TECH LINK

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The Diesel Exhaust System and DPF Soot Accumulation

The diesel exhaust system on 2017-2018 Silverado and Sierra models and 2019-2020 Silverado 2500/3500 and Sierra 2500/3500 models equipped with the 6.6L Duramax diesel engine (RPO L5P) requires an occasional Diesel Particulate Filter (DPF) cleaning. Under normal driving conditions, the DPF cleaning occurs without any driving involvement. However, there may be circumstances that require a service regeneration to be performed.

DPF SOOT LEVEL

Beginning with 2017 Silverado and Sierra models, the DPF Soot Accumulation is measured in percent instead of grams in GDS 2. The ECM will not try to perform a regeneration until the DPF Soot Accumulation increases to approximately 100%. If the DPF Soot Accumulation increases to 115% and the system has not been able to regenerate, the "Continue Driving" message will display on the Driver Information Center (DIC). If the DPF Soot Accumulation increases to 140%, DTC P2463 (DPF Soot Accumulation) will set and a service regeneration will be required to clean the DPF.

There are two soot level readings in GDS2. One uses the differential pressure sensor to calculate the soot in the DPF and the other uses other engine data. If either of these reaches the threshold, a regeneration will be performed.

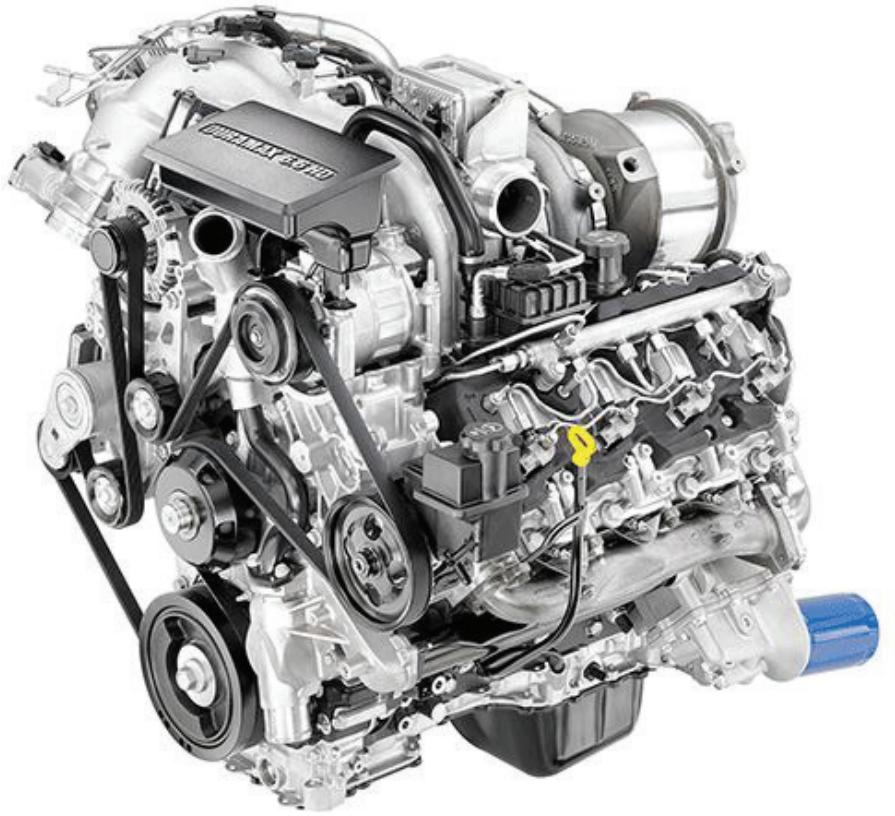
SERVICE REGENERATION

A Service Regeneration is designed to lower the soot accumulation in the DPF in a very controlled way. It is not as effective at lowering the soot accumulated in the DPF as a Regeneration Enable followed by a drive.

Only perform a service regeneration if instructed in the appropriate Service Information. If there is a concern about the DPF Soot Accumulation, perform a regeneration enable and return the vehicle to the customer.

VEHICLE IDLING

Some vehicles may spend a lot of time idling. Use the following steps to aid in determining the equivalent mileage (kilometers):



1. Record the total engine hours indicated on the DIC.
2. Multiply the engine hours by 33 miles or 53 km. This represents an average speed of 33 MPH or 53 KM/H.
3. The result should be close to or lower than the mileage on the odometer.

For example, if a vehicle has 1812.3 engine hours and 60,837 miles (97,908 km) on the odometer, the engine run time would equate to about 59,806 miles (96,052 km) (1812.3 X 33 = 59,806) (1812.3 X 53 = 96,052).

