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GROUP: Exhaust

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SUBJECT:

Cummins 6.7L Diesel Particulate Filter - Necessary System Inspections And Tests

OVERVIEW:

This bulletin involves the inspection and/or test of the Diesel Particulate Filter (DPF) and related emission system components.

MODELS:

2007 - 2008 (DH/D1) Ram Truck (2500/3500)

NOTE: This bulletin applies to vehicle equipped with a Cummins 6.7L engine (sales code ETJ).

SYMPTOM/CONDITION:

The customer may experience a Malfunction Indicator Lamp (MIL) illumination, warning chime, and an overhead Electronic Vehicle Information Center (EVIC) message that states "Catalyst Full Service Required".

Investigation may reveal that the MIL illumination is due to one or more of the following Diagnostic Trouble Codes (DTC's):

P1451 - Diesel Particulate Filter System Performance.

P2463 - Diesel Particulate Filter - Soot Accumulation.

P242F - Diesel Particulate Filter Restriction - Ash Accumulation.

DIAGNOSIS:

1. Connect the StarSCAN® to the Diagnostic Link Connector (DLC).
2. Set the parking brake. Start the vehicle engine.
3. From the "Home" screen on the StarSCAN® select:
 - a. "ECU View" button.
 - b. "PCM Powertrain Control Module" button.
 - c. "View DTC's" button.
4. **Record all Diagnostic Trouble Codes (DTC's) that are present in the PCM.**

NOTE: It is IMPORTANT to record (capture) all DTC's present in the PCM prior to proceeding further with this diagnosis.

5. Only when all DTC's have been recorded, then verify that the PCM is at the latest application software level.

6. Is the PCM at the latest application software level?
 - a. If YES >>> then proceed to the next step.
 - b. If NO >>> then reprogram the PCM to the latest software level. Refer to the respective Service Bulletin for directions and warranty reimbursement. Once reprogrammed, verify that no DTC's are present in the PCM. Then proceed to the next step.
 7. Was DTC P242F present in the PCM, along with possible DTC's P1451 or P2463?
 - a. If YES >>> then the Diesel Particulate Filter (DPF) requires replacement. Contact STAR for additional technical assistance. Then proceed to the Repair Procedure.
 - b. If NO >>> then proceed to the next step.
 8. Was DTC P1451 or P2463 present in the PCM, but NOT DTC P242F?
 - a. If YES >>> then an Exhaust System Black Smoke Test is required. Proceed to the next section "Check For Exhaust System Black Smoke".
 - b. If NO >>> then STOP. This bulletin does not apply. Additional diagnosis is required.
1. **Check For Exhaust System Black Smoke:**
 - a. Set the vehicle parking (emergency) brake.
 - b. Place the vehicle transmission in the park or neutral (manual transmission) position.
 - c. Start the vehicle engine.
 - d. Verify that the engine coolant is at operating temperature.
 - e. In a safe area, with the vehicle stationary and engine FULLY warmed and running, perform a "snap throttle". From idle to wide open throttle and back to idle three or four times
 - f. Look for the presence of black smoke from the exhaust system in the passenger rear mirror. Any visible black smoke or soot collected on the inside of the exhaust system tail pipe outlet indicates a failed DPF.
 - g. Stop engine. Turn the ignition switch to the "OFF" position.
 2. Is black smoke present from the vehicle exhaust system?
 - a. If YES >>> then **STOP**. The Diesel Particulate Filter (DPF) requires replacement. Contact STAR for additional technical assistance. Then proceed to the Repair Procedure section of this bulletin.
 - b. If NO >>> then proceed to the next step and perform a complete Exhaust System Aftertreatment Regeneration procedure. Proceed to the next section, Exhaust System Aftertreatment Regeneration Procedure.

NOTE: Perform a Exhaust System Aftertreatment Regeneration and Black Smoke Test ONLY if DTC P1452 or P2463 are present. If DTC P242F is present, then contact STAR for additional technical assistance and then proceed to the Repair Procedure section of this bulletin.

