



TSI 13-12-10: Exhaust Manifold Ring Seal Replacement

Study Guide



Course Code: 8470

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THE INFORMATION PROVIDED WITHIN THIS COURSE IS FOR TRAINING PURPOSES ONLY. ALWAYS CONSULT THE LATEST SERVICE, DIAGNOSTIC, AND TOOL INFORMATION, LOCATED ON NAVISTAR'S SERVICE PORTAL, PRIOR TO PERFORMING SERVICE ON NAVISTAR ENGINES, VEHICLES, AND EQUIPMENT.

Introduction

Welcome to the Navistar training course for TSI-13-12-10: Exhaust Manifold Ring Seal Removal / Installation. This course is intended to guide you through the replacement procedure of the Exhaust Manifold Ring Seals on MaxxForce® 11 and 13 (EPA 10), Navistar® N13, and 2013 MaxxForce® 13 HDOBD 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.

FRONT RING SEAL DISASSEMBLY

Tool List

To complete this repair, the following tools and components are required:

- 3/8 in. Drive 8mm Deep Socket
- 3/8 in. Drive 8mm Shallow Socket
- 3/8 in. Drive 10mm Shallow Socket
- 3/8 in. Drive 13mm Deep Socket
- 3/8 in. Drive 13mm Shallow Socket
- 3/8 in. Drive 15mm Deep Socket
- 3/8 in. Drive 3/8 in. Socket
- 3/8 in. Drive 3/16 in. Allen Socket
- 3/8 in. Drive T20 Torx® Socket
- 3/8 in. Drive T50 Torx® Socket
- 3/8 in. Drive 18mm Crow's Foot Socket
- 3/8 in. Drive 3 in. Extension
- 3/8 in. Drive 6 in. Extension
- 3/8 in. Drive 12 in. Extension
- 3/8 in. Drive Ratchet
- 3/8 in. Drive 6 in. Spinner Handle
- 3/8 in. Drive Swivel
- 3/8 in. Drive 1b-ft Torque Wrench
- Torque Screwdriver
- 90° Pick
- 1/4 in. Drive T20 Torx® Socket
- 1/4 in. Drive 8mm Shallow Socket
- 1/4 in. Drive 10mm Shallow Socket
- 1/4 in. Drive 13mm Shallow Socket
- 1/4 in. Drive 6 in. Extension
- 1/4 in. Drive 14 in. Extension
- 1/4 in. Hex To 1/4 in. Square Adaptor
- 1/4 in. Drive Swivel
- 1/4 in. Drive Ratchet
- 11/16 in. Combination Wrench
- 10mm Combination Wrench
- 14mm Combination Wrench
- 13mm Combination Wrench
- 17mm Combination Wrench
- 18mm Combination Wrench
- Slip Joint Pliers
- Flashlight
- P-80® Lubricant or equivalent

- 3/8 in. Drive 1b-in Torque Wrench
- 3/8 in. To 1/4 in. Drive Adaptor
- Claw Pick-up Tool
- Clean Shop Towel
- Navistar Cap Kit (ZTSE4296)
- KL5007NAV – Navistar® Coolant Management Tool

Prepare Vehicle for Service

Before performing this procedure the vehicle must be parked on a level surface with the transmission shifted to park or neutral. The parking brake must be engaged and the wheels chocked. The hood will need to be opened and the front bumper should be flipped forward.

Step 1: Remove Inner Fender

For ease of access to the components that you will service during this procedure, it is recommended that the passenger side inner fender be removed. Start by removing the seven bolts holding the fender in place and then lift the fender from the vehicle.

Step 2: Remove Air Inlet Duct

Loosen the hose clamp securing the air inlet duct to the low-pressure turbocharger inlet and separate the two components.

Next, reposition the spring clamp holding the compressor hose to the port on the air inlet duct and remove the hose from the port.

Loosen the hose clamp securing the air inlet duct to the air filter housing boot and completely remove the inlet duct from the vehicle.

Be sure to insert caps on the air filter housing boot, compressor hose and low-pressure turbocharger inlet to prevent contamination.

Step 3: Remove High-Pressure CAC Pipe

Now the high-pressure charge air cooler (HPCAC) pipe must be removed. In order to remove the pipe you must first remove the nut and bolt securing the A/C hoses to the clamp on the pipe.

Loosen the hose clamps holding the HPCAC pipe to the high-pressure turbo outlet and the charge-air-cooler and remove the pipe from the vehicle. Be sure to install a cap on the HPCAC to prevent contamination.

Step 4: Disconnect and Re-position Wiring Harness

Next Disconnect the engine harness connectors at the Mass Air Flow sensor, Air Inlet Temperature sensor, and the Turbocharger 2 Compressor Inlet Pressure sensor. After disconnecting the sensors, position the harness out of the way.

