



DO DIESELS SMOKE ?

**PLEASE NOTE OUR TELEPHONE NUMBER
HAS CHANGED TO 8369 00333**

Yes they smoke all right, but there is good and bad smoke. Diesel engine exhaust fumes, its colour or lack of colour is a good indicator of engine condition, power output and economy.

The following discussion is aimed at the casual observer and is far from a comprehensive analysis of injection system problems.

Most diesel owners would be aware of that 'hazy mist' observed in the rear view mirror at night. Even an engine in excellent condition will leave a mist due to the nature of the exhaust fumes. However if excessive, an observation should be made during daylight. Exhaust colours commonly seen are black, grey, translucent purple/blue and white or white/blue.



Smoke? What smoke

Black smoke is unburnt fuel which is "after burning" in the exhaust system (after the exhaust is expelled). It is commonly observed when powering up an incline. As the throttle position increases more fuel is injected into the cylinder faster than more air is inducted. This over rich mixture produces black smoke, which is acceptable on maximum throttle but not otherwise.

An over-fuelling injector pump will have the same result. Economy and engine life will be reduced. Black smoke can be the result of worn injector nozzles. If the spray pattern is imperfect the fuel does not atomise and the tiny droplets of fuel are too big to be completely burnt in the parcel of air which

surrounds them. The air-fuel mixture then continues to burn down the exhaust pipe, power and fuel economy being lost. In a normally aspirated diesel only the fuel burnt in the cylinder before the exhaust valve opens will contribute power to the engine. Another cause of black smoke can be airflow restrictions such as a dirty air cleaner or insufficient airflow into the air cleaner. A side benefit of a snorkel fitment is the increased fuel economy, up to 15% depending on the model, the economy being derived from increased airflow.

Cloudy white smoke indicates incorrect timing or low engine compression. If the timing is retarded or advanced, ie the fuel is injected before the piston and valves are in the correct position, then this could be the injector pump incorrectly aligned or timed to the crankshaft so it delivers the fuel to the injectors either early or late. Or the injectors may have low opening pressure. With low opening pressure the fuel enters the cylinder before the maximum pump pressure is realised resulting in poor atomisation of the fuel, and it occurs so early that the air is below maximum temperature.

With injection timing:
Optimum timing = maximum air temperature = most efficient burn of fuel = maximum power.

Blue or grey smoke can indicate a governor diaphragm problem. If the diaphragm is perforated it fails to control the rack and governor. With continued high rpm the rack moves to a high fuel supply position. When the throttle is quickly released the rack reacts slowly (due to the perforation) and the pump continues to supply fuel at the high rpm rate but the air is reduced quickly as the throttle was released. The blue/grey smoke is unburnt excess fuel. Translucent purple-blue smoke

when starting first thing in the morning is unburnt fuel. This unburnt fuel may be the result of the glow plugs not preheating the fuel sufficiently or a timing issue.

Light black smoke on starting the engine with no movement of the throttle. If with each repeated start-up, say 5 start and shut off 's in quick succession, there is a puff of light black smoke it suggests the injector nozzle or pintle is worn and fuel is dribbling onto the piston top after the engine has stopped firing. This produces a hot spot on the piston top and will certainly reduce engine life.

The radial clearance between the injector pintle and orifice is very small, between 0.02 to 0.05 mm. A deposit of only 5 microns thick can restrict fuel flow by up to 25%. Fuel gums, waxes and varnishes can easily build up on the critical surfaces of the injection system analogous to that of deposits of 'gunk' on the inside of human arteries. And we all know what that means! Water is the catalyst of injection problems. With water will come fungal growths, acids and corrosion.. Water accumulates over time from condensation in the tank and can also enter the system with fuel, even from bowsers. Use of a non-hydrocarbon based fuel system cleanser (Fuel Set) will mix with the water to carry it through to the injectors and finally be burnt. This maintains a healthy system but will not rebuild worn parts.

All the above problems lead to reduced engine performance, engine life and fuel economy but please remember that diesel engines are extremely reliable and efficient when maintained correctly.

If you are suspicious that your engine may have a problem then have the symptoms assessed by one of the 4WD Systems diesel technicians experienced with injection system problems.

VEHICLE INSPECTIONS

"What 4WD should I buy?" We hear that question several times a day from prospective purchasers of new and used 4WD's. We give the best advice and have an information pack to send out but what a choice there is.

A 4WD Systems comprehensive mechanical inspection enables you to gain an objective insight into the mechanical condition of your 4WD. We are in constant contact with 4WD's of all makes and models and are experienced in all areas of servicing and repairs to 4WDs. Our independent position enables us to evaluate the condition of each vehicle from an unbiased standpoint. Get your next 4WD inspected before you buy.

GEARBOX NOISES

If your 4WD has travelled more than 160,000 kms then have the transmission checked for any worn bearing and other noises. If you're not sure what worn bearings sound like then call in and we'll have a listen and drive with you. As the bearings wear, minute particles of steel move around with the oil damaging other components. Replacing the bearings before more expensive repairs are required makes good sense. Landcruiser wagons from 1983 to 1990, 75 Series from 1985 to 1993 and Hiluxes from 1984 to 1990 commonly require attention by now.