EXHAUST SYSTEM AFTERTREATMENT REGENERATION PROCEDURE:

Vehicle Engine Set-Up Procedure:

1. Turn the ignition switch to the "**ON/RUN**" position. DO NOT start the engine at this time.
2. From the "Home" screen on the StarSCAN®:
 - a. Select the "ECU View" button.
 - b. Select the "PCM Powertrain Control Module" button.
 - c. Select the "Misc. Functions" button. Wait while the StarSCAN® enters the Miscellaneous Functions screen.
 - d. Select/highlight "Reset Regenerative Filter Timers", and select the "START" button.

- e. Once in the “Reset Regenerative Filter Timers” screen select: the “NEXT” button, then select the “FINISH” button.
- f. **IMPORTANT:** Turn the ignition switch to the “OFF” position and **WAIT 30 seconds.**

CAUTION: It is IMPORTANT to turn the ignition switch to the “OFF” position and WAIT 30 seconds. This will allow the PCM to reset. Not doing so may not allow regeneration to occur.

3. **Start the vehicle engine and allow to idle.** The vehicle engine must be running before proceeding further.
4. From the “Miscellaneous Functions” screen, scroll to and then select:
 - a. **“Mobile DeSoot - NO Minimum Required Soot Load”.** Look closely and make sure you have selected the correct function.
 - b. Select the “START” button.
 - c. Once in the “Mobile DeSoot - NO Minimum Required Soot Load” screen, select the “NEXT” button, then select the “CANCEL” button. The “CANCEL” button completes the selection of the “Mobile DeSoot - No Minimum Required Soot Load” feature and returns the display to the prior screen. “Mobile DeSoot - No Minimum Required Soot Load” should now be enabled.
5. The vehicle engine is now set-up for manual aftertreatment regeneration mode. The StarSCAN display needs to be set-up before the vehicle is ready for the aftertreatment regeneration road drive. Proceed to the next section.

NOTE: If the above screen displays “Mobile DeSoot - NO Minimum Required Soot Load enabling failed. Please retry or exit”, verify that the ignition switch had been turned off for 30 seconds and that the engine was started prior to entering the Mobile DeSoot screen. To retry Mobile DeSoot, the procedure to “Reset Regenerative Filter Timers” must first be repeated.

StarSCAN Display Set-Up Procedure:

1. Page back one time to the “PCM Powertrain Control Module” screen. Select the “Data Display” button.
2. Once in the “Data Display” screen:
 - a. Select/highlight **“PT/Combustion Manager Interface Mode”**, and then select “Add To Graph”.
 - b. Select/highlight **“Exhaust Gas Temp Sensor 3”** in degrees F, and then select “Add To Graph”.
 - c. Select the “Show Graph” button.
3. The StarSCAN is now set-up for the aftertreatment regeneration road drive. Proceed to the next step.

Aftertreatment Regeneration Procedure:

1. The manual aftertreatment regeneration process for DeSoot and DeSOx will stop, which may require that the engine and StarSCAN aftertreatment treatment set-up procedures be repeated, if one of the following occurs:
 - a. Ignition switch is turned to the “OFF” position.
 - b. Transmission is in PARK.
 - c. A door is opened when at a stop.
 - d. The parking brake is set when the transmission is in neutral.
 - e. Exhaust temperature is below 525F.
 - f. Certain powertrain diagnostic trouble codes (DTC's) are present.

g. Cruise control is enabled.

NOTE: The “PT/Combustion Manager Interface Mode” data value will not change from “Normal” to “DeSoot” or “DeSOx” until the appropriate exhaust temperatures and/or vehicle speed are achieved.