Step 5: Remove High-Pressure Turbocharger Outlet Duct

To remove the high-pressure turbocharger outlet duct, first remove the two bolts securing it to the low-pressure turbocharger inlet duct.

Once the mounting bolts have been removed, pull the outlet duct down until it is completely disengaged from the high-pressure turbocharger and remove it from the vehicle. Discard the high-pressure turbocharger outlet duct O-ring.

Step 6: Remove Low-Pressure Turbocharger Inlet Duct

Next you must remove the low-pressure turbocharger inlet duct. Start by removing the two mounting bolts. After removing the mounting bolts, completely remove the low-pressure turbocharger inlet duct from the vehicle.

Remove and discard the O-ring from the low-pressure turbocharger inlet duct and install caps on the low-pressure turbocharger inlet and the high-pressure turbocharger outlet to prevent contamination.

Step 7: Reposition Coolant Tubes



DO NOT DISCONNECT THE COOLANT TUBES OR DRAIN THE ENGINE COOLANT.

Now remove the two bolts from the P-clamps securing the cab heater coolant return tube and the low-pressure charge-air-cooler coolant supply tube.

Next, carefully position both coolant tubes out of the way.

Step 8: Remove High-Pressure Turbocharger Inlet Duct Bolts



THE LOWER HIGH-PRESSURE TURBOCHARGER INLET DUCT BOLT MAY NOT COME ALL THE WAY OUT DUE TO INTERFERENCE WITH THE WASHER FLUID RESERVOIR. REMOVAL OF THE RESERVOIR IS NOT REQUIRED.

Remove the two bolts securing the air inlet duct to the high-pressure turbocharger.

Step 9: Reposition Air Control Valve

Now you must disconnect the air supply line from the Air Control Valve (ACV) and position it out of the way.

NOTE

THERE ARE TWO STYLES OF ACV ATTACHMENT TO THE EGR COOLER. ONE STYLE HAS TWO BOLTS SECURING THE ACV TO THE COOLER, AND ONE BOLT SECURING THE EXHAUST BACK PRESSURE VALVE (EBPV) ACTUATOR LINE TO THE EGR COOLER. THE OTHER STYLE USES THREE BOLTS TO SECURE THE ACV TO THE EGR COOLER AND THE ACTUATOR LINE IS NOT SUPPORTED.

Once you have the air supply line out of the way, remove the three bolts securing the ACV in place and then position the ACV out of the way.

Step 10: Remove CCOS Housing Outlet Hose

Before removing the Crankcase Oil Separator (CCOS) housing you must first disconnect the CCOS outlet hose.

Step 11: Remove CCOS Sensor Connector

Then remove the CCOS sensor connector.

Step 12: Re-position Crankcase Breather tube Assembly

Next, remove the bolt holding the crankcase breather tube assembly clamp and position the assembly out of the way.

Step 13: Remove CCOS Housing

NOTE

DO NOT REMOVE THE FOUR TORX BOLTS FOR THE OIL JET PLATE. THE OIL JET PLATE WILL NOT BE REMOVED DURING CCOS HOUSING REPLACEMENT.

In order to remove the CCOS housing you must remove the three hex bolts from the oil filter module.

While pulling out on the high-pressure turbocharger inlet duct, remove the CCOS housing from the oil jet plate.

Before continuing, cover the CCOS mount openings with a clean shop towel to avoid contamination.

Step 14: Remove EGR Cooler L-Bracket

Next you will need to remove the four bolts holding the EGR cooler L-bracket into place and remove the bracket from the vehicle.

Step 15: Remove Exhaust Manifold Heat Shield

Now remove the fastener securing the exhaust manifold heat shield to the manifold, and then remove the heat shield from the engine.

Step 16: Remove and Discard Failed Front Exhaust Manifold Ring Seal



VEHICLES PRODUCED BEFORE A CERTAIN PRODUCTION DATE MAY NOT BE EQUIPPED WITH AN EXHAUST RING SEAL FROM THE FACTORY. IF THE VEHICLE YOU ARE WORKING ON HAS A LEAKING EXHAUST FEY RING SEAL AND IS NOT EQUIPPED WITH A RING SEAL SKIP TO STEP 17. DO NOT REPLACE THE FAILED FEY RING SEAL.

To remove the failed exhaust manifold ring seal, start by loosening the two ring seal clamps. After loosening the clamps, position them out of the way and remove and discard the ring seal shields. Then, remove and discard the ceramic wrap.

Next you must remove the ring seal packing from the groove in the exhaust manifold. Discard the packing.

