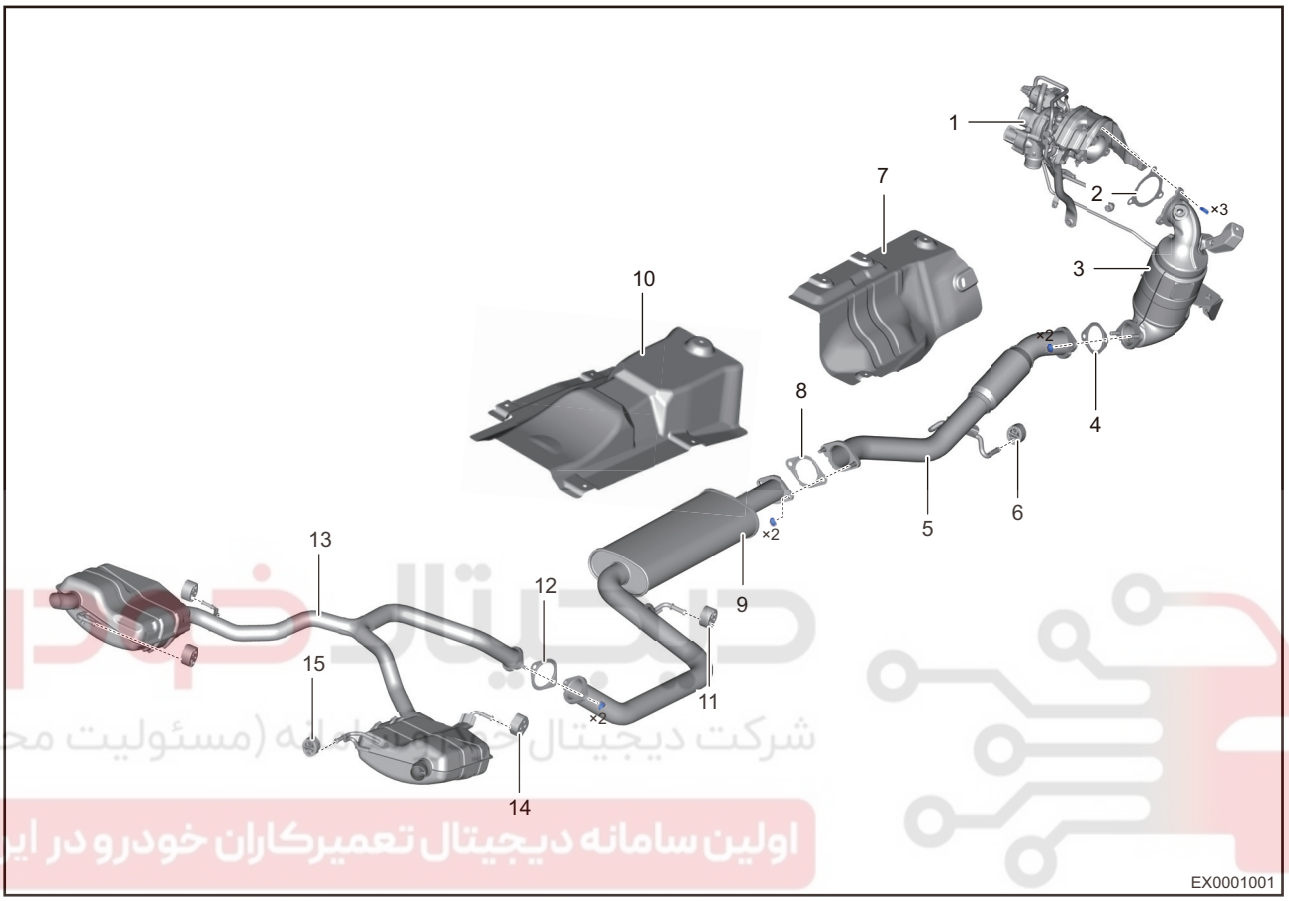
SQRD4T20 EXHAUST SYSTEM

GENERAL INFORMATION

Overview

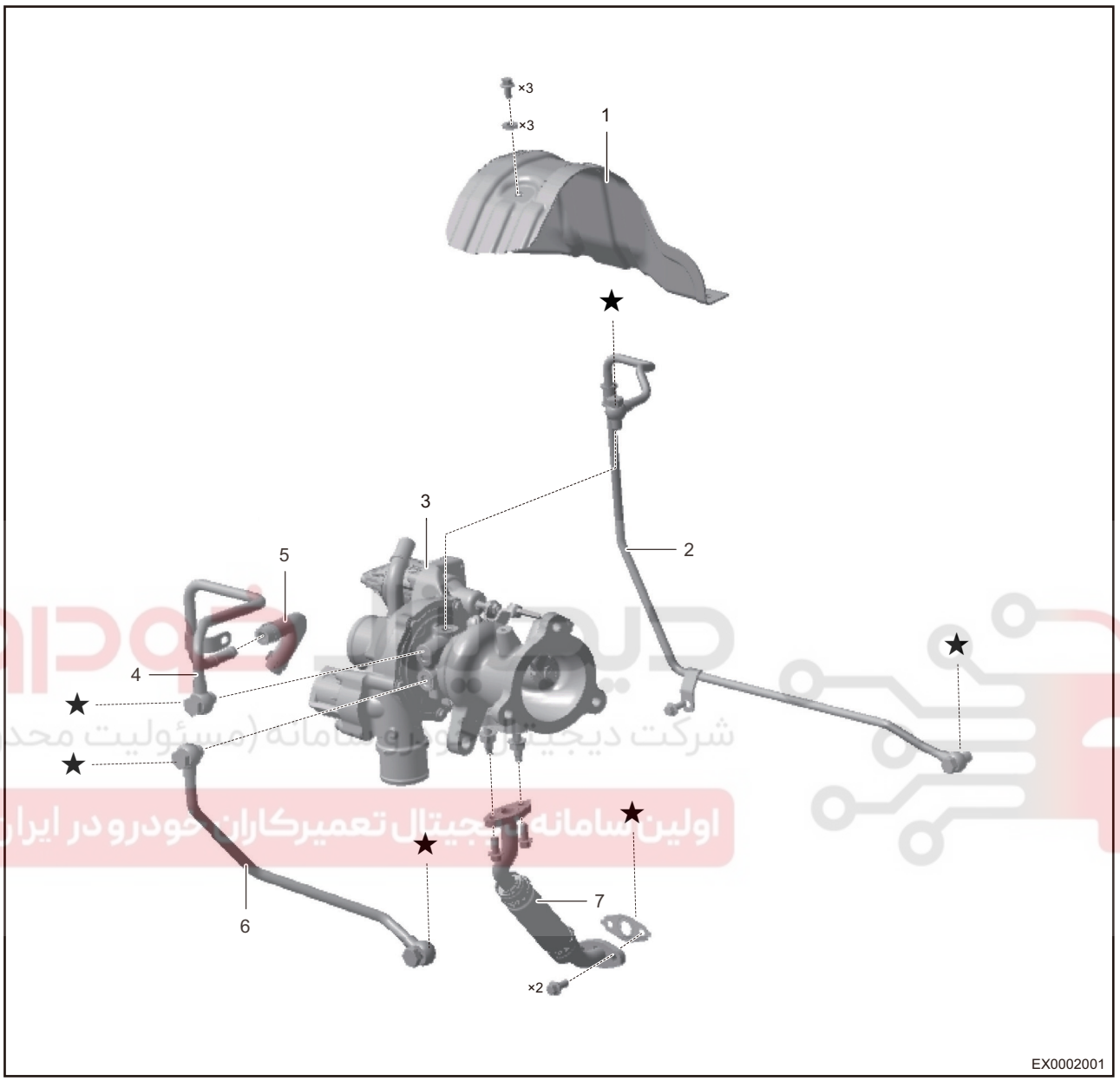
Description



1 - Turbocharger Assembly	2 - Gasket Between Turbocharger and Precatalytic Converter
3 - Precatalytic Converter Assembly	4 - Precatalytic Converter Rear Gasket
5 - Front Exhaust Pipe Assembly	6 - Hanger Block 2
7 - Heat Insulator Ⅱ	8 - Front Exhaust Pipe Rear Gasket
9 - Front Muffler Assembly	10 - Muffler Heat Insulator Ⅲ
11 - Hanger Block Ⅱ	12 - Front Muffler Rear Gasket
13 - Rear Muffler Assembly	14 - Hanger Block Ⅱ
15 - Hanger Block 2	

