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Service Information Bulletin

| SUBJECT | DATE |
|--|---------------|
| Aftertreatment System - Aftertreatment System Overview | February 2019 |

Additions, Revisions, or Updates

| Publication Number / Title | Platform | Section Title | Change |
|----------------------------|----------------|-------------------------------------|------------------------------|
| DDC-SVC-MAN-0190 | GHG17 DD HD | Performing a Parked Regeneration | Updated GHG17 HD procedures. |
| | | Aftertreatment DEF Gauge/Lamps | |
| | | Instrument Panel Lamps | |

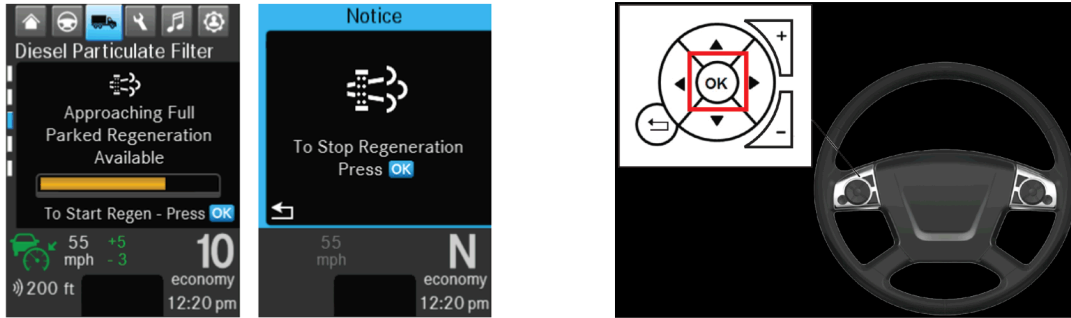


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2 Performing a Parked Regeneration

Parked Regeneration for Vehicles without a Physical Switch

Parked regeneration can be initiated by selecting OK when the driver message center displays "Parked Regen Required" or "Parked Regen Available". A parked regeneration is allowed when the DPF lamp is illuminated.



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A parked regeneration can be stopped by selecting OK while the regeneration is in progress. The parked regeneration may take up to 45 minutes.

Parked Regeneration for Vehicles with a Physical Switch



WARNING: ENGINE EXHAUST

To avoid injury from inhaling engine exhaust, always operate the engine in a well-ventilated area. Engine exhaust is toxic.



WARNING: HOT EXHAUST

During parked regeneration the exhaust gases will be extremely HOT and could cause a fire if directed at combustible materials. The vehicle must be parked outside.

NOTE: Under factory default settings, when the Diesel Particulate Filter (DPF) Regeneration Lamp is not illuminated, the regeneration request switch is disabled.

NOTE: The driver **MUST** stay with the vehicle throughout the regeneration process.

NOTE: Not all vehicles may be equipped with a Regeneration Request Switch due to application or user specification.

NOTE: The procedure will take approximately 30 to 45 minutes (depending on engine type and the amount of soot accumulated in the DPF).

When the parked regeneration request is accepted, the Diesel Particulate Filter (DPF) Regeneration lamp will turn ON one time for one second and then turn off for the remainder of the parked regeneration. The High Exhaust System Temperature (HEST) lamp will flash for one second every ten seconds and eventually become solid when the tailpipe temperature is above 525°C (977°F).

The engine speed may vary during parked regeneration (depending on engine displacement, exhaust temperature and the amount of soot accumulated in the DPF). The regeneration is complete when the engine returns to low idle and the DPF lamp remains OFF. The HEST lamp will remain ON, but the vehicle may be driven.

NOTE: A parked regeneration will STOP and the engine will return to low idle if any of the following happens:

- The key is turned to the OFF position
- The vehicle is put into gear
- The clutch is cycled
- The parking brake is released

NOTE: If a parked regeneration is being performed to check NOx conversion, the calculated ambient temperature in the ACM (AS053) must be above 0°C (32°F) or the test will fail.

NOTE: If the HEST LAMP is FLASHING, regeneration is in process and the system is coming up to temperature.

