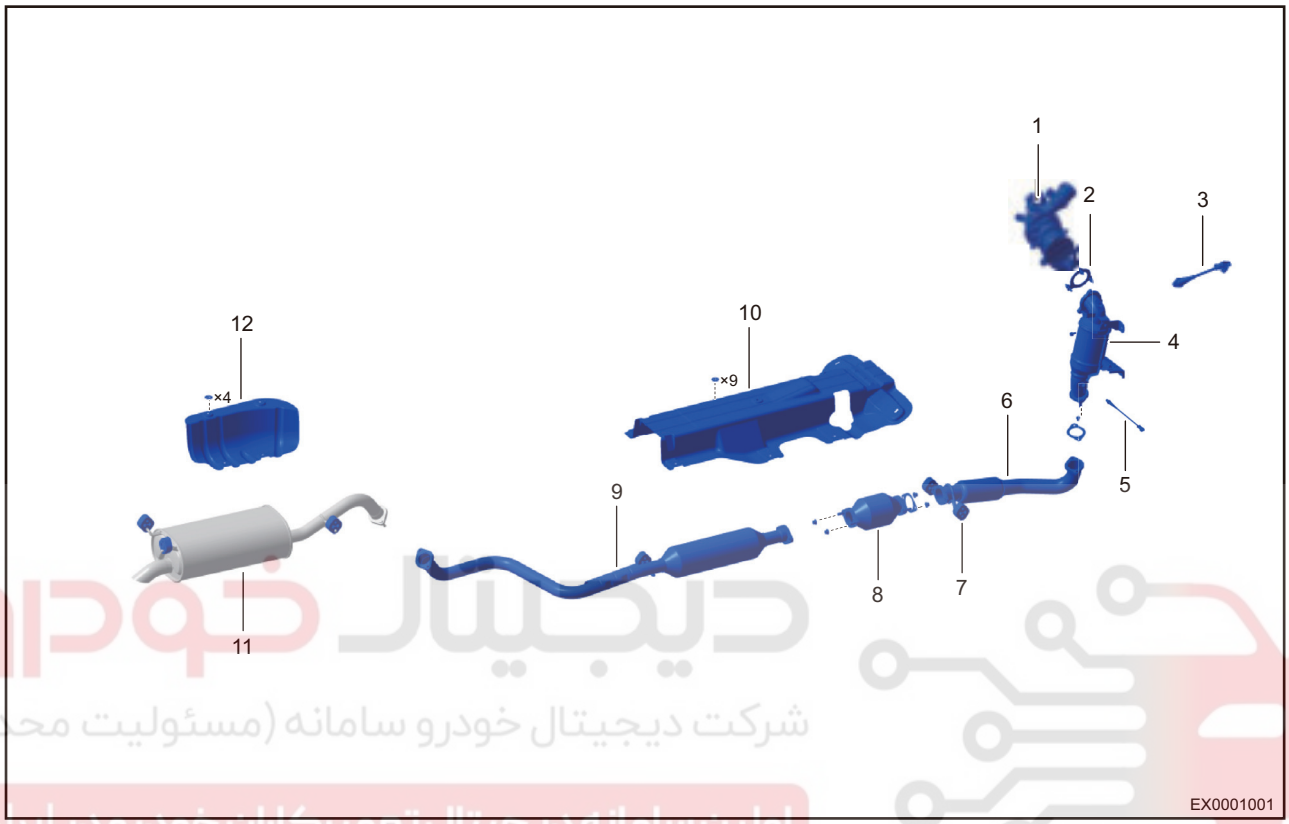
SQRE4T15B EXHAUST SYSTEM

GENERAL INFORMATION

Overview

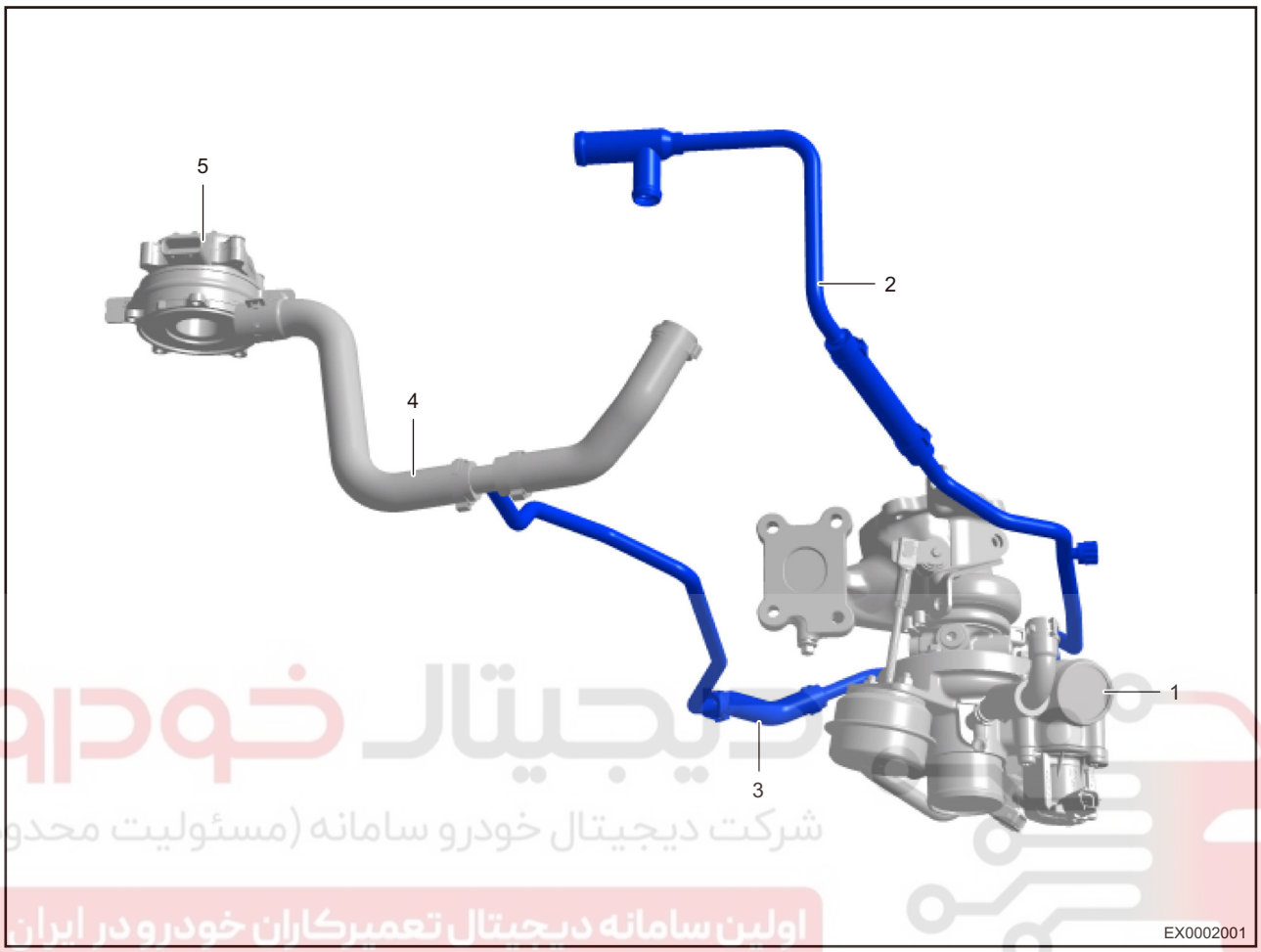
Description



1 - Turbocharger Assembly	2 - Precatalytic Converter Mounting Gasket
3 - Upstream Oxygen Sensor	4 - Precatalytic Converter Assembly
5 - Downstream Oxygen Sensor	6 - Front Exhaust Pipe Assembly
7 - Diamond Shaped Hanger Block	8 - Main Catalytic Converter Assembly
9 - Front Muffler Assembly	10 - Muffler Heat Insulator 1
11 - Rear Muffler Assembly	12 - Muffler Heat Insulator 2

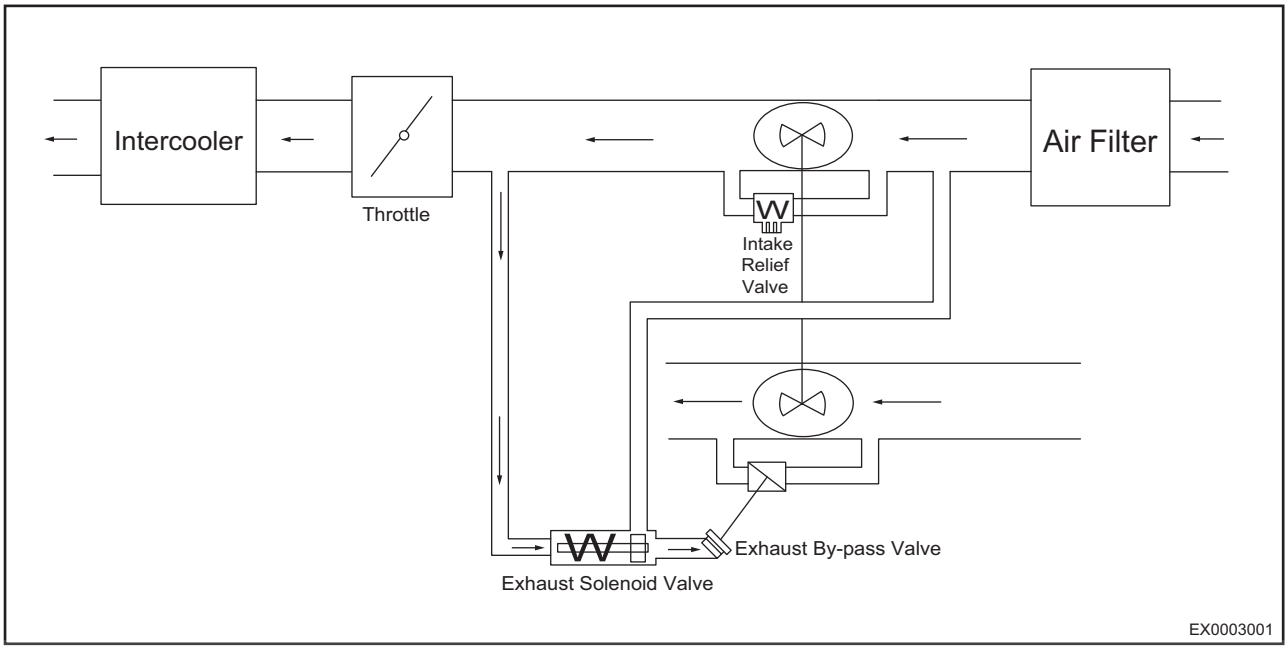
Description

Connection Between Turbocharger and Electric Water Pump



1 - Turbocharger Assembly	2. Turbocharger Water Outlet Pipe Set
3. Turbocharger Water Inlet Pipe Set	4 - Electric Water Pump Outlet Pipe
5 - Electric Water Pump Assembly	

Operation



Turbocharger use exhaust gas that is discharges during engine running to turn the turbo impeller, and then drive compressor impeller to send the air pressed through air filter into cylinder. As more air enters into cylinder, more fuel is allowed to be injected so that more engine power is generated. In addition, the turbocharger can also make the engine get power compensation when it works in highland.

Specifications

Torque Specifications

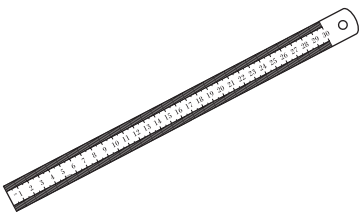
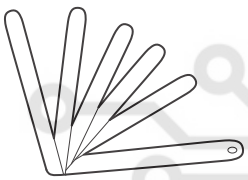
Description	Torque (N·m)
Precatalytic Converter Assembly Bracket Fixing Bolt	25 ± 4
Upstream Oxygen Sensor	45 ± 5
Downstream Oxygen Sensor	45 ± 5
Coupling Nut Between Precatalytic Converter Assembly and Front Exhaust Pipe Assembly	45 ± 5
Coupling Nut Between Precatalytic Converter Assembly and Turbocharger	27 ± 5
Bolt	33 ± 5
Coupling Nut Between Main Catalytic Converter Assembly and Front Exhaust Pipe Assembly	45 ± 5
Coupling Nut Between Main Catalytic Converter Assembly and Front Muffler Assembly	45 ± 5