Finally make sure to completely remove and discard the two ring seal clamps from the manifold.

FRONT RING SEAL ASSEMBLY

Step 17: Install New Exhaust Manifold Ring Seal

Now wrap the new seal packing around the exhaust manifold ring joint and align it so that the seal ends meet at the top of the manifold. Be sure to press the seal packing tightly into the joint with your fingers.

Next, wrap the manifold and the seal packing with the ceramic mat wrap making sure to cover the seal packing with the thick side of the ceramic mat. Align the ends of the ceramic wrap with the midpoint of the manifold.



VERIFY THAT THE RING SEAL SHIELDS COMPLETELY COVER THE CERAMIC MAT WRAP AND THAT THE CERAMIC WRAP OVERLAPS THE SEAL PACKING.

Install the two shield halves around the ceramic wrap with the beveled flange on the seal packing end (right side). Align the joints of the two shield halves with the midpoint of the manifold. While holding the shield halves in place install ring seal clamp #1 on the seal packing end (right side) and snug into place.

Now install ring seal clamp #2 around the ring seal shields.

Alternately tighten the ring seal clamps until the shields are snug. Make sure to keep the shields aligned with the midpoint of the manifold while tightening the clamps.

With both clamps snug and everything in alignment, torque the clamps to 70 lb/in (8 N·m).

Step 18: Install Exhaust Manifold Heat Shield

Install the manifold heat shield and torque the M8 retaining bolt to 23 Lb / ft. (31 N·m).

Step 19: Install EGR Cooler L-bracket

Now install the EGR cooler L-bracket and fasten it into place with the four retaining bolts. Torque the L-bracket bolts to 23 Lb/ft. (31 N·m).

Step 20: Inspect O-rings and Seal

After removing the shop towel, inspect the oil jet plate O-rings and the oil jet plate seal for damage. Discard and replace as necessary.

Step 21: Install New CCOS Housing

While pulling on the high-pressure turbocharger inlet duct, install the CCOS housing onto the oil jet plate. Secure the CCOS housing to the jet plate with three new housing bolts. Torque the bolts to 79 in/lbs. (8.9 N·m).

Step 22: Secure Crankcase Breather Tube Assembly

Next secure the crankcase breather tube assembly with the previously removed P-clamp and mounting bolt. Torque the mounting bolt to 115 in/lb. (13 N·m).

Step 23: Connect CCOS Housing Sensor Connector

Connect the CCOS housing sensor connector.

Step 24: Connect CCOS Housing Outlet Hose

Connect the CCOS housing outlet hose.

Step 25: Install ACV

Now move the Air Control Valve to its original position and secure it into place with the three previously removed ACV mounting bolts. Torque the three ACV mounting bolts to 23 ft/lbs. (31 N·m). If applicable, the M6 bolt should be torqued to 115 lb-in (13 N·m).

After securing the ACV, connect the air supply line. Use a back-up wrench to hold the fitting on the ACV in place and tighten the fitting on the air supply line.

Step 26: Secure High-Pressure Turbocharger Inlet Duct

Next, secure the high-pressure turbocharger inlet duct into place by installing the two mounting bolts. Torque the bolts to 45 ft/lbs. (62 N·m).

Step 27: Secure Coolant Tubes

Position the coolant return tube and coolant supply tube back into place and secure them with the two previously removed P-clamps. Torque the bolts securing the P-clamps to 23 ft/lbs. (31 N·m).

Step 28: Install Low-Pressure Turbocharger Inlet

Remove the caps from the low-pressure turbocharger inlet and the high-pressure turbocharger outlet.

Before installing the low-pressure turbocharger inlet duct, be sure to lubricate a new O-ring with P80® and install it onto the low-pressure turbocharger compressor housing.

Then install the inlet duct onto the low-pressure turbocharger and secure it into place using the two previously removed mounting bolts. Torque the lower M10 bolt to 45 lb-ft (62 N·m) and the upper M8 bolt to 23 lb-ft (31 N·m).

Step 29: Install High-Pressure Turbocharger Outlet Duct

Before installing the high-pressure turbocharger outlet duct you must install a new O-ring lubricated with P80®.

With a new O-ring installed, push the outlet duct up into the high-pressure turbocharger. Secure the duct into place with the two previously removed mounting bolts and torque them to 45 ft/lbs. (62 N·m).

Step 30: Connect Wiring Harness

Place the engine harness back to its original position and connect the connectors at the Mass Air Flow, Air Inlet Temperature, and the Turbocharger-2 Compressor Inlet Pressure sensors.

