



**IMPORTANT SERVICE
INFORMATION FOR:**

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

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GROUP:
FUEL AND EXHAUST

DIESEL FUEL CONTAMINATION

AFFECTED VEHICLES

- Isuzu Vehicles equipped with:
3.0L (4JJ1) and 5.2L (4HK1) diesel engines

INFORMATION

Damage to fuel systems, including to both low and high pressure components, often results from fuel contamination. Operating a vehicle's diesel engine on fuels and additives that do not meet the vehicle manufacturer's specifications for lubrication and cooling, or that have improper anti-corrosion properties, can cause drivability problems as well as component damage or even failure.

Due to the tight tolerances on modern diesel engines, contaminants such as water can dilute the lubricating properties of diesel fuel and cause engine damage. For instance, water can lead to acid forming in the fuel system, which can be extremely caustic and harmful to the engine.

Contamination of high pressure fuel system components may cause symptoms including, but not limited to, the following:

- Crank, but no start
- Long crank/Hard start
- Running rough
- Low power
- Fuel pressure-related DTCs
- DPF unable to regenerate
- Engine knocking
- Exhaust smoke
- Fuel rail pressure (FRP) slow to build

Most common sources of contamination:

- Contaminated fuel source
- Above and below ground fuel storage tanks
- Use of fuel stored for long periods
- Not draining water at proper intervals
- Fueling errors (e.g. introducing gasoline or DEF fluid into the fuel tank/s)
- Decomposing Bio-diesel
- Improperly positioned fuel filler neck
- Improperly installed rollover valve

Some examples of fuel contamination:

Identifiable in shop

- Water content exceeds specification
- DEF (Diesel Exhaust Fluid)
- Gasoline
- Organic Growth (Bacteria, Fungus)

May require external testing

- Aged/Oxidized Fuel
- Unapproved fuel additives
- Fuel with High TAN (Total Acid Number) – Acidic Fuel




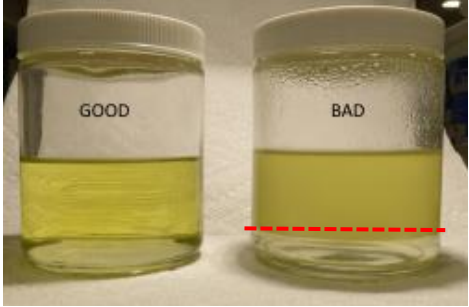
NOTE: If you are unable to identify the contaminant it may be necessary to send a sample of fuel out to a fuel analysis lab for contamination identification.


SERVICE PROCEDURE

CONTAMINATION DIAGNOSIS CHART

Step	Action	Value(s)	Yes	No
1	Obtain a fuel sample from the Water Separator using a clean, clear, dry container that is appropriate for holding fuel. Allow the fuel sample to sit for approximately 15 minutes. Compare the sample to the photos of contaminated fuel in Table 1. Does the fuel appear to be contaminated?	See photos in Table 1	Go to Step 2	Go to Step 3
2	Follow the recommended procedure based on the appearance of the fuel as compared to the photos in Table 1 and repair as necessary. Was a problem found and corrected?		Go to Step 4	Go to Step 3
3	Obtain a fuel sample from the bottom of the fuel tank(s). Perform a specific gravity test and record the results. Is the reading within specification?	API Gravity No1 Diesel 39-44 No2 Diesel 30-39	Go to Step 4	Go to Procedure B
4	1. Clear any DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. Are there any DTCs or conditions that you have not diagnosed?		Go to Diagnostic Aides	System OK

