

Technical Service Bulletin Number
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TSB140019



Technical Service Bulletin

Subject

Fuel Pump - Plunger and Tappet Roller Inspection and Repair

Warranty Statement

The information in this document has no effect on present warranty coverage or repair practices, nor does it authorize TRP or Campaign actions.

Contents

Product Affected

- ISX12 CM2350 X102
- ISX12/ISX11.9 CM2250
- ISX15 CM2250
- ISX15 CM2250 SN
- ISX15 CM2350 X101
- PowerGen QSX15 CM2250
- PowerGen QSX15 CM2250 ECF
- QSX11.9 CM2250 ECF
- QSX15 CM2250 ECF
- QSX15 CM2350 X105
- QSX15 CM2350 X106

This document, in conjunction with the information provided within the manuals listed in Table 1 provides inspection and repair guidelines following the malfunction of a fuel pump pumping plunger and/or roller tappet assembly.

The level of progressive damage to the fuel pump and other engine components will vary with every incident; however, the repair direction will depend on **only** a few key criteria.

Previous versions of this document provided specific repair directions according to the vintage of the fuel pump and type of pumping plungers. Repair directions have now been made common and apply to all fuel pumps regardless of vintage, pumping plunger type, or tappet roller assembly type.



Figure 1, Fractured Fuel Pump Ceramic Pumping Plunger on CM2250 Engines.



Figure 2, Fuel Pump Tappet Roller Assemblies.

Preliminary Inspection and Repair Direction for all Fuel Pump Malfunctions

If a broken tappet spring or spring retainer is found, see Technical Service Bulletin, Fuel Pump Head Barrel Assembly Serviceability – Spring and Spring Retainer, TSB170015 for repair direction.

Inspect and verify the condition of the fuel pump tappet rollers and fuel pumping plungers if ceramic (CM2250 only). Reference Figure 1 and Figure 2 above and Procedure 005-227 in Table 3 below.

Scenario 1: The fuel pump taper rollers are damaged or ceramic pumping plunger damage is found:

- Remove, cut open, and inspect the lubricating oil filter for debris. See Procedure 007-083 in Table 3.
- Connect INSITE™ electronic service tool to the service tool data link and review any logged fault codes.
- Reference Table 1 below for repair direction.

Scenario 2: The fuel pump tappet rollers and ceramic pumping plungers are **not** damaged:

- Connect INSITE™ electronic service tool to the service tool data link and review any logged fault codes. Follow appropriate fault code or symptom based troubleshooting in EDS or QuickServe® Online (QSOL).

Table 1, Repair Direction Decision Matrix		
Symptoms	Are Any Symptoms Present?	Repair Direction to Follow
<ul style="list-style-type: none"> • Non-wear debris or particles are evident in the lubricating oil filter element. • Fault Codes 415 or 143 are logged in the engine control module (ECM) within the last 8 hours of engine operation. • Engine is seized, or engine rotating assembly produces abnormal noise. 	Yes	Repair Direction A
	No	Repair Direction B

CAUTION

Immediately upon removal of the lubricating oil cooler assembly, a plug must be inserted into the housing and cylinder block oil passage drillings. Failure to insert the oil passage plug can result in a bearing failure, crankshaft failure, or both.

CAUTION

Do not allow dirt or foreign material to enter oil passages in the cylinder block when cleaning the gasket sealing surfaces. Connecting rod bearing failures can be caused if debris is introduced into the cylinder block or lubricating oil cooler housing oil passages. Therefore, use of power tools combined with abrasive pads to clean gasket surfaces is not recommended.

Repair Direction A:

1. Drain lubricating engine oil. See Procedure 007-037 in Table 3.
2. Remove lubricating oil pan, and clean thoroughly. See procedure 007-025 in Table 3.
3. Remove and inspect lubricating oil pump for reuse. See Procedure 007-031 in Table 3.
4. Remove number 1 and number 4 main bearing caps and main bearings. See procedure 001-006 in Table 3.
5. Inspect number 1 and number 4 main journals of crankshaft for reuse. See Service Bulletin Crankshaft Reuse Guidelines for Cummins® Engines, Bulletin 5411180.
 - If crankshaft meets reuse guidelines:
 - Inspect number 1 and number 4 main bearings for signs of significant debris embedding. If significant debris is found, remove number 1 and number 4 connecting rod bearings for inspection.
 - If damage is observed on number 1 and number 4 connecting rod bearings, roll new connecting rod bearings in on all six journals. See Procedure 001-006, 001-007, and 001-014 in Table 3.
 - Roll new main bearings in on all seven main journals and install new thrust bearings on number 4 main journal.
 - If crankshaft does **not** meet reuse guidelines:
 - Dealers should contact RAPIDSERVE™ Catastrophic group for pre-authorization if engine is under warranty.
 - Cummins® Distributors should follow their local catastrophic process or contact RAPIDSERVE™ for repair direction if engine is under warranty.
6. Repair fuel pump. Table 2 below **must** be referenced for specific instruction by product type. See Procedure 005-016 in Table 3 below.
7. Thoroughly clean lubricating oil cooler housing. See Procedure 007-003 in Table 3.
8. Replace following lubricating oil system components:
 - Lubricating oil cooler element. See Procedure 007-007 in Table 3.
 - Lubricating oil filter bypass valve. See Procedure 007-014 in Table 3.
 - Lubricating oil thermostat. See Procedure 007-039 in Table 3.
9. Install lubricating oil pan and other components removed to access main bearings. See procedure 007-025 in Table 3
10. Install a new lubricating oil filter. See Procedure 007-013 in Table 3.
11. Prime and fill the engine with new lubricating oil. See Procedure 007-037 in Table 3.
12. Perform an aftertreatment diesel particulate filter (DPF) regeneration. See Procedure 014-013 in Table 3.
13. Perform a second lubricating oil and lubricating oil filter change. Priming lubricating oil system a second time is **not** required. See Procedure 007-013 and 007-037 in Table 3.

Repair Direction B:

1. Repair the fuel pump. Table 2 below **must** be referenced for specific instruction by product type. See Procedure 005-016 in Table 3.
2. Drain the engine lubricating oil and remove the lubricating oil filter. See Procedure 007-013 and 007-037 in Table 3.
3. Replace the lubricating oil filter bypass valve. See Procedure 007-014 in Table 3.
4. Fit a new lubricating oil filter and refill the engine lubricating oil system. Priming the lubricating oil system is **not** required. See Procedure 007-013 and 007-037 in Table 3.

Table 2, Fuel Pump Replacement Matrix		
Product	Fuel Pump Variation	Additional Action Needed When Replacing the Fuel Pump
ISX15 CM2250	Two-cylinder pumps and fuel pump gear pump top mount fuel lines	There is a cost effective option to use a fuel pump short block service kit. Reference TSB150033.
ISX15 CM2250 SN		
PowerGen QSX15 CM2250		
PowerGen QSX15 CM2250 ECF	Three cylinder, two piston fuel pumps	Reference TSB110064.
QSX15 CM2250	Fuel pump gear pump with bottom mount fuel lines	New fuel lines are required. Reference TSB130044.
ISX15 CM2350 X101	None	Reference TSB150033 for fuel pump repair options. If damage to fuel pump camshaft and roller tappets was identified during tappet inspection, fuel pump head must be reused, unless any of following conditions are present at time of repair: <ul style="list-style-type: none"> • Visual fuel leaks from Torx™ plugs on fuel pump head • Active or recently inactive fault codes related to fuel system performance (Example FC: 559, 4726, or 4727) • Complaints/confirmation of excessive fuel in lubricating oil. Complete fuel pump assemblies should not be used for these repairs. If fuel pump head must be replaced, build a complete fuel pump using individual components.
QSX15 CM2350 X105		
QSX15 CM2350 X106		
ISX12 CM2350 X102	None	None
ISX12/ISX11.9 CM2250		
QSX11.9 CM2250 ECF		

Table 3, Associated Procedures			
Procedure Title	Procedure Number	Service Model Name	Bulletin Number
Fuel Pump		ISX15 CM2250	4022250

Table 3, Associated Procedures			
Procedure Title	Procedure Number	Service Model Name	Bulletin Number
	Refer to Procedure 005-016		
Fuel Pump	Refer to Procedure 005-016	ISX15 CM2250 SN	4310736
Fuel Pump	Refer to Procedure 005-016	ISX12/ISX11.9 CM2250	2883445
Fuel Pump	Refer to Procedure 005-016	ISX15 CM2350 X101	4310641
Fuel Pump	Refer to Procedure 005-016	QSX15 CM2250 ECF	2883557
Fuel Pump	Refer to Procedure 005-016	QSX11.9 CM2250 ECF	2883561
Fuel Pump	Refer to Procedure 005-016	QSX15 CM2350 X105	4332667
Fuel Pump	Refer to Procedure 005-016	QSX15 CM2350 X106	4332712
Fuel Pump Head	Refer to Procedure 005-227	ISX15 CM2250	4022250
Fuel Pump	Refer to Procedure 005-227	ISX15 CM2250 SN	4310736
Fuel Pump Head	Refer to Procedure 005-227	ISX12/ISX11.9 CM2250	2883445
Fuel Pump Head	Refer to Procedure 005-227	ISX15 CM2350 X101	4310641
Fuel Pump Head	Refer to Procedure 005-227	QSX15 CM2250 ECF	2883557
Fuel Pump Head	Refer to Procedure 005-227	QSX11.9 CM2250 ECF	2883561
Fuel Pump Head	Refer to Procedure 005-227	QSX15 CM2350 X105	4332667
Fuel Pump Head	Refer to Procedure 005-227	QSX15 CM2350 X106	4332712
Lubricating Oil Cooler	Refer to Procedure 007-003	ISX15 CM2250	4022250
Lubricating Oil Cooler	Refer to Procedure 007-003	ISX15 CM2250 SN	4310736