Coupling Nut Between Front Muffler Assembly and Rear Muffler Assembly	45 ± 5
Turbocharger Bracket Fixing Bolt	23 ± 3.5
Turbocharger Heat Insulator Fixing Bolt	9 ± 1.5
Turbocharger Heat Insulator II Fixing Bolt	8 + 3
Turbocharger Fixing Nut	25 ± 5
Exhaust By-pass Control Solenoid Valve Fixing Bolt	3 + 2
Electric Water Pump Assembly Fixing Bolt	8 + 3
Electric Water Pump Bracket Fixing Bolt	8 + 3
Hollow Bolt Torque	25 + 5

Non-reusable Part

Non-reusable Part	
High Temperature Nut (Turbocharger)	Replace it
Gasket - Turbocharger	Replace it
Gasket (Hollow Bolt)	Replace it
Fluid Return Pipe Gasket	Replace it

Tools

General Tools

Precision Straightedge	 063
Feeler Gauge	 060

DIAGNOSIS & TESTING

Diagnosis Content

Problem Symptoms Table

Hint:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Excessive exhaust noise	Exhaust pipe (loose connection)
	Exhaust manifold assembly (damaged or leaked)
	Main catalytic converter assembly (damaged or leaked)
	Muffler assembly (damaged or leaked)
	Exhaust pipe gasket (damaged)
Excessive exhaust temperature	Exhaust manifold assembly (blocked)
	Main catalytic converter assembly (blocked)
	Precatalytic converter assembly (blocked)
	Incorrect ignition timing in ignition system
	Inadequate gas mixture combustion
Exhaust pipe leakage	Exhaust pipe gasket (damaged)
	Exhaust manifold assembly (damaged or leaked)
	Main catalytic converter assembly (damaged or leaked)
	Muffler assembly (damaged or leaked)

Exhaust System Gas Leakage Inspection

Method to check gas leakage in exhaust system joints: Warm up engine for a while, and check for gas leakage in exhaust system joints. A certain amount of gas leakage at the exhaust pipe joint is allowed, but gas leakage at the joint between turbocharger and cylinder head or precatalytic converter is prohibited. The judging standard is that engine does not shudder and no "poof" sound is heard from the joints.

