File in Section: -
Bulletin No.: PIP5007C
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Service Bulletin

PRELIMINARY INFORMATION

Subject: **Exhaust Fluid Quality Poor Message Difficult To Clear**

Models: **2010 - 2014 Chevrolet Express and GMC Savana**
2011 - 2014 Chevrolet Silverado and GMC Sierra
Equipped with the 6.6L Duramax Diesel Engine RPO codes LGH or LML

This PI was superseded to update model years. Please discard PIP5007B.

The following diagnosis might be helpful if the vehicle exhibits the symptom(s) described in this PI.

Condition/Concern

A dealer may encounter a customer concern of an Exhaust Fluid Quality Poor message displayed on the DIC. The dealer may or may not find DTCs stored. An Exhaust Fluid Quality Poor message can be displayed with no DTCs.

The Exhaust Fluid Quality Poor DIC message notifies the customer that the ECM has detected a drop in the SCR NOx reduction efficiency.

This PI is to assist with vehicles that have difficulty completing the Reductant Fluid Quality Test (RFQT) and/or clearing the Exhaust Fluid Quality Poor Message.

Recommendation/Instructions

Complete the current SI diagnostic for any trouble codes or symptoms found. If an Exhaust Fluid Quality Poor message is displayed with a specific DTC, use that specific SI diagnostic, and repair the vehicle as necessary.

Note: An Exhaust Fluid Quality Poor message does not always mean the fluid is contaminated or needs to be changed. Use the J26568 - Coolant and Battery Fluid Tester to test the fluid before deciding to discard it.

If the dealer has found an Exhaust Fluid Quality Poor message with no DTCs, diagnose the condition using the current SI diagnosis for DTC P20EE / P207F (P2BAD for 2012 MY). After making repairs use the SI Document titled "Reductant Fluid Quality Test (With or without DTCs)" to evaluate and clear the Exhaust Fluid Quality Poor DIC message.

If the Reductant Fluid Quality Test does not complete, or the Exhaust Fluid Quality Poor DIC message is difficult to clear, please follow the description and suggestions below.

General Information/Helpful Guidelines:

If the vehicle has been in a cold climate condition, defined as -7C/20F or less over the last few days, it may be in “frozen tank status” which prevents the Reductant Fluid Quality Test (RFQT) from evaluating a result when triggered. Frozen tank status is entered when the vehicle key on event reads a DEF tank temperature below -7C/20F. The DEF tank temperature may be warmer after extended idles but only the conditions at key on are considered. To exit “frozen tank status”, the vehicle needs to be soaked in a warm garage for greater than 6 hours with the key off continuously. After this 6 hour key off event, make sure the DEF tank temperature is above -7C/20F immediately after key on. If not, it is necessary to repeat the soak procedure allowing the DEF tank to warm up above the -7C/20F threshold.

Note: Many dealers are parking the vehicle outside when starting the Reductant Fluid Quality Test. When parking the vehicle outside to complete the RFQT it is important to monitor the ambient temperature. If the MAF senses intake ambient temperature below -7C/20F the test many not run correctly or timeout.

Prior to starting a RFQT, the vehicle needs to be driven for 25 minutes to purge residual Reductant Fluid out of the SCR brick. After driving, command the Reductant Fluid Quality Test without shutting down the engine. An ECM power down is required between repeated RFQT tests (Key off the vehicle, remove the ignition key, and unplug the Tech 2 for two minutes between tests).

The Reductant Fluid Quality Test (RFQT) may not pass the first test or it may time out (45 minutes for LGH, 70 minutes LML). If the vehicle continues to fail the Reductant Fluid Quality Test, run a DPF service regen followed by another ECM power down, a 25 minute drive, and a Reductant Fluid Quality Test. If after 2 attempts of this total procedure, the Reductant Fluid Quality Test does not pass, it is probable a faulted condition still exists with the vehicle.

It is important to note whether an RFQT passes/fails versus a timeout event. Each of these could have a different root cause. For the case in which the test times out, one or more of the Conditions for running the DTC (as stated in the P20EE) were not true. There will not be any indication on the Tech 2 for which condition is not true other than the RFQT timing out. For the case in which the test continues to fail, it is necessary to inspect the DEF system/ components for symptoms of failure. The following guides can be used to help pinpoint the failing component.

1. During a RFQT, the downstream NOx ppm should read roughly 70% less than the upstream NOx ppm on a healthy system. (As an example the upstream NOx ppm should be near 100ppm when the downstream NOx sensor 2 is around 30ppm or less).
2. During a DPF service regen, the SCR is too hot to reduce NOx effectively. The upstream and downstream NOx ppm values should be relatively similar. NOx2 can be up to 30% higher than NOx1 in some cases.
3. During a DPF service regen, EGT1 should be between 250C/482F and 400C/752F, EGT2 should be the hottest of all the EGT's in the range of 550C/1022F to 700C/1292F, EGT3 and EGT4 should be slightly cooler than the previous sensor on a healthy system. If EGT3 and EGT4 temperatures are 100 C/212F higher than EGT2, an intake/exhaust leak or a fuel quality issue (Sulfur above 15 ppm) may exist. Completing a service regen will purge Sulfur from the exhaust system. In rare cases, a degraded DOC can be suspected.
4. During a road test at highway speeds (with system at operating temperature), the downstream NOx sensor should be 70% less than the upstream sensor and transition in the same direction as the upstream sensor, but at a much lower magnitude. During a road test, you can collect transient data for NOx1 and NOx2. After a heavy acceleration followed by a tip out (0 pedal), both sensors should go to zero while coasting down. If NOx2 does not go to zero shortly after NOx1, NOx2 is either faulty or the system is saturated with DEF. Performing this test during or shortly after a DPF regen prevents the system from being saturated with DEF.
5. If the above NOx sensor comparisons aren't true, there are several possible causes. The NOx sensor cannot distinguish between NOx and liquid NH3 (DEF). High NOx sensor 2 readings can be caused by DEF getting past the SCR catalyst. This can be the result of a degraded catalyst or a condition that causes excessive DEF on the SCR. After a DPF service regen, the SCR system is purged of excessive DEF. It is easier to evaluate if an SCR brick is compromised right after a service regen because it eliminates the extra DEF that the system was exposed to.
6. The SCR system can also store NOx in cold temperatures (extended idle). When the system warms up, this NOx can be released and results in a brief NOx2 increase above NOx1.
7. If NOx2 is malfunctioning or poisoned, NOx values will be influenced and may be stuck higher than NOx1.
8. This document assumes that the DEF injector volume has been verified and passes with 3 distinct spray plumes from the injector.
9. This document also assumes the intake and exhaust system are leak free. Intake and exhaust leaks can cause changes to the dosing system performance due to varied NOx output from the engine.
10. After-market components including, but not limited to, air induction parts, performance modifiers, grill covers, and exhaust modifications may negatively influence the DEF system performance. If all conditions above appear to be functioning normally, SCR replacement may be required but is a very rare occurrence. If the SCR is replaced, the new component will require a DPF service regen followed by the RFQT procedure prior to releasing the vehicle. Also, refer to the SI for appropriate resets to be performed by the Tech2.

Please follow this diagnostic or repair process thoroughly and complete each step. If the condition exhibited is resolved without completing every step, the remaining steps do not need to be performed.