


EXHAUST EMISSIONS


APPLICATION

This inspection applies to all Diesel and other Compression Ignition engines.

Vehicles first used before 1 January 1980 will be subject to a visual examination only.

The inspection of the engine MIL applies to diesel fuelled vehicles. The engine emission system (EES) MIL is only part of the test where a vehicle is not fitted with the commonly recognised engine MIL.

The engine MIL 

The engine emission system (EES) MIL 

The engine MIL inspection does not apply to dual fuelled vehicles.

PROCEDURE AND STANDARDS

Diesel (Compression Ignition) Engines

The density of the exhaust emissions must be checked using a calibrated smoke meter, only in exceptional circumstances where it is not possible to use a smoke meter or where the vehicle is first registered before 1 January 1980 will a visual check be carried out instead.

Note:

If a vehicle has twin independent exhaust systems without a balance pipe, both exhaust systems will have to be checked for smoke emissions. It may be necessary to clear the exhaust system of accumulated soot before the second check.

Some Volvo models have fitted an exhaust regulator governor, which functions as an exhaust brake and to heat the engine by loading, when starting and during idling. On the F10 and F12 models, in addition to the normal controls, the application of the parking brake automatically engages the exhaust governor.

On these models with the parking brake applied a 'free acceleration' check may produce dense black smoke. Therefore, the parking brake must be released before the smoke check is carried out.

Examiners must ensure that when such a smoke check is being carried out the vehicle is adequately chocked to prevent it moving off. The chocks must not be removed until the parking brake has been re-applied.

If the exhaust has been deliberately modified to prevent the smoke meter from being used, this is a Reason for Failure.

If the vehicle has a supercharger the test should be treated as a non-turbocharged engine.

Hybrid Electric Vehicles (HEV) **do not require** a metered smoke test or a visual smoke test. However, if during the test excessive smoke is observed, this will be a Deficiency Category Dangerous.

Note:

The test procedure for turbocharged and non-turbocharged engines is the same.

It is not normally sufficient to run the engine with the vehicle stationary to warm it up to temperature, so the emissions should be tested as soon as possible after the vehicle arrives at the test centre.

Care must be taken to ensure that the probe is correctly aligned to the exhaust gas flow.

1. Free acceleration test using smoke meter on vehicles first used on or after 1 January 1980
 - a. Select the appropriate test settings on the PC.
 - b. Inserted the smoke meter probe into the exhaust pipe
 - c. Check that the engine is at or near normal operating temperature (using vehicles own temperature gauge where applicable – not required to actually measure or enter the temperature on the test system).
 - d. Purge the inlet and exhaust systems fully by holding the engine speed steady at just below maximum governed speed for up to 30 seconds (this in most cases can be done when building up air pressure in the braking system).
 - e. If there are any obvious signs of an engine defect e.g. oil pressure warning light illuminated, abandon smoke test and record on notification of refusal.
 - f. Select the appropriate settings on the smoke meter hand set.
 - g. Follow the meter prompts, depress the accelerator pedal quickly but not violently, to reach full fuel position **in less than 1 second**. Hold it there until a release prompt is given (on some very clean engines the meter may not recognise a change in smoke when full throttle is applied and therefore will continue to ask for full throttle, in these cases the examiner must press the enter key and release

the throttle). If, at the end of the 1st acceleration or consecutive accelerations, the smoke meter value is very low the vehicle will have met the **fast pass** limit.

- h. If the fast pass limit is not met, further accelerations will be required, following meter prompts, up to a maximum of 6 accelerations.

Note:

A vehicle will pass the statutory test requirements if the opacity level is no greater than

- 2.50m^{-1} for vehicles with non-turbocharged engines, used before 1 July 2008
- 3.00m^{-1} for vehicles with turbocharged engines, used before 1 July 2008
- 1.50m^{-1} for vehicles used on or after 1 July 2008 but before 1 January 2014
- 0.70m^{-1} for vehicles used on or after 1 January 2014

2. Visual emission test

The visual test is only required on vehicles first used before 1 January 1980 or in exceptional circumstances where the smoke meter cannot be used or where risk to health and safety would arise. The procedure is the same for supercharged, turbocharged and non-turbocharged engines.

