CAUTION!

Working with compressed air can be dangerous. The combination of large bore sizes and long stroke automotive crankshafts create a potential for a great deal of torque to be applied to the crankshaft while performing this test. The safest approach is to have the piston in the test cylinder exactly at TDC for the test. Be certain to remove your wrench from the crankshaft, and stay well clear of potential rotating parts when applying the test pressure to the cylinder.

Excessive pressure can also damage your leakdown tester. To avoid shock to the regulator and gauges, relieve air pressure from the leakdown tester before disconnecting the air supply. While performing the test, connect the air supply to the tester and gradually increase air pressure until you reach the required test pressure.

If you ever get an unrealistically low reading on the secondary gauge, it is most likely the result of debris in the orifice between the two gauges. Remove the knob assembly only from the regulator and blow air through the tester opposite to normal flow to clear the blockage.

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LDT-50 Leak Down Tester Instructions

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LDT-50

Please read instructions before using.

Reviewed July 2013

Cylinder leakage testing, also known as leakdown testing is one of the most efficient ways to determine the condition of an engines' cylinders. Leakage testing involves pressurizing the cylinders with compressed air, and measuring the pressure loss through engine components which do not seal. Investigating where the air is exiting the engine reveals which components are leaking.

Conventional cylinder compression testing involves cranking the engine with a pressure gauge attached & measuring the pressure the cylinder creates. This method of testing has several shortcomings. Lower than specified compression can be due to restrictive air cleaner or intake paths, or restrictive throttle or choke valves. A weak battery or starter motor will also produce low readings due to slow cranking speed (additionally, cranking the engine while the spark plugs are removed may damage the ignition secondary circuit unless the circuit is properly shunted). Consequently, low compression readings may not always accurately indicate worn engine components. An additional shortcoming is that cylinders with low compression readings need further investigation to locate the failed or worn components. The cylinder leakage test avoids these problems altogether.

Procedure

The cylinder leakage test is best performed on an engine at operating temperature. Due to the time involved in removing spark plugs, and the hazards of working around a hot engine this may be impractical. The test is generally reliable when done on a cold engine, but if engine damage is suspected, and a cold test shows no problems, then the test should be repeated with the engine warm to verify results.

Before beginning the test, use a blow gun to clean around the spark plugs. This will prevent contaminants from entering the cylinders or interfering with the test hose seal.

1. Remove all of the spark plugs and rotate the crankshaft to place the piston in the cylinder being tested at Top Dead Center of the compression stroke.

2. Insert the adaptor hose into the spark plug hole of the test cylinder. Connect this hose to the leakdown tester.

IMPORTANT! To Avoid a sudden engine rotation or damage to your leakdown tester, make certain the leakdown tester in NOT connected to a compressed air source at this time.

3. On the leakdown tester, unlock & back off (counterclockwise) the regulator knob a few turns & then connect your shop compressed air supply. Now slowly increase test air pressure to cylinder by tightening (clockwise) the regulator knob. The pressure reading will rise on both gauges; you are only adjusting the left hand or primary gauge. The easiest test pressure to interpret is 100 p.s.i. (you should have at least 110 p.s.i. line pressure from your compressor to use this setting).

CAUTION! If the piston is not exactly at top dead center, the air pressure will rotate the crankshaft. Make certain you are clear of any fans, belts, etc. and that the vehicle is in neutral with the parking brake set. If it is not possible to judge the TDC accurately, you may use a socket and long breaker bar to rotate the engine back to TDC and hold it there while testing. Use caution, as the compressed air creates a LOT of leverage on the crankshaft.

4. Adjust the primary (left gauge) to read exactly 100 p.s.i. Note and record the reading on the secondary (right) gauge. The difference between the two readings is the amount of pressure being lost through the cylinder leakage. After recording the secondary (cylinder) pressure, lower the regulated pressure and disconnect the leakdown tester.

5. Move on to the next cylinder to be tested, following the same procedures. Record the cylinder pressures for all cylinders and the proceed to interpret your results. (See chart below.)

Analyzing Test Results

The leakage tester utilizes two gauges so that the cylinders' rate of leakage can be seen as the difference between the test pressure on the primary gauge and the leakage pressure on the secondary gauge. The condition of the cylinder is therefore judged by the comparison of these two pressures, expressed in "percentage of leakage." The chart below shows the percentage of leakage at three different test pressures. The top row is the percent of leakage based on the pressure observed on the secondary gauge. If you used 100 p.s.i. for the test pressure (primary gauge reading), read the numbers in the "100 p.s.i." row. If you used 90 p.s.i., read the second row, and if you used 80 p.s.i., read the third row. The percent of leakage is shown in the top row above the column containing your observed test pressure.

What it Means

Different engine designs vary so widely in their performance characteristics that it is difficult to present a concise rule for interpreting leakage results. Every engine will exhibit some degree of cylinder leakage. Even in the best of engines you may observe up to about 1 or 2% leakage. As a rule, a good cylinder will exhibit no more than about 5-8% leakage. When an engines' cylinders begin to exhibit leakdown percentages above or about 12 or 15%, the performance and economy of the engine are usually being noticeably compromised. Leakages above 15 to 20% indicate serious enough wear that repair should be made. Note that long stroke or high rpm engines may tolerate a slightly higher leakage, due to their greater piston speeds. Six and eight cylinder engines respond less noticeably to increased leakage than do four cylinder engines. Small displacement engines (especially single and twin cylinder engines) will suffer greatly with leakages above 12 or 15%. As you gain experience with the cylinder leakage tester, you will become better able to discern differing levels of concern with different engines.

What to Repair

One of the biggest benefits to cylinder leakage testing is that the test will not only determine how badly a cylinder leaks, but also will help to pinpoint the causes of excessive cylinder leakage. Simply listen and look around the engine to find where the compressed air is escaping. The two primary causes of cylinder leakage are past piston rings and valves. Leakage past the rings causes air to blow into the crankcase. Usually this can be verified by listening at the oil filler cap. Likewise, intake valve leakage can be heard at the carburetor or throttle body, and exhaust leakage can be heard at the tailpipe. Sealing the exiting air by placing your hand over its source often verifies the severity of the leak by causing a pressure rise on the secondary gauge. This technique can help to isolate the worst components that may cause cylinder leakage are cracked castings and blown cylinder head gaskets. Check for air escaping into the coolant and/or excessive leakage in two adjacent cylinders to verify this diagnosis.

% of Leakage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
100 p.s.i.	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85
90 p.s.i.	89	88	87	86.5	85.5	85	84	83	82	81	80	79	78	77	77
80 p.s.i.	79	78	78	77	76	75	74	74	73	72	71	70	70	69	68