ON-VEHICLE SERVICE

Turbocharger Heat Insulator Assembly

Removal

Warning/Caution/Hint

Warning:

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

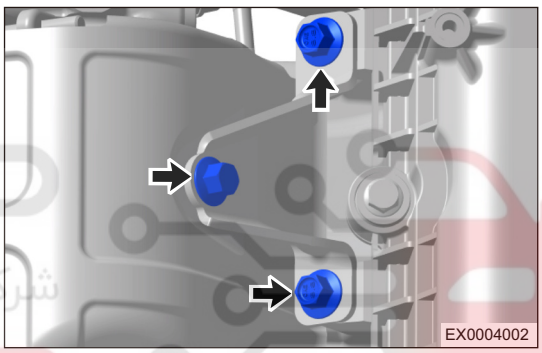
Caution:

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the turbocharger fixing bracket.

   (a) Remove 3 fixing bolts (arrow) from turbocharger fixing bracket.

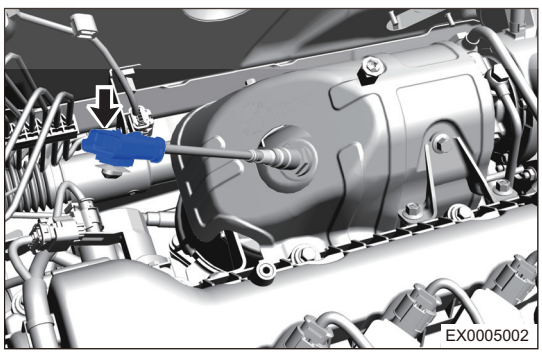
   Tightening torque
   23 ± 3.5 N·m



   (b) Remove the turbocharger fixing bracket.

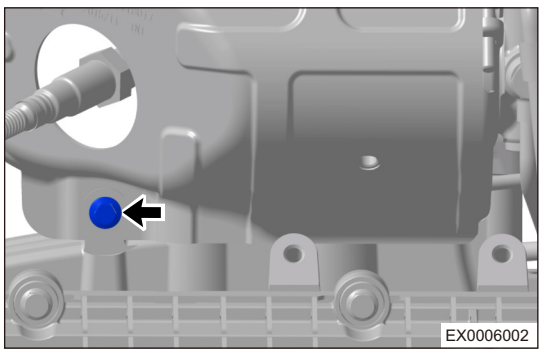
5. Remove the turbocharger heat insulator assembly.

   (a) Disconnect the upstream oxygen sensor connector (arrow).



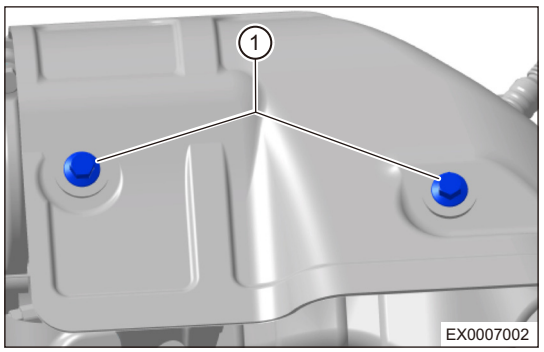
   (b) Remove the turbocharger heat insulator fixing bolt (arrow).

   Tightening torque
   9 ± 1.5 N·m



(c) Remove 2 turbocharger heat insulator fixing bolts (1).

Tightening torque
9 ± 1.5 N·m

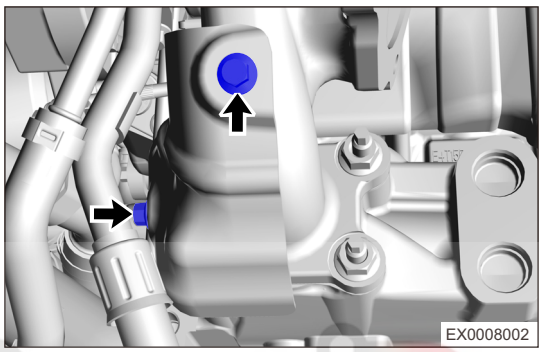


(d) Remove the turbocharger heat insulator assembly

6. Remove the turbocharger heat insulator II.

(a) Remove 2 turbocharger heat insulator II fixing bolts (arrow).

Tightening torque
8 + 3 N·m



(b) Remove the turbocharger heat insulator II.

Installation

1. Installation is in the reverse order of removal.

Turbocharger Assembly

Removal

Warning/Caution/Hint

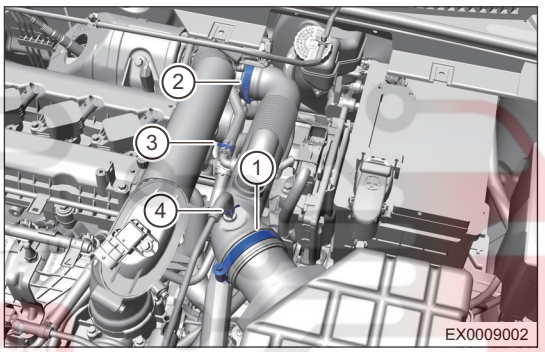
Warning:

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

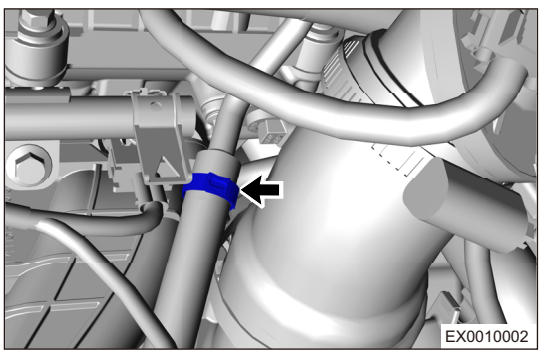
Caution:

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

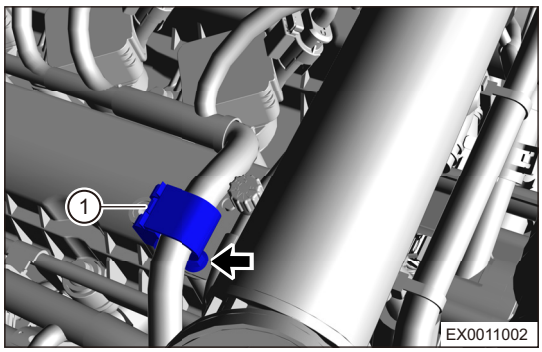
1. Turn off all electrical equipment and the ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Drain the coolant (See page 12-10).
5. Remove the muffler assembly (See page 10-12).
6. Remove the precatalytic converter assembly (See page 11-16).
7. Remove the intake hose assembly.
   (a) Loosen worm clamp (1) and disconnect connection between intake hose and air filter assembly.