- a. With the engine at or near normal operating temperature check the density of the exhaust emission visually.
- b. Ask the driver to depress the accelerator pedal quickly but not violently, to reach full fuel position **in less than 1 second**. Immediately release when the engine reaches its maximum governed speed, allow the engine to return to idle speed.
- c. Ignore smoke from the first acceleration.
- d. Repeat up to a maximum of six times if necessary until the exhaust smoke is considered to be acceptable for two successive accelerations.

3. Continuous load test for turbocharged CI engines

This test is only to be carried out when a satisfactory result cannot be obtained by the visual free acceleration test.

Ask the driver to drive the vehicle around the test centre, on full power, against the sustained load of a partially applied brake. Observe the level of smoke emitted.

Caterpillar Engines

Examiners should be aware of the Air Fuel Ratio Control (AFRC) fitted to Caterpillar engines. When the engine is stopped the control goes into an excess fuel position. When the engine is restarted the inlet manifold pressure necessary to reset the AFRC into its normal running position is normally greater than that generated during the free acceleration test. Vehicles should therefore either be checked at the start of the test if the engine has not been stopped or at the end of the test where the vehicle should be driven around the centre against the load of a partially applied brake sufficient to reset the AFRC prior to conducting the test.

4. Emission control systems

This is confined to those systems fitted as original equipment by the manufacturer and only those components which are readily visible.

5. Turn on the ignition and check that the **engine malfunction indicator lamp (MIL)** illuminates and then goes off. On some vehicles it will be necessary to start the engine before the MIL goes off.

An engine MIL is required to be fitted to diesel vehicles with 4 or more wheels and first used on or after 1 July 2008.

Vehicles first used before 1 July 2008 are not required to be fitted with an engine MIL, however if an engine MIL is fitted and is illuminated indicating a fault this must be regarded as a defect.

Where a vehicle is fitted with an engine MIL any illumination of the EES lamp is to be disregarded.

REASONS FOR FAILURE

	Deficiency Category
1. Smoke Meter Test	
a. After a total of six accelerations have been completed, the average smoke opacity recorded for accelerations 4, 5 and 6 is more than	
• 2.50m ⁻¹ for vehicles with non-turbocharged engines, used before 1 July 2008	MAJOR
• 3.00m ⁻¹ for vehicles with turbocharged engines, used before 1 July 2008	MAJOR
• 1.50m ⁻¹ for vehicles used on or after 1 July 2008 but before 1 January 2014	MAJOR
• 0.70m ⁻¹ for vehicles used on or after 1 January 2014	MAJOR
b. The exhaust emits excessive smoke or vapour of any colour, to an extent likely to obscure vision.	DANGEROUS
c. The emissions cannot be measured because:	
• a tailpipe accessory is fitted which prevents insertion of the smoke meter probe, or	MAJOR
• the examiner is not satisfied that the engine is in a condition that the smoke test would not cause damage.	MAJOR
2. Visual Test	

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| a. | After a maximum of six accelerations the exhaust emits smoke of a level greater than that of equivalent metered levels (turbocharged engines emitting excessive smoke must be further tested using the continuous load test). | MAJOR |
| b. | The exhaust emits excessive smoke or vapour of any colour, to an extent likely to obscure vision. | DANGEROUS |

Note:

The criterion is density and not volume of smoke. The description 'dense smoke' includes any smoke or vapour which largely obscures vision.

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| 3. | Emission control equipment fitted by the manufacturer, including a Catalytic converter, particulate filter or selective catalytic reduction system absent, or obviously defective. | MAJOR |
| 4. | Engine MIL (or EES MIL, where no engine MIL is present) inoperative (Does not apply to dual fuelled vehicles). | MAJOR |
| 5. | Engine MIL (or EES MIL, where no engine MIL is present) illuminated, indicating a fault. (Does not apply to dual fuelled vehicles). | MAJOR |