1. Keep engine at slow idle (cannot be in Fast Idle or PTO Mode). Put transmission in neutral (if equipped with an automatic transmission, cycle it into gear and then back to neutral).
2. Set park brake (cycle the park brake OFF then ON).
3. Press and release clutch pedal once per ignition cycle (if configured).
4. Hold DPF Switch to the ON position for five seconds and then release (engine speed will increase and DPF lamp will go out).

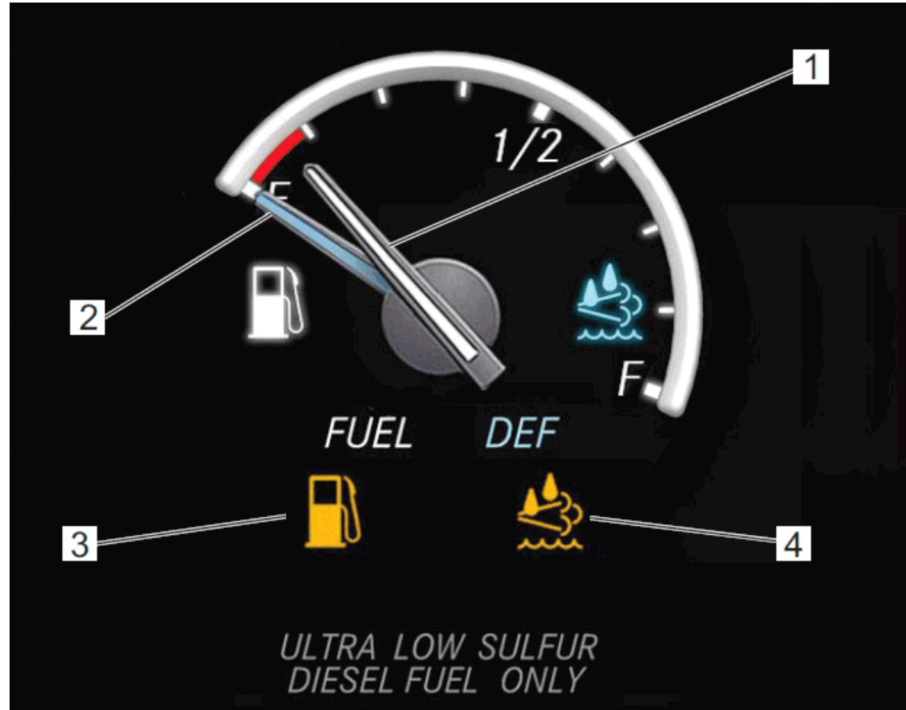


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3 Aftertreatment Diesel Exhaust Fluid Gauge/Lamps

ATD DEF Gauge/Lamps for Vehicles with a Video Gauge

Diesel fuel and DEF levels are communicated using a dual-purpose gauge.



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- | | |
|-----------------------|--------------------------------|
| 1. Fuel Gauge Pointer | 3. Low Fuel Level Warning Icon |
| 2. DEF Gauge Pointer | 4. Low DEF Level Warning Icon |

The low DEF Level warning icon (4) displays amber when the DEF level drops below 1/8th of tank capacity. Progressive warning messages will appear on the dash display. In the empty state, the DEF icon flashes, the MIL icon displays, vehicle speed is limited to 55 mph, and an engine derate is enabled. In the empty and ignored state, the DEF icon flashes, the MIL icon displays, vehicle speed is limited to 5 mph, and an engine derate is enabled.

ATD DEF Gauge/Lamps for Vehicles with a Physical Gauge

A four light bar segment indicates the Diesel Exhaust Fluid (DEF) level in 25% increments. Low DEF levels will trigger a decrease in the engine's performance. The use of improper DEF fluid will trigger a decrease in the engine's performance. In an empty or an ignored state and the diesel fuel tank is filled without filling the DEF tank, the vehicle's speed will be limited to 5 mph until DEF is detected in the DEF tank.

NOTICE: Tampering with the Aftertreatment System (ATS) system components and/or Diesel Exhaust Fluid (DEF) quality will result in a progression of lamp warning, engine performance reductions, and eventual 5mph vehicle speed limiting. 5mph vehicle speed limiting will be applied during non-drive conditions.

