

Automotive Workshop AUTO 109

Engine Checks

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Oil leaks

- Oil leakage can be a sign of crankcase compression forcing oil out through gasket joints or past oil seal. It is important to locate oil leaks and determine the cause of them.

Compression check

- Compression check is carried out to ensure that the combustion chamber pressure is within the required limits for proper combustion to take place. To carry out a compression check, firstly the engine is required to be at an operating temperature. Then the ignition and fuel system must be disconnected and a pressure gauge has to be installed at the cylinder under investigation.

Compression check

The engine should be then cranked with the throttle wide opened and will achieve usually 250-350 revolutions per minute.

- For normally aspirated engines the pressure should be between 1.3 – 1.5 MPa and for a turbocharged engine should be between 1.1 – 1.3 MPa. It is important that all cylinders do not vary more than 10%. If so action is needed to be taken.

Cylinder leakage Test

- Using this method, the amount of leakage at the engine cylinders is measured and it is possible to locate the source of any leaks. A similar check can be performed using a compression gauge by injecting oil in the cylinder. Some conditions must be fulfilled before this test is carried out.

Cylinder leakage Test

- The engine should be run to operating temperature so that the thermostat is open.
- The piston in the cylinder that is being checked must be set to top dead centre (TDC) at the compression phase.
- A metered air pressure is connected to the relevant cylinder via an adapter that is secured in the spark plug / glow plug well.
- A gauge is used to measure the size of the leakage from the cylinder.
- This is a pressure sensor with a regulator and displays the size of the leak expressed as a percentage.
- This allows the extent of any problem to be determined.

The source of a leak can be located by analyzing sound at the following points:

- Exhaust pipe -Faulty exhaust valve.
- Intake manifold / throttle body (TB) –Faulty intake valve.
- Dip stick hole / Crankcase ventilation –Faulty piston / piston ring.
- Adjacent cylinder -Faulty cylinder head gasket.
- Radiator - Faulty cylinder head gasket / cracked cylinder wall. Also check for bubbles in the expansion tank.

Cylinder leakage test



UNITS TRANSFORMATION

We want to transform: **Kg/cm² to bars**

1) Using Newton's second law: **$F = m a$**

for gravity on earth **$F = m g = m 9.81 \text{ m/s}^2$**

So for **1 kg** on earth equals a force of

$$F = 1 \text{ kg} \cdot 9.81 \text{ m/s}^2 = \underline{\underline{9.81 \text{ N}}}$$

2) $1 \text{ cm} = 10^{-2} \text{ m}$ SO $(1 \text{ cm})^2 = (10^{-2} \text{ m})^2 \Rightarrow$

$$\underline{\underline{1 \text{ cm}^2 = 10^{-4} \text{ m}^2}}$$

3) Then substitute for **kg** and **cm²** we get:

$$\begin{aligned} \text{Kg/cm}^2 &= 9.81 / 10^{-4} \text{ N/m}^2 = 0.981 * 10^5 \text{ N/m}^2 \\ &= \underline{\underline{0.981 \text{ bar}}} \end{aligned}$$