


**IMPORTANT SERVICE  
INFORMATION FOR:**

- ✓ SERVICE MANAGER
- ✓ SERVICE ADVISOR
- ✓ TECHNICIAN
- ✓ PARTS DEPARTMENT
- ✓ WARRANTY PERSONNEL

BULLETIN NUMBER:  
**IB09-J-003B**

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GROUP:  
**ENGINE**

## Symptom Diagnosis – Engine Fuel System

### AFFECTED VEHICLES

2005-2010MY Isuzu N-Series  
2005-2010MY GMC/ Chevrolet W-Series Medium Duty Vehicles  
Equipped with 5.2L 4HK1-TC diesel engine

***This bulletin supersedes information bulletin IB09-J-003A. This bulletin is being revised to update diagnostic information. Please discard previous bulletin IB09-J-003A.***

### INFORMATION

The following table contains many possible causes for the following symptoms.

- Hard Start/No Start
- Rough, Misfire, Unstable or Incorrect Idle
- Surges, Lack of Power, Hesitation, Lag or Stumble

While some of these symptoms may lead to component replacement, the replacement should not be considered a completed repair. These types of symptoms have a high probability for a repeat repair since the true source of the failure is typically fuel contamination. In order to improve the overall repair and reduce the potential for repeat failures, the procedure below is provided to assist in identifying the source of fuel contamination. Additionally, this bulletin will provide information to clarify the meaning of injector balancing rates and how to apply the values when trying to diagnose the Isuzu common rail fuel system.

***Important: Balancing rates alone do not indicate a specific failure. Do not replace components solely based on balancing rate information.***

A balancing rate is defined as an adjustment to fuel volume for each cylinder at idle (below 1200RPM) as calculated by the ECM. A negative value indicates the fuel volume is lowered. A positive value indicates the fuel volume is increased. These balancing rates fluctuate positive or negative to compensate for temperature, internal engine friction, cylinder compression, injector performance and fuel quality to ensure stable idle speed. These values may react to certain type of internal engine, fuel system and electrical issues as the ECM tries to compensate to maintain the best possible stable idle. While the value may change drastically, the balancing rate alone does not indicate a specific failure. Additional information and testing is necessary in order to understand the reason for the change in balance rates.

The Inspection procedure in this bulletin will help guide the technician through the possible causes for the above listed symptoms. At some point, balancing rates may be monitored. However, do not replace components solely based on balancing rate information. This type of action will likely result in: additional diagnosis, delayed repair and expenses that may not be covered under warranty.

Use the [inspection form](#) at the end of this bulletin to record your finding as you work through this diagnosis. This information will be helpful should additional technical assistance be required. For additional technical assistance contact Isuzu Commercial Truck of America Technical Assistance at 1-877-478-9828 prompt #3.



## INSPECTION

Begin by reviewing the available repair history for the vehicle. Check The Isuzu Vehicle Information System (IVIS) for previous warranty repairs, your dealer's system for maintenance history and question the vehicle owner for maintenance history not performed at your dealer. Understanding this history information may be helpful in understanding the current condition. Next, inspect the following areas:

- [Fuel Filler Neck Inspection](#)
- [Water Separator Draining Procedure](#)
- Fuel line (hoses and pipes)

Improper installation or damage in these locations may allow water and other types of debris to enter the fuel system. Refer to the [Fuel Filler Neck Inspection Procedure](#) and the [Water Separator Draining Procedure](#) for additional information.

