SB-10057199-6980

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| **Major System:** | ENGINES | **Created:** | 6/3/2014 |
| **Current Language:** | English | **Last Modified:** | 11/18/2014 |
| **Other Languages:** | NONE | **Author:** | Amber Chapman |
| **Viewed:** | 790 | | |

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**Title: MaxxForce 11/13/15L and N13 Metal in the Fuel System and/or Noise from the High Pressure Fuel Pump**

**Applies To: 2010 Emissions MaxxForce 11, 13, 15L, 2013 N13 with SCR**

## CHANGE LOG

2014/11/18 - Fixed Quick Links (note, no repair instructions in doc), added info to description and symptoms
2014/11/17 - Updated coding (publish external)
2014/11/14 - Adding SRT links for flushing procedure.
2014/10/20 - Added details to the flushing step.
2014/06/18 - Correcting SRT links for 15L.
2014/06/11 - New article release

## QUICK LINKS


| | | | |
|---|---|---|---|
| Description | Symptoms | Tools | Parts |
| Diagnostics | Repair-Removal | Repair-Installation | Warranty |


## DESCRIPTION

In cases of low pressure fuel system failure, the fuel pump may send debris into the fuel lines and tank. This document is supplement to the fault code action plan iKNow articles and contains steps to diagnose and correct the metal debris in the low pressure side of the fuel system.

Though the low pressure pump is part of the high pressure pump assembly, it is important to note the high pressure fuel side of the system is not affected during this type of failure. The debris comes from the low pressure return side of the system and gets caught by the fuel filters--it has no opportunity to reach the high pressure components. Therefore, do NOT replace the injectors, fuel rail, high pressure lines, DSI, or AFI for this failure.

## SYMPTOMS

• Large and small amounts of metal debris in the fuel system
• Noise from the High Pressure Fuel Pump area
• Fuel system diagnostic trouble codes

***POTENTIAL* Diagnostic Trouble Codes:**

Complete DTCs through appropriate iKNow articles (Fault Code Action Plans) first.

| DTC/Light | Description |
|---|---|
| SPN 94 FMI 0 | Fuel Delivery Pressure Above Maximum |
| SPN 3055 FMI 0 | FRP Exceed Maximum |
| SPN 3055 FMI 1 | No Start due to Low Rail Fuel Pressure |
| SPN 3055 FMI 15 | FRP Below Minimum with Maximum Command |
| SPN 3055 FMI 17 | FRP Above Maximum with Minimum Command |

**Customer Observations or Concerns:**

• High return pressure
• Aeration on supply side
• Inlet restriction on supply side
• Debris in fuel tank
• Noise

## SPECIAL TOOLS

| Tool Description | Tool Number | Comments | Instructions |
|---|---|---|---|
| Fuel Priming Tool | 12-922-01 | | |
| Clean Fuel Source Tool | 15-637-01 | Only if necessary | |
| Compucheck Fitting | ZTSE4526 | For fuel restriction or fuel return pressure test, if necessary | |
| Pressure Test Kit | ZTSE4409 | For fuel restriction test, if necessary | |
| Fuel Pressure Gauge | ZTSE4681 | For fuel return pressure test, if necessary | |
| Fuel Inlet Restriction/Aeration Tool | ZTSE4886 | For fuel restriction test, aeration test, or fuel return pressure test, if necessary | |
| Fuel Block Off Tool | ZTSE4905 | For fuel restriction test and aeration test, if necessary | |
| Fuel Line Coupler | ZTSE4906 | | |

Link to Tools Resource Center

## SERVICE PARTS INFORMATION

| Kit Description | Part Number | Quantity Required | Notes |
|---|---|---|---|
| High pressure fuel pump Kit 11L/13L/N13 | 3007641C94 | 1 | If required |
| High pressure fuel pump Kit 15L | 3014489C91 | 1 | If required |
| Kit, Fuel Filter 13L primary, chassis mounted | refer to Parts Catalog | 1 | If required |
| Kit, Fuel Filter, secondary, engine mounted | 3004473C93 | 1 | If required |
| | 3004477C92 | 1 | |

| | | | |
|---|---|---|---|
| Kit, Fuel Primer Pump and Strainer 13L | | | If required, Restriction Test Point or Aeration Test |
| Hose Assy, Fuel Drain (return line HPFP to tank | 3005913C1 | 1 | If required, Fuel Return Pressure test |