Since the calculated mileage is less than the actual mileage, the vehicle does not spend an excessive amount of time idling.

If the calculated mileage is more than the actual mileage, the vehicle would be considered a vehicle that idles a lot and this information may be useful in diagnosing any issues.

TIP: The engine hours formula should be used to aid in engine diagnosis only. It should not be used to determine any warranty claims.

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HOW REGENERATION SHOULD OCCUR

The DPF traps the soot generated as a part of the normal operation of a diesel engine so that it is not sent into the environment. The process of regeneration enables the vehicle to clean the filter so it can trap more soot. Factors that determine when the ECM will try to perform a regeneration include:

- After approximately 36 gallons (136 L) of fuel used since the last regeneration.
- A maximum distance of 800 miles (1287 km) have been traveled since the last regeneration.
- A pre-determined number of engine hours since the last regeneration.
- A calculated or measured soot mass of 100% in the particulate filter.

When any of the above criteria are met, the ECM will perform a regeneration as soon as all the correct conditions are met. If the ECM cannot perform a regeneration, the ECM will only look at the soot mass to determine to display the Continue Driving DIC message or to set DTC P2463.

The ECM uses the following criteria to perform a regeneration:

- Vehicle in Drive
- BARO sensor 1 is more than 51 kPa (7.4 PSI)
- Engine speed between 500 and 4000 RPM
- Exhaust Gas Temperature Sensor 1 between 100 and 725 C
- Exhaust Gas Temperature Sensor 2 between 95 and 750 C
- Exhaust Gas Temperature Sensor 3 between 0 and 750 C
- Exhaust Gas Temperature Sensor 4 between 60 and 750 C
- Exhaust Gas Temperature Sensor 4 between 60 and 850 C
- Engine Coolant Temperature between 50 and 140 C
- Intake air temperature between -70 and 250 C
- Fueling from -1 to 165mm3
- Vehicle speed from -1 to 160 km/hr
- No active DTC related to EGR, Indirect injector, or Throttle (boost)

The vehicle does not have a soot level sensor to determine how much soot is in the DPF. It uses algorithms to calculate the soot mass.

DTC P2463

When DTC P2463 sets, the ECM will no longer try to perform a driving regeneration and the vehicle will require the more controlled service regeneration. There are a number of factors that can cause the code to set, including:

- The driver ignoring the keep driving messages
- Leaks from intake or exhaust system
- Poor fueling in the engine
- Contaminated or bad fuel
- Externally damaged or worn components.
- Loose or improperly installed components
- Dirty components (air filter or TMAP sensor)
- Driving style, such as binary driving (frequently on/off accelerator or brake)

Continue Driving message on the DIC.

HIGH SOOT LEVELS

Factors that contribute to generating high levels of soot include:

- Charge air cooler (CAC) and Air induction system leaks.
- A restricted air filter.
- Exhaust system leaks that may cause inaccurate Exhaust Gas Temperature sensor or Exhaust Pressure Differential sensor values.
- Failed, intermittent, improperly installed, incorrectly wired or loose Exhaust Gas Temperature sensors may cause inaccuracies in the soot model. Look at all temperature sensors when the vehicle is cold to verify that they read close to each other.
- Improperly routed differential pressure lines. The exhaust differential pressure line should have a continuous downward gradient without any sharp bends or kinks from the sensor to the DPF.
- Leaks or internal restrictions from the Exhaust Pressure Differential sensor lines.
- A skewed or shifted Exhaust Pressure Differential sensor will cause inaccuracies in the soot model.
- A cracked or damaged MAF sensor housing.
- A skewed, stuck in range, or slow responding MAF sensor. Inspect the MAF sensor for contamination.

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The Diesel Exhaust System and DPF Soot Accumulation

continued

- Indirect Fuel Injector leaking or restricted.
- Externally damaged or worn components.
- Loose or improperly installed components.
- Water in fuel contamination.
- Engine mechanical condition, such as low compression.
- Vehicle Modifications

REDUCING THE NUMBER OF DPF REGENERATIONS

If a customer asks what can be done to reduce the number of DPF regenerations needed. Explain that when the "Continue Driving" message is displayed, the vehicle should be driven safely at a steady speed as close to the posted speed limit as possible, until the message turns off, which can take up to 30 minutes.

In addition, driving with cruise control when possible will help the engine perform more efficiently as well as help the engine burn cleaner, resulting in less regenerations.

Driving at a steady pace without aggressive throttle application also will reduce the amount of soot generated by the system.

