P219E: CYLINDER #3 IMBALANCE ERROR

OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Intermediate
Repair Cost	:	**$100-$300**
Can I Still Drive?	:	**Yes**

What Does The P219E Code Mean?

When a code P219E is stored, it means that the powertrain control module (PCM) has detected an imbalance error in the number three cylinder. To monitor the air to fuel ratio for each cylinder of the engine, the PCM uses data input from heated exhaust oxygen sensors (sometimes called air fuel sensors) and the crankshaft position (CKP) and camshaft position (CMP) sensors.

Each oxygen sensor is constructed using a zirconium dioxide sensing element situated in the center of a vented steel housing. Tiny electrodes (usually of platinum) attach the sensing element to wire leads in the oxygen sensor harness connector and the connector plugs into the controller area network (CAN) which connects the oxygen sensor wiring harness to the PCM connector.

Each oxygen sensor is threaded (or studded) into an exhaust pipe. It is situated so the the sensing element is near the center of the pipe. As spent exhaust gases exit the combustion chamber (via the exhaust manifold) and continue through the exhaust system (including catalytic converters), they flow over the oxygen sensors.

Exhaust gases enter the oxygen sensor through specially designed vent holes in the steel housing and swirl around the sensing element. Swirling ambient air is drawn through wire lead cavities in the sensor housing in order to fill a tiny chamber in the middle of the sensor. The air (in the tiny chamber) is then heated. This forces the oxygen ions to produce energy that is recognized by the PCM as voltage.

Variations between the number of oxygen ions in ambient air (drawn into the O2 sensor), and the number of oxygen molecules in the exhaust, cause the oxygen ions inside the O2 sensor to bounce from one platinum layer to the other, very swiftly and repetitively. As the surging oxygen ions shift between platinum layers, variations in oxygen sensor output voltage occur.

The PCM sees these variations in oxygen sensor output voltage as changes in exhaust oxygen concentration. Voltage signal outputs from the oxygen sensors are lower when more oxygen is present in the exhaust (lean condition) and higher when less oxygen is present in the exhaust (rich condition).

Crankshaft and camshaft position sensors are of the electromagnetic variety. They are triggered by a steel ring that rotates with the engine. A signal is sent to the PCM in the form of a waveform pattern. Inconsistencies in the waveform pattern are interpreted by the PCM as variations in engine RPM and/or cylinder efficiency.

If the PCM detects an imbalance in the air to fuel ratio for a engine cylinder three, a code P219E will be stored and a malfunction indicator lamp (MIL) may be illuminated. Most vehicles will require multiple ignition cycles (with a failure) for MIL illumination.

What Are The Symptoms Of The P219E Code?

Symptoms of a P219E trouble code may include:

- Diminished fuel efficiency
- A lack of general engine performance
- Stored misfire codes or lean/rich exhaust codes
- Service engine soon lamp illumination

What Are The Potential Causes Of The P219E Code?

Causes for this code may include:

- Inadequate engine compression
- Defective oxygen sensor/s
- Faulty CKP or CMP sensor
- Burnt, chafed, broken, or disconnected wiring and/or connectors
- A faulty mass air flow or manifold air pressure sensor
- Bad fuel pump or clogged fuel filter

How Can You Fix The P219E Code?

All misfire codes, throttle position sensor codes, manifold air pressure codes, and mass air flow sensor codes should be addressed before attempting to diagnose a code P219E. The engine should

also be running smoothly and efficiently. If it is determined that either a rich or lean condition exists (with the engine), this must be repaired as it may be the cause of the P219E being stored.

You will need a diagnostic scanner, a digital volt/ohmmeter (DVOM), and a source of reliable vehicle information to accurately diagnose a code P219E. A digital oscilloscope will be helpful when testing CKP and CMP sensor output.

You may save yourself time by searching for technical service bulletins (TSB) that replicate the code stored, vehicle (year, make, model, and engine), and symptoms exhibited. This information may be found in your vehicle information source. If you find the right TSB, it could yield a speedy solution to your diagnosis.

Step 1

After you connect the scanner to the vehicle diagnostic port and retrieve all stored codes and pertinent freeze frame data, write the information down (in case the code proves to be an intermittent one). After that, clear the codes and test drive the vehicle until one of two things happens; the code is restored or the PCM enters readiness mode. The code may be more difficult to diagnose if the PCM enters readiness mode at this point, because the code is intermittent. The condition which caused the P219E to be stored may need to worsen before an accurate diagnosis can be made.

If the code is immediately reset, continue with the diagnosis.

Step 2

You may obtain connector face views, connector pinout charts, component locator charts, wiring diagrams, and diagnostic flow charts (pertaining to the code and vehicle in question) using your source of vehicle information.

Perform a visual inspection of related wiring and connectors. Repair or replace wiring that has been cut, burned, or damaged.

Step 3

If the engine is running smoothly and the code P219E persists, start the engine and allow it to reach normal operating temperature with the engine at idle and the transmission in neutral or park. With the scanner connected to the vehicle diagnostic port, observe oxygen sensor input data on the data stream.

Narrow the scope of the data stream to include only pertinent data and you will get a faster response. If the oxygen sensors are functioning normally, voltage on pre-cat oxygen sensors will cycle continuously between 1 and 900-millivolts once the PCM enters closed loop operation.

Post-cat sensors will cycle between 1 and 900-millivolts as well but they will settle at a certain point and remain relatively stable) compared to the pre-cat sensors). Oxygen sensors which fail to cycle adequately should be considered defective if the engine is in good working order.

Step 4

Use the oscilloscope to test for voltage spikes or glitches in the CKP and CMP sensor inputs.

- In most cases, you will rectify the P219E by correcting a mechanical engine failure

Severity Description

Cylinder imbalance may be caused by either a mechanical or an electrical issue. A code P219E should be categorized as severe and rectified as quickly as possible.

Reference Sources

P219E Cylinder #3 Imbalance Error, OBD-Codes.