

<b>Technical Service Bulletin Number</b>
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TSB150104
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## Technical Service Bulletin

### Subject

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High Pressure Fuel Pump Performance Test and New Service Tool to Assist in Troubleshooting Fault Code 559

### Warranty Statement

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The information in this document authorizes specific changes to the repair practice for failures covered under product warranty coverages.

### Contents

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#### Product Affected

- ISX15 CM2250
- ISX15 CM2250 SN
- ISX15 CM2350 X101
- PowerGen QSX15 CM2250 ECF
- QSX15 CM2350 X105
- QSX15 CM2250 ECF
- QSX15 CM2350 X106

#### Description of Change

An improved procedure for high pressure fuel pump diagnostics when troubleshooting Fault Code 559 is being implemented.

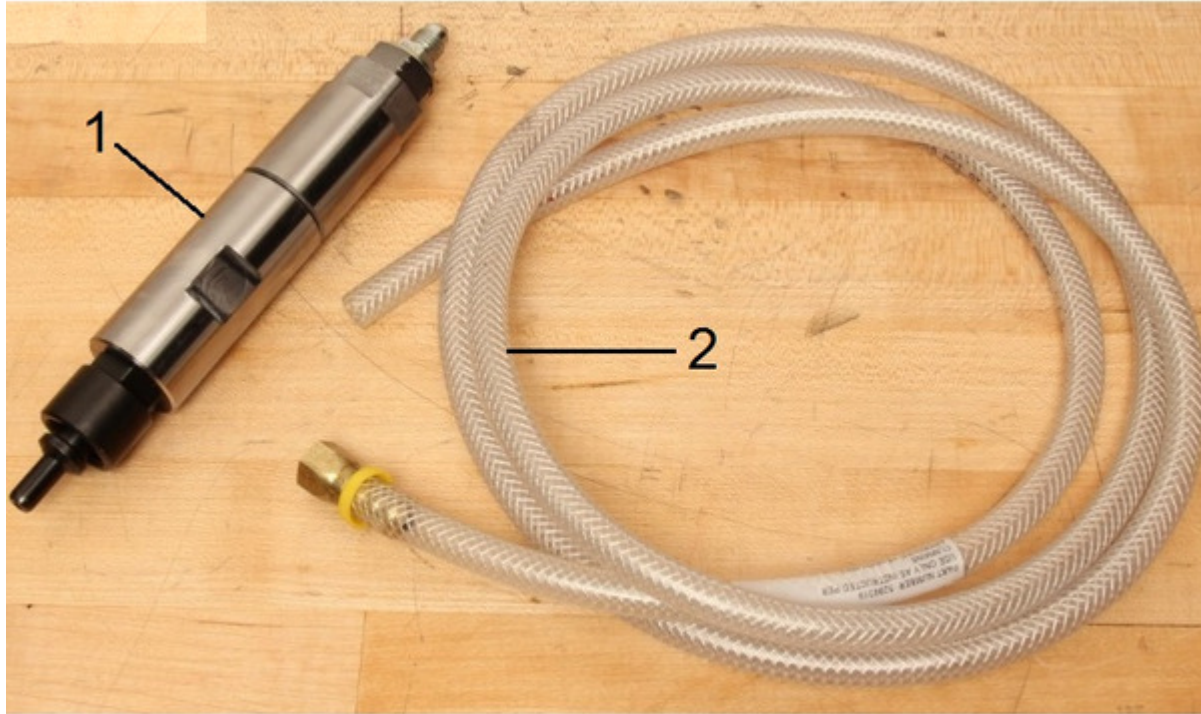
The High-Pressure Fuel Pump Performance Test will replace the High-Pressure Fuel Pump Return Flow Test in the Fault Code 559 troubleshooting tree.

Completion of High-Pressure Fuel Pump Performance Test requires the new fuel pump

performance test kit, Part Number 5299721.

The High-Pressure Fuel Pump Performance Test will test both the fuel volume and fuel pressure capabilities of the high pressure fuel pump at the same time.

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Figure 1, Fuel Pump Performance Test Kit, Part Number 5299721.

### Service Tool Availability

The fuel pump performance test kit, Part Number 5299721, will become commercially available mid-September 2015. If you have questions please contact your local Cummins Distributor.

Table 1, Fuel Pump Performance Test Kit, Part Number 5299721	
Part Description	Part Number
Tester, Fuel Pump (Figure 1, Item 1)	5299753
Hose, Leak Test (Figure 1, Item 2)	3164673

## CAUTION

When **not** in use, the fuel pump performance test service tool **must** be stored in a clean environment. Do **not** disassemble the fuel pump performance test service tool as it can be damaged by dirt or debris.

## Service Instructions

A video of the following service procedure is located on QuickServe™ Online. See the video link below.