When descending an incline, use Tow/Haul mode to help with the ability of the vehicle to perform a regeneration.

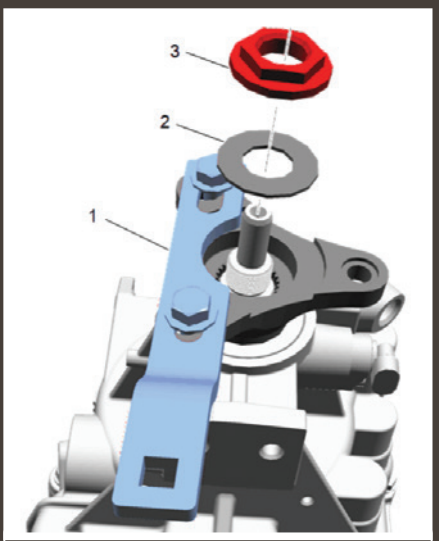
The use of the diesel exhaust brake on declines will also help adjust the gearing to allow the vehicle to perform a regeneration. Keep in mind that on 2020 models, the diesel exhaust brake may not be as noticeable as in prior model year vehicles.

▶ Thanks to Larry Yaw and Rob Ritz

Slipping Output Speed Sensor Reluctor Wheel

Some 2016-2019 ATS models and 2016-2020 Camaro models equipped with the 6-speed manual transmission (RPO M13) may have an illuminated Check Engine MIL and DTC P17A2 (Transmission Clutch Slip Detected) may be set in the Engine Control Module (ECM). These conditions may be the result of the output speed sensor reluctor wheel slipping on the shaft due to improper torque of the output shaft nut.

Remove the output vehicle speed sensor and use a small tool to lightly pry on the speed sensor reluctor wheel. If the reluctor wheel moves, install a new output shaft flange thrust washer and nut and torque to specification. If the reluctor wheel does not move, refer to the appropriate Service Information to continue diagnosis.



1. J-45012 Holding Fixture
2. Output shaft flange thrust washer
3. Output shaft flange nut

To install a new output shaft flange thrust washer and nut, first remove the two-piece propeller shaft. Install the J-45012 Holding Fixture and remove the output shaft flange nut and thrust washer.

Install the new output shaft flange thrust washer and nut. Torque the nut to 145 Nm (107 lb.-ft.)

Refer to Bulletin #20-NA-153 for additional information and part numbers.

▶ Thanks to Ann Briedis

Latest AFIT Software V13 Now Available

CH-47976
Active Fuel Injection Tester (AFIT)

Software Link
AFIT (Active Fuel Injector Tester) Software Update – V13.00 July 2020

Support Document(s)

AFIT Update instructions
AFIT DMU Instructions Guide Rev B
AFIT Diesel Diagnostics Reference Guide
AFIT Quick Reference Guide Rev A
AFIT User Guide Rev A
AFIT SIDI Diagnostic Guide

Look for software update V13.00

The latest software update (CH-47976-SWV13) for the CH-47976 Active Fuel Injector Tester (AFIT) has recently been released. The new update adds 2021 model year applications (up to October 31, 2020) as well as several other features.

The software updates also includes:

- PC Application Software V4.0 (Windows 10/7 compatible)
- MCU Firmware V3.44 (FP regulator drive timeout enhancements)
- DMU Firmware V1.31 (optimizes support for FP regulator PWM control)

SOFTWARE DOWNLOAD

The CH-47976-SWV13 software update is available through the Service Workbench selection of "Essential Tools – Software Updates" in GM GlobalConnect (U.S. only). Select the link for AFIT (Active Fuel Injector Tester) Software Update – V13.00 and follow the instructions.

In Canada, the software is available for download through the Service Application selection of GM Special Tools & Equipment – Software Updates in GM GlobalConnect.

AFIT Update Instructions are available on the GM Tools and Equipment website under the Support Documents link for the software download.

For questions regarding the software release, contact Bosch Automotive Service Solutions Technical Support at 1-800-GM-TOOLS (1-800-468-6657).

▶ Thanks to Rick Jackson

Silverado HD/Sierra HD
BRAKE SQUEAL

Each brake pad has an Inner or Outer label.

Some 2020 Silverado 2500/3500 and Sierra 2500/3500 models may have a brake squeal condition caused by the low scorch friction material used on the original brake pads.

New brake pads are available that have a high scorch friction material to reduce the potential for noise. Replace the front and rear brake pads with the new pads.

