

A P P E N D I X .

TROUBLES DUE TO TOO MUCH SMOKE EXHAUST IN DIESEL ENGINES

Excessive White Exhausts

A. Injection timing is retarded too much.

1. The set screw for the coupling of the injection pump has become loose.
2. The engine is misassembled and the timing is wrong.
3. Due to excessive wear of tappet rollers of the injection pump or cams, the timing where by plunger is pushed up is out of order.
4. Due to loose adjusting screw of tappet at the injection pump, timing whereby the plunger is pushed up is out of order.

B. Insufficient compressing power of the engine.

In this case, if the compression is barely enough to start the engine, power output remains insufficient for some time after the starting, issuing a large amount of white exhaust. But continued running of the engine will change the color of exhaust to black with the rise of engine temperature.

1. Rocker arm keeps the valve open.
2. Too much valve clearance.
3. Valve stem is sticking to the stem guide and keeps the valve open.
4. Valve seat is not a good fit and is not fully airtight.
5. Valve spring is broken.
6. A great deal of compression leak owing to worn cylinder or sticking piston ring.

7. Tightened portion of cylinder and cylinder head leaks.

C. Inferior fuel.

1. Water exists in the fuel.

D. Too much lubricant oil comes up to the upper portion of the piston.

If it becomes too much in excess, it burns along with the fuel, and causes knock and a large amount of greyish black exhaust.

However if the amount thus goes up is small, knock does not take place and the exhaust becomes bluish white.

1. Due to excessive amount of lubricant in crank case, oil is scooped up by the rotation of crankshaft.

2. Due to worn or sticking piston or oil rings, scraping of oil is not properly done.

3. Too much clearance between cylinder and piston.

4. Viscosity of the lubricant is too low.

Besides above, in cases when oil pressure is too high or connecting rod bearings or crank bearings are worn out, too much oil leads out of bearing parts resulting in excessive amount of oil scattered in crank case and going up pistons.

E. Improper combustion due to cool engine.

When engine is cool, compression temperature is necessarily low, much delay of ignition follows and high knock results.

F. Due to prolonged operation of the engine without load, oil exists in the exhaust manifold.

Excessive Black Exhausts.

A. Injection timing is advanced too much. In this case there

is a high knocking.

1. Due to error in reassembling the engine, injection timing is unduly advanced.

B. Uneven injection of the injection pump.

If the injection of fuel is uneven as to each cylinder, there will be improper combustion, irregular operating condition of the engine and insufficient power output. Excessive depressing of the accelerator pedal in order to cope with the above situation will result in larger amount of black exhaust and accompanying knock.

1. One or several tappet rollers or cams are so worn that the timing the plungers are pushed up is out of order.
2. One or several tappet adjusting screws are slacked so that the timing the plungers are pushed up is out of order.
3. One or several tappets are sticking and improper back stroke results.
4. One or several plungers are extremely worn.
5. Due to sticking or broken spring, one or several plungers do not return full stroke.
6. Tightening screw of one or several adjusting segment gears are loose.
7. One or several delivery valve seats are damaged or spring broken.

C. Spraying condition from the nozzle is improper.

Nozzle in bad spraying condition can be detected from

outside by hand while the engine is running. Sometimes high knock takes place.

1. Nozzle body and valve are sticking together and the valve keeps open.
2. Lapping of nozzle valve seat is imperfect and fuel dribbles in quantity.
3. Injection pressure is low owing to loosened injection pressure adjusting screw.
4. Broken nozzle spring.
5. Clogged nozzle packing.

D. Amount of compressed air in the engine is short and improper combustion follows.

If amount of compressed air becomes extremely short, the engine will fail to operate. If the lack of air is of a degree where insufficient power output is perceptible, a large amount of black exhaust will issue. If the amount of compressed air is insufficient from the outset of the starting of engine, a large quantity of white exhaust will issue at the beginning and as operation is continued it will change to black with the rise of the temperature of engine. In case amount of air becomes insufficient only in a specific cylinder while the engine is running it can be detected by a knock issuing only from the said cylinder.

1. Rocker arm keeps the valve open.
2. Too much valve clearance.
3. Valve stem is sticking to valve guide and the valve remains open.
4. Bad fit of valve seat and insufficient air tightness.

5. Broken valve spring.
6. A good deal of compression leak due to worn cylinder or sticking piston ring.
7. Tightened portion of cylinder and cylinder head leaks.
8. Air cleaner is clogged with dirt.
9. Owing to overheated engine, the air taken in swells and accordingly less air is admitted.

E. Too much lubricant oil comes up to the upper part of piston more than required.

If it becomes too much in excess, it burns along with the fuel, and causes knock and a large amount of greyish black exhaust.

However if the amount thus goes up is small, knock does not take place and the exhaust becomes bluish white.

1. Due to excessive amount of lubricant in crank case, oil is scooped up by the rotation of crankshaft.
2. Due to worn or sticking piston or oil rings, scraping of oil is not properly done.
3. Too much clearance between cylinder and piston.
4. Viscosity of the lubricant is too low.

F. Too much fuel spray.

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