

# Cylinder Leak-Down Testing

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If you have done a cranking compression test and have identified one or more cylinders that are much lower than the rest, you can do another test to find out the cause. It's called a cylinder leak-down test. A leak-down test can tell you if the loss of compression is due to things like worn rings, burned or stuck open valves (intake or exhaust) or a leaking head gasket. The beauty of the leak down test is, you can test only low cylinders, or you can test all the cylinders to determine overall engine condition. In this article, we'll focus on how to test only the cylinders that had low compression readings.

The best leak-down tester is the twin-gauge type. You read inlet shop air pressure on one gauge and read the percentage of cylinder leakage on the other.

Leak-down test gauges are not all created equal and may not read the same. It's not critical whose gauge is correct. It's more important that your gauge and the inlet shop air pressure remains consistent.



## The Test

Leave all the spark plugs in except for the cylinder you're testing. You'll need a breaker bar or long-handle ratchet and socket to turn the crank nut.

1. Warm up the engine, so the rings have a chance to seal.
2. Pull the spark plug out of the cylinder you want to test.
3. Turn the engine over by hand until the piston in that cylinder is at top dead center (TDC).

**NOTE:** Often, when air pressure applied to the cylinder, the engine will turn over. Try to have the piston as close to TDC as you can so the crank, rod, and piston are as vertical as possible. Leaving the other spark plugs in the engine will help provide some resistance to turning.

**WARNING:** Remove the breaker bar and socket from the crank nut before putting air to the cylinder. If the cylinder you're testing is not perfectly on TDC, the engine will turn over quickly and the breaker bar can strike you or damage under hood components.

4. Install the gauge's air-fitting adapter into the spark plug hole and the shop air pressure to the inlet side of the gauge. Remember to double-check that your gauge reads "zero" before you start.

**NOTE:** When you adjust the regulator to "zero" the leak-down gauge, the shop air pressure gauge will read current shop pressure. Shop pressure can be anywhere between 60-100 psi but it needs to remain constant and steady.

5. Record your leak-down percentage for the cylinder you're testing. Test any remaining low cylinders using the same method.

## Results

No engine will have perfect sealing with 0 percent loss. For normally aspirated engines, 5 to 10 percent loss indicates the engine in great condition. If an engine reads between 15-20 percent, it's not a reason for condemning the engine – but be more concerned about where the leakage is occurring. And at 30 percent, there are some major problems and an overhaul is likely.

If you are testing all the cylinders, the percent of leakage should also be consistent across the cylinders. Any great differences indicate a problem in that cylinder. When comparing cylinders, a variation of 4 to 5 percent is acceptable.

## Leaks

Besides the occasional head gasket leak, there are three major leak paths where cylinder pressure can escape:

- 1) The rings
- 2) The intake valve
- 3) The exhaust valve

If you can hear a hissing sound coming from the valve cover breather hole or from the dipstick tube, then the air is escaping past the rings. If you hear that same hissing sound at the throttle blades and, then the pressure is leaking past the intake valve. If the air is escaping past the exhaust valve, you will probably be able to hear the air even as far back as the tailpipe.

Let's say your engine measures 30 percent or more loss for each cylinder, and it's all running past the rings. This is a good indication that your engine is tired and needs rebuilding. But if the leakage number is under 20 percent and most of it is past the rings, then a rebuild is not going to be worth much in terms of power gain. The point is that even cylinders with 20 percent leakdown do not represent a major power loss.

The area where leakage presents the most concern is the intake valve. If you detect a significant amount of air escaping past the intake valve during the leakdown test, try tapping on the intake valve with a plastic mallet to see if this will reduce the leakage. If the leak persists and is well into the 20 percent zone, it might be worth the time to yank the head and repair the problem.

Conclusions:

The leakdown tester is a great diagnostic tool to identify real cylinder pressure difficulties. But don't be alarmed if you get 15 to 18 percent leakdown on all cylinders. If the cylinders perform within a couple of percentage points of each other, look elsewhere for any perceived problems.