The table below shows the various states in which the Aftertreatment Device notifies the driver using the driver indicator lamps on the instrument panel.

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DIESEL EXHAUST FLUID (DEF) INDICATOR LAMPS

- The light bar indicates the level of fluid in the DEF tank.
- Low DEF levels will trigger a decrease in engine performance.
- The use of improper fluid will trigger a decrease in engine performance.
- In the empty and ignored state, vehicle speed will be limited to 5 mph until DEF is detected in the tank.

DEF level is very low
Solid DEF lamp, 1 green bar lit. Vehicle speed limited to 55 mph / engine derated.

DEF level is EMPTY
Flashing DEF lamp, 1 red bar lit. Vehicle speed limited to 55 mph / engine derated.

DEF level is EMPTY and IGNORED
Flashing DEF lamp, 1 red bar lit, and STOP ENGINE lamp. Vehicle speed limited to 5 mph / engine derated.

ULTRA LOW SULFUR DIESEL FUEL ONLY

Low DEF warning light
Light bar shows DEF level

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Figure 2. Driver Card

4 Instrument Panel Lamps

The instrument panel lamps are explained below:


Amber Warning Lamp

Table 1.

| Lamp | Lamp Name | Description | Result |
|--|--------------------------|---|--|
|  | Amber Warning Lamp (AWL) | Indicates a fault with the engine controls. | Vehicle can be driven to end of shift. Call for service. |
| Lamp Solid | | Lamp Flashing | |
| <ul style="list-style-type: none"> At the start of every ignition cycle (bulb check). When an electronic system fault occurs. (Fault should be diagnosed as soon as possible.) | | <ul style="list-style-type: none"> Flashes last 90 seconds before idle shutdown if programmed for override. Flashes when idle shutdown or the optimized idle shutdown occurs. | |


Red Stop Lamp

Table 2.

| Lamp | Lamp Name | Description | Result |
|--|---------------------|--|---|
|  | Red Stop Lamp (RSL) | Indicates a major engine fault that may result in engine damage. Engine derate and/or shutdown sequence will be initiated. | Move the vehicle to the nearest safe location and shut down the engine. Call for service. |
| Lamp Solid | | Lamp Flashing | |
| <ul style="list-style-type: none"> At the start of every ignition cycle (bulb check). A potential engine damaging fault is detected. | | <ul style="list-style-type: none"> Flashes when engine protection shutdown occurs. | |


Diesel Particulate Filter Regeneration Lamp

Table 3.

| Lamp | Lamp Name | Description | Result |
|---|---|--|--|
|  | Diesel Particulate Filter Regeneration Lamp | Solid yellow indicates a regeneration is required. Blinking yellow, derate and/or shutdown are possible as soot load continues to increase. Lamp will shut off during parked regeneration. | Lamp Solid - regeneration is required. Lamp Flashing- regeneration is required immediately. |
| Lamp Solid | | Lamp Flashing | |
| <ul style="list-style-type: none"> At the start of every ignition cycle (bulb check). Regeneration is required. | | <ul style="list-style-type: none"> When a regeneration is required immediately (if the lamp flashing is ignored), a derate and/or shutdown could occur. | |


High Exhaust System Temperature Lamp

Table 4.

| Lamp | Lamp Name | Description | Result |
|--|---|---|---|
|  | High Exhaust System Temperature (HEST) Lamp | Lamp is yellow. Indicates exhaust temperature is above a preset limit and unit is operating at low vehicle speed (below 5 mph [8 kph]). When the engine speed is elevated for a parked regeneration, lamp will flash once every 10 seconds. | Vehicle can be driven. Lamp solid for an extended period (Longer than 40 Minutes) - call for service. |
| Lamp Solid | | Lamp Flashing | |
| <ul style="list-style-type: none"> At the start of every ignition cycle (bulb check). Vehicle speed is less than 5 mph and the Diesel Particulate Filter (DPF) outlet temperature is greater than 525° C (977° F). | | <ul style="list-style-type: none"> Flashes every 10 seconds when the Selective Catalytic Reduction (SCR Catalyst) is not up to temperature. | |


Malfunction Indicator Lamp

Table 5.