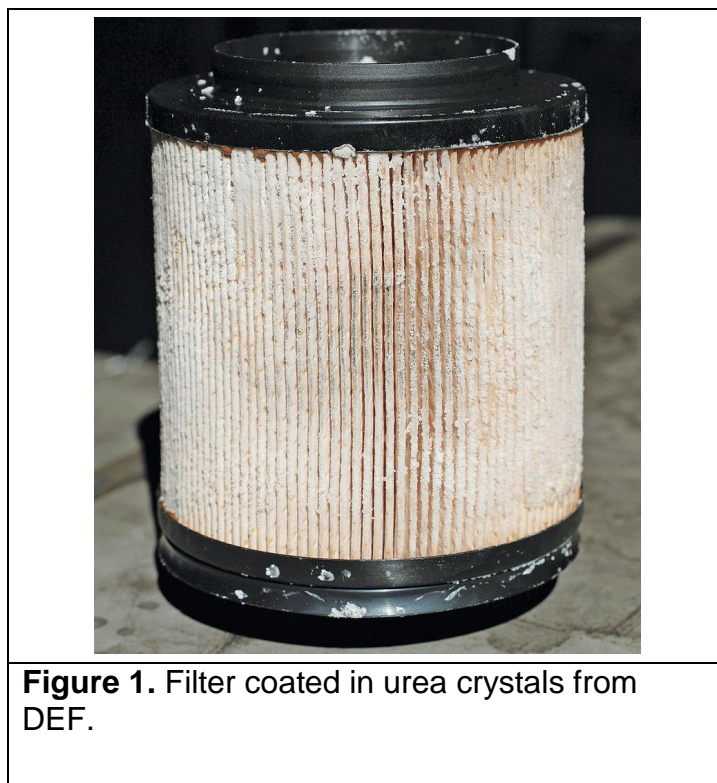
TABLE 1

Condition	Image	Procedure	Note
Rust		B	<p>Red, orange, brown debris.</p> <p>Cloudy</p> <p>Grainy sedimentation</p> <p>Metal components may have rust on them</p>
Organic		B	<p>Sedimentation in fuel tank.</p> <p>May have floating particles.</p> <p>Powdery sedimentation</p>
Gasoline		B	<p>No visual difference.</p> <p>May smell like gasoline.</p>
Water		B	<p>Diesel and Water will separate with the diesel fuel on top.</p> <p>Appears cloudy.</p>

DEF		A	<p>Diesel and DEF will separate with the diesel fuel on top.</p> <p>Perform DEF Contamination Check.</p>
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DEF CONTAMINATION CHECK

1. If the contaminant is suspected to be DEF, verify by removing the Water Separator Cover, Primary Fuel Filter Element, and let the element and cover dry for two (2) hours. If DEF is present, crystalized DEF may be visible inside the Water Separator Cover, Upper Housing, Primary Fuel Filter and the Secondary Fuel System ports. See Figure 1 for reference.
 - If DEF contamination is found during inspection follow Procedure A to repair the vehicle.
 - If no there is no indication of DEF contamination follow Procedure B,



PROCEDURE A – WATER OR DEF CONTAMINATION

1. Remove cap from fuel tank.
2. Disconnect suction line from the water separator.
3. Use air to push fuel and contaminants into fuel tank.
4. Reconnect suction line to water separator.
5. Clean the fuel tank.
 - Drain fuel into an appropriate storage container.
 - Remove fuel tank. Refer to workshop manual for procedure.
 - Inspect fuel tank for signs of damage, (example: water = rust).
 - Thoroughly clean the fuel tank.
 - Install fuel tank. Refer to workshop manual for procedure.
 - Fill fuel tank to $\frac{1}{4}$ full with clean, fresh, and good quality diesel fuel.

IMPORTANT: To prevent contaminated fuel from re-entering the system, be sure to remove all contaminated fuel from the fuel tank.

IMPORTANT: Be sure to properly dispose of contaminated fuel in accordance to local laws and guidelines.

6. Replace both the sedimenter cartridge and fuel filter.

On 4HK1 remove, inspect the fuel screen on the back of the fuel pump for signs of damage due to fuel contamination.
7. Replace all metal high pressure fuel system components.
 - Fuel pump
 - Injector lines
 - Fuel rail
 - Fuel injectors
 - Injector return hose
 - 4HK1, replace fuel screen on back of fuel pump

NOTE: If there are no signs of physical damage, the low pressure fuel lines can be reused.

