



Testing for Diesel Fuel System Contamination

Testing for Diesel Fuel System Contamination..... 2

Updated Techline Connect Tips..... 5

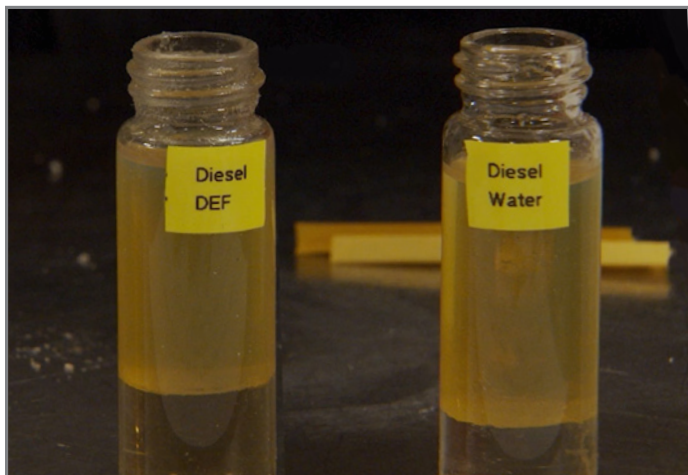
Free Spinning or Grinding Starter Sounds 6

Neutral Idle Control Feature on 6-Speed Automatic Transmission..... 7

Testing for Diesel Fuel System Contamination

One of the most common sources of diesel fuel system contamination is automotive fluids, which often include gasoline and Diesel Exhaust Fluid (DEF) that may have been mistakenly added to the fuel system by owners. On some full-size trucks, the DEF fill and fuel fill are both located behind the fuel fill door, so it's critical that owners correctly distinguish the fill port for DEF (small blue cap) from the fuel fill (large green cap, if equipped) when filling the DEF tank.

Since DEF will separate from diesel fuel and appear clear much like water, it may be difficult to determine if there is DEF in the fuel system. If a vehicle has a Water in Fuel message displayed, the fuel system should be checked for DEF contamination. To help identify contaminated fluid, there are updated diagnostic procedures in Service Information (SI).



Diesel fuel mixed with DEF (left) and diesel fuel mixed with water (right).

If contamination in the fuel system is suspected, refer to the updated Fuel System Cleaning and Contaminants-in-Fuel Diagnosis procedures in the appropriate Service Information. Bulletin #18-NA-361 also includes additional fuel system contamination diagnosis information.

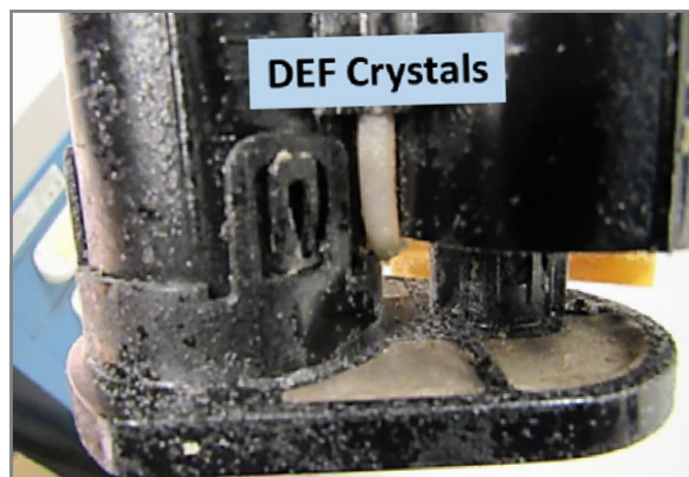
Fuel system contamination issues can affect the performance of the fuel pump module, especially the spring and strut components, fuel level sensor and the fuel pump. These conditions may be found on many GM vehicles equipped with diesel engines (RPOs LM2, LZ0, LUZ, LH7, L5P, L5D),

including 2017-2023 Silverado; Sierra; 2019-2023 Silverado 2500HD/3500HD, Silverado 4500HD/5500HD/6500HD; Sierra 2500HD/3500HD; 2021-2023 Tahoe, Suburban, Yukon, Escalade; 2018-2019 Equinox, Terrain; and 2014-2019 Cruze models.

