TSI 13-12-04: Crankcase Oil Separator Housing Replacement

Study Guide

TMT121379

Course Code: 8443
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Welcome to the Navistar training course for TSI-13-12-05: Replacement Procedure for High-Pressure Turbocharger Cartridge. This course is intended to guide you through the replacement procedures for the high-pressure turbocharger cartridge on MaxxForce® 11 and 13 EPA 10, Navistar® N13, and 2013 MaxxForce® 13 HD-OBD engines.

If you have questions or concerns regarding the playback of this program, please contact Navistar Service Education by submitting a case file (Dealer Personnel); or by calling 1-800-365-0088.
Tool List
To complete this repair, the following tools and components are required:

- 3/8 in. drive 10mm shallow socket
- 3/8 in. drive 13mm deep socket
- 3/8 in. drive 15mm deep socket
- 3/8 in. drive 6 in. extension
- 3/8 in. drive 12 in. extension
- 3/8 in. drive ratchet
- 3/8 in. drive electric impact gun
- 3/8 in. drive lb-ft torque wrench
- 3/8 in. drive lb-in torque wrench
- 11/16 in. combination wrench
- 14mm combination wrench
- 10mm combination wrench
- ¼ in. drive 8mm shallow socket
- ¼ in. drive 10mm shallow socket
- ¼ in. drive 6 in. extension
- ¼ in. drive 14 in. extension
- ¼ in. drive swivel
- ¼ in. drive ratchet
- Slip joint pliers
- Claw pick-up tool
- 90° pick
- P-80® lubricant or equivalent
- Navistar cap kit (ZTSE4296)
- Clean shop towel

SERVICE PROCEDURE

1. Prepare Vehicle for Service
Park the truck on a level surface, shift transmission to PARK or NEUTRAL, set the parking brake, and chock the wheels. Open the hood and tilt the bumper forward. Remove the right side inner fender.

2. Loosen Air Inlet and Compressor Hose Clamps
Loosen the clamp at the air filter housing boot (1). Use hose clamp pliers to slide the spring clamp (2) down the air compressor hose and then remove the hose from the pipe. Install a protective cap in the hose to prevent entry of foreign material.
3. Remove Air Inlet Duct
Loosen the air inlet duct clamp (1) at the Low-Pressure (LP) turbocharger inlet. Remove the air inlet duct from the turbocharger inlet and the air filter housing boot. Install a protective cap into the turbocharger inlet and the filter housing boot.

4. Remove HPCAC Pipe Clamps
Loosen the front and rear High-Pressure Charge Air Cooler (HPCAC) pipe clamps (1). Remove the nut and bolt (2) securing the A/C hoses to the HPCAC pipe (3). Remove the pipe and install a protective cap over the HPCAC inlet.

5. Disconnect Engine Harness Connectors
Disconnect the engine harness connectors at the Air Inlet Temperature sensor (1), Mass Air Flow sensor (2), and the Turbocharger-2 Compressor Inlet Pressure sensor (3). Move the engine harness aside.

6. Remove High-Pressure Turbocharger Outlet Duct
Remove the two nut-bolts (1) from the High Pressure (HP) Turbocharger outlet duct (2). Pull the duct down until disengaged from the turbocharger and then remove. Install a protective cap on the turbocharger outlet. Remove and discard the outlet duct O-ring.
7. Remove LP-turbocharger Inlet
Remove the two bolts securing the LP-turbocharger inlet duct (1). Remove the inlet (2) and install a protective cap into the LP-turbocharger compressor inlet. Discard the inlet O-ring.

**NOTE**
ENGINE COOLANT IS NOT DRAINED DURING THIS PROCEDURE. DO NOT DISCONNECT THE COOLANT TUBES OR DRAIN THE COOLANT.

8. Remove P-Clamp Bolts
Remove the two P-clamp (1) bolts securing the cab heater coolant return tube and the low-pressure charge-air-cooler (LPCAC) coolant supply tube to the HP-turbocharger air inlet duct. Carefully position both coolant tubes out of the way.

**NOTE**
THE HP-TURBOCHARGER AIR INLET DUCT IS NOT REMOVED DURING THIS PROCEDURE. COMPLETE REMOVAL OF THE HP-TURBOCHARGER AIR INLET DUCT BOLTS IS NOT REQUIRED.

9. Loosen HP-Turbocharger Air Inlet Duct Bolts
Remove the two bolts securing the HP-turbocharger inlet duct (1). Complete removal of the lower bolt is not required.

10. Remove ACV Air Supply Line
Loosen the air supply line (1) from the Air Control Valve (ACV) while using a back-up wrench on the ACV fitting (2). Remove the line and position aside.
11. Remove ACV Bolts
Remove the three bolts securing the ACV to the EGR cooler.

12. Position ACV
Lift the ACV (1) and rest the valve on the edge of the EGR cooler.

13. Disconnect CCOS Outlet Hose and CCOS Sensor
Use hose clamp pliers to release the spring clamp (1) on the CCOS outlet hose and then remove the hose from the housing. Disconnect the engine harness (2) from the CCOS sensor.