| Lamp | Lamp Name | Description | Result |
|--|----------------------------------|---|--|
|  | Malfunction Indicator Lamp (MIL) | Yellow lamp Indicates a failure of an Emission Control device. May illuminate at the same time as the Amber Warning Lamp. | Vehicle can be driven to end of the shift. Call for service. |
| Lamp Solid | | Lamp Flashing | |
| <ul style="list-style-type: none"> At the start of every ignition cycle (a bulb check). For any emission related fault (light out when the fault is inactive). | | <ul style="list-style-type: none"> Never flashes. | |


Fuel Filter Restriction Sensor Lamp: Fuel Filter Failed

Table 6.

| Lamp | Lamp Name | Description | Result |
|--|--|--|---------------|
|  | Fuel Filter Restriction Sensor (FFRS) Lamp | Yellow lamp Indicates that the fuel filter is restricted and needs to be serviced. May illuminate at the same time as the Malfunction Indicator Lamp (MIL) and Amber Warning Lamp (AWL). | Service soon. |
| Lamp Solid | | Lamp Flashing | |
| <ul style="list-style-type: none"> At the start of every ignition cycle (a bulb check). Fuel filter needs service. | | <ul style="list-style-type: none"> Never. | |

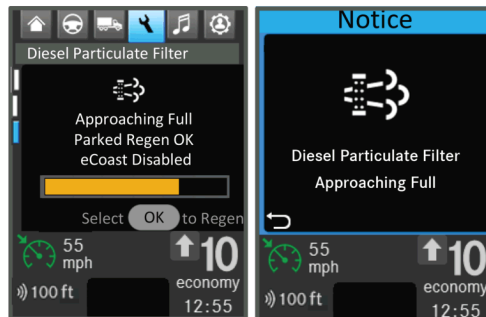
Water-In-Fuel Lamp (WIF)

Table 7.

| Lamp | Lamp Name | Description | Result |
|--|--------------------------|---|--|
|  | Water-In-Fuel (WIF) Lamp | Yellow lamp indicates that the fuel water separator has reached its capacity and needs to be drained. | Engine water separator must be drained or an engine derate will occur. |
| Lamp Solid | | Lamp Flashing | |
| <ul style="list-style-type: none"> At the start of every ignition cycle (a bulb check). Water separator has reached it maximum capacity. | | | |

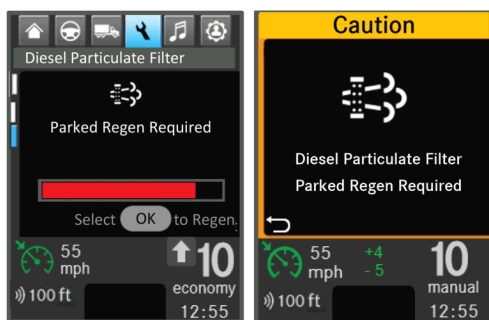
Instrument Panel for Vehicles with Video Instrument Cluster (ICUC)

Once the DPF status bar has reached 60 to 80% (yellow), an active or passive regeneration is allowed. A notice message is displayed indicating "Diesel Particulate Filter Approaching Full." Passive regenerations can occur during extended periods of time at highway speeds once the predetermined conditions are met.



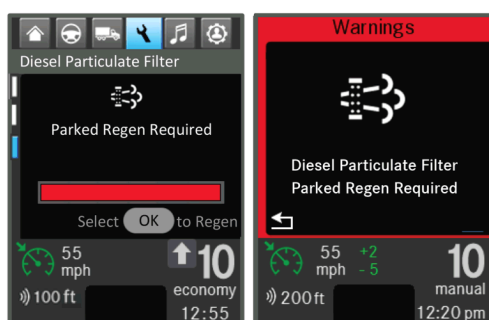
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Once the DPF status bar has reached 80 to 90% (red), a parked regeneration must be performed. A caution message is displayed indicating "Diesel Particulate Filter Parked Regeneration Required".



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Once the DPF status bar has reached 80 -90% (red) a parked regeneration must be performed. If a regeneration is not initiated within 30 seconds of the engine starting, the engine will shut down. A warning message is displayed indicating "Diesel Particulate Filter Parked Regeneration Required."



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