

The cornerstone of a diesel fuel maintenance program aboard a yacht is installing an onboard system that will polish the fuel and clean all the tanks.

Fuel polishing systems can be powered by direct current or alternating current, depending on the available electrical supply aboard the yacht and the pumping capacity of the system. The fuel polishing process can be automated with a fully programmable control unit or operated with manually controlled timers, depending on one's budget.

The ideal tank cleaning system has dedicated pick-up and return tubes plumbed into each tank, including the day tank. The dedicated pick-up tube is placed lower in the tank than the normal pick-up tube for the engines. While a normal pick-up tube is located about 6 inches above the tank bottom, the dedicated tank cleaning pick-up tube is located less than an inch above the bottom of the tank. This allows more water and sludge to be suctioned up during the fuel polishing process, which assures a better job of tank cleaning.

The dedicated pick-up and return tubes from each tank are led into a distribution manifold that feeds the tank cleaning system. This arrangement allows each tank to be cleaned separately by the same piece of fuel polishing equipment. Since the hoses plumbed for tank cleaning are independent of the fuel supply and return hoses for operating the engines, the fuel can be cleaned while the vessel is under way and the engines are running.

The best tank cleaning systems are multistage systems that use a variety of inline fuel conditioning and filtration technologies. Sizing the equipment to match the job is important. The flow rate of the pump that circulates the fuel through the tank cleaning equipment must match the capacity of the tank being cleaned.

If a 3,000 gallon tank is being cleaned using a pump that has a flow rate of 150 gallons an hour, it will take 20 hours to clean that tank. But if the flow rate is 600 gallons an hour, the process will only take five hours.

The first phase of fuel polishing is to pass the fuel through a magnetic conditioner that breaks apart the large clusters of hydrocarbon contaminants. The permanent magnets generate a weak

electrical field that separates the bonds holding together the large sediment molecules and disperses them.

The next phase is a water coalescer and particulate filter, which removes free water, sludge, and organic and inorganic matter greater than 30 microns in size. The waste solution of oily water and sludge filtered out during this step is a biohazard and must be disposed of in an environmentally responsible manner.

The last phase is final filtration in which particles down to a diameter of 3 microns or less are removed. This is the most critical step in the fuel cleaning process since particulate contamination is the No. 1 cause of failure in electronically controlled common rail fuel delivery systems in diesel engines. Newer common rail injectors spray fuel into cylinders at a pressure of up to 44,000 pounds per square inch (psi). That is an astounding amount of force since Niagara Falls only has a pressure of 870 psi.

A tiny particle, less than a tenth of the width of a human hair, propelled at extremely high pressure will cut into the ball seat of an injector like a water jet metal cutter. Not only will the injector be permanently damaged, the piston can be damaged as well. Associated repairs can tally into the tens of thousands of dollars per engine.

During the tank cleaning process, an additive is used to dissolve sludge and slime that accumulates on the walls and baffles of the tanks. This procedure assures that mold and bacteria are removed from all tank surfaces to inhibit future growth. Use of a full spectrum additive during this step will also add lubricity to the diesel fuel, prevent corrosion, reduce carbon build up and stabilize the fuel.

Ideally, fuel should be polished and the tanks cleaned whenever the yacht is refueled, or monthly if the yacht is not fueled frequently.

Diesel fuel is the lifeblood of the main engines and generators aboard every yacht. Implementing and strictly adhering to a fuel preventive maintenance program is a simple and inexpensive alternative to the cost of repairing severely damaged high pressure pumps, injectors and pistons.

Capt. Jeff Werner has been in yachting for more than 20 years on private and charter yachts, both sail and power. He is an instructor for RYA, MCA, USCG and US Sailing courses and owns Diesel Doctor (MyDieselDoctor.com). Comments on this column are welcome at editorial@the-triton.com.

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