

DTC P0420 Catalyst System Low Efficiency Bank 1

Circuit Description

In order to maintain a reasonably low emissions of Hydrocarbons (HC), Carbon Monoxide (CO), and Oxides of Nitrogen (NOx), the engine controls system uses a three-way catalytic converter. The catalyst within the converter promotes a chemical reaction which oxidizes the HC and CO present in the exhaust gas. This reaction converts them into harmless water vapor and Carbon Dioxide. The catalyst also reduces NOx, converting it to Nitrogen. The PCM monitors this process using Bank 1 HO2S #2. Bank 1 HO2S #2, located in the exhaust stream past the three-way catalytic converter, produces an output signal which indicates the oxygen storage capacity of the catalyst. This determines the catalysts ability to convert exhaust emissions effectively. If the catalyst is functioning correctly, the Bank 1 HO2S #2 signal will be far less active than that produced by Bank 1 HO2S #1. This indicates that the three-way catalytic converters oxygen storage capacity is below a threshold considered acceptable.

When the conditions for running this DTC are met, the following occurs:

- The PCM captures the current rear HO2S rich/lean status.
- The Air Fuel ratio transitions from rich to lean or lean to rich depending on the capture rear HO2S rich/lean status.
- The Air Fuel ratio transitions a second time opposite the first Air Fuel ratio transition.
- The PCM captures the response time (the time the HO2S goes from below 300 mV to above 600 mV and from 600 mV to below 300 mV) of the front and rear Heated Oxygen sensors when the Air Fuel ratio transitions occurred.
- The PCM measures the time it takes the rear HO2S voltage to cross a reference rich/lean threshold minus the time it takes the front HO2S voltage to cross the same rich/lean threshold. The time difference from the front and rear HO2S is the oxygen storage capacity of the catalyst. This DTC sets if the time exceeds a predetermined threshold.

Conditions for Running the DTC

- DTCs, P0101, P0102, P0103, P0107, P0108, P0112, P0113, P0117, P0118, P0121, P0122, P0123, P0125, P0171, P0172, P0174, P0175, P0200, P0230, P0300, P0325, P0327, P0332, P0335, P0336, P0341, P0342, P0343, P0351-P0358, P0401, P0404, P0405, P0410, P0412, P0418, P0440, P0442, P0443, P0446, P0449, P0500, P0704, P0801, P0803, P1258, P1336, P1404, P1415, P1416, P1441 and HO2S DTCs not set.
- The engine is operating for longer than 400 seconds.

- The ECT is between 80°C (176°F) -120°C (248°F).
- The IAT is between -15°C (5°F) and 75°C (167°F).
- Engine speed is more than 900 RPM for a minimum of 22 seconds (manual transmission) or 25 seconds (Automatic Transmission) since the end of the last idle test.
- The BARO is more than 74 kPA.
- The fuel system is operating in closed loop.

Conditions for Setting the DTC

The PCM determines the oxygen storage capability of the catalytic converter has degraded below a calibrated threshold.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) when the diagnostic runs and fails.
- The PCM records the operating conditions at the time the diagnostic fails. The PCM stores this information in the Freeze Frame and/or the Failure Records.

Conditions for Clearing the MIL/DTC

- The PCM turns the malfunction indicator lamp (MIL) OFF after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A last test failed (current DTC) clears when the diagnostic runs and does not fail.
- A History DTC clears after 40 consecutive warm-up cycles, if this or any other emission related diagnostic does not report any failures.
- Use a scan tool in order to clear the MIL/DTC.

Diagnostic Aids

If the HO2S parameter is monitored using a scan tool while this diagnostic is running, the HO2S voltages may be fixed low or high.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. Before replacing the Three-Way Catalytic Converter, correct any conditions which may have damaged the catalyst.

