P0169: INCORRECT FUEL COMPOSITION

OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Advanced
Repair Cost	:	**$80-$1000**
Can I Still Drive?	:	**Yes** (Short-term only)

What Does The P0169 Code Mean?

A stored code P0169, means that the powertrain control module (PCM) has detected a voltage signal from the fuel composition sensor/fuel temperature sensor that indicates an abnormally high level of contaminants or ethanol in the fuel supply. Since flex fuel vehicles can function normally even with high concentrations of ethanol, unacceptable levels of ethanol would likely exceed eighty-five-percent.

The fuel composition sensor is usually integrated into a single housing with the fuel temperature sensor. Although it resembles a fuel filter, it is a small computerized device designed to provide the PCM with an accurate fuel composition and fuel temperature analysis.

As fuel passes through the inline sensor, it is electronically analyzed to determine the degree of ethanol, water, and unknown contaminants (non-fuel) found therein. The fuel composition sensor not only analyzes fuel composition but also fuel temperature.

The information is input to the PCM as an electrical signal that reflects not only what contaminants are present (and to what degree the fuel has been contaminated) but also the temperature of the fuel. Fuel contamination is analyzed, according to the ratio of contaminants to fuel.

This generates a voltage signature in the fuel composition/temperature sensor which is input to the PCM as square waveforms of voltage. Waveform patterns vary in frequency contingent to the degree of contamination found in the fuel. The closer the waveform frequency, the greater the

degree of fuel contamination; this constitutes the vertical portion of the waveform.

The fuel composition sensor analyzes the amount of ethanol present in fuel independently of other contaminants.

If the PCM detects an input signal from the fuel composition sensor that indicates that fuel contamination exceeds a programmed limit, a P0169 code will be stored and a malfunction indicator lamp (MIL) may be illuminated. Multiple ignition cycles (with a failure) may be required for MIL illumination on some vehicles.

What Are The Symptoms Of The P0169 Code?

Symptoms of this code may include:

- Usually no symptoms accompany a code P0169
- Other fuel composition codes may be present
- MIL illumination will eventually occur

What Are The Potential Causes Of The P0169 Code?

Potential causes for this code to set are:

- Excessive fuel contamination
- Defective fuel composition/temperature sensor
- Open, shorted, or damaged wiring or connectors
- PCM or a PCM programing error

How Can You Fix The P0169 Code?

A good starting point is always to check for technical service bulletins (TSB) for your particular vehicle. Your issue may be a known issue with a known fix put out by the manufacturer and can save you time and money during diagnosis.

You will need a diagnostic scanner, a digital volt/ohmmeter (DVOM), an oscilloscope, an infrared thermometer, and a vehicle information source (such as All Data DIY) to diagnose a code P0169. A diagnostic scanner with an integrated DVOM and a portable oscilloscope would do the job adequately.

Begin with a visual inspection of all related wiring harnesses and connectors to increase your chances of a successful diagnosis.

Using the DVOM and your vehicle information source, test reference voltage at the fuel composition sensor connector. Use the DVOM to test the corresponding circuits at the PCM connector, if there is no reference voltage. If a reference voltage signal is identified at the PCM

connector, repair the open circuit between the fuel composition sensor and the PCM.

Caution: Before testing circuit resistance with the DVOM, disconnect all related controllers. Suspect a faulty PCM (or a programming error) if no reference voltage is present at the PCM connector.

Observe live data in the form of waveform patterns using the oscilloscope, if the reference and ground are present at the fuel composition sensor connector. Connect the test leads to the signal and ground circuits and observe the display screen. Measure actual fuel temperature using the infrared thermometer and compare the findings with the temperature reflected by the waveform patterns on the oscilloscope.

If the fuel temperature revealed on the oscilloscope fails to coincide with that of the infrared thermometer, suspect that the fuel temperature sensor is defective.

Additional diagnostic notes:

- Use the DVOM to test fuel temperature sensor resistance according to manufacturer's recommendations
- If fuel appears to be contaminated, this code may be a reaction to the fuel composition sensor operating as it is designed
- Excessive fuel contamination may require fuel composition sensor replacement

Severity Description

A stored code P0169 should be treated as severe because fuel composition is critical for calculating fuel delivery strategy in flex fuel vehicles. Contaminated fuel may also harm fuel delivery and internal engine components.

Reference Sources

P0169: Incorrect Fuel Composition, OBD-Codes.