IDENTIFYING DEF CONTAMINATION

Possible DEF contamination may be present in the fuel system when several fuel pump-related DTCs are set — such as DTCs P1029, P0461, P0463 and P129F — as well as some engine-related DTCs — including P0087, P228C, P228A, P228B, P228D, P026D and P2A00. These codes are potential indicators that DEF may have been added to the fuel tank.

DEF contamination will often appear as white crystals, in the form of residue (similar in appearance to salt), when it dries on the fuel pump or other components. Of course, the residue cannot be seen in the contaminated fuel. But without removing the fuel pump module, it may be difficult to recognize DEF in the fuel tank.



DEF residue

Since DEF is 70% water, it will separate from the fuel just like water and sink to the bottom of the tank, where it's picked up by the fuel pump. Since some water in the fuel system is a common condition, how can DEF be easily identified from water in diesel fuel?

CONTINUED ON PAGE 3

One of the most effective ways to determine if there is DEF contamination is to test a fuel sample following the SI Contaminants-in-Fuel Diagnosis procedure. The updated procedure uses 1 to 14 pH litmus paper (the same litmus paper you may remember from science class in school) to determine if the contamination is DEF or water.

The pH level provides information on how acidic or basic a solution is. Because the pH level of diesel fuel and DEF are quite different, litmus paper can be used to detect DEF in the sample. The litmus paper (or Universal Indicator Paper) should include a scale to gauge the pH level, indicated by the color the paper will take on in the sample.

TESTING A FUEL SAMPLE

Drain a sample from the fuel filter reservoir into a clear container. Refer to the Water in Fuel Draining procedure in the appropriate Service Information.

Next, fold a strip of litmus paper in half to make it more sturdy and easier to dip into the fluid. Be sure to insert the strip all the way into the container because DEF and water will separate into the bottom of the sample. Keep it submerged in the fluid for 10–15 seconds. A change in color of the paper will be seen.

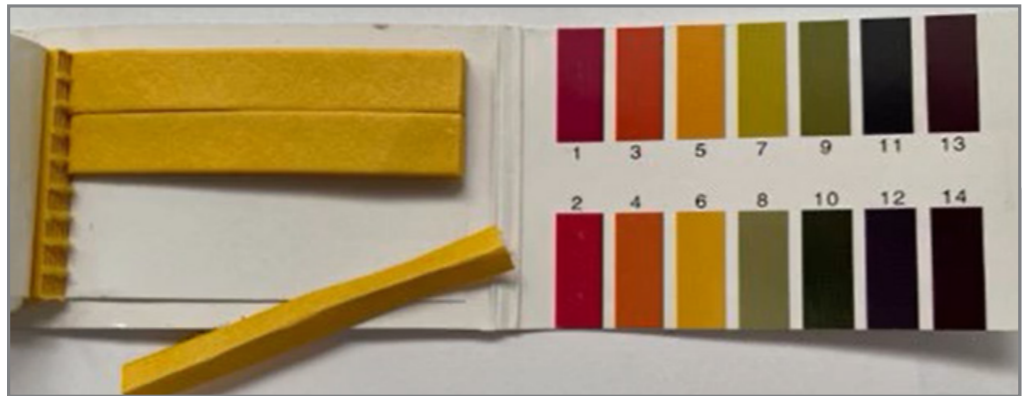
Remove the strip from the fluid and compare it to the pH scale provided with the litmus paper. Be sure to compare the strip to the scale right away. The color of the strip may change in as little as 3 or 4 minutes.

TIP: Litmus paper should be stored in a dark, dry space until use. Clean and dry your hands before handling the strips. Wear the appropriate protective equipment when working with diesel fuel and DEF.

As a reference for testing, uncontaminated diesel fuel will have a pH level of about 5.



