

On the Line

Gasoline Direct vs. Port Fuel Injection It Makes a Difference with Valve Deposits

Often, in our diagnostics we identify intake valve deposits as the cause of an engine performance related symptom. The vehicle owner may assure us that they only purchase Top Tier fuel and they supplement with fuel system additives. Unfortunately, their engine may still encounter intake valve deposits. There is a reason for this. The first step in the diagnostics is determining the type of fuel injection system the vehicle is equipped with.

HOW INJECTION SYSTEMS DIFFER

The formation of the deposits may be in relation to how the fuel is delivered to the combustion chamber. There is a major difference in the fuel delivery when comparing Port Fuel Injection (PFI) to Gasoline Direct Injection (GDI). Let's consider those differences:

Port Fuel Injection...On a PFI system the fuel is injected into the intake manifold upstream of the intake valves. Fuel spray, at approximately 60 psi, has a cleansing effect on the intake valves, minimizing deposits. Fuel detergents and supplements added to the fuel tank can be beneficial in removing deposits on this type fuel injection system.

Gasoline Direct Injection...On a GDI system the fuel is injected directly into the combustion chamber at pressures that can exceed 2000 psi. Each injector is positioned in a cylinder where it sprays fuel directly into the combustion chamber through six metered orifices, producing a cone shaped pattern. The GDI system offers improved fuel economy, increased engine performance and lower emission output. Fuel never sprays directly on the intake valves, and this can result in the formation of carbon deposits due to the absence of the fuel wash. While additives can help clean the combustion chambers, they offer no benefit to the intake valves on a GDI system, as only air passes across the intake valves.

SOURCE OF CONTAMINATES

The crankcase is purged via a positive crankcase ventilation (PCV) valve, and the vapors are routed through the intake manifold and intake valves, where they are consumed in the combustion process. During this purging process the intake valves are subjected to oil vapors, which get baked onto the valves. Further, oil seeping past the intake valve guides and seals contributes to the same.

Higher mileage engines with greater wear promote a faster accumulation of these deposits. Exhaust gas recirculation (EGR) is another source of contamination. With the GDI system there is no fuel washing of the intake valves. Once formed, these deposits can create hard starts, misfiring, surging, stumbling and random misfire codes. The deposits can create turbulence in the airflow and restrict airflow to the cylinders.

EXAMINATION

Examining an engine for excessive intake valve deposits may require the removal of the intake manifold, cylinder heads, or the use of a bore scope. Rather than investing labor hours in identifying intake valve contamination, just clean the intake system. Doing so will save the customer some unnecessary expense and improve the performance of the vehicle.

REMOVING CONTAMINATES

Some vehicle manufacturers recommend removing the intake manifold for cleaning with the use of chemicals, and some recommend blasting the deposits with walnut shells. Others may recommend removing the cylinder heads and disassembling the valves for cleaning with a wire brush. These methods can be labor intensive and expensive. There is a less expensive and less invasive way to clean the system. Ask your Mighty Rep about his complete line of intake manifold and valve cleaning chemicals that do an excellent job of cleaning the system.

PREVENTIVE MAINTENANCE

Do not let the contamination get to point that the valves are totally encrusted, making a clean-up difficult. Why not recommend an intake cleaning annually or every 15K miles to prevent the formation of major carbon deposits before they become a major issue. Once heavy contamination occurs, cleaning can dislodge large fragments, causing piston or cylinder wall damage. Further, they can damage the oxygen sensors and catalytic converter. The process is non-invasive and only requires chemicals introduced into the intake manifold, downstream of the mass airflow sensor. It is a simple procedure that can save the customer much expense and frustration.



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