   (b) Loosen worm clamp (2) and disconnect connection between intake hose and turbocharger assembly.
   (c) Loosen elastic clamp (3) and disconnect connection between crankcase ventilation hose and intake hose.
   (d) Loosen elastic clamp (4) and disconnect connection between fuel vapour pipe set and intake hose.
   (e) Remove the intake hose assembly.
8. Remove the turbocharger water outlet pipe set assembly.
   (a) Loosen clamping ring (arrow) and disconnect connection between turbocharger water outlet pipe set and water outlet hose.



(b) Disconnect the engine wire harness fixing clip (1).

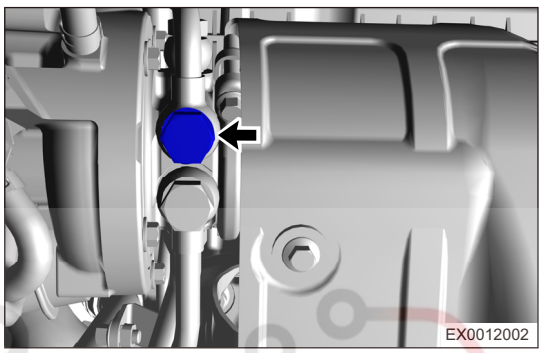


(c) Remove fixing bolt (arrow) from turbocharger water outlet pipe set bracket.

Tightening torque
8 + 3 N·m

(d) Remove hollow bolt (arrow) between turbocharger water outlet pipe set and turbocharger assembly.

Tightening torque
25 +5 N·m



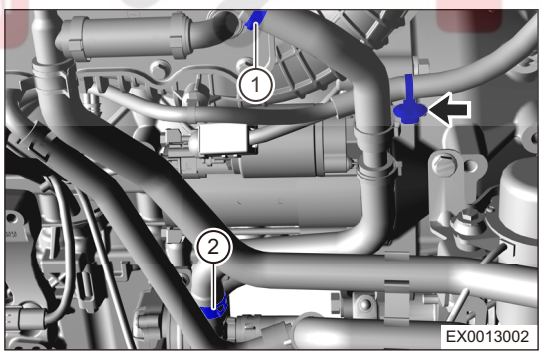
(e) Remove the turbocharger water outlet pipe set assembly.

Caution:

- Pay attention not to drop upper and lower washers of hollow bolt during removal and do not reuse them.

9. Remove the turbocharger water inlet pipe set assembly.

(a) Loosen clamping ring (1) and disconnect connection between turbocharger water inlet pipe set hose and intercooler assembly.

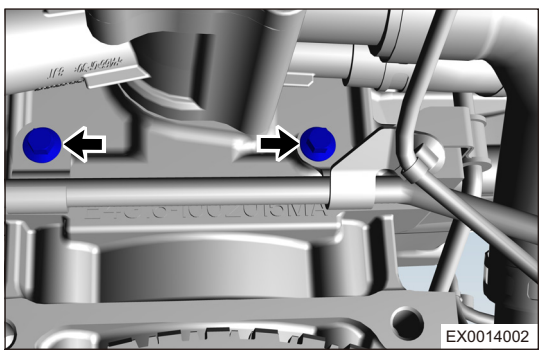


(b) Loosen clamping ring (2) and disconnect connection between electric water pump assembly and water outlet hose.

(c) Disconnect the engine wire harness fixing clip (arrow).

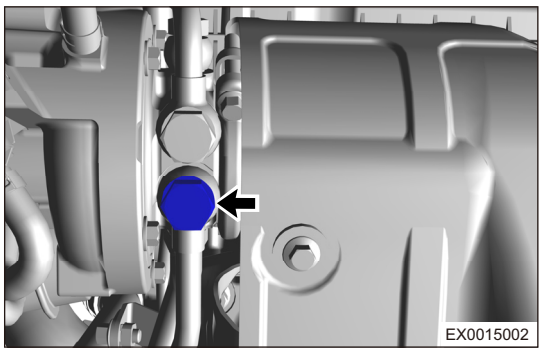
(d) Remove 2 fixing bolts (arrow) from turbocharger water inlet pipe set bracket.

Tightening torque
8 + 3 N·m



(e) Remove hollow bolt (arrow) between turbocharger water inlet pipe and turbocharger assembly.

Tightening torque
25 +5 N·m



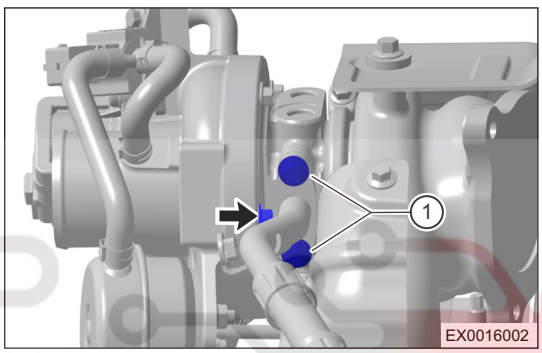
(f) Remove the turbocharger water inlet pipe set assembly.

Caution:
- Pay attention not to drop upper and lower washers of hollow bolt during removal and do not reuse them.

10. Remove the turbocharger fluid return pipe assembly.

(a) Remove fixing bolt (arrow) from turbocharger fluid return pipe bracket.

Tightening torque
8 + 3 N·m

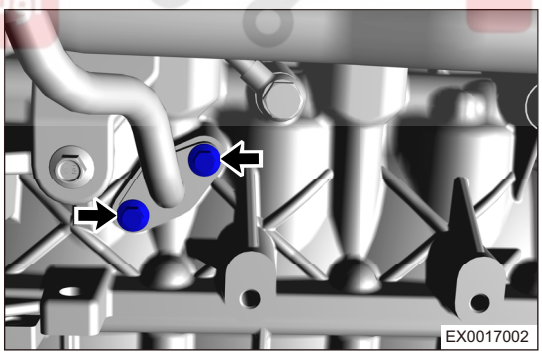


(b) Remove 2 coupling bolts (1) between turbocharger fluid return pipe and turbocharger assembly.

Tightening torque
8 + 3 N·m

(c) Remove 2 coupling bolts (arrow) between turbocharger fluid return pipe and cylinder block assembly.