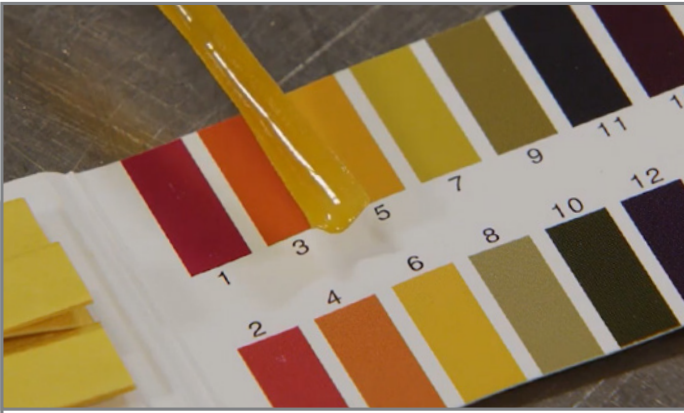
A fuel sample will show a separation of DEF and water from diesel fuel.



Litmus paper and pH scale



Fuel filter drain plug (#1)



Uncontaminated diesel fuel

If the litmus paper shows a pH level of approximately 10–11, it is likely DEF. Compare the sample with a strip of litmus paper inserted into pure DEF to confirm. If there is DEF contamination, and the engine has been cranked, the entire fuel system from the fuel fill pipe to high-pressure fuel pump, fuel rail, injectors, injector return fuel lines, high-pressure fuel pipes and low-pressure return lines must be replaced. For complete information on addressing fuel system contamination, refer to Fuel System Cleaning in the appropriate Service Information.

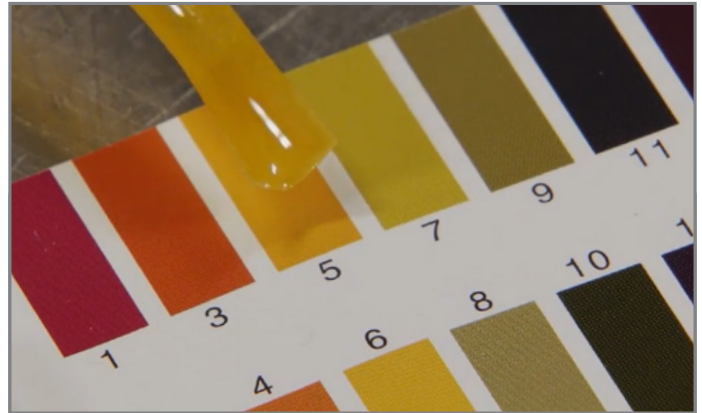


Diesel fuel mixed with DEF

If the litmus paper shows a pH level of about 6–7, it is typically diesel fuel mixed with water. Both diesel fuel and water have a pH level of about 6–7 and, as a result, the color of the strip will not change much. To confirm, insert a strip of litmus paper into pure water, which has a pH level of about 6–7.

Remember, diesel fuel has a pH level of 5, so there should not be much change seen in a mixture of diesel fuel and water. If the fuel system is contaminated with water, inspect the fuel system components for rust or deterioration.

It's recommended to keep the sample litmus paper as well as perform a quick test again with a fresh piece of litmus paper if customers have any questions about the fuel contamination diagnosis.



Diesel fuel mixed with water

DEF AND DIESEL FUEL DON'T MIX

If diesel fuel is mistakenly mixed with DEF, or if DEF or gasoline is added to the fuel tank, the contamination is not the result of a product issue, and the repairs are not covered by the New Vehicle Limited Warranty.

Stress to customers that if a mistake is made and DEF is accidentally added to the fuel tank:

- Do not turn on the ignition.
- Do not start the engine.
- Do not drive the vehicle.



Owners may mistakenly add DEF to the fuel system.

As soon as the ignition is turned on, the fuel pump will be engaged and contaminated fuel will be sent into the fuel system, which may potentially damage the entire system. DEF is a corrosive fluid that tends to form deposits on components. If the in-tank fuel pump has been run, then contaminated fuel has been pumped through both the low-pressure system and high-pressure pump. Inform customers to have the vehicle towed to the dealership or a qualified service facility.

