

DTC P0420 or P0430

Circuit Description

A three-way catalytic converter (TWC) controls emissions of hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx). The catalyst within the converter promotes a chemical reaction which oxidizes the HC and CO that are present in the exhaust gas. This process converts these chemicals into water vapor and carbon dioxide (CO₂), and will reduce the NOx, converting the NOx into nitrogen.

The catalytic converter stores oxygen. The efficiency of the TWC is determined by the measurement of the oxygen storage capacity (OSC). The engine control module (ECM) measures the catalyst OSC by monitoring the heated oxygen sensor (HO₂S) bank 1 sensor 2 and HO₂S bank 2 sensor 2, during a steady state cruise. The ECM commands the air-to-fuel ratio lean and then rich for a calibrated number of cycles while monitoring the response time of the HO₂S 2. The ECM then establishes an average response time from subsequent air-to-fuel ratio cycles. The difference of the average response time determines the OSC of the catalyst. If the ECM detects that this time difference is less than a calibrated value, DTC P0420 or DTC P0430 sets.

DTC Descriptors

This diagnostic procedure supports the following DTCs:

- DTC P0420 Catalyst System Low Efficiency Bank 1
- DTC P0430 Catalyst System Low Efficiency Bank 2

Conditions for Running the DTC

- DTCs P0010, P0011, P0013, P0014, P0016, P0017, P0018, P0019, P0020, P0023, P0024, P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, P0058, P0068, P0102, P0103, P0112, P0113, P0116, P0117, P0118, P0121, P0122, P0123, P0125, P0128, P0131, P0132, P0133, P0134, P0135, P0137, P0138, P0140, P0141, P0151, P0153, P0155, P0157, P0158, P0159, P0160, P0161, P0171, P0172, P0174, P0175, P0221, P0222, P0223, P0300-P0308, P0315, P0335, P0336, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391, P0500, P0608, P1137, P1138, P1157, P1258, P1358, P1380, P1381, P2088, P2090-P2095, P2101, P2119, P2135, P2231, or P2234 are not set.
- The mass air flow (MAF) is between 11-80.3 grams per second.
- The engine speed is between 1,088-3,008 RPM.
- The engine has been running more than 10 minutes.
- The predicted catalyst temperature is between 644-902°C (1,191-1,656°F).
- The barometric pressure (BARO) is more than 74 kPa.
- The engine coolant temperature (ECT) is more than 62°C (143°F).
- The intake air temperature (IAT) is between -6°C and +200°C (+21°F and +392°F).
- The engine is in Closed Loop fuel control.
- The vehicle speed sensor (VSS) is more than 35 km/h (22 mph).
- The engine is at a steady cruise, a light load, with no load variation.

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- DTC P0420 and P0430 run once within the above conditions are met for 24.8 seconds.

Conditions for Setting the DTC

- The powertrain control module (PCM) determines that the oxygen storage capability of the TWC has degraded to less than a calibrated threshold.
- The above condition exists for more than 1 second.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Diagnostic Aids

- The catalyst may have been temporarily contaminated with a chemical from an aftermarket fuel additive or fuel containing too much sulfur. The sulfur will coat the converter wash coat causing the converter performance to degrade temporarily. Driving the vehicle at highway speeds for 10 minutes will burn off the contamination. Retest the converter afterwards.
- Certain conditions may cause a catalytic converter to degrade. These conditions may include the following:
 - An engine misfire
 - High engine oil or high coolant consumption
 - Retarded spark timing
 - A weak spark
 - A lean fuel mixture
 - A rich fuel mixture
 - A damaged oxygen sensor wiring harness
- Correct any condition that may cause an engine performance concern.
- If an intermittent condition cannot be duplicated, the information included in Freeze Frame data can be useful in determining the vehicle operating conditions when the DTC was set.

Step	Action	Values	Yes	No
1	Did you perform the Diagnostic System Check - Vehicle?	--	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	Review the DTC information on the scan tool. Are any other DTCs set?	--	Go to Diagnostic Trouble Code (DTC) List - Vehicle in Vehicle DTC Information	Go to Step 3
3	<ol style="list-style-type: none"> Allow the engine to reach operating temperature. Ensure Closed Loop is achieved. Increase the engine speed to 2,000 RPM for 2 minutes. Return the engine to a stabilized idle. Observe the catalyst monitor HO2S 2 voltage parameter on the scan tool for the applicable bank. <p>Is the HO2S 2 parameter transitioning below the first specified value and above the second specified value?</p>	300 mV 650 mV	Go to Step 5	Go to Step 4
4	<p>Caution: Refer to Road Test Caution in the Preface section.</p> <ol style="list-style-type: none"> Clear the DTCs with a scan tool. Start the engine. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. <p>Did DTC P0420 or P0430 set?</p>	--	Go to Step 5	Go to Diagnostic Aids
5	<p>Important: Verify that the three-way catalytic converter is a high quality part that meets the OEM specifications.</p> <p>Visually and physically inspect the three-way catalytic convertor for the following conditions:</p> <ul style="list-style-type: none"> Any dents A severe discoloration caused by excessive temperatures Any internal rattles caused by 	--		

	loose catalyst substrate			
	Did you find and correct the condition?		Go to Step 10	Go to Step 6
6	<p>Visually inspect the exhaust system for the following conditions:</p> <ul style="list-style-type: none"> • The exhaust system for leaks-- Refer to Exhaust Leakage in Engine Exhaust. • The exhaust system for a restriction--Refer to Restricted Exhaust in Engine Exhaust. • Any physical damage • Any loose or missing hardware • The heated oxygen sensor (HO2S) 2 for the applicable bank for proper torque 	--		
	Did you find and correct the condition?		Go to Step 10	Go to Step 7
7	<p>Visually inspect the HO2S 2 at the applicable bank for the following conditions:</p> <ul style="list-style-type: none"> • The pigtail and the wiring harness making contact with the exhaust or any ground • Any dents 	--		
	Did you find a condition?		Go to Step 8	Go to Step 9
8	<p>Replace the applicable HO2S 2 sensor. Refer to Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 or Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 .</p>	--		
	Did you complete the replacement?		Go to Step 10	--
9	<p>Notice: In order to avoid damaging the replacement three-way catalytic converter, correct the engine misfire or mechanical fault before replacing the three-way catalytic converter.</p> <p>Replace the three-way catalytic converter.</p>	--		
	Did you complete the replacement?		Go to Step 10	--
	Caution: Refer to Road Test Caution in the Preface section.			

<p>10</p>	<p>Important: A new catalyst may fail this test due to out-gassing of the internal matting. If this occurs, operate the vehicle at highway speeds for approximately one hour and retest.</p> <ol style="list-style-type: none"> 1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. <p>Did the DTC fail this ignition?</p>	<p>--</p>	<p>Go to Step 2</p>	<p>Go to Step 11</p>
<p>11</p>	<p>Observe the Capture Info with a scan tool.</p> <p>Are there any DTCs that have not been diagnosed?</p>	<p>--</p>	<p>Go to Diagnostic Trouble Code (DTC) List - Vehicle in Vehicle DTC Information</p>	<p>System OK</p>