



Oxygen Sensors

Since the mid 1980s, oxygen sensors have played a key role in the efficient operation of electronic fuel injected engines. The sensor is part of the emissions control system that supplies data to the engine's power control module (PCM). The job of the sensor is to help the engine run as efficiently as possible and also to produce as few emissions as possible.

An engine burns [gasoline](#) in the presence of oxygen. The optimum air/fuel ratio is 14.7:1. This ratio depends on the amount of hydrogen and carbon found in a given amount of fuel. If there is less air than the optimum ratio, then there will be fuel left over after combustion. This is called a rich mixture. Rich mixtures cause unburned fuel to be expelled from the exhaust creating pollution. If there is more air than the optimum ratio, then there is excess oxygen. This is called a lean mixture. A lean mixture tends to produce more nitrogen-oxide pollutants, and, in some cases, it can cause poor performance and even engine damage.

The oxygen sensor is usually located in the exhaust pipe or exhaust manifold and detects rich and lean mixtures. The sensor operation involves a chemical reaction that generates a voltage. The engine computer looks at this voltage to determine if the mixture is rich or lean, and adjusts the amount of fuel entering the engine accordingly.

The engine needs the oxygen sensor because the amount of oxygen entering the cylinders depends on all sorts of things, such as the altitude, the temperature of the air, the temperature of the engine, the barometric pressure, the load on the engine, the quality of the fuel etc. When the oxygen sensor fails, the computer can no longer sense the air/fuel ratio (it will run on a default value programmed into the computer), usually the result is your car performs poorly and uses more fuel than it needs to. When this happens, normally the check engine light will illuminate, warning that something is wrong in the system.

Oxygen Sensors are also often the most overlooked tune-up maintenance parts on your vehicle. While earlier fuel injection systems used one or possibly two oxygen sensors, today's newer vehicles can have up to five sensors. Their wave pattern and operation should be checked whenever spark plugs and other ignition components are serviced. The dollars spent in replacing a worn oxygen sensor can be easily recouped in better fuel economy, along with improved engine performance.

Oxygen sensors start to deteriorate after 80,000 kilometers, depending on the vehicle application. They wear out because of constant exposure to carbon, soot, antifreeze, chemicals, extreme temperature changes, poor fuel quality and vehicle vibrations, all of which occur during normal driving conditions. Increasing your vehicle's fuel efficiency and reducing environmentally unfriendly exhaust emissions are two major ongoing goals of the automotive industry – goals which, can be achieved by attaining the proper mix of oxygen and fuel. A worn out oxygen sensor is a common cause of excessive harmful exhaust emissions causing the vehicle to not meet emission standards. Also, a constant rich or lean fuel mixture will shorten the life of your costly catalytic converter.

May 2005.