► Thanks to Rodney Lopez



Updated Techline Connect Tips

TECHLINE CONNECT

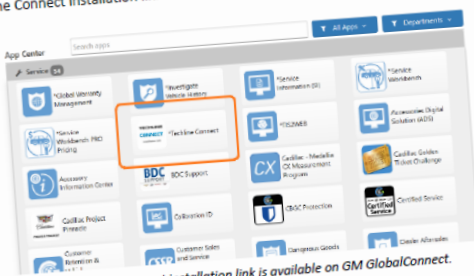
Techline Connect and SPS Tips

March 2023

The Techline Customer Support Center (TCSC) has released their latest tips for Techline Connect and the Service Programming System.

To help technicians get the most out of Techline Connect (TLC), check out the following tips when using the application. Be sure to verify these operating features and requirements before making a call to the TCSC.

The Techline Connect installation link is available for download in GM GlobalConnect.



The Techline Connect installation link is available on GM GlobalConnect.

TECHLINE CONNECT CORE APPLICATION

Techline Connect Error Message

The latest MDI2 software has reduced the error message; however, a solution is being developed for the MDI2 update. In the meantime, a workaround is available in the Manager.

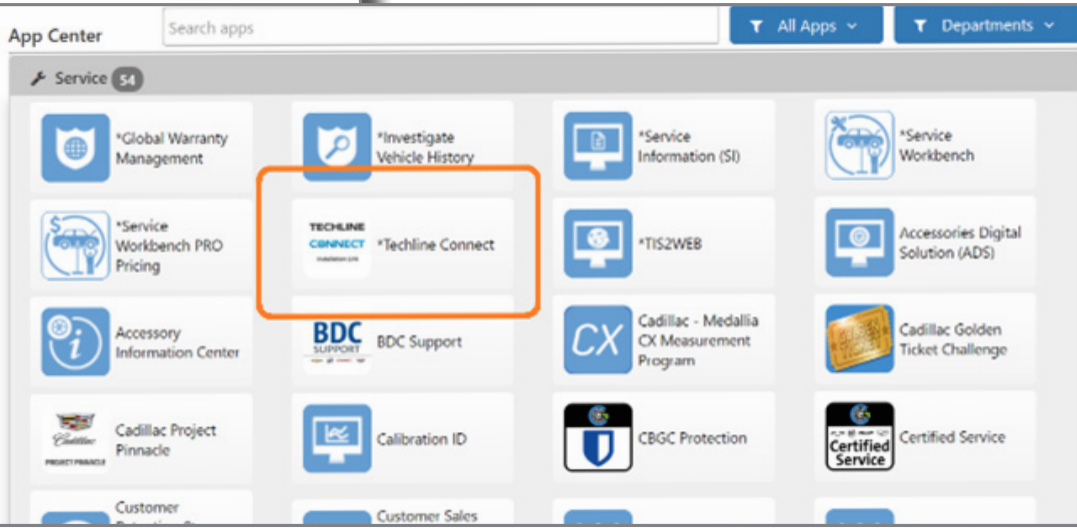
The Techline Customer Support Center (TCSC) has released their latest tips for Techline Connect and the Service Programming System. The tips — included in the easy-to-print PDF below — cover Techline Connect error messages, SPS2 not recognizing a USB drive and other topics.

To get the most out of Techline Connect (TLC), check these items when using the application. Be sure to verify these operating features and requirements before making a call to the TCSC.

The Techline Connect installation link is available for download in GM GlobalConnect.

For assistance with any Techline Connect issues, contact the Techline Customer Support Center at 1-800-828-6860 (English) or 1-800-503-3222 (French).

► Thanks to the Techline Connect team



The Techline Connect installation link is available on GM GlobalConnect.

Free Spinning or Grinding Starter Sounds

A starter grinding sound or free spinning sound under the hood may be heard on some 2019-2020 Enclave and Traverse models equipped with the 3.6L V6 engine (RPO LFY). In some cases, there also may be issues during auto stop/start operation.