Step 31: Install HPCAC Pipe

Before installing the high-pressure charge-air-cooler pipe, remove the cap from the HPCAC. Then, slip the pipe couplers over the high-pressure turbocharger outlet and over the inlet of the HPCAC.

Tighten the clamps on both ends of the HPCAC pipe to between 71 and 80 in/lbs (8-9 N·m).

Now secure the A/C lines to the HPCAC pipe using the previously removed nut and bolt. Torque the bolt to 115 lb-in. (13 N·m).

Step 32: Install Air Inlet Duct

Next, remove the caps from the low-pressure turbocharger inlet, the air filter housing boot, and the compressor hose.

Install the air inlet duct to the air filter housing boot and the low-pressure turbocharger inlet. Tighten the clamps on both ends of the duct starting with the one on the turbo inlet and then the one on the air filter housing boot.

Install the compressor hose onto the port on the air inlet duct and secure it into place with the spring clamp.

Step 33: Install Inner Fender

If it was removed prior to performing this procedure, reinstall the passenger side inner fender with the seven previously removed mounting bolts. Torque the bolts to 23 lb-ft (31 N·m).

REAR RING SEAL DISASSEMBLY

Step 1: Drain the Coolant

Part of this process requires that you open the cooling system. The engine coolant will have to be drained using the Navistar Coolant Management Tool, part number KL5007NAV.

Step 2: Remove Passenger's Seat

Start by removing the four bolts from the right front seat. Then move the seat forward to allow easy access to the seatbelt mounting bolts. Now remove the seatbelt bolts from both sides of the seat. Then disconnect any air lines from the passenger seat as applicable. With the assistance of another technician, remove the seat from the vehicle.



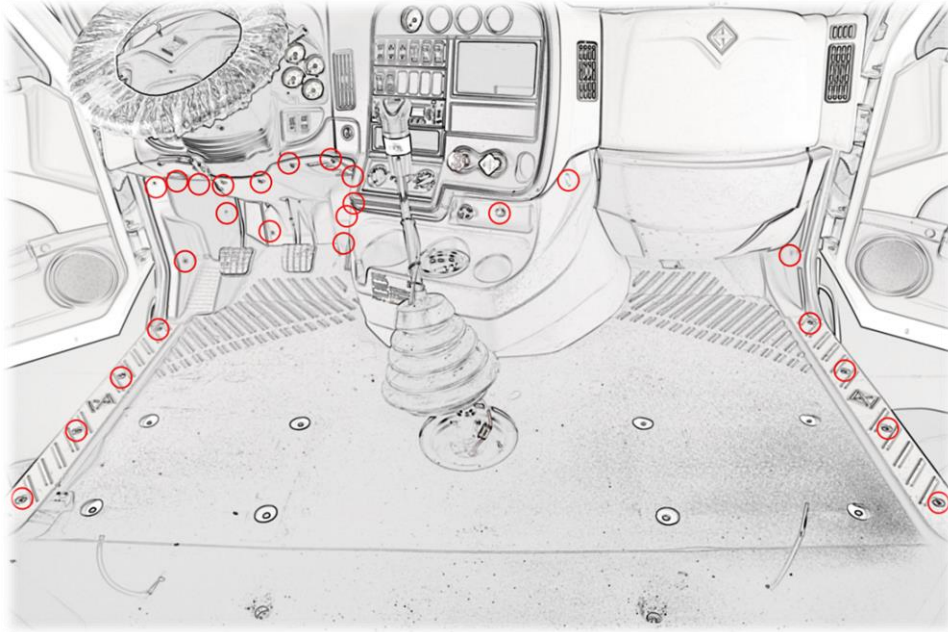
Step 3: Remove Driver's Seat

Next, if equipped, remove the fire extinguisher from the driver's side of the vehicle. Then remove the bolts securing the fire extinguisher bracket to the floor and remove the bracket from the vehicle. To remove the left front seat, repeat the procedure used to remove the passenger side seat. Again, with the assistance of another technician, remove the seat from the vehicle.



Step 4: Remove Scuff Plates

Shown here is a diagram highlighting the location of all of the bolts you will need to remove to access the engine cover once the seats are out.



Remove the four screws from each of the scuff plates along the bottom of the door frame. Remove the seatbelt guides from the scuff plates and then remove the plates from the vehicle.

Step 5: Remove Left Kick Panel

Next, remove the two bolts and one screw from the left kick panel, and then remove the kick panel from the vehicle.

Step 6: Remove Steering Column Trim Panel

You will now need to remove the ten screws from the trim panel below the steering column, and then remove the trim panel from the vehicle.

