

There are two kinds of bubbles that may be visible at the fuel pump inlet of a diesel fuel system. The bubbles can be characterized as either air bubbles or vapor bubbles.

### Air Bubbles

Air bubbles are caused by any air leak on the vacuum (suction) side of the fuel system from the fuel tank pick-up to, and including the lift pump (see Figure 1).

If there is an air leak in the fuel system, air bubbles will be present in the clear cover of the Fuel Pro. Follow test procedures outlined in "Diagnostic Procedures for Air Leaks" for air leak diagnostics. If there are no bubbles present in the Fuel Pro cover and the engine continues to run rough, lopes or has a loss of power, there may be an air leak between the Fuel Pro outlet port and lift pump inlet. This type of air bubble can be seen if a sight tube is installed at the lift pump inlet. Air bubbles may also be visible in the fuel return (spill) hose out of the fuel gallery. These leaks are easily eliminated by checking and torquing the fuel fittings in the area of the leak.

**TEST 1:** A quick procedure to determine if the air leak is between the fuel tank and the Fuel Pro is to remove the Fuel Pro inlet hose and route a new hose from the Fuel Pro inlet into a container of fuel or the fuel tank fill cap opening. Start the engine and check for bubbles.

If there are no air leak symptoms, but bubbles are present in a sight tube at the fuel lift pump inlet, they are most likely vapor bubbles.

### Vapor Bubbles

All diesel fuel has some level of entrained air caused by the natural splashing that occurs in the fuel tank during normal vehicle or equipment operation. Vapor bubbles develop in the Fuel Pro because the pressure inside the Fuel Pro is lower than the atmospheric pressure in the fuel tank. Vapor bubbles can vary from champagne size up to ¼" in diameter. They may increase in size or volume as engine RPM increases. The lower pressure draws the entrained air/vapor out of the fuel and these bubbles will be visible as the fuel exits the Fuel Pro (see Figure 2). As the fuel enters the lift pump, it is pressurized and the bubbles are compressed back into the fuel. There will be no bubbles on the fuel return side of the system. These vapor bubbles will not affect the performance of the engine.

**TEST 2:** An easy way to determine the difference between vapor and air bubbles is by temporarily removing the filter element from the Fuel Pro. Fill the cover with clean diesel fuel, replace the vent cap and re-run the outlet fitting sight glass test. If there are no bubbles visible in the sight glass, then the bubbles that were previously visible were vapor bubbles. If bubbles are still present then they are air. If air bubbles still exist, re-run the test in **TEST 1** to eliminate the chassis plumbing as a variable.

*There is no troubleshooting or repair procedure required for vapor bubbles. Vapor bubbles do not cause performance issues and will not be present after the lift pump.*

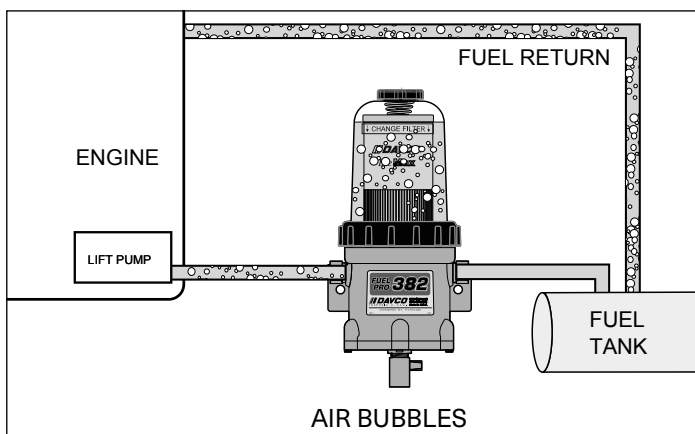


Figure 1

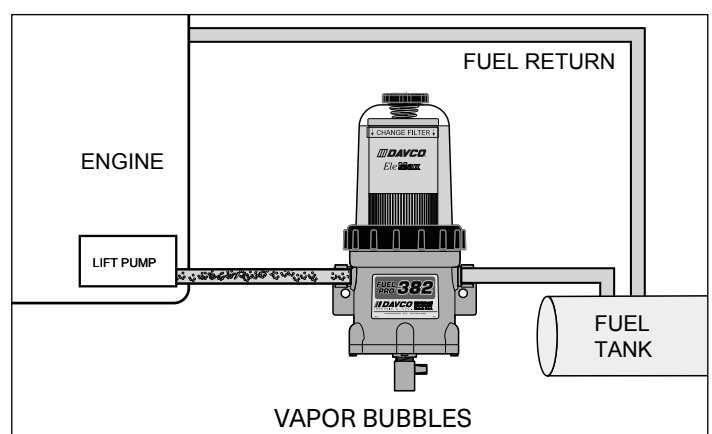


Figure 2