NOTE: Driving the vehicle at highway speeds between 50 to 60 mph is the ideal environment to allow maximum DeSoot and DeSOx to occur in the quickest amount of time. The manual regeneration road drive time will vary due to several parameters and your driving environment. DeSoot and DeSOx will occur at other vehicle speeds, but may take longer to complete. The vehicle may come to a stop, with the engine at idle, and the aftertreatment regeneration process for DeSoot and DeSOx may continue to occur (at a slower rate), as long as the exhaust temperature remains above 525F.

2. Start driving the vehicle to raise exhaust system temperatures. Driving the vehicle at highway speed, between 50 to 60 mph is preferred. Monitor the StarSCAN® display graph for the “PT/Combustion Manager Interface Mode” and the “Exhaust Gas Temp Sensor 3” values. Note the gradual increase in exhaust temperature. Monitor as the aftertreatment system enters regeneration.

NOTE: During DeSoot, the “Exhaust Gas Temp Sensor 3” will normally read/display at approximately 1,100F.

3. Use the StarSCAN® display graph to monitor the progress of the manual aftertreatment regeneration process for DeSoot and DeSOx. DO NOT stop the engine during the manual regeneration road drive. The vehicle may come to a stop and engine may idle during the manual regeneration road drive without significant impact to the aftertreatment regeneration process, other than extending the time it will take to complete a full regeneration of the aftertreatment system. Too much extended idling or stopping will cause exhaust temperature to drop 525F, which may cause the manual regeneration process to stop.
4. When the “PT/Combustion Manager Interface Mode” no longer enters either DeSoot or DeSOx modes, and instead remains in the “Normal” or “DeNOx” modes, then the manual aftertreatment regeneration process for DeSoot and DeSOx is complete. You will also notice a decrease in exhaust temperature.
5. When the road drive is complete and the vehicle has returned to the dealership, stop the vehicle engine.
6. Clear all DTC's. At the “HOME” screen of the StarSCAN®:
 - a. Turn the ignition switch to the “ON/RUN” position. Do not start vehicle engine.
 - b. Select “System View”.
 - c. Select “All DTC's”.
 - d. Select “Clear All Stored DTC's”.
 - e. Select “Yes” at the confirm screen.
 - f. Turn the ignition switch to the “OFF” position. **WAIT 10 seconds.**
 - g. Start the vehicle engine to verify that all DTC's have been erased.
 - h. Stop the vehicle engine. Turn the ignition switch to the “OFF” position.
7. This concludes the exhaust system aftertreatment regeneration process. No further DPF repairs are required.

PARTS REQUIRED:

Qty.	Part No.	Description
(AR) 1	68035060AA	Converter, Diesel Particulate Filter (DPF) - Ram Truck 2500 (DH)
(AR) 1	68035061AA	Converter, Diesel Particulate Filter (DPF) - Ram Truck 3500 (D1)
6	06104717AA	Nut, Hex Flange Lock (3 needed for DPF and 3 needed for NAC)
2	52122213AB	Gasket, Exhaust Pipe (for Diesel Particulate Filter and for the NOx Absorber Catalyst)
1	68038089AA	Gasket, EGR Cooler (at rear of cooler)
1	68005465AA	Gasket, EGR Cooler (natural - at front of cooler for V-band joint)
1	68005465AA	Gasket, EGR Crossover Tube (natural - driver side)
1	68027035AA	Gasket, EGR Crossover Tube (metal - passenger side)
2	68005184AA	Gasket, EGR Valve
1	68024672AA	Gasket, Intake Plenum (Air Intake Connection)
(AR) 1	68035059AA	Converter, NOx Absorber Catalytic (NAC)
(AR) 1	52121426AC	Pipe and Converter, Exhaust (Diesel Oxidation Catalyst - DOC)
(AR) 1	68027034AB	Valve, EGR Airflow Throttle Control
(AR) 1	68005256AA	Gasket, Throttle Body (EGR Airflow Throttle Control Valve)
(AR) 1	53034051AB	Filter, Air
(AR) 1	68002441AB	Sensor, Charge Air (Mass Air Flow Sensor)
(AR) 1	68002434AA	Sensor, Temperature / Pressure (Intake Air Pressure Sensor)
(AR) 1	68028729AA	Cleaner, Mopar EGR System
(AR) 1	04897150AB	Cleaner, Brake Parts Non-Chlorinated
(AR) 1	04897151AB	Cleaner, Brake Parts Non-Chlorinated (VOC exempt)
	DSL FUELS	Fuel Allowance (4 gallon maximum) - Allowed only if an exhaust system manual regeneration is required.