Step 7: Remove Shifter



IF THE VEHICLE IS EQUIPPED WITH A PUSH-BUTTON SHIFTER, REMOVE THE SHIFTER PANEL WITH THE FOLLOWING PROCEDURE:

REMOVE THE SCREWS ON THE PANEL, PULL THE PANEL OUT, AND THEN DISCONNECT THE ELECTRICAL CONNECTOR BEHIND THE PANEL.

Next, if equipped, remove the manual transmission shifter lever. Start by pulling the dust boot up the shaft of the lever. With the dust boot out of the way disconnect the red and black air lines at the quick disconnect fittings. Then remove the retaining nut and bolt from the shift lever. After removing the bolt, lift the lever up and remove it from the vehicle.

Step 8: Remove Cup Holder Assembly

Now remove the three screw caps from the cup holder assembly, as well as the three screws securing the assembly into place. Unclip the cup holder assembly from the interior module trim cover and disconnect the 12V accessory port and floor light electrical connectors. Once the assembly is disconnected, remove it from the vehicle.

Step 9: Remove Right Kick Panel

Next remove the bolt securing the right kick panel, and remove the kick panel from the vehicle.

Step 10: Remove Floor Mat



TO AVOID TEARING AND DAMAGING THE FLOOR MAT, BE CAREFUL WHEN YOU REMOVE IT. THIS IS ESPECIALLY TRUE FOR MATS THAT MAY BE GLUED TO THE ENGINE COVER.

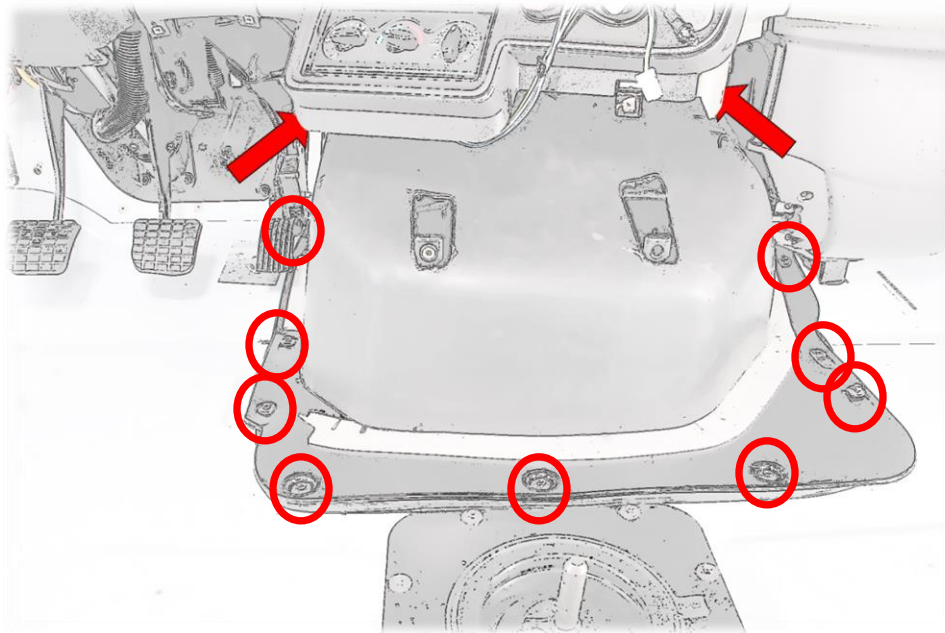
Start removing the floor mat by unhooking it from under the interior module trim cover, as well as from under the pedal assemblies. If servicing a vehicle with a sleeper cab, also separate the front floor mat from the sleeper floor mat. Remove the front floor mat from the vehicle once it is completely free.

Step 11: Remove Engine Cover



FOR THE EXACT BOLT LOCATIONS FOR THE ENGINE COVER, REFER TO THE APPROPRIATE SERVICE MANUAL FOR THE VEHICLE BEING SERVICED.

The bolts for the engine cover on the vehicle used in this course have been highlighted to show their location.



To remove the engine cover, start by removing the bolts securing the rear of the cover to the floor. Then using a 10mm ratcheting wrench remove the engine cover bolt located below the interior module trim cover, and then remove the two top bolts located on the left and right side of the cover. Once all of the engine cover bolts have been removed, lift the rear of the cover up and pull it towards the back of the vehicle to remove it.