Step	DESCRIPTION	Value	Yes	No
1	Duplicate the Customer's Concern as listed above. Can the customer's concern be duplicated?	-	Go to Step 2	No Problem Identified
2	Check vehicle repair history for the following previous repairs. <ul style="list-style-type: none"> <li>▪ Injector replacement</li> <li>▪ Suction control valve (SCV)(Fuel rail pressure (FRP) regulator) replacement</li> <li>▪ Supply pump replacement</li> <li>▪ ECM replacement</li> <li>▪ Fuel filter replacement</li> <li>▪ Other fuel system components</li> <li>▪ Wiring repairs</li> </ul> Make a note of these previous repairs as these may affect the outcome of the diagnosis. Proceed to Step 3.	-	-	-
3	Visually inspect the fuel system for leaks or aftermarket additions. Take a fuel sample from the water separator (fuel filter) by referring to the Water Separator Draining procedure. (Be sure to drain any water before taking the fuel sample) Check the following: <ul style="list-style-type: none"> <li>▪ API Rating (use special tool J-38641-B)</li> <li>▪ Water</li> <li>▪ Gasoline</li> <li>▪ Debris (Dirt, Sand, Rust, Fungus)</li> <li>▪ Biodiesel above B5 (black contaminant in return line)</li> </ul> Was a problem found?	-	Go to Step 12	Go to Step 4
4	Does the engine start and continue to Idle?	-	Go to Step 5	Go to <a href="#">"Engine Cranks but Will Not Run"</a> in the Service Information
5	Install a scan tool and check for any DTCs even if the MIL is not illuminated. Were any DTCs present?	-	<a href="#">Go to DTC</a>	Go to Step 6
6	Start the engine and allow the engine to warm up to at least 140°F. Increase engine speed in 200 RPM increments from IDLE to W.O.T. and observe the Actual Fuel Rail Pressure and Desired Fuel Rail Pressure parameters with a scan tool. Allow 2-3 seconds between each 200 RPM increment to allow the rail pressure to stabilize. Record the values.  Is the difference between the actual and desired fuel rail pressure within the specified value?	± 290 psi (± 2MPa)	Go to Step 7	Go to <a href="#">"Fuel System Check"</a> in the Service Information



7	<p>Check the following Scan tool parameter values against the service information normal value ranges. If possible, compare against a known good vehicle.</p> <ul style="list-style-type: none"> <li>▪ APP (smooth change from 0% at no pedal to 100%)</li> <li>▪ BARO (outside barometric pressure reading with the key ON and engine OFF within 4kPa (Ex. Sea Level = 101kPa))</li> <li>▪ Boost Pressure (same value as the BARO with the key ON and engine OFF within 4kPa, then change from 15psi at idle to over 30psi at W.O.T under full acceleration)</li> <li>▪ ECT (should indicate the same value as the temperature of the engine coolant. Compare the ECT, IAT and FT sensor values when the vehicle has been sitting overnight. The readings should be within 5 degF (2 degC) of each other)</li> </ul> <p>Are all sensor values within normal ranges?</p>	-	Go to Step 8	Refer to Service Information for repair
8	<p><b><u>Important: Balancing rates alone do not indicate a specific failure. Do not replace components solely based on balancing rate information.</u></b></p> <p>Turn the engine "OFF" for one minute.</p> <p>Turn engine "ON" and let IDLE for 2 minutes. (Engine temp should be greater than 140°F)</p> <p>Raise the engine RPM above 1500 for 30 seconds.</p> <p>Allow RPM to return to IDLE (balancing rates will only update below 1200 RPM) for one minute.</p> <p>Monitor the Balancing Rates for cylinders 1 through 4.</p> <p>Balancing rates above (positive) the specification indicate additional fuel is being added to the combustion chamber. Balancing rates below (negative) the specification indicate fuel is being removed from the combustion chamber.</p> <p>Are any of the balancing rates greater than the specified value?</p>	See Service Manual	Go to Step 10	Go to Step 9
9	<p>If all tests were performed properly and no faults were found, review the following items for other potential causes of the customer's concern:</p> <ul style="list-style-type: none"> <li>▪ Injector flow rates incorrectly programmed in ECM</li> <li>▪ Poor fuel quality</li> <li>▪ Restricted Intake (air filter)</li> <li>▪ Restricted exhaust (catalyst/ DPF/exhaust brake)</li> <li>▪ Truck overweight (exceeding GVW)</li> <li>▪ Contaminated injector (intermittent)</li> <li>▪ Brake drag</li> <li>▪ Transmission performance</li> </ul>	-	-	-
10	<p>If the balancing rate is high in one or more cylinders, check the following:</p> <ul style="list-style-type: none"> <li>▪ Injector Flow Rate Programming</li> <li>▪ Exhaust Manifold Temperature Measurement <ul style="list-style-type: none"> <li>○ Using an infra red thermometer, measure the exhaust manifold temperature at exhaust port near the cylinder head. The area around each port should be within <math>\pm 20^{\circ}\text{F}</math> of each other. Any cylinder noticeably cooler indicates poor cylinder performance.</li> </ul> </li> <li>▪ Perform Cylinder Compression Test <ul style="list-style-type: none"> <li>○ Refer to the Compression Test section of the service manual for test procedures and specifications</li> </ul> </li> </ul> <p>Repair as necessary.</p> <p>Did you find and correct the condition?</p>	-	Go to Step 13	Go to Step 11