## DIAGNOSTIC STEPS

| Step | Action | Decision |
|---|---|---|
| 1 | • Connect the Clean Fuel Source Tool directly to Low Pressure inlet and High Pressure return.<br>• With a pickup magnet in the tool fuel tank, start and run the engine at idle speed for 5 minutes, while checking the return line discharge from the pump for metallic debris.<br>Is magnetic metallic debris present? | **Yes**. Go to **Step 2**.<br>**No**. Debris in fuel system is residual from manufacturing or from a previous failure. The fuel filters will prevent High Pressure Pump damage of this nature.<br>If only noise from High Pressure Pump is present, proceed to **Step 12.**<br>If no debris is found and no noise is present, diagnose other symptoms and fault codes related to the customer concern |

| Step | Action | Decision |
|---|---|---|
| 2 | • Check fuel for other signs of contamination, such as water, waxing, icing, or DEF.<br>Is fuel contaminated with something other than metal? | **Yes**. Discard fuel. Open a case file with Tech Services. Go to **Step 4**.<br>**No**. Go to **Step 3**. |

| Step | Action | Decision |
|---|---|---|
| 3 | • Drain fuel from fuel tanks.<br>• Save fuel and run through priming cart to filter and reuse.<br>• Remove any anti-siphon shields for the fuel filter neck.<br>Note: Debris in the tank will be removed in a later step, after cleaning fuel lines. | Go to **Step 4**. |

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**For the remaining steps, please reference the items in the image below.**

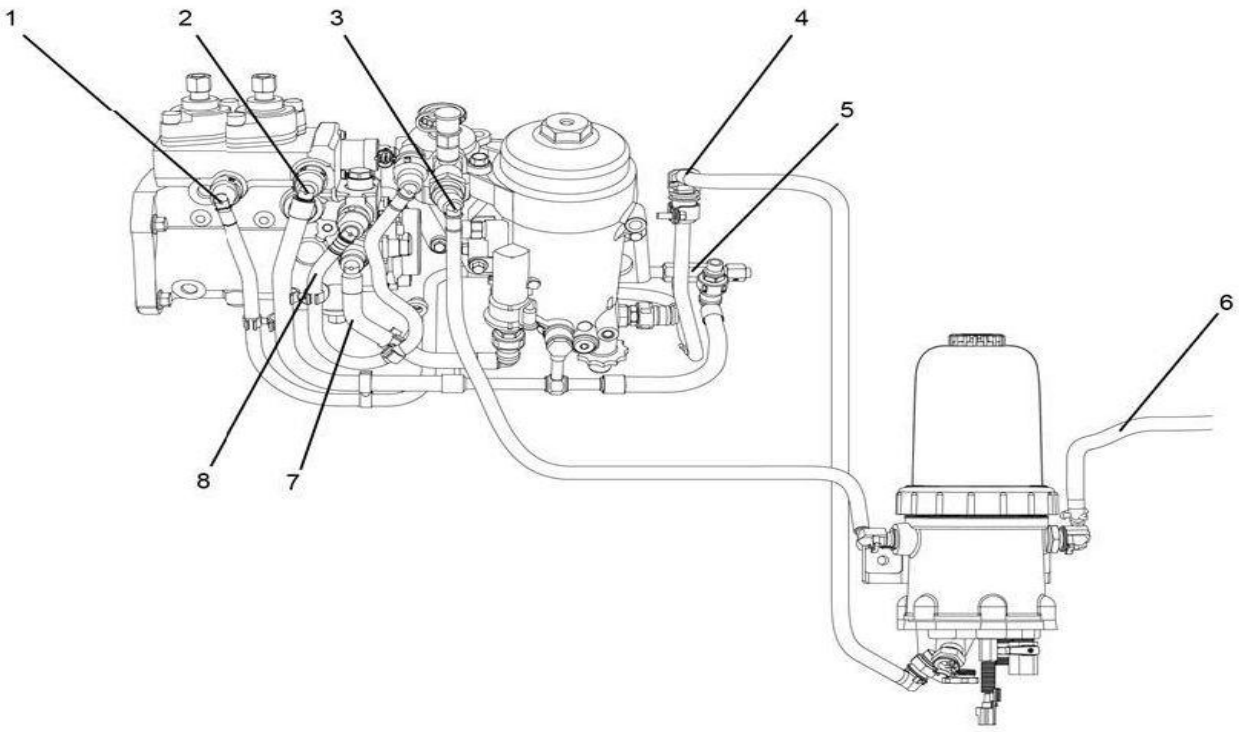


**Figure 1: Low Pressure Fuel System**

**Item 1**: High Pressure Return Line (Fuel drain hose)
**Item 2**: High Pressure Supply Line (After filter supply hose)
**Item 3**: Hand Primer Supply Line
**Item 4**: Fuel Return Line
**Item 5**: "T" fitting
**Item 6**: Fuel filter Supply Line
**Item 7**: PreFilter Fuel Supply Hose
**Item 8**: PrePump Fuel Supply Hose

| Step | Action | Decision |
|---|---|---|
| **4** | Using the Fuel Priming Tool,<br>• Remove the primer pump, remove sight bowl and clean out.<br>• Open the drain valve on the frame mounted Primary fuel filter module.<br>• Back flush from the primer pump inlet into the frame mounted Primary filter (**Figure 1**, item 3)<br>• Remove frame mounted Primary filter and flush bowl into drain container.<br>• Reinstall primer pump. | Go to **Step 5**. |