**NOTE:** <http://tsb.cumminsvirtualcollege.com/tsb150104.aspx>

If a shop possesses the new fuel pump performance test service tool, reference the service procedure below for instructions on how to complete the High-Pressure Fuel Pump Performance Test.

## High-Pressure Fuel Pump Performance Test

### Initial Setup

If the low pressure fuel system is degraded or the fuel pressure relief valve leakage is out of specification, this High-Pressure Fuel Pump Performance Test will **not** provide accurate results.

Troubleshoot the low pressure fuel system and any high pressure fuel system leakage before performing High-Pressure Fuel Pump Performance Test.

### Preparatory Steps

#### **WARNING**

Normal engine operation creates highly pressurized fuel in the fuel line which will remain in the fuel line after engine shutdown. Never open the fuel system when the engine is operating. Before servicing the fuel system, always loosen the pump-to-rail fuel line at the rail to vent the pressure. Keep hands clear of the line when loosening. High-pressure fuel spray can penetrate the skin, resulting in serious personal injury or death.

#### **WARNING**

High pressure fuel spray can cause serious injury or death.

#### **WARNING**

Depending on the circumstance, diesel fuel is flammable. When inspecting or performing service or repairs on the fuel system, to reduce the possibility of fire and resulting severe personal injury, death, or property damage, never smoke or allow sparks or flames (such as pilot lights, electrical switches, or welding equipment) in the work area.

Before servicing the high-pressure fuel system, loosen the pump to rail line at the rail to vent the fuel pressure. See Figure 2 below.

When loosening the nut, keep hands clear of the pump to rail line.

**NOTE: A machined slot in this fitting directs the fuel spray towards the engine.**

Tighten the fuel rail nut.

**Torque Value:** 47 N•m [ 35 ft-lb ]

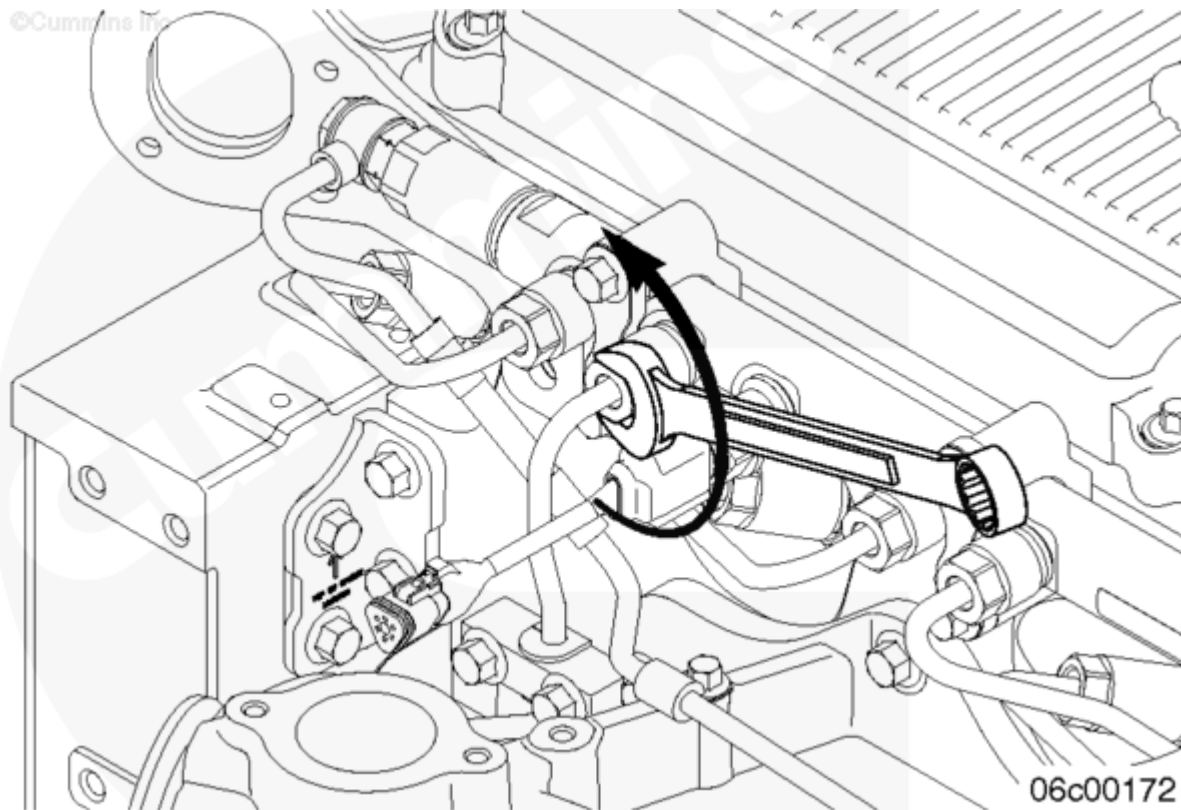


Figure 2, Loosening Pump-To-Rail Line at Fuel Rail to Vent Pressure.