11	<p>Replace the affected injector that indicates a high balancing rate.</p> <p><b>Important: Injector Flow Rate must be programmed into the ECM as part of injector replacement.</b></p> <p>Did you complete the replacement?</p>	-	Go to Step 13	-
12	<p>The fuel system is contaminated. Find the source.</p> <p>Drain the fuel from the fuel tank. Collect the fuel in a clean container for inspection. Look for large debris, rust, discoloration, water or gasoline (Odor). See <a href="#">Fuel Tank Inspection Procedure</a>.</p> <p>Using a filter cutting tool SUM-900510 or equivalent cut open and inspect the fuel filter cartridge.</p> <p>If foreign material or corrosion is found, the affected component should be cleaned and flushed free of contamination or repaired as necessary.</p> <p>Was a problem found and repaired?</p>	-	Go to Step 1	-
13	<p>Reconnect all previously disconnected harness connector(s) or components.</p> <p>Turn OFF the ignition for 30 seconds.</p> <p>Turn the ignition "ON" with the engine "OFF".</p> <p>Clear any DTCs with the scan tool.</p> <p>Bleed the air from the fuel system. Refer to <a href="#">Fuel System Air Bleeding</a> in this section.</p> <p>Attempt to duplicate the customer's concern again.</p> <p>Can the customer's concern be duplicated?</p>	-	Go to Step 1	Problem Resolved



### Fuel Filler Neck Inspection Procedure

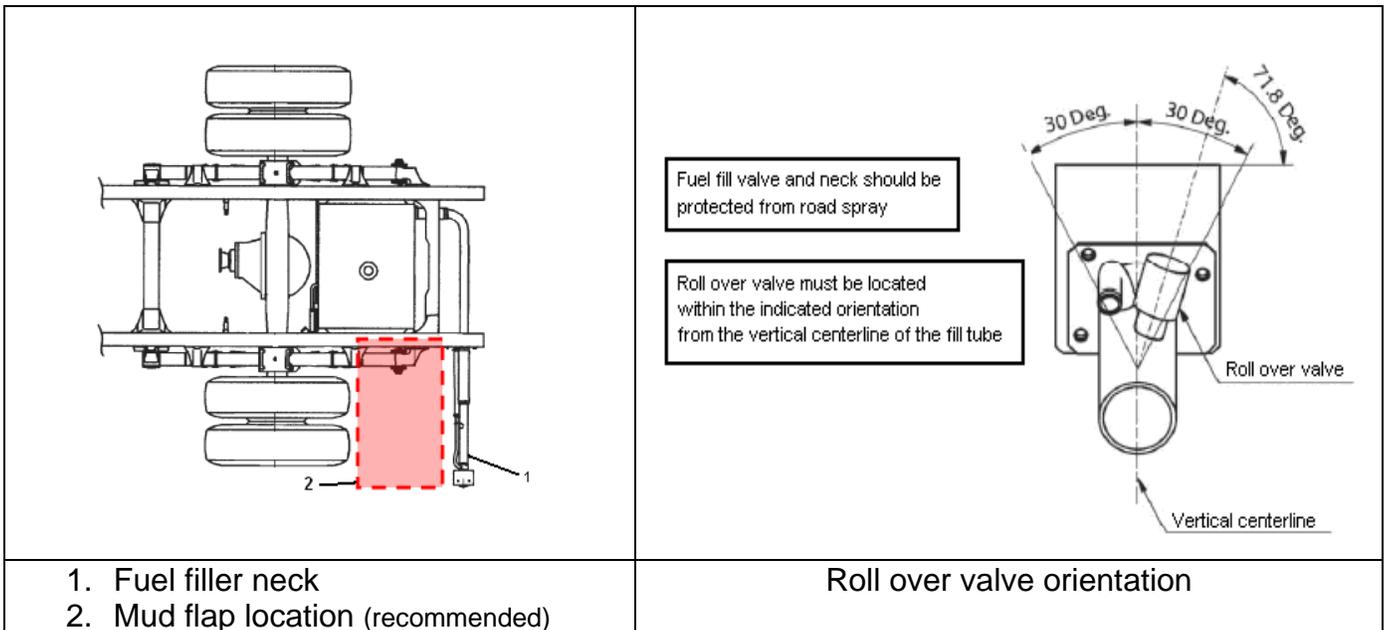
The following diagnosis might be helpful if the vehicle exhibits the symptom(s) described in this Bulletin

