vent hose that runs from the fuel tank to the tank vent on the outside of the boat. One model is fitted to the inside of the hull, replacing the tank vent fitting.

How it works: The inertia of surging fuel or rising fuel bubbles float a small ball that restricts the vent hose when it becomes suddenly overrun with fuel.

Pros: An inexpensive option that can be installed without a professional. Most models will not require cosmetic changes to your boat.

Cons: The boat must have access around the overboard vent area. You must fuel slowly and use extra care to prevent potential back-splash from the deck fill.

Vented Deck Fills



Models Tested: (In order of photos) Attwood Vented Deck Fill (Angled), Model 3782, \$59.99; Perko Combination Fill and Tank Vent Flip Top, Model 1319, \$20.99; Perko Combination Fill and Vent Screw Top, Model 0541, \$28.99, Seacurefill Fuel Recovery System, 1-1/2" Model, \$139.00

What it is: A special deck fill that must be installed in place of the factory-installed deck fill. A few boat manufacturers include one factory-installed.

How it works: The hose from the fuel tank that would normally vent overboard vents back into the deck fill itself, so the excess will flow back into the deck fill and into the tank.

Pros: No chance of spillage from tank vent since it is disconnected, or in the case of the Seacurefill, bypassed.

Cons: Is prone to causing back-splash from the deck fill unless extreme care is taken to fuel slowly and not top off. May need to be professionally installed since sometimes a new hole needs to be cut in your boat's deck.

Fuel Management Systems



Models Tested: (In order of photos) FloScan Diesel Fuel Flow Monitoring System with GPS interface, Series K9000, \$1,399.99 and Navman TrackFish 6600 Combination Chartplotter, Fishfinder, and Fuel Solution, Gas Model, \$1,899.99.

What it is: A computer that helps you manage fuel use by providing the rate of fuel consumption and calculating amounts of fuel used and available.

How it works: By measuring the fuel flow from the tank to the engine via sensors in the fuel line.

Pros: Once calibrated, can provide precise data on how much fuel a boater needs to take on to avoid overflow. Helps improve fuel efficiency and can be used as a diagnostic tool to alert the boater to changes in fuel efficiency that could be caused by prop or engine problems. Often is combined with a GPS, a chart plotter and/or fish finder. More basic models can cost as little as \$200.

Cons: Can be costly and some may need to be professionally-installed. Some require time calibrating the flow meter to your boat initially, and a quick read of the manual to understand usage of all features.

For even more on these products and for additional details of our testing, please visit our expanded Foundation Findings Web site at www.boatus.com/foundation.

per gallon. The FloScan also tracks rpms, allowing the Fleming's captain to find the boat's "sweet spot." We found that a flow meter could be a powerful and useful tool for a boater, both for conserving fuel and for avoiding overfilling.



The Seacurefill Fuel Recovery System requires you to install a second opening (that looks a lot like a deck fill) adjacent to your existing deck fill. While you're fueling, you temporarily use a clear hose to catch overflow from there and direct it into the original deck fill.

Best Practices for Boaters

It may sound overly simple, but modifying your behavior at the pump may be the best thing you can do to keep fuel out of the water. Keep track of your fuel consumption so you know how much you need at the fuel dock, then hold the nozzle rather than setting it on auto and walking away. Slow down, watch and listen. When you know you are close to full, fill your tanks to only 90% to allow room for expansion of fuels on hot summer days.

Topping off is also a major culprit of spills, since you are pushing your tank to full or past full. Simply by eliminating this behavior, thousands of small spills could be avoided.

Keeping inexpensive clean fueling supplies on board — ranging in price from \$1 to \$25 — can also help. Oil absorbent pads, which pick up fuel but not water, are infinitely useful. Also, an absorbent fueling donut or fueling bib can be placed around a fuel nozzle to catch backsplash. A plastic overflow catchment device, like the No Spill, which is suction-cupped to the boat's hull over the tank vent, can also be an effective tool in avoiding vent spills.

There is no perfect answer for every boat, so read the chart for pros and cons before considering what might be a match for your boat. Then visit our Web site for even more in-depth details, pictures, and findings. ■

— By Joni Sralla Turken

The BoatU.S. Foundation is a national nonprofit 501(c)(3) organization.

technotalk

Chart plotters are among today's most popular electronic navigation aids. The course plotters built into many GPS receivers are the most basic. While presenting no cartography data they plot the vessel's course over the ground to the accuracy of the GPS signal and are invaluable in preserving a record of the path the boat traveled, making it easy to retrace one's course in an uncharted anchorage. Many boaters will find that a GPS plotter and a good depth sounder should satisfy most of their electronic navigation needs.

Integrating cartography with the GPS position information creates a true chart plotter rather than a simple course plotter. Systems in between the course plotter and the chart plotter fall into two broad categories, special purpose hardware using a fixed operating program and those that operate on personal computers running a proprietary software program. The way you intend to use the system should guide your choice.

Chart plotters used as real-time navigation aids should be located in easy view of the helm and have display screens bright and clear enough to be seen without excessively distracting the helmsman. These systems work best when equipped with dedicated controls (either hardware buttons or keys or "soft" keys) that provide direct access to the desired data display, without the need to progress through menu choices to access the needed data.

Regardless of screen size, the system should allow de-cluttering of the display to enhance visibility of critical navigation information. Most of the plotters that meet these criteria are dedicated hardware/software devices. Many of these units combine a number of display functions; cartography, depth sounder/fish finder, radar, closed-circuit TV monitor and weather data, either from a satellite link or from a weatherfax receiver.

In addition to real-time navigation, chart plotters are also used to create voyage plans and to capture a detailed record of a vessel's operation, including the information needed to create "polars" for a sailboat and cruise efficiency curves for a powerboat. In such applications, the plot-

ter may be located at a boat's chart table, a location amenable to laptop computer use. The navigation software programs used usually run under Windows on a PC, however an outstanding program that runs on the latest Macintoshes (www.GPSNavX.com) was introduced recently. These programs usually provide a broad range of capabilities, including an interface with the boat's wind velocity, heading and hull speed sensors and the ability to capture and store a virtually unlimited volume of data. However, the user interface of some software programs may be significantly less user friendly than the dedicated hardware systems.

The most critical element in a chart plotter is the display screen. Although large screens are just as attractive in a plotter as they are in a TV set, you don't have to have a big screen to make the data you need visible. Placing a small screen unit close at hand will make it easy both to manipulate the controls and to see the information on the screen. Units with screens no larger than some PDAs can perform very well.

Regardless of display screen size, the unit you choose must be able to withstand exposure to its environment. Unless it is below deck, waterproof is the way to go, something that may be a challenge with a laptop computer.

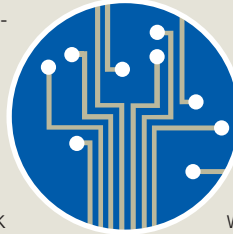
Regardless of your choice of chart plotter remember that a prudent helmsman never relies exclusively on a single source of navigation data. The chart you see on the screen may be slightly or, in some cases, grossly incorrect. Always use all available information, including paper charts.

Following the previously recorded plot of your successful course into that delightful anchorage may get you in trouble if you fail to take the height of the tide into account or if a storm has moved the sand about.

Putting too much data on the screen at one time can create undesirable confusion. Viewing radar data overlaid on the chart can create problems if the boat's heading sensor is inaccurate or lags behind in heading changes.

Often the simplest picture is the best choice. ■

Chuck Husick is a sailor, pilot, engineer and former president of Chris-Craft Boats.



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