REPAIR PROCEDURE:

NOTE: Perform the following Repair Procedures only if the Diesel Particulate Filter (DPF) requires replacement.

NOTE: It is IMPORTANT that this Repair Procedure be performed completely prior to returning the vehicle to the customer.

NOTE: Detailed removal and installation procedures (and graphics), required to perform this bulletin, will not be listed individually in each Inspection and Test Section of this Repair Procedure. It will be important to refer to TechCONNECT for all detailed service procedures.

A). EXHAUST SYSTEM INSPECTION:

1. Place the vehicle on a suitable lift.
2. Raise the vehicle.
3. Disconnect the exhaust pressure differential sensor metal (hard) tubing from the Diesel Particulate Filter (DPF) and the NOx Absorber Catalyst (NAC).
4. Remove the two (2) temperature sensors and one (1) oxygen sensor from the Diesel Particulate Filter (DPF).
5. Remove the DPF from the vehicle.
6. Remove the NOx Absorber Catalyst (NAC) from the vehicle.
7. Visually inspect the NAC ceramic faces (inlet and outlet sides).
 - a. Inspect for signs of damage or plugging.
 - b. Using a light source, verify that light will filter through the catalyst ceramic element and that the element is not plugged.
 - c. Replace the NAC if it is damaged or plugged.
8. Was the NAC ceramic faces damaged or plugged?
 - a. If YES >>> then the Diesel Oxidation Catalyst will require inspection. Proceed to step 10 for DOC inspection.
 - b. If NO >>> then proceed to step 11 for oxygen sensor cleaning.
9. Inspect the Diesel Oxidation Catalyst (DOC):
 - a. Remove the oxygen sensor and temperature sensor.
 - b. Remove the DOC from the vehicle.
 - c. Using a light, inspect the face of the ceramic element on the inlet side of the DOC.
 - d. Check for signs of damage or plugging.
 - e. Replace the DOC if the ceramic element is damaged or plugged.
10. Inspect both oxygen sensors (from DOC and DPF). Clean oxygen sensor shroud with a clean shop towel and compressed air.
11. Inspect temperature sensors for thread damage or sensor probe damage. Clean temperature sensors probe end with Mopar Brake Parts Cleaner.
12. Disconnect the exhaust differential pressure sensor metal (hard) lines from the flexible tubing near the exhaust differential pressure sensor.
 - a. Inspect both exhaust differential pressure sensor metal (hard) tubing for restrictions.
 - b. If restrictions are present, flush metal (hard) tubing from the clean end of the tube using Mopar Brake Parts Cleaner.
13. Inspect the Exhaust Differential Pressure Sensor (mounted to transmission).
 - a. Look for physical damage to the Exhaust Differential Pressure Sensor.
 - b. Mark the flexible tubes that connect to the Exhaust Differential Pressure Sensor for disassembly.

- c. Remove the flexible tubes from the Exhaust Differential Pressure Sensor and inspect.
 - d. Verify that the flexible tubes and sensor ports are clear and not plugged. Clean ports/lines as necessary.
 - e. Assemble flexible tubes to the Exhaust Differential Pressure Sensor. Make sure tubes are installed to correct sensor port.
14. Install the Exhaust Differential Pressure Sensor flexible tubes to the metal (hard) tubes.
 15. Install the NAC and DPF to the vehicle exhaust system.
 16. Install the Exhaust Differential Pressure Sensor metal (hard) tubes to the DPF and NAC.
 17. Install the oxygen sensors and temperature sensors to the exhaust system.
 18. Check the exhaust system for minimum clearance (25 mm / 1.0 inch) from body/frame parts.