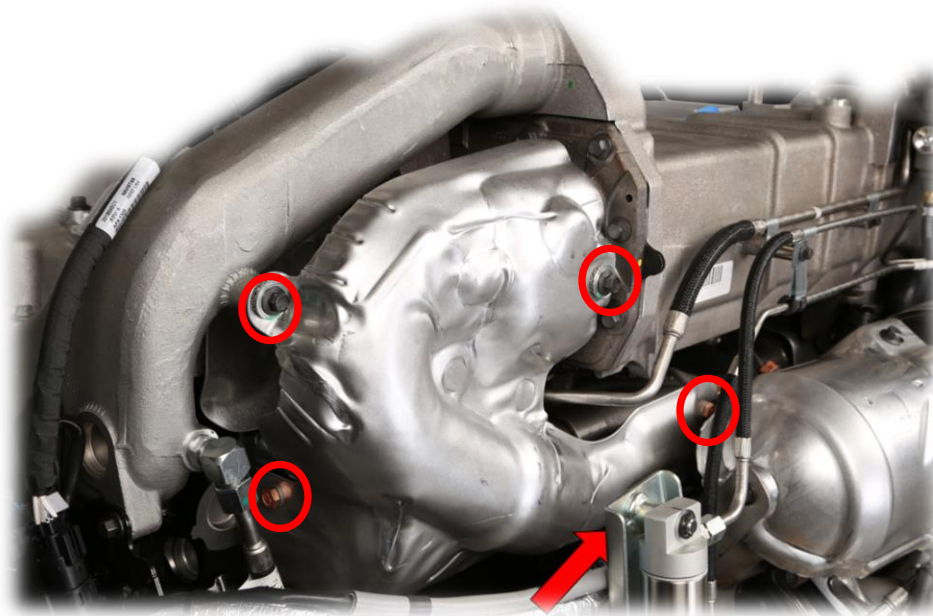
Step 12: Remove HCl Coolant Supply Tube

Now that you have access to the rear of the engine, it is time to remove the Hydrocarbon Injector (HCI) Coolant Supply tube. Use two wrenches to loosen the fitting, and install a cap onto each of the lines.



Step 13: Remove Heat Shield

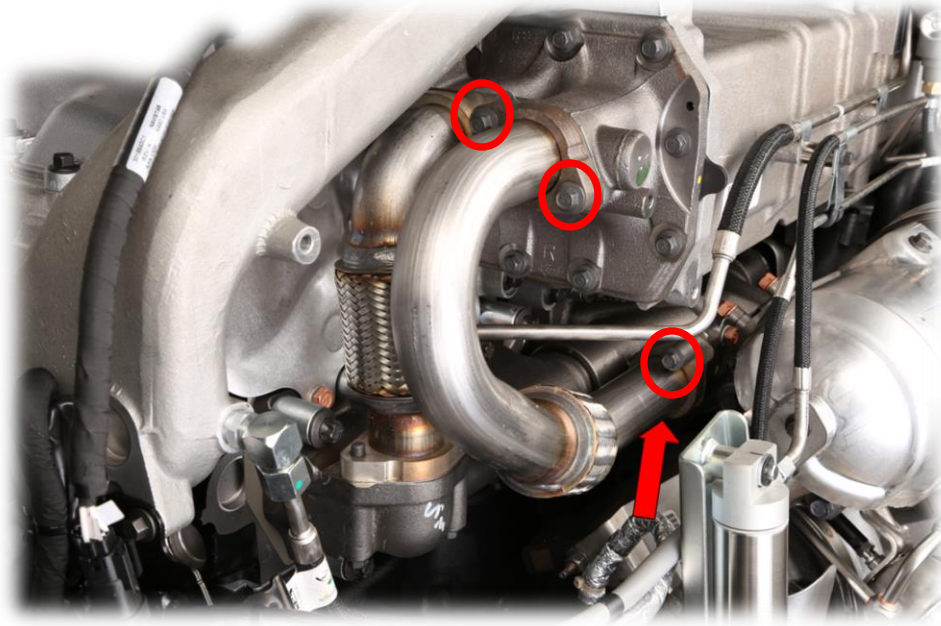
Shown here is a diagram highlighting the location of all five bolts securing the heat shield to the engine.



To remove the exhaust heat shield, start by removing the three bolts at the rear of the shield as well as the bolt on the bottom of the shield. The bolt at the front of the shield only needs to be loosened because the shield is slotted to allow easy removal. After loosening the bolt, the heat shield can then be removed from the vehicle.