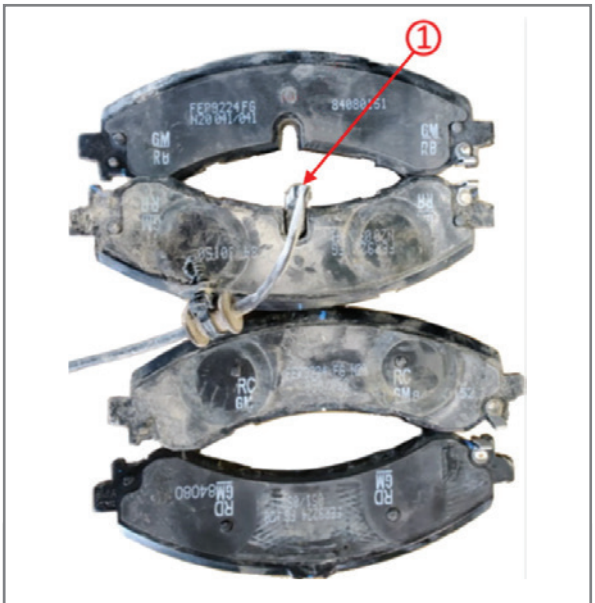
TIP: Each brake pad has an Inner or Outer label to indicate where it should be installed.

If the pads are replaced and the squeal sound continues, check the orientation of the pads. If the inboard and outboard designation on the pads indicate the pads are installed in the wrong location, the squeal sound may persist.

Keep in mind that only the left side of the truck has the wear sensors, which are mounted on the inner pad.

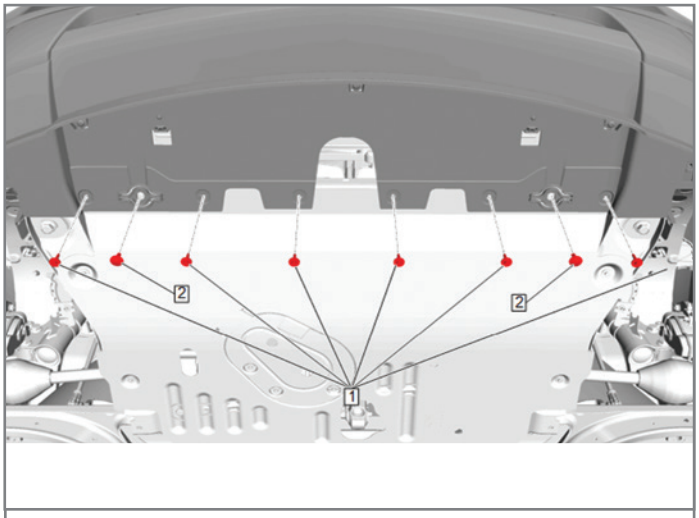
Refer to Bulletin #20-NA-020 for additional information and part numbers.

▶ Thanks to Kevin Minor



Only the left side of the truck has the wear sensors

Boom Sound or Flutter Under Light Throttle



1. Six front bumper extension bolts
2. Two front bumper fascia extension retainers

Push up on the CRFM to move the bushing holder forward and then out the bottom.

A boom sound or flutter vibration may be noticed on some 2020 Encore GX models equipped with the 1.3L engine (RPO L3T) at low speeds with light throttle input. If these conditions are found, replace the lower radiator mount bushings.

To replace the bushings, first remove the front compartment insulator. With the insulator removed, remove the six front bumper fascia extension bolts and the two front bumper fascia extension retainers.

Next, push up on the condenser, radiator and fan module (CRFM) slightly in order to move the bushing holder forward within the vehicle, and then out the bottom.

The lower radiator mounts can now be removed and replaced. Be sure to tighten the fasteners for the new mounts to 22 Nm (16 lb.-ft.).

Refer to Bulletin #20-NA-154 for additional information and part numbers.

▶ Thanks to Frank Jakubiec

Replace the lower radiator mounts.

The last two characters designate the bank (L or R) and intake or exhaust (I or E).

HFV6 Remanufactured Engine Drivability Diagnosis Following Installation

After installing a GM remanufactured High Feature V6 (HFV6) engine in some 2007-2009 G6; 2007-2010 Aura, Outlook; 2007-2011 STS; 2007-2012 Malibu; 2007-2016 Allure (Canada only), LaCrosse, CTS, SRX; 2007-2017 Equinox, Acadia; 2007-2020 Enclave; 2008-2009 G8, Torrent; 2008-2010 Vue; 2009-2020 Traverse; 2010-2015 Camaro; 2010-2017 Terrain; 2012-2020 Impala; 2013-2015 ATS; 2013-2019 XTS; and 2015-2016 Colorado and Canyon models equipped with a 2.8L engine (RPO LP1, LAU), 3.0L engine (RPO LF1, LFW), or 3.6L engine (RPO LY7, LLT, LFY, LFX, LF3), a misfire, an illuminated Check Engine MIL or other drivability concerns may appear.

