

## Fuel Injector Balance Test

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### [Diagnostic Instructions](#)

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provide an overview of each diagnostic category.

### [Circuit/System Description](#)

When performing the fuel injector balance test with the fuel injector tester or the scan tool, the scan tool is first used to energize the fuel pump relay. The fuel injector tester or the scan tool is then used to pulse each injector for a precise amount of time, allowing a measured amount of fuel to be injected. This causes a drop in the system fuel pressure that can be recorded and used to compare each injector.

The CH 47976 Active Fuel Injector Tester , is used to test the fuel pump, fuel system leak down, and the fuel injectors. Following the User Guide, CH 47976–11, and the on screen prompts or selections, will indicate the steps required to perform each of the available tests. The tester will perform all of the tests automatically and display results of the test. The results can also be down loaded for storage and printing.

### [Diagnostic Aids](#)

- Monitoring the Current Misfire Counters, or misfire graph, may help to isolate the fuel injector that is causing the condition.
- Operating the vehicle over a wide temperature range may help isolate the fuel injector that is causing the condition.

### [Reference Information](#)

Schematic Reference

#### [Engine Controls Schematics](#)

Connector End View Reference

#### [Component Connector End Views](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

### Special Tools

- *CH 47976* Active Fuel Injector Tester
- *CH 48027* Digital Pressure Gauge
- *J 39021* Fuel Injector Coil and Balance Tester
- *J 44602* Injector Test Adapter

#### Note:

- DO NOT perform this test if the engine coolant temperature (ECT) is above 94°C (201°F). Irregular fuel pressure readings may result due to hot soak fuel boiling.
- Verify that adequate fuel is in the fuel tank before proceeding with this diagnostic.
- Before proceeding with this test review the User Manual CH 48027–5 for Safety Information and Instructions.

### Fuel Injector Balance Test–Fuel Pressure Test

1. Install a fuel pressure gauge. Refer to [Fuel Pressure Gauge Installation and Removal](#).
2. Turn ON the ignition, with the engine OFF.

#### Note:

- The fuel pump relay may need to be commanded ON a few times in order to obtain the highest possible fuel pressure.
  - DO NOT start the engine.
3. Command the fuel pump relay ON with a scan tool.
  4. Observe the fuel pressure gauge with the fuel pump commanded ON. The fuel pressure should be 345–414 kPa (50–60 psi).
- If the fuel pressure is not within the specified range, refer to [Fuel System Diagnosis](#).
- Monitor the fuel pressure gauge for one minute. The fuel pressure should not decrease more than 34 kPa (5 psi).
  - If the fuel pressure decreases more than 34 kPa (5 psi), refer to [Fuel System Diagnosis](#).
  - Perform the Fuel Injector Balance Test with Special Tool, the Fuel Injector Balance Test with Tech 2, or the Fuel Injector Balance Test with the Active Fuel Injector Tester.

### Fuel Injector Balance Test with Special Tool

1. Set the amperage supply selector switch on the fuel injector tester to the Balance Test 0.5–2.5 A position.
2. Connect the *J 39021* Fuel Injector Coil and Balance Tester to a fuel injector using the *J 44602* Adapter .
3. Command the fuel pump relay ON and then OFF three times with a scan tool. On the last command, as the fuel pressure begins to slowly degrade and stabilize, select a fuel pressure within 34 kPa (5 psi) of the maximum pump pressure. Record this fuel pressure. This is the starting pressure at which you will pulse each injector.
4. Command the fuel pump relay ON one more time and energize the fuel injector by depressing the Push to Start Test button on the *J 39021* Fuel Injector Coil and Balance Tester at the previously selected pressure.
5. After the injector stops pulsing, select Min from the Display Mode on the *CH 48027* Gauge and record the Min pressure.

**Note:** New test results will not be recorded if the Min/Max results are not cleared after each injector is tested.

6. Clear the Min/Max results on the *CH 48027* Gauge .
7. Select Normal from the Display Mode on the *CH 48027* Gauge .

8. Repeat steps 2 and 4 through 7 for each fuel injector.
  9. Subtract the minimum pressure from the starting pressure for one fuel injector. The result is the pressure drop value.
  10. Obtain a pressure drop value for each fuel injector.
  11. Add all of the individual pressure drop values except for the injector suspected of being faulty. This is the total pressure drop.
  12. Divide the total pressure drop by the number of fuel injectors that were added together. This is the average pressure drop. The difference between any individual pressure drop and the average pressure drop should not be more than 20 kPa (3 psi).
- If the difference between any individual pressure drop and the average pressure drop is more than 20 kPa (3 psi), replace the fuel injector.

### Fuel Injector Balance Test with Scan Tool

1. Command the fuel pump relay ON and then OFF three times with a scan tool. On the last command, as the fuel pressure begins to slowly degrade and stabilize, select a fuel pressure within 34 kPa (5 psi) of the maximum pump pressure. Record this fuel pressure. This is the starting pressure at which you will pulse each injector.
2. With a scan tool, select the Fuel Injector Balance Test function within the Special Functions menu.
3. Select an injector to be tested.
4. Press Enter to prime the fuel system.
5. Energize the fuel injector by depressing the Pulse Injector button on the scan tool at the previously selected pressure.
6. After the injector stops pulsing, select Min from the Display Mode on the *CH 48027* Gauge and record the Min pressure.

**Note:** New test results will not be recorded if the Min/Max results are not cleared after each injector is tested.

7. Clear the Min/Max results on the *CH 48027* Gauge .
  8. Select Normal from the Display Mode on the *CH 48027* Gauge .
  9. Press Enter on the scan tool to bring you back to the Select Injector screen.
  10. Repeat steps 3 through 9 for each fuel injector.
  11. Subtract the minimum pressure from the starting pressure for one fuel injector. The result is the pressure drop value.
  12. Obtain a pressure drop value for each fuel injector.
  13. Add all of the individual pressure drop values except for the injector suspected of being faulty. This is the total pressure drop.
  14. Divide the total pressure drop by the number of fuel injectors that were added together. This is the average pressure drop. The difference between any individual pressure drop and the average pressure drop should not be more than 20 kPa (3 psi).
- If the difference between any individual pressure drop and the average pressure drop is more than 20 kPa (3 psi), replace the fuel injector.

### Fuel Injector Balance Test with the Active Fuel Injector Tester

1. Turn OFF all accessories.
2. Turn OFF the ignition.
3. Install the Active Fuel Injector Tester. Refer to the Active Fuel Injector Tester User Guide.
4. Turn ON the Active Fuel Injector Tester and select the vehicle.
5. Turn ON the ignition and perform the Injector Test.

- If the Active Fuel Injector Tester aborts testing due to fuel pressure or fuel leak down, refer to [Fuel System Diagnosis](#).
- View the test results.
  - If any injector exceeds the recommended tolerance, replace the injector(s).

#### [Repair Instructions](#)

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

#### [Fuel Injector Replacement](#)