**CAUTION**

Do **not** install the fuel system leak tester tool at the high-pressure pump outlet fitting. Severe engine damage will result. This tool can **only** be installed at the fuel rail for the purpose of isolating the high-pressure fuel supply from individual fuel injectors.

**WARNING**

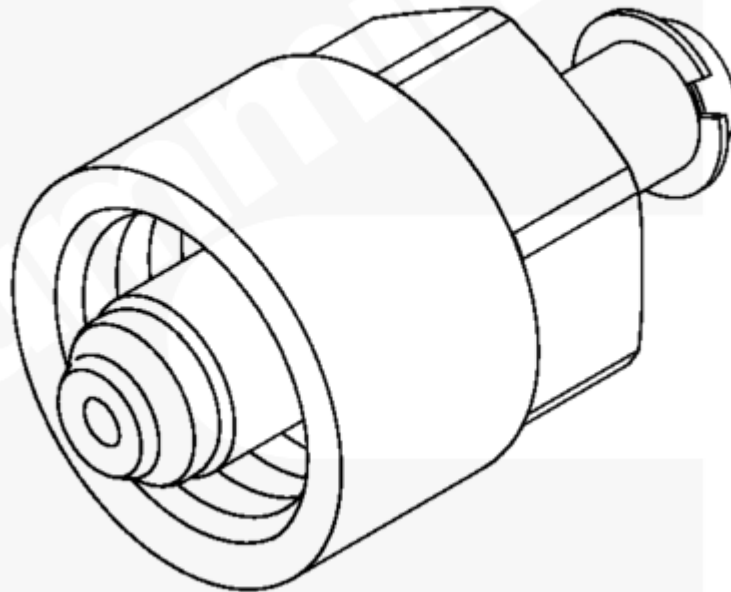
When servicing the engine do not use the starting motor to rotate the engine with a high-pressure fuel system joint open. Rotating the engine can create highly pressurized fuel in the fuel system. High-pressure fuel spray can penetrate the skin, resulting in serious personal injury or death.

This test requires five fuel system leak tester tools, Part Number 4919546. See Figure 3 below.

Block off five fuel injectors at the fuel rail in place of the high-pressure fuel line. Keep the injector line supply port that is most accessible unblocked.

**Torque Value:** 47 N•m [ 35 ft-lb ]

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Figure 3, Fuel System Leak Tester

Install the fuel pump performance test service tool, Part Number 5299753 (See Figure 1, Item 1), at the unblocked fuel rail connection.

**Torque Value:** 47 N•m [ 35 ft- lb]

### Measurement

#### **▲ CAUTION ▲**

Do **not** crank the engine for 30 seconds continuously. Crank the engine in intervals with a 15 second pause between intervals. This reduces the possibility of overheating the starting motor.

**NOTE:** If necessary, use a battery charger to maintain proper cranking speed. Units equipped with starter lockout features may require additional cranking aids.

Engine cranking speed **must** be above 130 rpm.

1. With the following conditions met:
  - Fuel drain line, Part Number 3164673 (Figure 1, Item 2), connected to high-pressure fuel pump service tool, Part Number 5299753 (Figure 1, Item 1).
  - Fuel pump actuator disconnected from electrical harness.
  - Injector pass-through harness disconnected from engine wiring harness.
2. Route the hose, Part Number 3164673, into a graduated beaker, Part Number 4919139, for measurement.
3. Connect INSITE™ electronic service tool.
4. Log Engine Speed and Fuel Rail Pressure Measured with INSITE™ electronic service tool.
5. Initial Purge
  - Crank until fuel flow exits the hose or for 15 seconds maximum. If no fuel flow exists after three 15 second crank cycles, inspect the fuel pump head. See the corresponding Service Manual. Reference Procedure 005-227 Fuel Pump Head in section 5.
  - Discard purged fuel from service tool hose and move to First 15 Second Measurement Cycle. Proper disposal is required. Dispose of in accordance with local and environmental regulations.
6. First 15 second measurement cycle (This begins when the fuel pump performance test service tool opens)
  - Crank the engine while monitoring engine cranking speed (rpm).
  - Begin 15 second measurement cycle when the fuel pump performance test service tool opens. A pressure pulse can be felt through the high-pressure fuel pump service tool and an audible sound can be heard.
  - Collect the fuel that exits the high-pressure fuel pump service tool during the measurement cycle.
7. Allow the starting motor to cool for 15 seconds.
8. Second 15 second measurement cycle
  - Repeat the 15 second measurement cycle.
9. The fuel flow from the high-pressure fuel pump service tool is equal to the sum of the first and second measurement cycles.
10. Record the average engine cranking speed from INSITE™ electronic service tool logging results.