| Step | Action | Decision |
|---|---|---|
| **5** | • Remove and manually flush the prepump fuel supply hose (**Figure 1**, item 8). | Go to **Step 6**. |

| | | |
|---|---|---|
| | • Set aside for later installation. | |

| Step | Action | Decision |
|---|---|---|
| 6 | • Open the drain valve on the secondary engine-mounted filter module.<br>• Disconnect pump side of the prefilter fuel supply hose and flush (Fig 1, item 7).<br>• Remove secondary fuel filter.<br>• Flush and drain secondary filter module. | Go to **Step 7**. |

| Step | Action | Decision |
|---|---|---|
| 7 | • Remove High Pressure pump return line (**Figure 1**, item 1) to metal "T" located near DSI (**Figure 1**, item 5).<br>• Clean the tee fitting of metal shavings/blockage and reinstall.<br>• Inspect HP pump return line (**Figure 1**, item 1)for physical damage.<br><br>Is the HP pump return line physically damaged? | **Yes:** Replace HP pump return line.<br>Go to **Step 8**.<br><br>**No:** Remove debris from restriction point and ensure line is clean. Go to **Step 8**. |

| Step | Action | Decision |
|---|---|---|
| 8 | • Back flush the frame mounted filter supply lines (**Figure 1**, Item 6) into the fuel tanks. | Go to **Step 9**. |

| Step | Action | Decision |
|---|---|---|
| 9 | • Forward flush fuel return line (**Figure 1**, Item 4) from engine mounted return.<br><br>Forward flush from frame mounted filter through the return lines back to the fuel tanks.<br><br>Note: This forces any chassis side debris into the tanks and allows effective tank flushing. | Go to **Step 10**. |

| Step | Action | Decision |
|---|---|---|
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| **10** | • Use the priming cart and flexible hose attachment (with the fuel tank drain plug removed) to flush the fuel tanks through the filler neck.<br><br>Note: The focus is to get the majority of debris out of the tanks, so the tanks do not need to be removed from the chassis or steam cleaned. | Go to **Step 11**. |

| Step | Action | Decision |
|---|---|---|
| **11** | Once the system is flushed:<br>• Install new Primary Fuel Filter<br>• Install new Secondary Fuel filter<br>• Install High Pressure Fuel Pump<br>• Reinstall all lines<br>• Use the fuel priming tool to prime the system.<br><br>Note: Do not use the hand primer and **NEVER** crank the engine to prime. The filters will catch any remaining debris. | Run the engine to bleed the fuel system and proceed to **Step 12** to address root cause of the High Pressure Pump failure. |

| Step | Action | Decision |
|---|---|---|
| **12** | • Check for restriction in low pressure fuel system. Perform Fuel Restriction Test.<br><br>Is fuel system free of restriction (13 to 17 inHg)? | **Yes:** Go to **Step 13**.<br><br>**No:** Repair restriction in low pressure fuel system according to Fuel Restriction Test. |

| Step | Action | Decision |
|---|---|---|
| **13** | • Check for restricted fuel return line. Perform HP Pump Fuel Return Pressure Test.<br><br>Is pressure < 13 psi? | **Yes:** Go to **Step 14**.<br><br>**No:** Repair restriction in fuel return line between high-pressure fuel pump and fuel tank. |

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| Step | Action | Decision |
|---|---|---|
| 14 | • Check for aeration in low pressure fuel system. Perform Fuel Aeration Test.<br><br>Is the fuel system free from aeration? | **Yes:** Release Unit |
| | | **No:** Repair aeration in low pressure fuel system according to Fuel Aeration Test |

## WARRANTY INFORMATION

**Claim Requirements/Approvals:**

There are no special requirements for this repair.

**Warranty Claim Coding:**

| | |
|---|---|
| **Group:** | 12000 - Engine |
| **Noun:** | 454 - High Pressure Fuel Pump |

**Standard Repair Times:**

| Description | Chassis | Engine | Code | Time |
|---|---|---|---|---|
| Drain and Fill Fuel Tank - Note: for second tank only, the first is covered in Flushing SRT) | 100 gal or larger tank | All | B15-100-2 | 0.6 |
| Drain and Fill Fuel Tank - Note: for second tank only, the first is covered in Flushing SRT) | Up to 100 gal tank | All | B15-100-3 | 0.4 |
| HPFP Return Line (if indicated by HP Pump Fuel Return Pressure Test) | All | All | T-Time | 0.2 |
| Flush, Replace Fuel Filters, Prime | WorkStar | 2010+ MaxxForce 11/13 | N12-7454U-1 | 1.1 |
| Flush, Replace Filters, Prime | TranStar | 2010+ MaxxForce 11/13 | Q12-7454U-1 | 1.1 |
| Flush, Replace Filters, Prime | ProStar | 2010+ MaxxForce 11/13 | R12-7454U-1 | 1.1 |
| | | | | |

