Toolbox Talks

DEF, DPF, and Regeneration

Toolbox Talks are intended to facilitate health and safety discussions.
Find more Toolbox Talks on the Occupational Safety web page.

General Information

In 2010 the U.S. Environmental Protection Agency (EPA) required diesel engines to reduce exhaust emissions by incorporating diesel particulate filters (DPF) and diesel exhaust fluid (DEF) into the exhaust system.

What is Diesel Exhaust Fluid (DEF)?

- DEF is deionized water containing urea that is injected into the exhaust system of a diesel engine.
- Its purpose is to convert toxic nitrogen oxides produced during combustion into harmless nitrogen and water.

What is a Diesel Particulate Filter (DPF)?

- A DPF is a filter on the exhaust system of a diesel engine that captures, and stores soot and ash caused by combustion.
- It is the device responsible for elimination of black smoke from diesel exhaust that was commonly seen in the past.
- It can become full of soot and then requires regeneration.

What is regeneration?

- Regeneration is when heat causes soot (carbon) in the DPF to combine with oxygen and convert it into carbon dioxide.
- Passive regeneration occurs when the engine's heat is high enough to oxidize the soot during normal operation.
- Active regeneration requires fuel to be injected into the exhaust system to increase to temperature and allow soot to oxidize.
  - Temperatures can exceed 1000° F during active regeneration.

When is active regeneration necessary?

- Active regeneration occurs when soot in the DPF reaches a point of excess due to a lack of engine heat.
- Extended periods of operation at low RPMs or repeatedly bypassing regeneration increases active regeneration.

What do I need to know about regeneration?

- Regeneration occurs automatically in most equipment.
- A symbol or warning light should alert the operator when active regeneration is needed or in progress.
- Do not shut off the engine during regeneration
  - Increase the RPM to increase engine heat (refer to operator's manual).
- Keep the area around and on top of the exhaust free of dust and combustible materials to prevent fires.

Discussion Date:

Supervisor:

Participants:

Source: Universal Technical Institute