



Power Stroke Diesel News: Questions about EGR Valves?

The purpose of the Exhaust Gas Recirculation (EGR) valve is to recirculate cooled exhaust gas from the engine back into the combustion chamber. The purpose of exhaust gas recirculation is to reduce Nitrous Oxide, or “NOx”, emissions. NOx emissions are caused by extremely high combustion chamber temperatures. NOx is a major O-zone pollutant. The recirculated exhaust gas is an inert gas that takes up space in the cylinder and effectively lowers the combustion temperature, thus lowering NOx emissions.

The EGR valve you see in Figure 1 has accumulated a lot of soot, or particulates. Particulates are basically pieces of partially burnt fuel. Partially burnt fuel can be created in a variety of ways. It can be caused by poor air to fuel mixing in the combustion chamber or it can be the result of poor fuel quality.

Extended Idling:

Most EGR valve failures are experienced in vehicles that are subjected to extended idle times. The operating temperature of a diesel engine, unlike a gas engine, will be reduced during idle. Since a diesel is a compression ignition engine, the combustion process loses efficiency at idle and therefore tends to create more particulates. A gas engine is ignited by a spark plug, so idling a gas engine will have little to no effect on the amount of particulates generated.

Fuel Quality:

Fuel quality also plays a major role in the amount of particulates generated by the combustions process. The cetane rating of diesel fuel is basically the ability of the fuel to combust. The higher the cetane rating, the better the resulting combustion process will be. The minimum recommended cetane level for all Power Stroke Diesel engines is 45. Unfortunately, the average cetane levels we see around the country are typically lower. Unlike gasoline octane levels, cetane levels of diesel fuel are very inconsistent at the pump. Using a fuel additive, like Motorcraft Cetane Booster & Performance Improver, PM-22-A US (PM-22-B CAN) which treats 125 U.S. Gallons and PM-22-ASU that treats 35 U.S. Gallons, will increase diesel fuel cetane levels significantly and reduce the creation of particulates, even at idle.

You may be asking, why should I be concerned about the amount of particulates created by the combustion process? Well, since we are using cooled exhaust gas, from the EGR system, to lower combustion chamber temperatures and NOx emissions, those particulates end up right back in the engine. To complicate this even more, the difference in temperature between the hot and cooled exhaust gas may be as much as 750°F (400°C). This drop in temperature causes a condensing effect and those particulates become cool and moist. Lastly, the EGR valve opens and closes as the engine varies its duty cycle. During idle, the engine duty cycle is unchanged, therefore resulting in no movement of the valve. This allows the particulates to gather on the valve.



Figure 1: Failed EGR Valve due to particulate contamination



Figure 2: Power Stroke Diesel Cetane Booster & Performance Improver – PM-22-ASU (Left), PM-22-A (Right)

Bottom Line:

By now, you’ve concluded that there are two ways to avoid EGR valve failures: avoiding extended idling and increasing fuel quality. Depending on vehicle application, avoiding idle time may be difficult. That is why adding Power Stroke Diesel Cetane Boost (Figure 2) to improve fuel quality is the easiest way to help avoid these issues. Another thought is that after an extended period of idling, it is best to run the engine through a full cycle at warm operating temperature. This will actuate the valve open and closed, increase the temperature of the combustion process and maximize air flow through the engine.

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