Table 3, Associated Procedures			
Procedure Title	Procedure Number	Service Model Name	Bulletin Number
Lubricating Oil Cooler	Refer to Procedure 007-003	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil Cooler	Refer to Procedure 007-003	ISX15 CM2350 X101	4310641
Lubricating Oil Cooler	Refer to Procedure 007-003	QSX15 CM2250 ECF	2883557
Lubricating Oil Cooler	Refer to Procedure 007-003	QSX11.9 CM2250 ECF	2883561
Lubricating Oil Cooler	Refer to Procedure 007-003	QSX15 CM2350 X105	4332667
Lubricating Oil Cooler	Refer to Procedure 007-003	QSX15 CM2350 X106	4332712
Lubricating Oil Cooler Element	Refer to Procedure 007-007	ISX15 CM2250	4022250
Lubricating Oil Cooler Element	Refer to Procedure 007-007	ISX15 CM2250 SN	4310736
Lubricating Oil Cooler Element	Refer to Procedure 007-007	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil Cooler Element	Refer to Procedure 007-007	ISX15 CM2350 X101	4310641
Lubricating Oil Cooler Element	Refer to Procedure 007-007	QSX15 CM2250 ECF	2883557
Lubricating Oil Cooler Element	Refer to Procedure 007-007	QSX11.9 CM2250 ECF	2883561
Lubricating Oil Cooler Element	Refer to Procedure 007-007	QSX15 CM2350 X105	4332667
Lubricating Oil Cooler Element	Refer to Procedure 007-007	QSX15 CM2350 X106	4332712
Lubricating Oil Filter (Spin-On)	Refer to Procedure 007-013	ISX15 CM2250	4022250
Lubricating Oil Filter (Spin-On)	Refer to Procedure 007-013	ISX15 CM2250 SN	4310736
Lubricating Oil Filter (Spin-On)	Refer to Procedure 007-013	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil Filter (Spin-On)	Refer to Procedure 007-013	ISX15 CM2350 X101	4310641

Table 3, Associated Procedures			
Procedure Title	Procedure Number	Service Model Name	Bulletin Number
Lubricating Oil Filter (Spin-On)	Refer to Procedure 007-013	QSX15 CM2250 ECF	2883557
Lubricating Oil Filter (Spin-On)	Refer to Procedure 007-013	QSX11.9 CM2250 ECF	2883561
Lubricating Oil Filter (Spin-On)	Refer to Procedure 007-013	QSX15 CM2350 X105	4332667
Lubricating Oil Filter (Spin-On)	Refer to Procedure 007-013	QSX15 CM2350 X106	4332712
Lubricating Oil System	Refer to Procedure 007-037	ISX15 CM2250	4022250
Lubricating Oil System	Refer to Procedure 007-037	ISX15 CM2250 SN	4310736
Lubricating Oil System	Refer to Procedure 007-037	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil System	Refer to Procedure 007-037	ISX15 CM2350 X101	4310641
Lubricating Oil System	Refer to Procedure 007-037	QSX15 CM2250 ECF	2883557
Lubricating Oil System	Refer to Procedure 007-037	QSX11.9 CM2250 ECF	2883561
Lubricating Oil System	Refer to Procedure 007-037	QSX15 CM2350 X105	4332667
Lubricating Oil System	Refer to Procedure 007-037	QSX15 CM2350 X106	4332712
Lubricating Oil Filter Bypass Valve	Refer to Procedure 007-014	ISX15 CM2250	4022250
Lubricating Oil Filter Bypass Valve	Refer to Procedure 007-014	ISX15 CM2250 SN	4310736
Lubricating Oil Filter Bypass Valve	Refer to Procedure 007-014	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil Filter Bypass Valve	Refer to Procedure 007-014	ISX15 CM2350 X101	4310641
Lubricating Oil Filter Bypass Valve	Refer to Procedure 007-014	QSX15 CM2250 ECF	2883557
Lubricating Oil Filter Bypass Valve	Refer to Procedure 007-014	QSX11.9 CM2250 ECF	2883561