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|---|---|---|---|---|
| Flush, Replace Filters, Prime | LoneStar | 2010+ MaxxForce 11/13 | S12-7454U-1 | 1.1 |
| Flush, Replace Filters, Prime | PayStar | 2010+ MaxxForce 11/13 | T12-7454U-1 | 1.1 |
| Flush, Replace Filters, Prime | WorkStar | N13 | N12-7454US-1 | 1.1 |
| Flush, Replace Filters, Prime | TranStar | N13 | Q12-7454US-1 | 1.1 |
| Flush, Replace Filters, Prime | ProStar | N13 | R12-7454US-1 | 1.1 |
| Flush, Replace Filters, Prime | LoneStar | N13 | S12-7454U-1 | 1.1 |
| HPFP & Gear, Replace | PayStar | 2010+ MaxxForce 11/13 | T12-7454U-20 | 3.0 |
| HPFP & Gear, Replace | WorkStar | 2010+ MaxxForce 11/13 | N12-7454U-20 | 3.0 |
| HPFP & Gear, Replace | TranStar | 2010+ MaxxForce 11/13 | Q12-7454U-20 | 3.0 |
| HPFP & Gear, Replace | LoneStar | 2010+ MaxxForce 11/13 | S12-7454U-20 | 3.0 |
| HPFP & Gear, Replace | ProStar | 2010+ MaxxForce 11/13 | R12-7454U-20 | 3.0 |
| HPFP & Gear, Replace | TranStar | N13 | Q12-7454US | 4.0 |
| HPFP & Gear, Replace | ProStar | N13 | R12-7454US | 3.0 |
| HPFP & Gear, Replace | WorkStar | N13 | N12-7454US | 3.0 |
| HPFP & Gear, Replace | 9900i | MaxxForce 15 | FA12-7454O | 3.9 |
| HPFP & Gear, Replace | ProStar | MaxxForce 15 | R12-7454O | 3.9 |
| HPFP & Gear, Replace | PayStar | MaxxForce 15 | T12-7454O | 3.9 |
| Fuel Primer Pump (if needed) | WorkStar | 2010+ MaxxForce 11/13 | N15-3922U | 0.9 |
| Fuel Primer Pump (if needed) | TranStar | 2010+ MaxxForce 11/13 | Q15-3922U | 0.9 |
| Fuel Primer Pump (if needed) | ProStar | 2010+ MaxxForce 11/13 | R15-3922U | 0.9 |

| | | | | |
|---|---|---|---|---|
| Fuel Primer Pump (if needed) | PayStar | 2010+ MaxxForce 11/13 | T15-3922U | 0.9 |
| Restriction Test Point 1 | ProStar | 2010+ MaxxForce 11/13 | R12-2186U | 0.3 |
| Restriction Test Point 2 | ProStar | 2010+ MaxxForce 11/13 | R12-2187U | 0.2 |
| Restriction Test Point 3 | ProStar | 2010+ MaxxForce 11/13 | R12-2188U | 0.2 |
| Restriction Test Point 1 | ProStar | MaxxForce 15 | R12-2045O | 0.3 |
| Restriction Test Point 2 | ProStar | MaxxForce 15 | R12-2045O-20 | 0.2 |
| Restriction Test Point 3 | ProStar | MaxxForce 15 | R12-2045O-21 | 0.2 |
| Restriction Test Point 1 | ProStar | N13 | R12-2186US | 0.3 |
| Restriction Test Point 2 | ProStar | N13 | R12-2187US | 0.2 |
| Restriction Test Point 3 | ProStar | N13 | R12-2188US | 0.2 |
| HPFP Fuel Return Pressure Test | ProStar | 2010+ MaxxForce 11/13 | R12-2192U | 0.3 |
| HPFP Fuel Return Pressure Test | ProStar | N13 | R12-2192US | 0.3 |
| Aeration Test Point 1 | ProStar | 2010+ MaxxForce 11/13 | R12-2184U | 0.2 |
| Aeration Test Point 2 | ProStar | 2010+ MaxxForce 11/13 | R12-2185US | 0.3 |
| Aeration Test Point 1 | 9900i | MaxxForce 15 | FA12-2044O | 0.2 |
| Aeration Test Point 2 | 9900i | MaxxForce 15 | FA12-2044O-20 | 0.3 |
| Aeration Test Point 1 | ProStar | N13 | R12-2184US | 0.2 |
| Aeration Test Point 2 | ProStar | N13 | R12-2185US | 0.3 |

SRT Manual

## OTHER RESOURCES

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