

Understanding fuel systems: anti-drain back valves.

“After I installed my performance fuel system my car is hard to start, especially when it’s been sitting for a while”

This is normal on certain platforms and no cause for alarm. Here is a detailed explanation.

Most fuel injected vehicles are equipped with an anti-drain back feature built into the fuel system. The goal is to maintain fuel pressure when the engine is turned off, allowing for fuel pressure at the injector when the engine is started the next time. This is accomplished by incorporating a one-way valve in the fuel pump’s primary outlet that allows fuel to flow “out” when the pump is operating but closes when the pump is off and not producing pressure. This valve closes quickly enough that the main fuel delivery circuit does not lose pressure.

Modern fuel systems require pressurized fuel flow to “power” other parts of the system such as siphon pumps that utilize venturi jets to continuously fill the surge tank and to move fuel from isolated areas of the tank to the pump. Because these auxiliary systems require pressure they have to be “ahead” of the outlet in the pressure circuit, and because they are “open” fuel pressure “bleeds” off when the system is powered down. To get around this, most manufacturers equip the fuel pump with a separate, smaller outlet that is “behind” the primary outlet and its one-way valve. This small outlet delivers pressurized fuel to power the auxiliary systems. This circuit does not maintain pressure when the pump is powered down; but is isolated from the primary circuit so it does not bleed it down.

The high-performance pumps utilized in your fuel system, and to our knowledge every performance fuel system on the market, do not have the secondary outlet to feed the auxiliary systems. Because of this the primary fuel circuit feeds everything and will bleed off pressure when the vehicle’s engine is turned off. This might mean that a slightly altered engine starting procedure will be required.

If you are experiencing this effect, you will need to pressurize the system prior to starting the engine. To do this simply move the ignition to “Run” for a few seconds (but not Start), turn it off and then start the engine as normal. In some cases, you will need to do this a couple of times. **NOTE:** the engine control computer will only allow the fuel pump to run for 5 – 8 seconds during the engine start sequence. Do not attempt to start the engine for longer than this; turn the ignition to Off and repeat the procedure.

It is possible to eliminate this effect by installing an aftermarket anti-drain back valve between the engine and the fuel system. It is recommended that the AD valve utilizes the “ball and spring” architecture as opposed to a diaphragm. Additionally, if possible, use a valve that is one step larger in diameter than the fuel line size, (for example use a -10 valve

for -08 feed lines). Finally, install the valve as close as possible to the fuel tank, allowing the greatest volume of fuel available in the lines / rails.