These conditions may be caused by a component transferred from the original engine that was not supplied with the replacement engine. These components may include camshaft actuator solenoids, fuel injectors, intake manifolds, and catalytic converters.

A mistimed engine or the incorrect camshaft or actuator for an engine also may cause these conditions.

If a misfire or DTC is found after engine installation, follow the diagnostics in the appropriate Service Information. Verify that the misfire or DTC is not caused by ignition, fuel, or electrical components that were not part of the replacement engine assembly.

For example, a stuck solenoid pintle in a bad camshaft actuator solenoid is indicated by an open hole visible in the body of the solenoid compared with a good actuator solenoid.

Also check that the camshafts and actuators are correct and installed in the proper location. On the HFV6, the last two characters designates the bank (L or R) and the intake or exhaust (I or E).

If diagnostics do not help identify the cause of the drivability concern, call the GM Technical Assistance Center for a recommendation on next steps before removing the timing cover or cylinder heads.

Refer to #PIP5528F for additional information.

▶ Thanks to Aron Wilson

Stuck solenoid pintle in a bad camshaft actuator solenoid (left) vs. a good camshaft actuator solenoid (right).

Front End Rattle Sound at Highway Speeds

A whine, rattle or flutter sound may be heard coming from the front end of some 2020 Blazer models when driving at highway speeds. The sound is dependent on wind direction, so it may only occur while driving in certain directions.

Check the front upper aero shutter lower air guide seal. The seal may not be properly nested between the front impact beam and the front fascia grille blocker/EA foam.

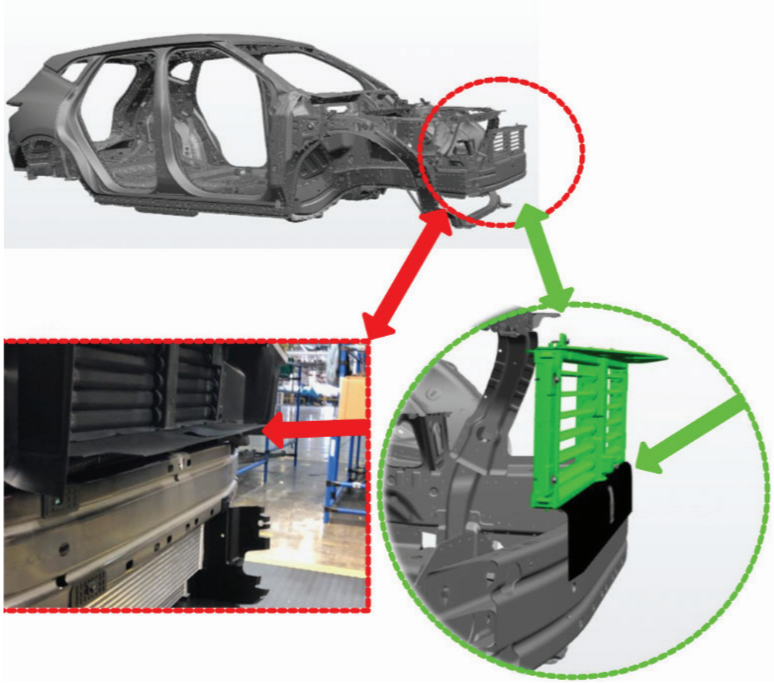
The lower air guide seal may not have the proper preform, which allows it to lay on top of the front fascia grille blocker/EA foam. If the rubber seal is not tucked between the grille blocker and front impact beam, it may produce the rattle or whine sound when exposed to highway speed winds.

To correct the condition, remove the front fascia assembly and manually roll the lower air guide seal over and down the top of the impact beam.

When reinstalling the front fascia assembly, ensure that the lower air guide seal is positioned between the front impact beam and the fascia assembly. It may help to apply adhesive tape to the forward edge of the seal to hold it in proper position before installing the front fascia assembly.

Refer to Bulletin #20-NA-146 for additional information.

▶ Thanks to Pamela Francisco



Correct orientation of the front upper aero shutter lower air guide seal (green) and the incorrect orientation (red).

TECH LINK

GM TechLink is published for all GM retail technicians and service consultants to provide timely information to help increase knowledge about GM products and improve the performance of the service department.

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