Table 3, Associated Procedures			
Procedure Title	Procedure Number	Service Model Name	Bulletin Number
Lubricating Oil Filter Bypass Valve	Refer to Procedure 007-014	QSX15 CM2350 X105	4332667
Lubricating Oil Filter Bypass Valve	Refer to Procedure 007-014	QSX15 CM2350 X106	4332712
Lubricating Oil and Filter Analysis	Refer to Procedure 007-083	ISX15 CM2250	4022250
Lubricating Oil and Filter Analysis	Refer to Procedure 007-083	ISX15 CM2250 SN	4310736
Lubricating Oil and Filter Analysis	Refer to Procedure 007-083	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil and Filter Analysis	Refer to Procedure 007-083	ISX15 CM2350 X101	4310641
Lubricating Oil and Filter Analysis	Refer to Procedure 007-083	QSX15 CM2250 ECF	2883557
Lubricating Oil and Filter Analysis	Refer to Procedure 007-083	QSX11.9 CM2250 ECF	2883561
Lubricating Oil and Filter Analysis	Refer to Procedure 007-083	QSX15 CM2350 X105	4332667
Lubricating Oil and Filter Analysis	Refer to Procedure 007-083	QSX15 CM2350 X106	4332712
Lubricating Oil Thermostat	Refer to Procedure 007-039	ISX15 CM2250	4022250
Lubricating Oil Thermostat	Refer to Procedure 007-039	ISX15 CM2250 SN	4310736
Lubricating Oil Thermostat	Refer to Procedure 007-039	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil Thermostat	Refer to Procedure 007-039	ISX15 CM2350 X101	4310641
Lubricating Oil Thermostat	Refer to Procedure 007-039	QSX15 CM2250 ECF	2883557
Lubricating Oil Thermostat	Refer to Procedure 007-039	QSX11.9 CM2250 ECF	2883561
Lubricating Oil Thermostat	Refer to Procedure 007-039	QSX15 CM2350 X105	4332667
Lubricating Oil Thermostat	Refer to Procedure 007-039	QSX15 CM2350 X106	4332712

Table 3, Associated Procedures			
Procedure Title	Procedure Number	Service Model Name	Bulletin Number
Aftertreatment Testing	Refer to Procedure 014-013	ISX15 CM2250	4022250
Aftertreatment Testing	Refer to Procedure 014-013	ISX12/ISX11.9 CM2250	2883445
Aftertreatment Testing	Refer to Procedure 014-013	QSX15 CM2250 ECF	2883557
Aftertreatment Testing	Refer to Procedure 014-013	QSX11.9 CM2250 ECF	2883561
Main Bearings	Refer to Procedure 001-006	ISX15 CM2250	4022250
Main Bearings	Refer to Procedure 001-006	ISX15 CM2250 SN	4310736
Main Bearings	Refer to Procedure 001-006	ISX12/ISX11.9 CM2250	2883445
Main Bearings	Refer to Procedure 001-006	ISX15 CM2350 X101	4310641
Main Bearings	Refer to Procedure 001-006	QSX15 CM2250 ECF	2883557
Main Bearings	Refer to Procedure 001-006	QSX11.9 CM2250 ECF	2883561
Main Bearings	Refer to Procedure 001-006	QSX15 CM2350 X105	4332667
Main Bearings	Refer to Procedure 001-006	QSX15 CM2350 X106	4332712

Document History

Date	Details
2014-2-14	Module Created
2014-9-4	none
2014-10-24	Fixed broken link.
2014-10-29	Typo corrected.
2015-1-7	Procedure steps updated.
2015-3-17	Added the fuel pump short block service kit TSB reference.
2015-10-19	Modified the fuel pump tappet rollers are damaged section step 1 and options a, b, and c.

Date	Details
2016-4-5	Modified title. Added Product Affected section. Updated repair direction and Table 3.
2016-7-5	Removed "Ceramic" from title. Modified Table 2.
2016-12-6	Repair Direction A: moved Steps 1, 3, and 4 to step numbers 6, 7, and 8.
2017-1-10	Updated Table 3, Associated Procedures.
2017-4-10	Updated repair direction.

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