8. Disconnect the return line to fuel tank.
9. Place return line into a suitable recovery container at least 2 gallons in size.
10. Disable fuel injectors.
 - 3.0L: Disconnect individual injectors on the top of the cylinder head cover. See Figure 8.
 - 5.2L: Disconnect all injectors by disconnecting harness connector H108. See Figure 9.

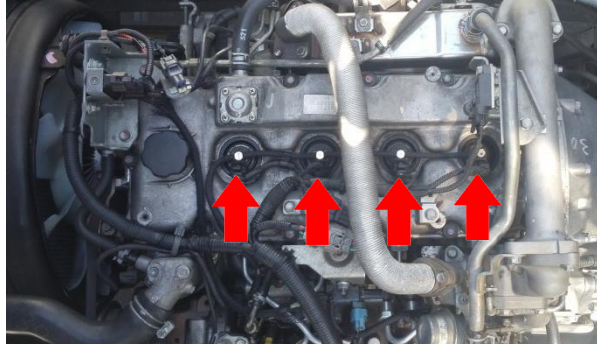


Figure 8: 4JJ1 connectors E5, E6, E7, and E8



Figure 9: 4HK1 connector H108

11. Crank the engine in 30 second time intervals, with a 1 minute cool down in between, until 1 gallon of fuel has accumulated into the recovery container.
12. Reconnect the fuel return line.
13. Reconnect the fuel injectors. Refer to workshop manual for procedure.
14. Attempt to start the engine.
 - If the engine starts, let it run for 15 minutes. Verify injector balance rates are normal. Check for engine noise. Verify proper fuel pressure track.
 - On a 4HK1 verify proper low side fuel pressure.
 - If the engine does not start, go to the hand primer pump and operate approx., 30 strokes, or until there is firm resistance. Re-attempt engine start.
15. Stop engine
16. Clean any fuel spillage from engine.
17. Bleed fuel system. Refer to workshop manual for procedure.
18. Start vehicle and check that there are no fuel system leaks. Repair as necessary.
19. Return to Step 4 of the Contamination Diagnosis Chart

PROCEDURE B - Organic, Rust, Gasoline or Kerosene Contamination

1. Remove cap from fuel tank.
2. Disconnect suction line from the water separator.
3. Use air to push fuel and contaminants into fuel tank.
4. Reconnect suction line to water separator.
5. Clean the fuel tank.
 - Drain fuel into an appropriate storage container.
 - Remove fuel tank. Refer to workshop manual for procedure.
 - Inspect fuel tank for signs of damage, (example: water = rust).
 - Thoroughly clean the fuel tank.
 - Install fuel tank. Refer to workshop manual for procedure.
 - Fill fuel tank to $\frac{1}{4}$ full with clean, fresh, and good quality diesel fuel.
6. Disconnect the return line to fuel tank.
7. Place return line into a suitable recovery container at least 2 gallons in size.
8. Disable fuel injectors.
 - 3.0L: Disconnect individual injectors on the top of the cylinder head cover. See Figure 8.
 - 5.2L: Disconnect all injectors by disconnecting harness connector H108. See Figure 9.
9. Crank the engine in 30 second time intervals, with a 1 minute cool down in between, until 1 gallon of fuel has accumulated into the recovery container.
10. Reconnect the fuel return line.
11. Reconnect the fuel injectors. Refer to workshop manual for procedure.
12. Attempt to start the engine.
 - If the engine starts, let run for 15 minutes. Verify injector balance rates are normal. Check for engine noise. Verify proper fuel pressure track.
 - On a 4HK1 verify proper low side fuel pressure.
 - If the engine does not start, go to the hand primer pump and operate approx., 30 strokes, or until there is firm resistance. Re-attempt engine start.
13. Stop engine
14. Clean any fuel spillage from engine.
15. Bleed fuel system. Refer to workshop manual for procedure.
16. Start vehicle and check that there are no fuel system leaks. Repair as necessary.
17. Return to Step 4 of the Contamination Diagnosis Chart