
Catalyst

Catalyst Deterioration Monitor Ca-1

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MONITOR DESCRIPTION

The ECM compares the waveform from the front and rear oxygen sensors to detect catalyst deterioration. The ECM calculates the "locus ratio" which is the ratio of oxygen sensor 1 (front sensor) output voltage locus length and oxygen sensor 2 (rear sensor) output voltage locus length. When the locus-length becomes more than specific value, the ECM concludes that the catalyst has deteriorated.

"Locus ratio" means the ratio of locus length when having the oxygen sensor 1 (front sensor) as denominator and the oxygen sensor 2 (rear sensor) as a numerator.

"Locus length" refers to the elapsed time between RICH and LEAN "swings" of the oxygen sensors.

MONITOR STRATEGY

| | | |
|-----------------------------|--|---|
| Related DTCs | P0420 | Catalyst deterioration |
| Required sensors/Components | Main | Front heated oxygen sensor and Rear heated oxygen sensor |
| | Sub | Crankshaft position sensor, ECT sensor, IAT sensor and MAF sensor (or MAP sensor) |
| Frequency of operation | Once per driving cycle | |
| Duration | Included in the Typical Malfunction Thresholds | |
| MIL operation | 2 driving cycles | |
| Sequence of operation | None | |

TYPICAL ENABLING CONDITIONS

| Item | Specification | |
|--|---------------|--------------------|
| | Minimum | Maximum |
| The monitor will run whenever the following DTCs are not present | See page In-4 | |
| 1996 and 1997 MY: | | |
| Fuel status | Closed Loop | |
| Engine RPM | - | 3,000 rpm |
| Intake air amount | 4 liters/sec. | 16 liters/sec. |
| Estimated catalyst temperature | Warmed up | |
| ECT | 80°C (176°F) | - |
| 1998 and 1999 MY: | | |
| Altitude | - | 2400 m (7,870 ft.) |
| Battery voltage | 11 V | - |
| Fuel status | Closed Loop | |
| Engine RPM | - | 3,000 rpm |
| Intake air amount | 4.8 g/sec. | 12 g/sec. |
| Estimated catalyst temperature | Warmed up | |
| ECT | 65°C (149°F) | - |
| IAT | -10°C (14°F) | - |
| Time after above conditions are met | 13 sec. | |

Catalyst

| 2000 to 2002 MY: | | |
|---|---------------|--------------------|
| Altitude | – | 2400 m (7,870 ft.) |
| Battery voltage | 11 V | – |
| Fuel status | Closed Loop | |
| Engine RPM | – | 4,000 rpm |
| Intake air amount | 4.8 g/sec. | 12 g/sec. |
| Estimated catalyst temperature | 480°C (896°F) | 725°C (1,337°F) |
| ECT | 75°C (167°F) | – |
| IAT | –10°C (14°F) | – |
| 2003 MY: | | |
| Altitude | – | 2400 m (7,870 ft.) |
| Battery voltage | 11 V | – |
| Fuel status | Closed Loop | |
| Engine RPM (1ZZ-FE) | – | 4,000 rpm |
| Engine RPM (2ZZ-GE) | – | 4,500 rpm |
| Intake air amount (1ZZ-FE) | 8.5 g/sec. | 25 g/sec. |
| Intake air amount (2ZZ-GE) | 7 g/sec. | 25 g/sec. |
| Estimated catalyst temperature (1ZZ-FE) | 500°C (932°F) | 900°C (1,652°F) |
| Estimated catalyst temperature (2ZZ-GE) | 500°C (932°F) | 750°C (1,382°F) |
| ECT | 75°C (167°F) | – |
| IAT | –10°C (14°F) | – |

TYPICAL MALFUNCTION THRESHOLDS

| Detection Criteria | Threshold | Duration |
|---|---------------------------------|------------------|
| 1996 and 1997 MY: | | |
| Catalyst deterioration level | 0.6 or more | 120 sec. |
| 1998 and 1999 MY: | | |
| Catalyst deterioration level (Federal) | 0.5 or more (detected 3 times) | 15 min. |
| Catalyst deterioration level (California) | 0.35 or more (detected 3 times) | 15 min. |
| 2000 to 2002 MY: | | |
| Catalyst deterioration level | 0.32 or more | 30 sec. x 3 time |
| 2003 MY: | | |
| Catalyst deterioration level (1ZZ-FE [2WD]) | 0.6 or more | 30 sec. x 3 time |
| Catalyst deterioration level (1ZZ-FE [4WD]) | 0.24 or more | 30 sec. x 3 time |
| Catalyst deterioration level (2ZZ-GE) | 0.55 or more | 30 sec. x 3 time |

READINESS MONITOR DRIVING PATTERN

See page In-9