14. Reposition Breather Tube
Remove the bolt securing the crankcase breather tube clamp to the low pressure charge-air-cooler and position the assembly aside.
15. Remove CCOS Housing Bolts
Remove the three hex head bolts (1) securing the CCOS to the oil filter module. Do not remove the Torx bolts from the CCOS housing.

16. Remove CCOS Housing
Remove the CCOS housing from the oil filter module while pulling out on the high-pressure turbocharger inlet duct (1).

17. Remove O-rings and Seal
Remove and discard the two O-rings (1) and seal (2).

18. Protect Oil Filter Module from Debris
Cover the oil filter module with a clean shop towel (1).

⚠️ NOTE
DO NOT REMOVE THE TORX BOLTS FROM THE CCOS HOUSING.

⚠️ CAUTION
TO AVOID ENGINE DAMAGE, COVER THE OIL FILTER MODULE WITH A CLEAN SHOP TOWEL UNTIL READY TO INSTALL THE NEW CCOS HOUSING.
19. Transfer CCOS Sensor
Remove the CCOS sensor bolt (1). Remove the sensor (2) and install the sensor onto the new housing. Tighten the bolt to 89 lb/in (10 N·m).

20. Install O-rings and Seal
Remove the shop towel used to cover the breather opening. Lubricate and install both O-rings (1). Lubricate and install the seal (2) with the two tangs (3) aligned with the slots.

21. Install CCOS Housing
Install the CCOS housing onto the oil filter module while positioning the high-pressure turbocharger inlet duct (1).

22. Install CCOS Housing Bolts
Install three new CCOS housing bolts (1). Tighten the bolts to 79 lb/in (8.9 N·m).
23. Secure Crankcase Breather Tube
Secure the crankcase breather tube assembly with the P-clamp and mounting bolt (1). Tighten the bolt to 115 lb/in (13 N·m).

24. Connect CCOS Sensor and Outlet Hose
Connect the engine harness to the CCOS sensor. Slide the hose onto the housing outlet and then use a pair of hose clamp pliers to move the spring clamp into position.

25. Secure ACV to EGR Cooler
Reposition the ACV and install the three bolts. Tighten the M8 bolts (1) to 23 lb/ft (31 N·m). If applicable, the M6 (2) bolt should be torqued to 115 lb-in (13 N·m).

26. Connect ACV Air Supply Line
Connect the ACV supply line and tighten the hose fitting while using a back-up wrench on the ACV fitting.
27. Install High-Pressure Turbocharger Air Inlet Duct Mounting Bolts
Install both HP-turbocharger air inlet duct mounting bolts (1). Tighten both bolts to 45 lb/ft (62 N•m).

28. Secure Coolant Tubes
Return the cab heater coolant return (1) tube and LPCAC coolant supply (2) tube to their original position and install the two P-clamp bolts. Tighten the P-clamp bolts to 23 lb/ft (31 N·m).

29. Install New Low-Pressure Turbocharger Inlet Seal
Remove the protective cap from the LP-turbocharger. Lubricate and install a new O-ring onto the LP-turbocharger inlet (1).

30. Install Low-Pressure Turbocharger Inlet Duct
Install the LP-turbocharger inlet duct over the turbocharger inlet. Install the two bolts. Tighten the lower M10 bolt (1) to 45 lb/ft (62 N·m). Tighten the upper M8 bolt (2) to 23 lb/ft (31 N·m).
31. Install High-Pressure Turbocharger Outlet O-ring
Lubricate and install a new HP-turbocharger outlet O-ring (1).

32. Install High-Pressure Turbocharger Outlet Duct
Remove the protective cap and insert the HP-turbocharger outlet duct into the HP-turbocharger. Install the two mounting bolts (1) and tighten the bolts to 45 lb/ft (62 N·m).

33. Connect Engine Sensors
Return the engine harness to its original position. Reconnect the following sensors: Air Inlet Temperature (1), Turbocharger-2 Compressor Inlet Pressure (2), and the Mass Air Flow sensor if equipped (3).

34. Install High-Pressure Charge-Air-Cooler Pipe
Remove the cap from the HPCAC inlet and install the HPCAC pipe. Tighten both clamps to 71 to 80 lb/in (8-9 N·m).
35. Secure A/C Lines
Install the nut and bolt to secure the A/C lines to the HPCAC pipe clamp. Tighten the bolt to 115 lb/in (13 N·m).

36. Install Air Inlet Duct
Remove the protective cap in the LP-turbocharger inlet and the filter housing boot. Install the inlet duct. Tighten the air inlet duct clamp (1) at the turbocharger inlet.

37. Attach Compressor Hose
Tighten the clamp at the air filter housing boot (1).
Remove the protective cap from the compressor hose. Slide the compressor hose on the inlet duct. Use hose clamp pliers to slide the spring clamp (2) into position.

38. Verify Proper Operation
Start the engine, verify proper operation, and check for both air and oil leaks. Install the passenger side inner fender if removed. Properly secure the hood and remove the wheel chocks. The Crankcase Oil Separator Housing Replacement Procedure for TSI 13-12-04 is now complete.
CONCLUSION
This concludes the Crankcase Oil Separator (CCOS) Housing Replacement Procedure for TSI 13-12-04.

NOTES