Tightening torque
8 + 3 N·m



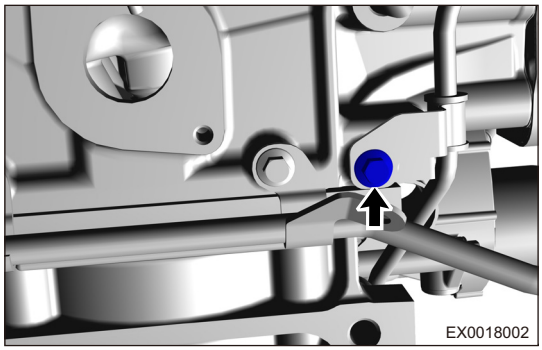
(d) Remove the turbocharger fluid return pipe assembly.

Caution:
- Pay attention not to drop the upper and lower washers and the bolt during removal and do not reuse them.

11. Remove the turbocharger fluid inlet pipe assembly.

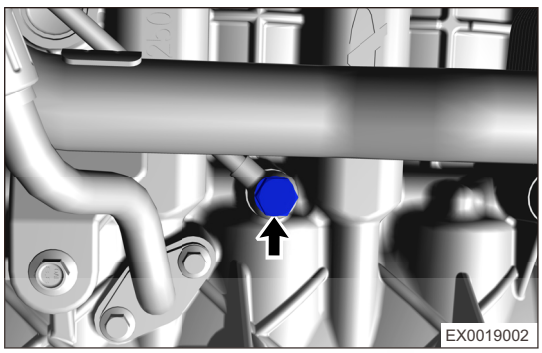
(a) Remove fixing bolt (arrow) from turbocharger fluid inlet pipe bracket.

Tightening torque
8 + 3 N·m



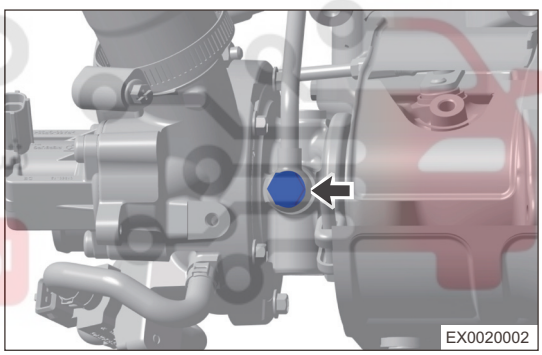
(b) Remove hollow bolt (arrow) between turbocharger fluid inlet pipe and cylinder block assembly.

Tightening torque
20 + 5 N·m



(c) Remove hollow bolt (arrow) between turbocharger water inlet pipe and turbocharger assembly.

Tightening torque
20 + 5 N·m



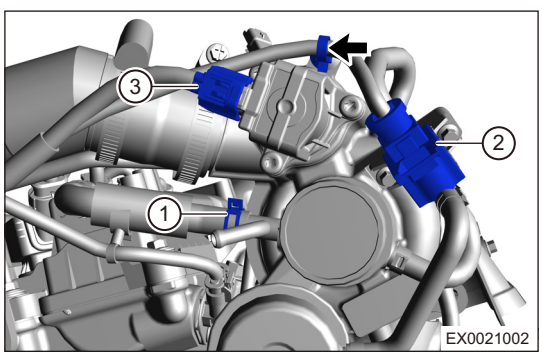
(d) Remove the turbocharger fluid inlet pipe assembly.

Caution:

- Pay attention not to drop upper and lower washers of hollow bolt during removal and do not reuse them.

12. Remove the turbocharger assembly.

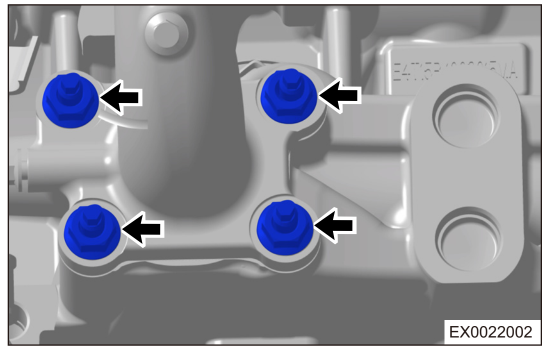
(a) Loosen elastic clamp (1) and disconnect connection between crankcase ventilation tube and turbocharger assembly.



(b) Disconnect the exhaust by-pass control solenoid valve connector (2).
(c) Disconnect the engine wire harness fixing clip (arrow).
(d) Disconnect the relief control solenoid valve connector (3).

(e) Remove 4 turbocharger fixing nuts (arrow).

Tightening torque
25 +5 N·m



(f) Remove the turbocharger assembly.

Inspection

1. Firstly perform basic inspection to turbocharger system during DTC with too high, too low boost pressure or when power lowers

   Basic inspection:
   - Check there are no cranks causing by overheating, biting, deformation or other damage on exhaust turbocharger turbo housing, otherwise, replace exhaust turbocharger.
   - Check there are no deposition and blocking on turbo oil hole.
   - Check there are no blockage, squash, deformation or other damage on fluid inlet and return pipes of exhaust turbocharger.
   - Check there are no oil leakage (inside leakage and outside leakage) on exhaust turbocharger.
   - Check that charcoal canister check valve between charcoal canister and front exhaust turbocharger intake hose and check valve between brake booster and intake manifold are correctly installed with the arrow above to point to conduction direction (fault multiple points).
   - Check all lines are connected securely, no leakage, aging, breakage, etc.

2. Turbocharger daily inspection

   (a) Check connecting lines between air filter and turbocharger, turbocharger and engine intake and exhaust pipes for sealing and tightness.

   (b) Check if turbocharger fluid inlet and return pipes are damaged or throttling, connecting bolts of joints are loose.

   (c) Check quality of oil, clean or replace the oil element.

   (d) Check the air filter and clean or replace the element in regular.

   (e) Check if engine crankcase blow-by gas is too large, breather is smooth, ensure crankcase pressure is normal.

3. Other requirements of turbocharger

   (a) Avoid low engine idle for long time (maximum should not exceed 20 minutes).

   (b) Never use the operation with "Accelerate - Stall - Neutral Sliding" before there is oil pressure on the engine, the engine must be kept in idling condition (3 to 5 minutes).

   (c) Before stopping the engine, let it gradually decrease its temperature and speed from maximum value (3 to 5 minutes).

Installation

Warning/Caution/Hint

Caution:

- Replace high temperature nut and washer, and clean foreign matters on connection part.
- Check for air leakage, if so, check if each nut and bolt are tightened; if component is damaged, replace damaged component.

1. Installation is in the reverse order of removal.

Exhaust By-pass Control Solenoid Valve

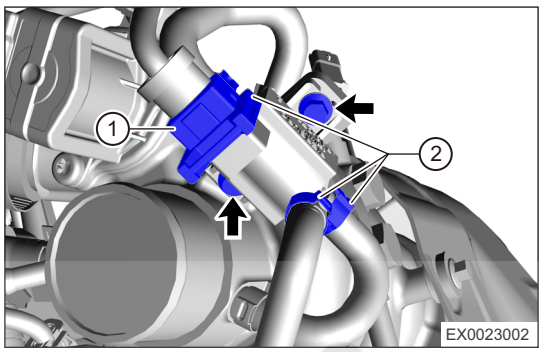
Removal

Warning/Caution/Hint

Caution:

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the exhaust by-pass control solenoid valve.
   (a) Disconnect the exhaust by-pass control solenoid valve connector (1).



