14.11 EXCESSIVE WHITE SMOKE

There are several causes for excessive white exhaust smoke. These probable causes are:

- Defective Fuel Pump
- Aerated Fuel
- Improper Valve Clearance, Worn or Damaged Camshaft Lobes and Rollers
- Faulty Fuel Nozzle
- Faulty PLD-MR Control Unit
- Improper Grade of Fuel

14.11.1 Troubleshooting Procedure for a Defective Fuel Pump

To determine if the fuel pump is causing excessive white smoke, perform the following steps:

1. Check fuel intake pressure upstream of fuel pump.
   
   [a] If the pressure at idle speed (600-650 rpm) is in the normal range of -0.09 to -0.12 bar (-1.3 to -1.7 psi [-9 to -12 kPa]), check for a faulty fuel injector nozzle.
   
   [b] If the pressure at idle speed (600-650 rpm) is greater than -0.12 bar (-1.7 psi [-12 kPa]), check for aerated fuel; refer to section 14.11.2.

14.11.2 Troubleshooting Procedure for Aerated Fuel

To determine if aerated fuel is causing excessive white smoke, perform the following steps:
14.11 EXCESSIVE WHITE SMOKE

<table>
<thead>
<tr>
<th>CAUTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.</td>
</tr>
<tr>
<td>□ Always start and operate an engine in a well ventilated area.</td>
</tr>
<tr>
<td>□ If operating an engine in an enclosed area, vent the exhaust to the outside.</td>
</tr>
<tr>
<td>□ Do not modify or tamper with the exhaust system or emission control system.</td>
</tr>
</tbody>
</table>

1. Disconnect the fuel line return hose from the fitting located at the fuel tank; refer to OEM guidelines.
2. Place the open end of the fuel line into a suitable container.
3. Start and run the engine.
4. Operate the engine at 1000 rpm.
5. Visually check to see if air bubbles are rising to the surface of the fuel within the container.
   - [a] If air bubbles are present, shut down the engine; refer to section 14.11.3.
   - [b] If air bubbles are not present, shut down the engine, check for improper valve clearance, worn or damaged camshaft lobes and rollers; refer to section 14.11.4.

### 14.11.3 Aerated Fuel Resolution

Perform the following steps to resolve aerated fuel:

1. Tighten all fuel line connections between fuel tank and fuel pump; refer to OEM guidelines.
2. Visually inspect all fuel lines between fuel tank and fuel pump for leaks.
3. Repair damaged components as required; refer to OEM guidelines.
4. Verify aerated fuel resolution; refer to section 14.11.3.1.

### 14.11.3.1 Test the Engine with Aerated Fuel Resolution

Perform the following to determine if aerated fuel resolution resolved excessive white smoke condition:
To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Always start and operate an engine in a well ventilated area.
If operating an engine in an enclosed area, vent the exhaust to the outside.
Do not modify or tamper with the exhaust system or emission control system.

1. Start and run the engine.
2. Run the engine at idle with a no-load condition for approximately five minutes, allowing the engine coolant to reach normal operating range.
3. Visually inspect exhaust for excessive white smoke.
   [a] If the engine exhaust emission appears normal, no further troubleshooting is required. Shut down the engine.
   [b] If the engine exhaust emission is excessively white, shut down the engine. Check for improper valve clearance; refer to section 14.11.4.

**14.11.4 Troubleshooting Procedure for Improper Valve Clearance, Worn or Damaged Camshaft Lobes and Rollers**

To determine if an improper valve clearance, worn or damaged camshaft lobes or rollers is causing excessive white smoke, perform the following:

1. Check for improper valve clearance, and worn or damaged camshaft lobes and rollers. Repair as required. Refer to section 12.1 and refer to section 1.20.1.1.
2. Verify valve clearance, worn or damaged camshaft lobes and rollers repair; refer to section 14.11.4.1.

**14.11.4.1 Test Engine with Corrected Valve Clearance, Worn or Damaged Camshaft Lobes and Rollers**

Perform the following steps to determine if the valve clearance, worn or damaged camshaft lobes and rollers repair has resolved excessive white smoke condition:
14.11 EXCESSIVE WHITE SMOKE

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- Always start and operate an engine in a well ventilated area.
- If operating an engine in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system or emission control system.

1. Start and run the engine.
2. Run the engine at idle with a no-load condition for approximately five minutes, allowing the engine coolant to reach normal operating range.
3. Visually inspect exhaust for excessive white smoke.
   