B). EXHAUST GAS RECIRCULATION (EGR) SYSTEM INSPECTION:

1. Remove and inspect the Exhaust Gas Recirculation (EGR) System.
 - a. Remove the EGR Crossover tube from the vehicle.
 - b. Remove the EGR Valve from the vehicle. Disassemble the EGR Valve for cleaning.
 - c. Remove the EGR Cooler from the vehicle.
2. Thoroughly clean the EGR Crossover tube, EGR Valve, and EGR Cooler in Mopar EGR System Cleaner.
3. Remove the EGR Temperature Sensor. The sensor is located on the intake plenum/snorkle, below, and to the rear of the EGR valve.
 - a. Clean the sensor end of the EGR Temperature Sensor with Mopar Brake Parts Cleaner.
 - b. Install the EGR Temperature Sensor to the intake plenum/snorkle.

C). AIR FILTER AND HOUSING INSPECTION:

1. Remove the air filter housing cover.
2. Inspect the air filter and air filter housing for soot accumulation.
3. Is soot accumulation is present on the ENGINE / TURBO side of the air filter and air filter housing?
 - a. If YES >>> then replace the air filter, mass air flow sensor, and intake air pressure sensor. Clean the air filter housing and duct to the turbocharger.
 - b. If NO >>> then proceed to the next step.
4. Assemble the air housing components.

D). CHARGE AIR COOLER (CAC) SYSTEM INSPECTION:

NOTE: EXCESSIVE SOOT ACCUMULATION is a fluffy deposit of soot WITH THICKNESS on the inner surface of CAC system components.

NOTE: It is considered NORMAL to have a little “dusting” on the inner surface of CAC system components.

1. Remove the Charge Air Cooler (CAC) hoses.
2. Inspect the CAC for excessive soot.
3. Is there excessive soot in the CAC?
 - a. If YES >>> then the CAC requires cleaning. Proceed to the next step.
 - b. If NO >>> then proceed to the next section - “Grid Heater Inspection”.
4. Remove the Charge Air Cooler from the vehicle.

5. Thoroughly clean the Charge Air Cooler and connecting hoses with a non-caustic solvent (i.e. dish soap or laundry detergent and water).

WARNING:DO NOT use mineral spirits, combustion cleaners, flammable cleaners, or equivalents to clean the charge air cooler. Residue from these chemicals may enter the engine combustion chamber, cause the engine to over rev, and may damage the engine.

6. Install the Charge Air Cooler and connecting hoses to the vehicle.
7. Verify that ALL Charge Air Cooler system connections are correct and tight.

E). GRID HEATER INSPECTION:

1. Remove the air intake connection.
2. Clean excess soot from the grid heater using a shop vacuum.
3. Install the air intake connection with new gasket.

F). INSTALL EGR SYSTEM COMPONENTS AND MARK EGR AIRFLOW THROTTLE CONTROL VALVE LEVER:

1. With the EGR system disassembled (and de-energized), note that the position of the EGR Airflow Throttle Control Valve should be open.
2. On the outside of the valve, mark the location of the control valve lever in its OPEN position relative to the body of the control valve and indicate open position. If possible, mark the location of the control valve lever in its CLOSED position relative to the body of the control valve and indicate closed position. The two marks should be approximately 90 degrees apart. These marks will be used later, in Section I - EGR Airflow Throttle Control Valve Test.
3. Assembly EGR Valve.
4. Install the EGR Cooler, EGR Valve, EGR Crossover tube, and new gaskets to engine.
5. Verify that all connections are correct and tight.