   (b) Loosen clamping rings (2) and disconnect 3 connections between hoses and exhaust by-pass control solenoid valve.
   (c) Remove 2 fixing bolts (arrow) from exhaust by-pass control solenoid valve.
   Tightening torque
   3 + 2 N·m
   (d) Remove the exhaust by-pass control solenoid valve assembly.

Installation

1. Installation is in the reverse order of removal.

Precatalytic Converter Assembly

Removal

Warning/Caution/Hint

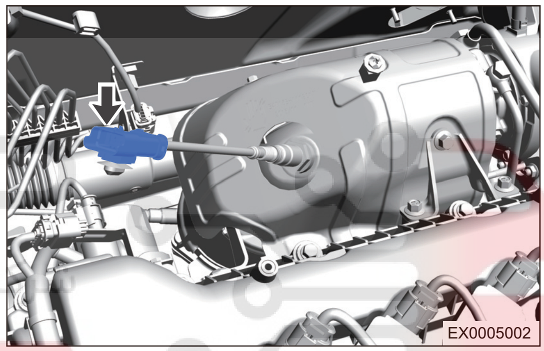
Warning:

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

Caution:

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the turbocharger heat insulator assembly (See page 11-8).
5. Remove the precatalytic converter assembly.
   (a) Raise vehicle to a proper position.
   (b) Disconnect the upstream oxygen sensor connector (arrow).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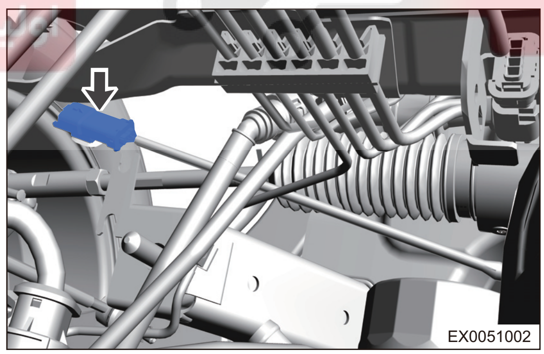
   (c) Disconnect the downstream oxygen sensor connector (arrow).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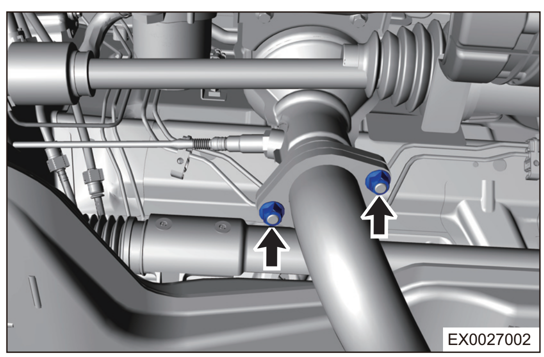
   (d) Remove 2 coupling nuts (arrow) between front exhaust pipe assembly and precatalytic converter assembly.

   Tightening torque
   45 ± 5 N·m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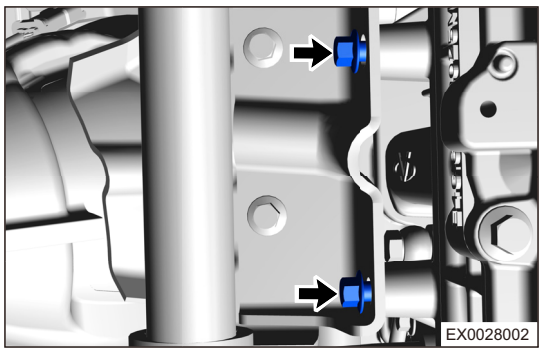
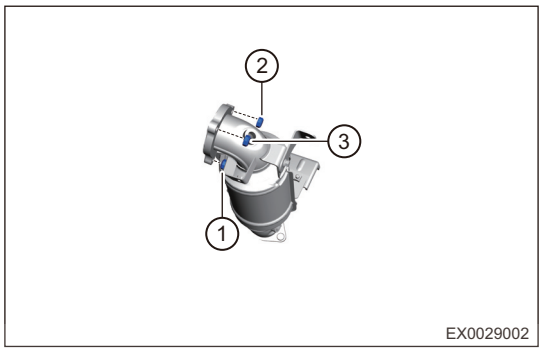
(e) Remove precatalytic converter assembly bracket upper bolt and bracket fixing bolt (arrow).

Tightening torque
25 + 4 N·m



(f) Remove coupling nuts (1) (2) (3) between precatalytic converter and turbocharger.

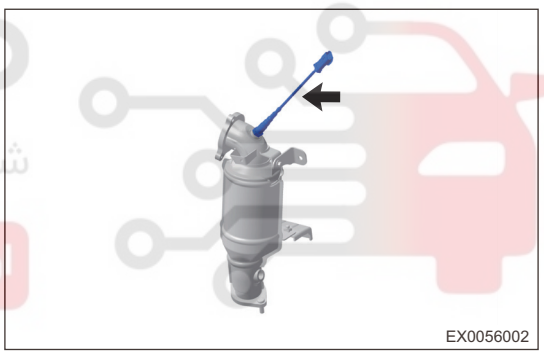
Tightening torque
27 ± 5 N·m



(g) Remove the precatalytic converter assembly.

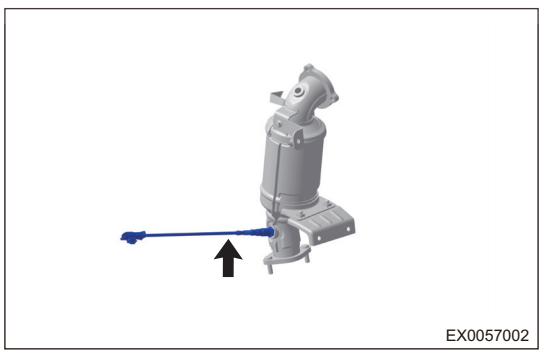
(h) Remove the upstream oxygen sensor assembly (arrow).

Tightening torque
45 ± 5 N·m



(i) Remove the downstream oxygen sensor assembly (arrow).

