

Catalyst Efficiency Monitor

F-650 / 750

The PCM monitors the oxidation catalytic converter (OC) during the diesel particulate filter regeneration. The PCM determines if the temperature increase across the catalyst is correct. The PCM uses the OC inlet temperature, measured by exhaust gas temperature bank 1, sensor 1 (EGT11) and the OC outlet temperature, measured by EGT bank 1, sensor 2 (EGT12) to calculate the temperature increase.

The catalyst efficiency monitor is enabled and runs continuously during a regeneration after a short time delay, to allow the OC to light-off. The catalyst efficiency monitor runs only when certain base engine conditions are first satisfied. The typical monitoring duration for this monitor is 2 minutes. Inputs from the crankshaft position (CKP), engine coolant temperature (ECT), EGT11 and EGT12 sensors are required to enable the monitor. The monitor entry conditions include:

- diesel particulate filter regeneration is active
- Engine coolant temperature is greater than 70°C (158°F)
- no fuel injector concerns
- engine speed between 600 and 3,000 RPM
- engine torque between 100 and 900 Nm
- OC inlet temperature 200-500°C (392-932°F)

The PCM continuously monitors the temperature increase. The PCM compares the measured increase against a minimum expected value. The minimum expected value is based on the amount of fuel injected for regeneration. The measured increase is filtered for a short period of time. At the end of this time, the measured increase is compared to the expected increase. If the temperature increase is less than 40% of the minimum expected increase, the monitor has failed.

All others

The Diesel Oxidation Catalyst (DOC) is monitored to ensure it is capable of converting hydrocarbons and carbon monoxide. While entry conditions are met, a small quantity of fuel is post-injected late in the combustion cycle (similar injection timing as DPF regen). The actual exothermic efficiency is calculated from the temperature rise across the DOC and normalized by the expected exothermic efficiency (based on quantity of fuel injected), which results in a ratio having values between 0-1. If the normalized exotherm is below the threshold, a fault is indicated. No other preconditioning is required. The monitor entry conditions include:

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- distance since last monitor completion 400km (248miles)
- time since entering normal Engine Operating Mode (EOM0) 300sec (transitioning from Regen or Catalyst Warmup) or 600sec (transitioning from Aftertreatment Overheat Mode)
- engine coolant temperature is greater than 70°C (158°F)
- engine speed greater than 1,000 RPM
- engine torque greater than 50Nm
- OC inlet temperature 210-280°C (410-536°F)

Monitor requires 3 failing results in order to diagnose a failed DOC. In the event of a failing result, the monitor will immediately run again, bypassing the 400 km threshold above, until either a passing result or three consecutive failing results are obtained.

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