   [a] If the engine exhaust smoke emission appears normal, no further troubleshooting is required. Shut down the engine.
   
   [b] If the engine exhaust smoke emission is excessively white, shut down the engine.
   Check for faulty fuel injector nozzle; refer to section 14.11.5.

14.11.5 Troubleshooting Procedure for a Faulty Fuel Injector Nozzle

To determine if a faulty fuel injector nozzle is causing excessive white smoke, perform the following:

1. Check for faulty fuel injector nozzle; refer to section .
2. Check for faulty fuel injector nozzle repair; refer to section .
3. Verify fuel injector nozzle repair; refer to section 14.11.5.1.

14.11.5.1 Test the Engine with Repaired Fuel Injector Nozzle

Perform the following to determine if the repaired fuel injector nozzle resolved the excessive white smoke condition:
CAUTION:

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

CAUTION:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Always start and operate an engine in a well ventilated area.
If operating an engine in an enclosed area, vent the exhaust to the outside.
Do not modify or tamper with the exhaust system or emission control system.

1. Start and run the engine.
2. Run the engine at idle with a no-load condition for approximately five minutes, allowing the engine coolant to reach normal operating range.
3. Visually inspect exhaust for excessive white smoke.

   [a] If the engine exhaust smoke emission appears normal, no further troubleshooting is required. Shut down the engine.

   [b] If the engine exhaust smoke emission is excessively white, shut down the engine.
   Check for faulty PLD-MR Control Unit; refer to section 14.11.6.

14.11.6 Troubleshooting Procedure for Faulty PLD-MR Control Unit

To determine if a faulty PLD-MR control unit is causing excessive white smoke, perform the following:

1. Check for faulty PLD-MR control unit; refer to section.
2. Check for faulty PLD-MR control unit repair; refer to section.

14.11.6.1 Test the Engine with Repair to the PLD-MR Control Unit

Perform the following to determine if the repaired PLD-MR control unit has resolved excessive white smoke:
14.11 EXCESSIVE WHITE SMOKE

**CAUTION:**

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

**CAUTION:**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.
- Always start and operate an engine in a well ventilated area.
- If operating an engine in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system or emission control system.

1. Start and run the engine.
2. Run the engine at idle with a no-load condition for approximately five minutes, allowing the engine coolant to reach normal operating range.
3. Visually inspect the exhaust for excessive white smoke.
   - [a] If the engine exhaust emission appears normal, no further troubleshooting is required.
     Shut down the engine.
   - [b] If the engine exhaust emission is excessively white, shut down the engine. Call Detroit Diesel Technical Service Group.

**14.11.7 Troubleshooting Procedure for Improper Grade of Fuel**

To determine if an improper grade of fuel is causing excessive white smoke, perform the following:

1. Acquire a fuel sample from the vehicle fuel tank(s).
2. Submit fuel sample for an ASTM test analysis.
   - [a] If the fuel meets specifications, check the fuel pump; refer to section 14.11.1.
   - [b] If the fuel did not meet specifications, resolve improper grade of fuel; refer to section 14.11.8. See Publication 7SE270 (Lubrication Oil, Fuel, and Filters) for fuel specifications.

**14.11.8 Improper Grade of Fuel Resolution**

Perform the following steps to resolve the improper grade of fuel:
1. Drain the fuel tank(s); refer to OEM guidelines, and dispose of properly.
2. Refill the fuel tanks with new fuel having a cetane number greater than 40.
3. Verify fuel resolution; refer to section 14.11.8.1.

14.11.8.1 Test the Engine with New Fuel

Perform the following steps to determine if the new fuel refill resolved the excessive white smoke condition:

<table>
<thead>
<tr>
<th>CAUTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.</td>
</tr>
<tr>
<td>□ Always start and operate an engine in a well ventilated area.</td>
</tr>
<tr>
<td>□ If operating an engine in an enclosed area, vent the exhaust to the outside.</td>
</tr>
<tr>
<td>□ Do not modify or tamper with the exhaust system or emission control system.</td>
</tr>
</tbody>
</table>

1. Start and run the engine.
2. Run the engine at idle with a no-load condition for approximately five minutes, allowing the engine coolant to reach normal operating range.
3. Visually inspect the exhaust for excessive white smoke.
   
   [a] If the engine exhaust smoke emission appears normal, no further troubleshooting is required. Shut down the engine.
   
   [b] If the engine exhaust smoke is excessively white, shut down the engine. Check the fuel pump; refer to section 14.11.1.
This page intentionally left blank.