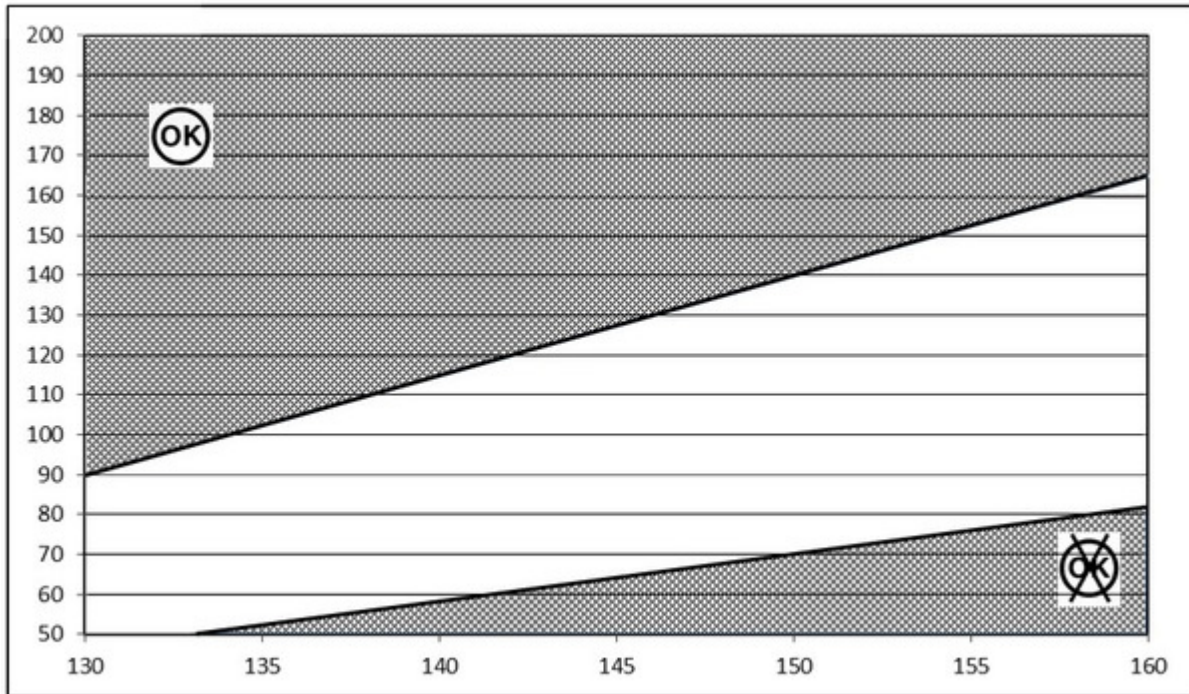
**NOTE:** After completing the high-pressure fuel pump performance test, fuel may remain in the drain line. Empty the remaining fuel in line into measuring container to obtain a proper measurement.

Fuel flow from the high-pressure fuel pump service tool is directly related to engine speed.

Use the graph below to determine the minimum flow from the high-pressure fuel pump service tool. See Figure 4 below.

- Engine speed in rpm can be found on the horizontal axis.
- Service tool flow in milliliters can be found on the vertical axis.

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Figure 4, Engine Speed (rpm) Versus Service Tool Flow (ml)

**Scenario 1**

If the measured fuel flow from the high-pressure fuel pump service tool at the recorded engine speed is in the upper shaded region of the graph, the fuel pump is functioning properly.

**Scenario 2**

If the measured fuel flow from the high-pressure fuel pump service tool at the recorded engine speed is in the lower shaded region of the graph, the fuel pump is **not** functioning properly and **must** be replaced.

**Scenario 3**

If the measured flow is in the unshaded part of the graph:

- Check to make sure that the correct specifications are being used.
- Verify proper high-pressure fuel pump service tool installation.
- Ensure there are no external leaks.
- Verify that all low pressure system checks were made, and then perform the high pressure fuel pump performance test again.
- If the test readings are still in the unshaded area, the fuel pump head **must** be removed and the fuel pump camshaft and fuel pump camshaft tappets rollers **must** be inspected. If the fuel pump passes the visual inspection, contact technical support.

## Finishing Steps

- Remove the test equipment.
- Install the fuel injector supply lines. Follow the installation sequence outlined in the fuel rail installation procedure. See the corresponding Service Manual. Reference Procedure 006-060 Fuel Rail in section 6.
- Reconnect the fuel pump actuator disconnected from electrical harness.
- Reconnect the injector pass-through harness disconnected from engine wiring harness.

## Document History

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Date	Details
2015-6-26	Module Created
2015-7-7	none
2015-7-9	Non-Product Problem Solving (PPS)
2015-7-15	Product Problem Solving (PPS)

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**Last Modified: 16-Jul-2015**

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