Step 14: Remove EGR Inlet Tube (Cylinders 1-3)

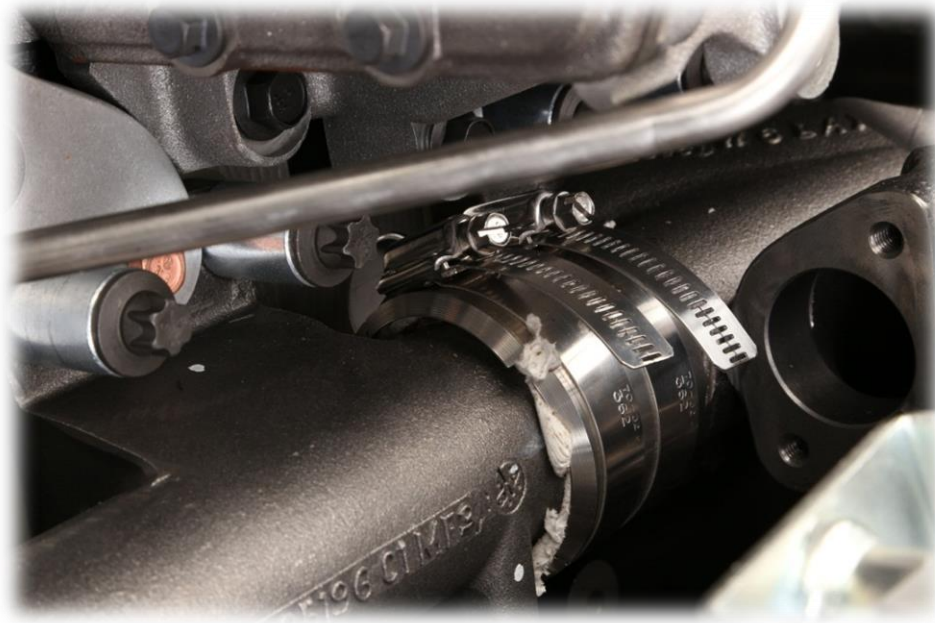
Shown here is a diagram highlighting the bolts securing the cylinder one through three EGR inlet tube to the engine.



Take out the two bolts securing the top of the EGR inlet tube (Cylinders 1-3) to the EGR valve. Take care not to drop the inlet tube gasket. Next, remove the two bolts securing the bottom of the inlet tube to the exhaust manifold. With the four bolts and both gaskets removed, remove the EGR inlet tube.

Step 15: Remove Exhaust Ring Seal

Shown here is a close up of the ring seal assembly when installed on the vehicle.



In order to remove the old manifold ring seal, start by loosening the two clamps. Position the clamps out of the way and remove the two shield halves. Then remove and discard the ceramic wrap from the manifold, as well as the seal packing. Because the clamps will not be reused, remove and discard both ring seal clamps.

Step 16: Install Exhaust Ring Seal

NOTE

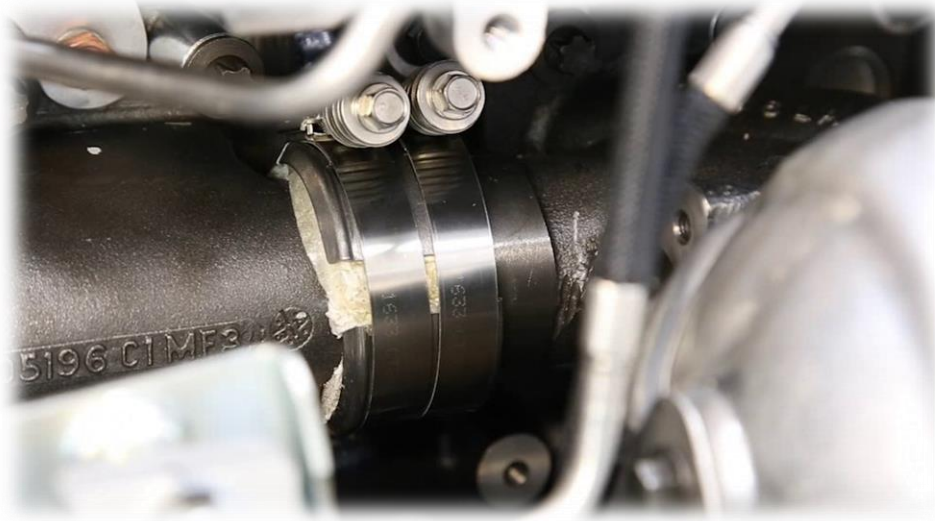
VERIFY THE SHIELD COMPLETELY COVERS THE CERAMIC MAT WRAP ON BOTH SIDES, AND THAT THE CERAMIC MAT WRAP OVERLAPS THE SEAL PACKING.

NOTE

RING SEAL CLAMP ALIGNMENT MUST MATCH THE CLAMP ALIGNMENT SHOWN IN THIS COURSE TO PREVENT PROBLEMS WHEN INSTALLING THE EGR INLET TUBE (CYLINDERS 1-3).