G). AIR INDUCTION SYSTEM PRESSURE TEST:

1. Loosen air inlet tube clamp at the turbocharger.
2. Remove the air filter housing and the inlet tube from the vehicle assembly.
3. Install the Charge Air Cooler (CAC) Pressure Tester 9022, with adapter 9861, into the inner diameter of the turbocharger, securing it in place with the supplied three-finger band clamp, tighten tool clamp to 8 Nm (72 in. lbs.).

CAUTION: Never attempt to start or run the vehicle at any time during this test, engine damage may occur.

4. Fasten the safety chain around a solid surface behind the turbocharger.

WARNING:Never run the CAC Pressure Test without the safety chain securely fastened.

5. Before attaching shop air to the pressure regulator, verify that the regulator is at its lowest pressure setting (0 psi.).
6. Attach an air supply to the regulator and slowly increase the air pressure until the pressure gauge reads 8 psi.

WARNING:Never apply more than 20 psi. air pressure.

7. Using a mixture of soap and water, spray the Turbocharger, Charge Air Cooler (CAC), the CAC hoses, and all other air induction system component connections. Inspect for air leaks.
8. Before ANY attempt is made to repair the CAC system, or other air induction system components, it is necessary to completely discharge the Air Induction System of all pressurized air.
9. Were there any air leaks / loose connections in the air induction system?
 - a. If YES >>> then correct the loose connection(s) and retest the air induction system.
 - b. If NO >>> then proceed to the next step.
10. Remove the CAC Pressure Tester.
11. Install the air inlet tube over the turbocharger inlet and tighten the band clamp to 35 in. lbs.

H). EXHAUST GAS PRESSURE SENSOR AND TUBE PRESSURE TEST:

1. Loosen, but do not remove, the exhaust gas pressure sensor tube from the exhaust gas pressure sensor. The exhaust gas pressure sensor is located at the thermostat outlet tube (front of engine).
2. Start the engine and spray a mixture of soap and water at the sensor base to tube connection. Look for gas pressure pulses from the manifold. With the exhaust gas pressure sensor tube loose, soap bubble SHOULD BE present when the engine is running.
3. If exhaust gas pressure pulses are NOT present at the loose connection, then the tube is restricted. Remove the exhaust gas pressure sensor tube and clean/flush the inside of the tube with Mopar Brake Parts Cleaner and shop air. Remove the exhaust gas pressure sensor from the thermostat outlet and remove any debris present.
4. Install the exhaust gas pressure sensor and tube. Verify all connections are correct and tight.

I). EGR AIRFLOW THROTTLE CONTROL VALVE TEST:

1. Look at the lever and the marks made previously on the outside of the EGR Airflow Throttle Control Valve. Note the position of the lever (control valve).
2. Start the vehicle engine, let idle for 10 seconds and key off.
3. Note the position of the control valve lever during this entire process. The lever (control valve) should have moved to the CLOSED position.

NOTE: If functioning properly, the EGR airflow throttle control valve (lever) will cycle closed immediately after the engine is shut down.

4. Did the EGR airflow throttle control valve cycle closed at engine shut down?
 - a. If YES >>> then STOP. Repairs are complete.
 - b. If NO >>> then replace the EGR airflow throttle control valve.

POLICY:

Reimbursable within the provisions of the warranty.

TIME ALLOWANCE:

Labor Operation No:	Description	Amount
11-50-02-92	No Smoke From Exhaust System - DPF DTC's Present - Perform Exhaust Aftertreatment System Regeneration (B) [Note: Refer to appropriate Service Bulletin or Rapid Response if PCM reprogramming is required]	1.8 Hrs.
11-50-01-90	Black Smoke From Exhaust System - Perform DeSoot Procedure (B) [Note: Refer to appropriate Service Bulletin or Rapid Response if PCM reprogramming is required]	A/T Hrs.

FAILURE CODE:

ZZ	Service Action
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