These conditions may be caused by a damaged automatic transmission flex plate. If there are missing or damaged flex plate teeth, the starter may not engage and there may be an open 350A starter mega fuse.

If these conditions are present, remove the starter and, through the starter mounting hole, inspect the automatic transmission flex plate.

Look for any damaged or missing flex plate teeth while slowly rotating the crankshaft. If

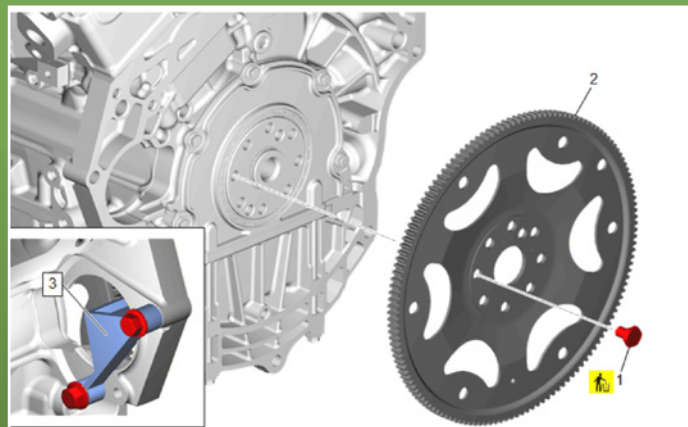
any teeth are damaged or missing, replace the flex plate. Refer to Automatic Transmission Flex Plate Replacement in the appropriate Service Information.

Also inspect the starter pinion for any damaged teeth by rotating the starter pinion. If the starter pinion teeth do not show any damage, do not replace the starter.

Starter pinion teeth damage is normally caused by broken or damaged flex plate teeth.



Check for damaged flex plate teeth through the starter mounting hole.



Automatic transmission flex plate



Starter pinion teeth without damage

Refer to Bulletin #21-NA-066 for more information, including part numbers.

► **Thanks to Scott Willems**

Neutral Idle Control Feature on 6-Speed Automatic Transmission

A single bump feeling may be felt when coming to a stop on some 2017-2022 Encore and Trax models equipped with the 6T40 6-speed automatic transmission (RPO MNH, MNK) and the Neutral Idle Control V5M calibration. The bump condition also may be present when releasing the brake pedal after coming to a stop and the transmission engages the 1-2-3-4 clutch.

The slight bump condition is considered part of normal operation of the Neutral Idle Control feature that helps increase fuel efficiency. The condition will not be present if the transmission is shifted into Manual Mode, as Manual Mode disables the Neutral Idle feature. No repairs should be performed for this condition.

NEUTRAL IDLE CONTROL OPERATION

Neutral Idle can only be commanded on when the transmission is operating in Drive with First Gear Engine Braking. When the brakes are applied and the vehicle speed, throttle position and transmission temperature are within the calibration defined limits, the Transmission Control Module (TCM) commands on Neutral Idle Control. The low and reverse clutch remains applied and the TCM reduces the pressure command to the 1234 PC Solenoid 5, which reduces the fluid pressure to the 1-2-3-4 clutch, allowing the clutch to slip. The resulting slip on the 1-2-3-4 clutch reduces the difference between the torque converter input speed and torque converter turbine speed, or torque converter clutch (TCC) slip speed. The reduced TCC slip speed reduces the engine load, which results in lower fuel consumption while Neutral Idle is commanded on

For more information, refer to #PIP5924.

► Thanks to Bill Alley



A single bump feeling may be felt when coming to a stop.

TECH LINK

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Publisher:
Ravishankar Bommanahally
GM Customer Care and Aftersales

Editor:
Chris Henley
GM Customer Care and Aftersales

Technical Editor:
Mark Spencer
mspencer@gpstrategies.com

Production Manager:
Marie Meredith

Creative Design:
5by5 Design LLC
dkelly@5by5dzign.com

Write to:
TechLink
PO Box 500, Troy, MI 48007-0500

GM TechLink on the Web:
GM GlobalConnect

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