To install a new exhaust ring seal, begin by wrapping the seal packing around the manifold and aligning it so that the seal packing ends meet at the top of the manifold. Press the seal packing tightly into the joint with your fingers. Place the ceramic mat wrap around the manifold and seal packing so that the thick end of the mat is covering the seal packing. Ensure that the ceramic mat wrap is aligned with the

manifold midpoint. Install both ring seal shields around the mat wrap with the beveled flange covering the seal packing end. Install a clamp around the two shields to hold them in place. Install the second ring seal clamp, and tighten both clamps alternately. Once both clamps are snug around the shields, tighten the two clamps to the specified value.



Step 17: Install EGR Inlet Tube (Cylinders 1-3)

Before installing the EGR inlet tube for cylinders one through three, pre-assemble the tube's lower gasket and a bolt. Install the tube and gasket assembly and then install the second lower bolt. Next, install the upper bolts and gasket. Tighten all of the bolts so the inlet tube is snug, and then tighten the bolts to the specified torque value.

Step 18: Install Exhaust Heat Shield

Reinstall the exhaust heat shield, and then secure it into place with the five mounting bolts. Torque each of the bolts to the specified torque value.

Step 19: Install HCI Coolant Supply Tube

Reinstall the coolant supply line for the Hydrocarbon Injector, and tighten the line to the specified torque value. Ensure that the line is not kinked after it is properly tightened.



Step 20: Install Engine Cover

Begin reassembling the interior by installing the engine cover and securing it with the previously removed bolts. Then torque each of the engine cover bolts to the specified torque value.

Step 21: Install Floor Mat

After bringing the floor mat back into the vehicle, ensure the mat is properly aligned with the floor of the cab. If servicing a vehicle with a sleeper cab, secure the front rubber floor mat to the sleeper mat by locking the channels together.

Step 22: Install Cup Holder Assembly

Position the cup holder assembly in the vehicle, and reconnect the 12V accessory port and floor light electrical connectors.



After lining up the mounting hardware, engage the pressure clips on the right side of the cup holder and install the three screws. Using a torque screwdriver, tighten the screws to the specified torque value. Next, reinstall the covers for each of the screws holding the cup holder assembly in place.

Step 23: Install Right Kick Panel

Now install the right kick panel by pressing the clip into the interior module trim cover and installing the mounting bolt. Tighten the bolt to the specified torque value.

Step 24: Install Steering Column Cover

Next, install the steering column trim panel and secure it with the previously removed screws. Once all of the screws are in place, tighten them to the specified torque value.

Step 25: Install Left Kick Panel

Install the left kick panel by installing the two lower bolts and the screw at the top. Each of the fasteners must be torqued to the specified torque value.

Step 26: Install Scuff Plates

On each side of the cab, install the seat belts and their guides into the scuff plates. Then attach the scuff plates to the cab with the previously removed screws. Tighten the screws to the specified torque value.



Step 27: Install Shifter



IF THE VEHICLE IS EQUIPPED WITH A PUSH BUTTON SHIFTER, REINSTALL THE SHIFTER PANEL WITH THE FOLLOWING PROCEDURE:

RECONNECT THE ELECTRICAL CONNECTOR BEHIND THE PANEL, INSTALL THE PANEL, AND REINSTALL THE SCREWS ON THE PANEL. TIGHTEN THE SCREWS TO THE SPECIFIED TORQUE VALUE.

Next reinstall the shifter lever. Secure the lever with the retaining nut and bolt removed earlier in this procedure. Then tighten the retaining nut and bolt assembly to the specified torque value. Re-connect the red and black air line quick disconnect fittings, and fit the shifter boot into its original position.

Step 28: Install Front Seats

After placing the front seats in the vehicle with the help of an assistant, reconnect the air supply lines where applicable.



USE ALL NEW MOUNTING HARDWARE WHEN INSTALLING SEATS TO ENSURE PROPER TORQUE REQUIREMENTS CAN BE MET.

Before moving the seat into its normal position, mount the seatbelts onto both sides of the seat. Tighten the bolts to the specified torque value. Next, slide the seat backwards into place and install the four mounting bolts. The seat mounting bolts must be torqued in an X pattern to the specified torque value. If the vehicle is equipped with a fire extinguisher, reinstall the fire extinguisher bracket, and the previously removed bolts. Then secure the fire extinguisher to the mounting bracket with the band clamp.

Before Returning the Vehicle to Service...

Step 29: Fill Cooling System

Now use the Navistar Coolant Management Tool KL5007NAV to refill the engine coolant and verify proper operation of the vehicle. Before returning the vehicle to service, be sure to remove the drain pan, close and properly secure the hood, and remove the wheel chocks.



CONCLUSION

You have now completed the Exhaust Manifold Ring Seal Replacement Procedure for TSI-13-12-10.

Thank you for your participation.

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