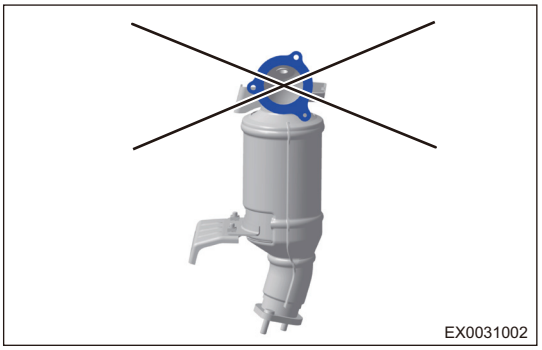
Tightening torque
45 ± 5 N·m



Inspection

1. Check precatalytic converter connection surface warpage.

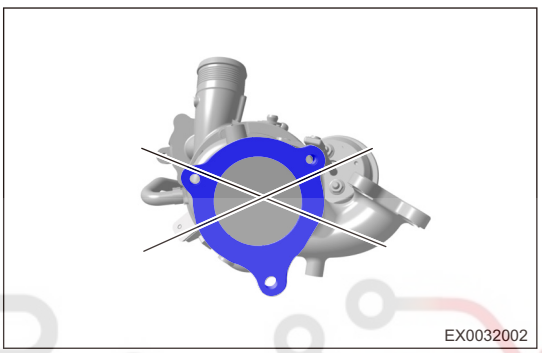
(a) Using a precision straightedge and feeler gauge, measure connection surface between precatalytic converter and turbocharger, replace it if surface warpage is greater than 0.5 mm.


EX0031002

(b) Check precatalytic converter internal carrier for cracked or blocked. Replace precatalytic converter assembly if damaged.

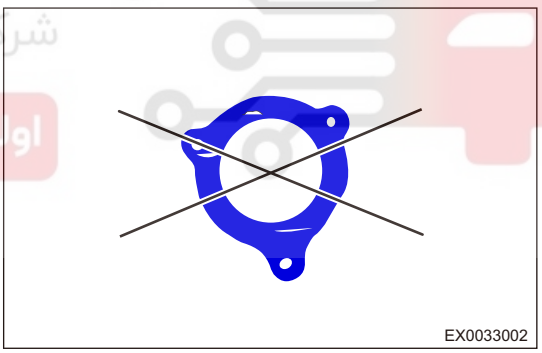
2. Check turbocharger connection surface curvature.

(a) Using a precision straightedge and feeler gauge, measure connection surface between turbocharger and precatalytic converter, replace it if surface curvature is greater than 0.04 mm.


EX0032002

3. Check sealing gasket.

(a) Check sealing gasket for scratch or rough, replace it if necessary.


EX0033002

Installation

Warning/Caution/Hint

Caution:

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- If there is any crack or leakage in the precatalytic converter assembly, replace it.
- Check that there is no exhaust gas leakage in connecting part of upstream oxygen sensor and downstream oxygen sensor.
- Check that there is no exhaust gas leakage between precatalytic converter assembly and turbocharger, front exhaust pipe assembly after installation is completed.

1. Installation is in the reverse order of removal.

Front Exhaust Pipe Assembly

Removal

Warning/Caution/Hint

Warning:

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

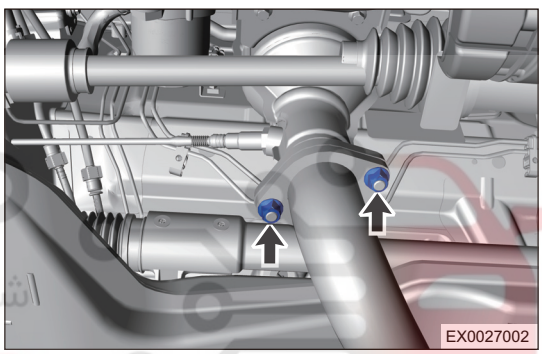
Caution:

- When removing front exhaust pipe assembly, an assistant is needed to hold it. This can prevent front muffler assembly from dropping during operation, which may cause an accident.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Raise vehicle to a proper height.
4. Remove the front exhaust pipe assembly.

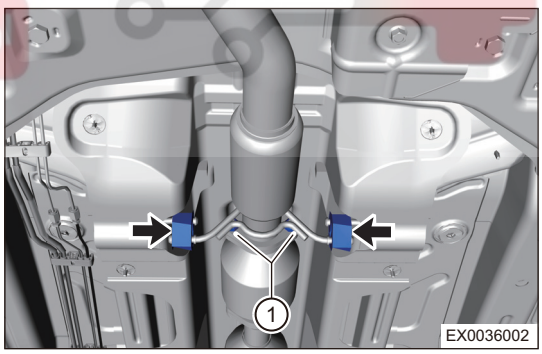
(a) Remove 2 coupling nuts (arrow), then disconnect connection between front exhaust pipe assembly and precatalytic converter assembly, and take off gasket from connecting part.

Tightening torque
45 ± 5 N·m



(b) Remove 2 coupling nuts (1), then disconnect connection between front exhaust pipe assembly and main catalytic converter assembly, and take off gasket from connecting part.

Tightening torque
45 ± 5 N·m



(c) Separate 2 diamond shaped hanger blocks (arrow) between front exhaust pipe assembly and body hook.

(d) Remove the front exhaust pipe assembly.

Installation

Warning/Caution/Hint

Warning:

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- Check exhaust gas for leakage. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.

1. Installation is in the reverse order of removal.

Main Catalytic Converter Assembly

Removal

Warning/Caution/Hint

Warning:

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

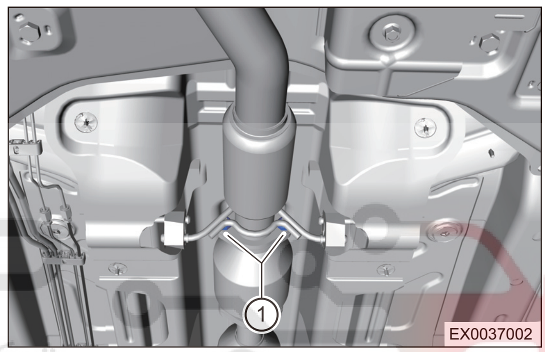
Caution:

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Raise vehicle to a proper height.
4. Remove the main catalytic converter assembly.

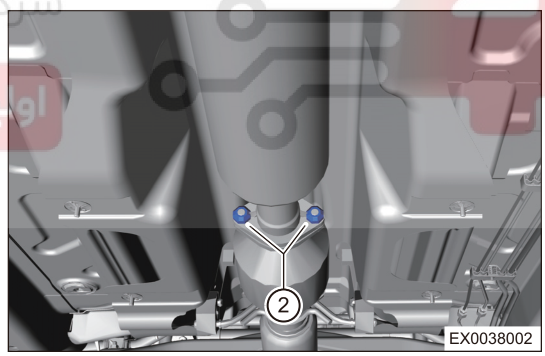
   (a) Remove 2 coupling nuts (1), then disconnect connection between front exhaust pipe assembly and main catalytic converter assembly, and take off gasket from connecting part.

   Tightening torque
   45 ± 5 N·m



   (b) Remove 2 coupling nuts (2), then disconnect connection between main catalytic converter assembly and front muffler assembly, and take off gasket from connecting part.

   Tightening torque
   45 ± 5 N·m



   (c) Remove the main catalytic converter assembly.

Inspection

1. Check precatalytic converter internal carrier for cracked, detachment, blocked, etc. Replace precatalytic converter assembly if damaged.

