



ENGINEER "CE"





TOPICS FOR THIS TRAINING

- REGEN (Specific for different engine types)
- OUR DIFFERENT ENGINE TYPES
- ARD LIGHT (On CAT powered engines)
- DEF FLUID



WHAT IS ENGINE REGENERATION (REGEN)

- Diesel Regeneration is a process initiated by the ECM to burn off pollution, the soot and ash that comes from the pollutants build up in your DPF ([Diesel Particulate Filter](#)). On average a Diesel engine only burns 55% of the fuel injected into it. The ECO Fuel Enhancer reorganizes fuel to help it burn cleaner. The cleaner burning fuel results in less required RE-Gens cycles and improved fuel efficiency.
- Diesel Regeneration is a manufacturer update initiated in 2007 to help reduce pollution. A Diesel engine that does excessive idling or in town driving is more prone to having the DPF filter get clogged. A Regen warning light goes off when the DPF filter tells the computer it is full. When it is full it can create a back pressure causing the engine to run poorly and use much more fuel.



TYPES OF REGEN

- “Passive” Will occur when driving. No DPF burn, just higher exhaust temps. No action required by driver.
- “Automatic” Soot loading in filter reaches a preset position (about 45%). The vehicles ECU will start post combustion fuel injection, which will increase exhaust temps to Automatic Regen levels. Must be sustained driving or pumping, 45-60 minutes to complete.
- “Parked” Park and use on board Regen switch to activate Regen process. 45-60 minutes.
- “Laptop/Forced” Performed by the Shop, 45-60 minutes. Only true way to check and analyze system performance.



LEVELS OF REGEN

There are four levels of REGEN

- Level 1. DPF light on solid (low to medium levels of particulate build-up).
- Level 2. DPF light flashing (medium to high levels of particulate build-up). DPF is reaching system limits.
- Level 3. DPF light flashing, along with solid Check Engine light. System has REACHED its limitations.
- Level 4. DPF flashing, Both Check Engine, and Stop Engine lights will be lit. Engine or emissions equipment could be damaged.



AFTER TREATMENT DEVICE INDICATOR LIGHTS



High Exhaust System
Temperature
(HEST)



Malfunction
Indicator
(MIL)



Diesel
Particulate Filter
(DPF)





INDICATOR LIGHTS

- High Exhaust System Temperature (HEST). (Passive) Regen is occurring. Continue to drive or park in high idle to help extend Regen intervals.
- DPF (Diesel Particulate Filter). Regen is needed. Can be solid or blinking light.
- Check Engine. Amber warning light that indicates there is a problem with the engine and or aftertreatment components.
- Stop Engine. Red warning light indicates a major engine fault that could result in engine damage.
- Malfunction Indicator (MIL). Yellow picture of engine that indicates a fault with emission related components.



Caterpillar Engine

- Yellow in color.
- On most of our Pierce Arrows.
- 430 Horse Power
- 1450 Torque
- Occasional problems with getting a successful Regen.
- This Engine is not made anymore.





Detroit Series 60 Engine

- Turquoise in color.
- Oldest Engine in the fleet.
- On Pierce Dash's and some Arrows.
- 450 Horse Power
- 1450 Torque
- Very easy to Regen with little to no problems.





Detroit DD13 Engine

- Grey and Black in color.
- Newest Engine in the fleet.
- On all Pierce Arrow XT's.
- 470 Horse Power.
- 1650 torque.
- Dependable, little to no Regen issues.





REGEN OF CAT/DETROIT SERIES 60 POWERED ENGINES

- Must have the DPF light on or flashing. Engine should be warmed up.
- Insure tailpipe and surrounding area is clear.
- Set wheel blocks.
- Start apparatus with parking brakes set, and in neutral.
- Release parking brake.
- Place transmission into Drive, and insure transmission monitor shows "1".
- Return to neutral.
- Set both parking brake and front brakes.
- Request Regen by holding Regen button down for 5 seconds and releasing.
- Idle should increase on its own, Regen will begin.
- DPF light will go out, Regen will continue until apparatus returns to idle.



REGEN OF CAT/DETROIT SERIES 60 POWERED ENGINES

- Level 1. Solid DPF light. Remain in service, perform a Regen when convenient.
- Level 2. Flashing DPF light. Out of service, Regen as soon as possible.
- Level 3. Flashing DPF with Check Engine light. Out of service, return to station, and contact the shop.
- Level 4. Flashing DPF with Stop Engine light. Out of service, stop when safe, and shut down the engine. Contact the shop.
- **Levels 3 and 4 Require a “Laptop Regen”**
- After any level Regen, fill out Regen record.



REGEN OF DETROIT DIESEL (DD13) POWERED ENGINES

- **Level 1.** Solid DPF light. Remain in service, Regen when convenient. Highway speeds for 30-60 minutes might accomplish a “Passive”, or “Automatic Regen”.
- **Level 2.** Flashing DPF light. Out of service, perform a “Parked Regen” as soon as possible. If the “Parked Regen” exits and the lights remain on, repeat Regen once more. If second attempt fails, notify the shop.
- **Level 3.** Flashing DPF light with Check Engine light. Out of service, and a “Parked Regen” needs to be performed as soon as its safe to do so. If the “Parked Regen” exits and the lights remain on, repeat Regen once more. If second attempt fails, notify the shop.
- **Level 4.** Flashing DPF with Check Engine, and Stop Engine lights. Out of service, and a “Parked Regen” needs to be performed IMMEDIATELY. If the “Parked Regen” exits and the lights remain on, repeat Regen once more. If second attempt fails, notify the shop.
- Engine can be restarted in level 4, but a “Parked Regen” must be started in 30 seconds, or engine will shut down.



CANCELLING A REGEN

Two ways to stop a Regen

1. By pressing “REGEN INHIBIT” button for 5 seconds, the Regen will stop until you can successfully complete it. It will show a “Regen Inhibit” light until you hold down the “Regen Inhibit” button for 5 seconds and restart the Regen.
2. Release the Parking Brake, and let Engine return to Idle.





ARD LIGHT ON CAT ENGINES

CAT ARD Head Clean

- On CAT powered engines the “ARD Clean” is a green light just below the parking brake. If this light is on and blinking, attempt to continue driving or park and idle when possible. This will extend Regen intervals and reduce OOS events.
- Usually lasts 45-60 minutes.





DEF Fluid

- DEF Tank is 4.5 gallons.
- 50:1 Fuel to DEF ratio.
- 1 year shelf life.
- **Always have a full spare on your Apparatus.**
- You can wait until tank reads just above $\frac{1}{4}$ full to fill, should take the whole jug, and not spill.
- Store in cool, dry area, out of sunlight.
- **If you accidentally put DEF in Diesel Tank, don't start engine. Contact Shop and follow their direction.**





- Look to see new laminated “Regen” cards for the rigs in the near future.
- Any questions, contact the Shop.
- My contact: jwormington@sandiego.gov

THANKS FOR WATCHING!