#### **Condition**

Engine misfire and/or lack of power possibly due to water/debris entering the fuel filler system and damaging the fuel system (filters, injectors, supply pump, etc.)

#### **Inspection:**

Inspect for evidence of water and debris inside the fuel fill neck, roll over valve and cap. Check that the roll over valve is positioned properly and free from debris. If your inspection reveals water and dirt intrusion of the fuel fill neck, roll over valve and/or cap, it is possible the fuel tank is ingesting water and/or debris.



#### **Correction:**

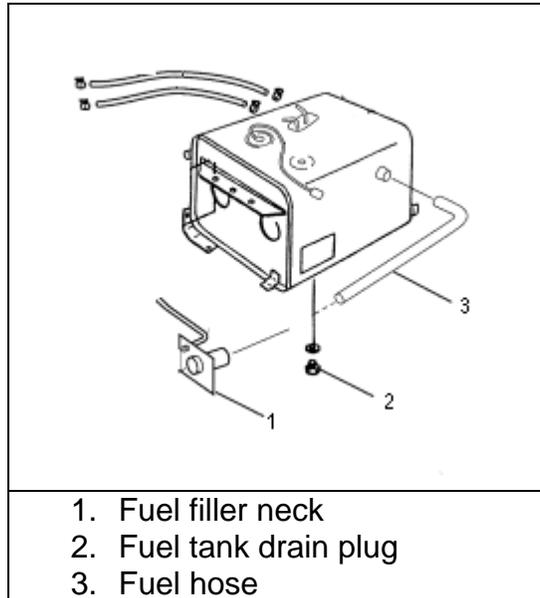
The information above is provided as a guideline for proper installation of the fuel filler neck assembly. Repair as necessary to ensure proper orientation of the roll over valve and installation of the fuel filler neck assembly to help prevent water and debris intrusion. Isuzu recommends mud flap installation between the filler neck and the rear axle. Refer to the Isuzu Body Builder Guide for more detailed information.

**Note:** Isuzu provides up-fitters and body companies the parts and the instructions for putting the fuel fillers together. The above illustration shows the housing/collar installed at the end of the filler neck. If the fuel tank fill neck collar is not installed, this may cause damage to the vehicle fuel system.



### Fuel Tank Inspection Procedure – In Vehicle

1. Inspect fuel tank fuel level.
2. Drain fuel from tank using drain plug (#2).
3. Remove fuel filler neck hose at rear of tank (#3).