Installation

Warning/Caution/Hint

Warning:

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- Check exhaust gas for leakage. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.
- If there is any crack or leakage in main catalytic converter assembly, replace it.

1. Installation is in the reverse order of removal.

Front Muffler Assembly

Removal

Warning/Caution/Hint

Warning:

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

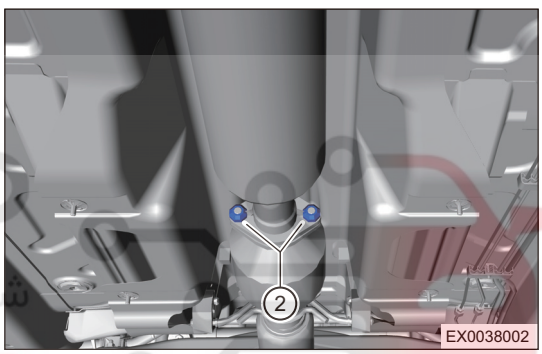
Caution:

- When removing front muffler assembly, an assistant is needed to hold it. This can prevent front muffler assembly from dropping during operation, which may cause an accident.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Raise the vehicle to a proper position.
4. Remove the front muffler assembly.

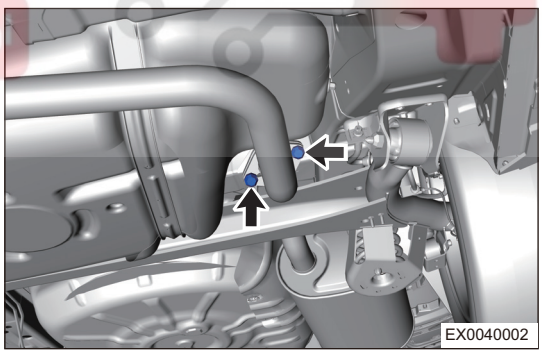
(a) Remove 2 coupling nuts (arrow), then disconnect connection between front muffler assembly and main catalytic converter assembly, and take off gasket from connecting part.

Tightening torque
45 ± 5 N·m

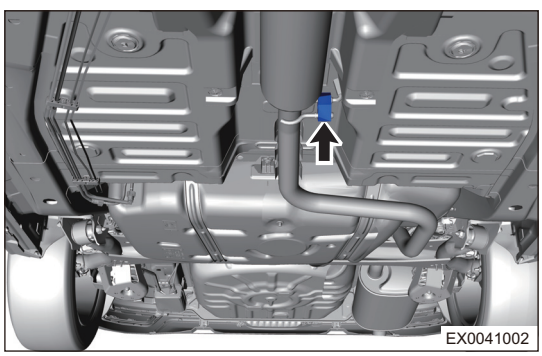


(b) Remove 2 coupling nuts (arrow), then disconnect connection between front muffler assembly and rear muffler assembly, and take off gasket from connecting part.

Tightening torque
45 ± 5 N·m

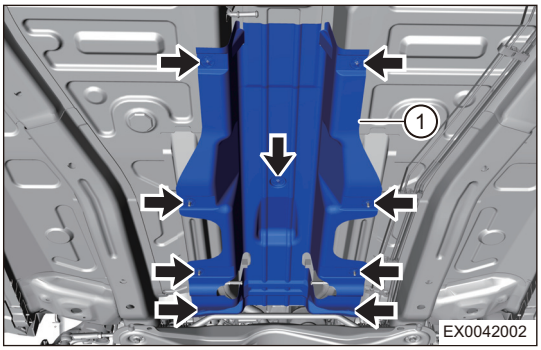


(c) Separate 1 diamond shaped hanger blocks (arrow) between front muffler assembly and body hook.



(d) Remove the front muffler assembly.

5. Remove the muffler heat insulator 1.
   (a) Remove 9 clamping pieces (arrow) and take off muffler heat insulator 1 (1).



Installation

Warning/Caution/Hint

Caution:

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- If there is any crack or leakage in front muffler assembly, replace it.
- Check exhaust gas for leakage. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.

1. Installation is in the reverse order of removal.

Rear Muffler Assembly

Removal

Warning/Caution/Hint

Warning:

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

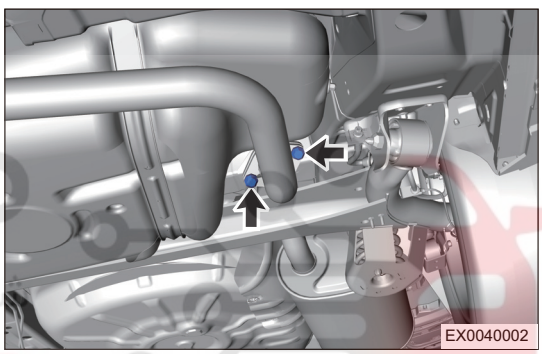
Caution:

- When removing rear muffler assembly, an assistant is needed to hold it. This can prevent rear muffler assembly from dropping during operation, which may cause an accident.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

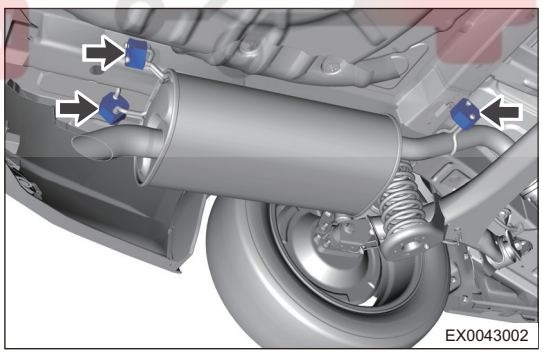
1. Turn off all electrical equipment and the ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Raise the vehicle to a proper position.
4. Remove the rear muffler assembly.

   (a) Remove 2 coupling nuts (arrow), then disconnect connection between rear muffler assembly and front muffler assembly, and take off gasket from connecting part.

   Tightening torque
   45 ± 5 N·m



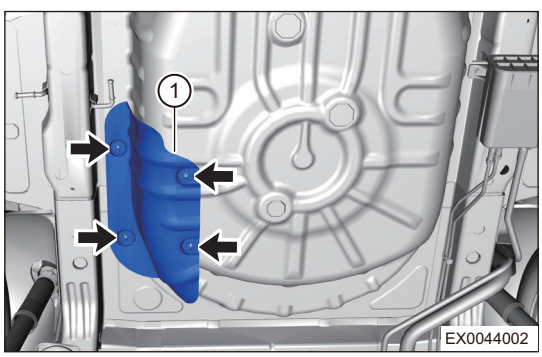
   (b) Separate 3 diamond shaped hanger blocks (arrow) between rear muffler assembly and body hooks.



   (c) Remove the rear muffler assembly.

5. Remove the rear muffler heat insulator 2.

   (a) Remove 4 clamping pieces (arrow) from rear muffler heat insulator assembly and take off muffler heat insulator 2 (1).



Installation

Warning/Caution/Hint

Caution:

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- If there is any crack or leakage in rear muffler assembly, replace it.
- Check exhaust gas for leakage. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.

1. Installation is in the reverse order of removal.