

## Engine Difficult to Start or Will Not Start (No Exhaust Smoke)

This is symptom tree t044

Cause	Correction
<p><b>STEP 1</b> Low fuel level in the fuel tank</p>	<p>Check the fuel level in the fuel tanks. Verify the fuel gauge is working properly.</p>
<p>OK Go To Next Step</p>	
<p><b>STEP 2</b> Low fuel rail pressure</p>	<p>Attempt to start the engine by engaging the engine starting motor for at least 30 continuous seconds. Use INSITE™ electronic service tool to monitor Fuel Rail Pressure (Measured) and Fuel Rail Pressure (Commanded). Use INSITE™ electronic service tool to read the fault codes. Attempting to start the engine for 30 continuous seconds allows the fault code logic time to run. If Fault Code 559 becomes active, fuel rail pressure is <b>not</b> being developed.</p>
<p>OK Go To Next Step</p>	
<p><b>STEP 3</b> Malfunctioning ECM power or ground circuit</p>	<p>Check the battery voltage of the ECM power supply and ground circuit. Refer to the corresponding wiring diagram for the engine being serviced for connector pin identification.</p>
<p>OK Go To Next Step</p>	
<p><b>STEP 4</b> Keyswitch circuit is malfunctioning.</p>	<p>Check the machine keyswitch circuit. Refer to Procedure 019-064 in Section 19.</p>
<p>OK Go To Next Step</p>	
<p><b>STEP 5</b> Low battery voltage</p>	<p>Check the battery voltage. Measure the voltage from the positive (+) terminal to the negative (-) battery terminal while trying to start the engine.</p>
<p>OK Go To Next Step</p>	
<p><b>STEP 6</b> Slow cranking speed</p>	<p>The minimum cranking speed <b>must</b> be greater than 150 rpm.</p>
<p>OK Go To Next Step</p>	
<p><b>STEP 7</b> ROM-booted ECM</p>	<p>Connect INSITE™ electronic service tool. If the ECM is ROM-booted, either the ECM will <b>not</b> communicate or INSITE™ electronic service tool will indicate the ECM is ROM-booted and <b>must</b> be calibrated.</p>
<p>OK Go To Next Step</p>	

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### Cause

#### **STEP 8**

Fuel drain-back to the fuel tanks

OK

Go To Next Step

#### **STEP 9**

Air in the fuel

OK

Go To Next Step

#### **STEP 10**

OEM fuel drain line not routed to the bottom of the fuel supply tank

OK

Go To Next Step

#### **STEP 11**

High exhaust restriction

OK

Go To Next Step

#### **STEP 12**

Stuck in-range or drifting fuel rail pressure sensor

OK

Go To Next Step

#### **STEP 13**

Plugged OEM fuel tank vent

OK

Go To Next Step

#### **STEP 14**

Fuel grade is **not** correct for the application or the fuel quality is poor

### Correction

Verify all suction side fuel line connections are tight and air is **not** allowed to enter the fuel system. Verify the suction side fuel filter is tight. Refer to Procedure 006-066 in Section 6.

Check for air in the fuel system. Refer to Procedure 006-003 in Section 6.

Verify the OEM fuel drain line is routed correctly to the bottom of the fuel tank. If the drain line is **not** routed to the bottom of the tank, air is allowed to enter the fuel system and the fuel will drain back to the tank on the suction side of the pump. This will cause a hard start condition after the engine is turned OFF for an extended period of time.

Measure the exhaust restriction. Refer to Procedure 011-009 in Section 11.

Relieve the fuel pressure from the high-pressure fuel rail by loosening the pump-to-rail line at the rail. Use INSITE™ electronic service tool to measure fuel rail pressure. The fuel rail pressure should read  $0 \pm 43$  bar [ $0 \pm 624$  psi]. Refer to Procedure 006-061 in Section 6.

Remove the fuel tank cap. If the engine starts properly with the fuel cap removed, inspect the fuel tank vent for plugging or restriction.

Operate the engine from a tank of known high quality fuel. Refer to Procedure 018-002 in Section V of the Operation and Maintenance Manual, PowerGen QSX15 CM2250, Bulletin 4310666.

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