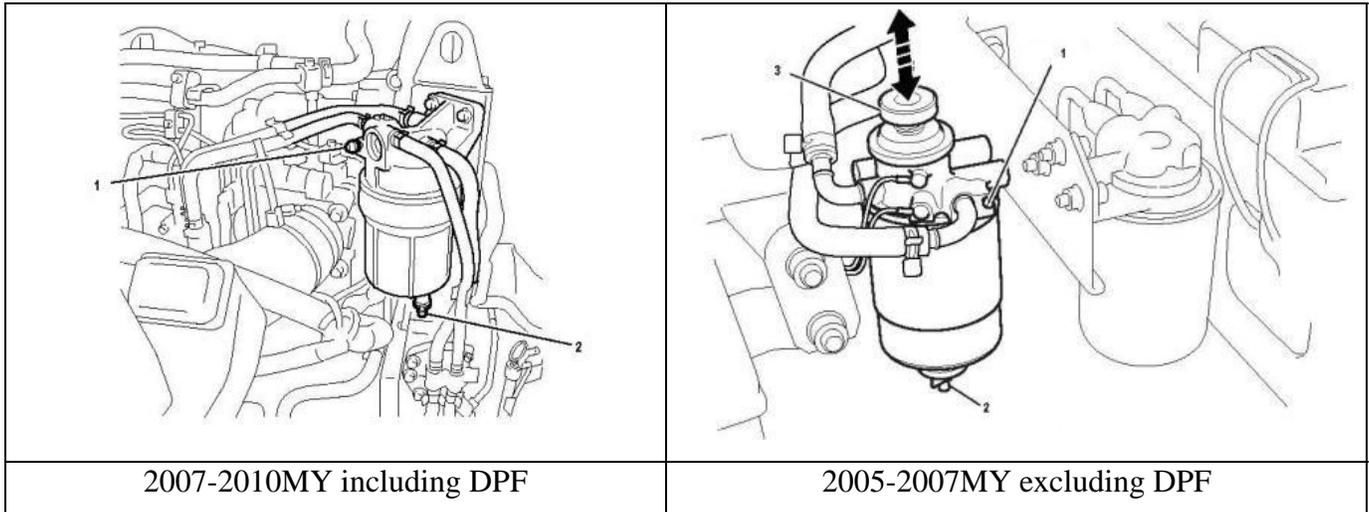
4. Using an inspection mirror (1¼"round, 26" extendable) and small flash light, look through the fuel tank opening and inspect the sides and top of the fuel tank for contamination or corrosion. With the mirror completely extended and the mirror positioned at 45 degrees, view the fuel pick up tube and sending unit for corrosion
5. If foreign material or corrosion is found in the fuel tank, remove the tank for cleaning and repair.
6. With the fuel lines (supply and return) disconnected at the fuel tank and at the filter/engine (fuel filter removed), flush through the lines using clean diesel fuel in an effort to remove any remaining contaminated fuel and foreign material.
7. Install the repaired fuel tank, the fuel filter and all fuel lines.



## Water Separator Draining Procedure

The purpose of the water separator is to clean the fuel of any dirt particles that can cause wear on the fuel injector sliding surface; and to separate any water from the fuel that may have formed in the fuel tank due to condensation. The water separator is located on the bottom of the fuel filter.

1. Place a drain pan directly below the drain plug.
2. Loosen the drain plug.
3. Loosen the air bleeding plug.
4. Drain the condensed water.
5. Retighten both plugs.
6. Pump the priming pump until the handle is firm.
7. Start the engine and check for any fuel or air leaks.



1. Air Bleed Plug
2. Drain Plug
3. Primer Pump



**Engine Fuel System Symptoms Diagnosis- Inspection Form**

Dealer Code	VIN	Repair Order #

**Fuel Filler Neck Inspection** (circle all that apply)

Mud flap placement (OK / NG) Roll over valve (OK / NG) Fuel Cap (OK / NG)

**Fuel Visual Inspection** (circle all that apply) – from Step 3

Gasoline OK Discolored Water Foreign Material

**Vacuum Test Results** from “Fuel System Check” (if applicable)

Engine Speed	Before filter replacement	After filter replacement	After filter head replacement
Idle			
W.O.T.			

**Fuel Rail Pressure** – from Step 6

Idle		W.O.T.	
Actual	Desired	Actual	Desired

**Balancing Rates** – from Step 8

Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4

**Compression Test Results** – from Step 10 (if applicable)

Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4

**Fuel Tank Inspection** (circle all that apply) - from Step 12.

OK Discolored Water Foreign Material Rust