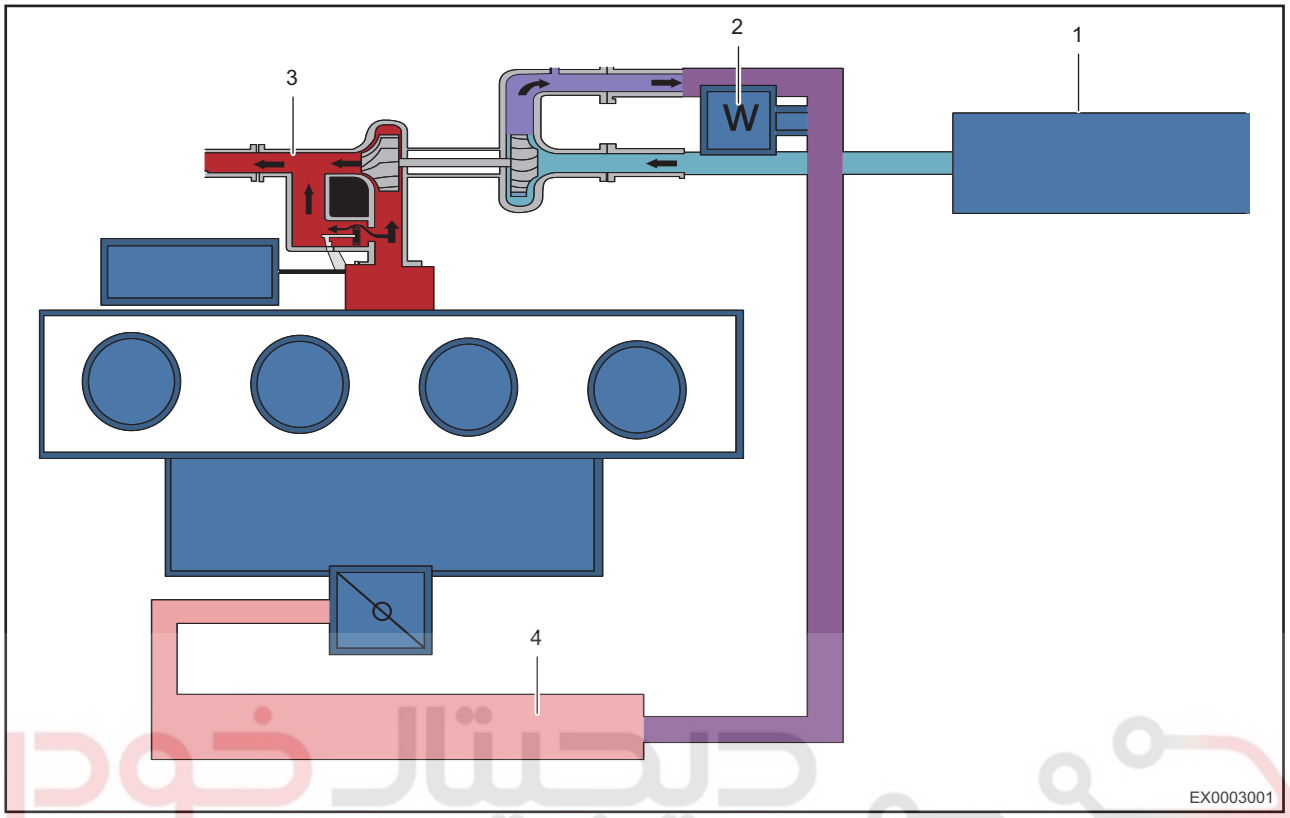
Components

Turbocharger



1 - Turbocharger Heat Insulator	2 - Turbocharger Oil Supply Pipe
3 - Turbocharger Assembly	4 - Hollow Bolt
5 - Turbocharger Water Outlet Pipe Assembly	6 - Turbocharger Water Inlet Pipe Assembly
7 - Turbocharger Oil Return Pipe	★ - Non-reusable Part

Operation



1 - Air Filter	2 - Pressure Discharge Solenoid Valve
3 - Turbocharger Control Valve	4 - Intercooler

Turbocharger use exhaust gas discharged during engine running to turn the turbo impeller, and then drive compressor impeller to send the air pressurized into cylinder through air filter. 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 engine obtain power compensation when it works in plateau.

Specifications

Torque specifications

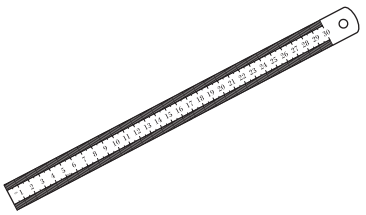
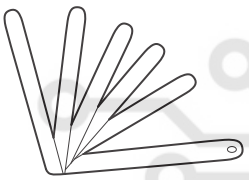
Description	Torque (N·m)
Precatalytic Converter Assembly Fixing Bracket Bolt	25 ± 3.5
Coupling Nut Between Precatalytic Converter Assembly and Front Exhaust Pipe Assembly	45 ± 5
Coupling Nut Between Precatalytic Converter Assembly and Turbocharger	45 ± 5
High Temperature Bolt	25 ± 3.5
Coupling Nut Between 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 Heat Insulator Fixing Bolt	8 + 3
Turbocharger Fixing Nut	33 ± 3
Exhaust By-pass Control Solenoid Valve Fixing Bolt	3 + 2
Hollow Bolt Torque	25 + 5

Non-reusable Part

Non-reusable Part	
High Temperature Nut (Turbocharger)	Replacement required
Turbocharger Gasket	Replacement required
Gasket (Hollow Bolt)	Replacement required
Oil Return Pipe Gasket	Replacement required

Tools

General Tools

Precision Straightedge	 RCH0063006
Feeler Gauge	 RCH0060006

DIAGNOSIS & TESTING

Diagnosis & Testing

Problem Symptoms Table

Hint:

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

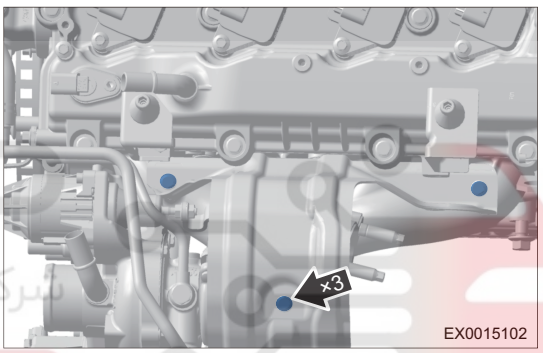
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

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 heat insulator.

   (a) Remove 3 fixing bolts (arrow) from turbocharger heat insulator.

   Tightening torque

   8 + 3 N·m



   (b) Remove the turbocharger heat insulator.

Installation

1. Installation is in the reverse order of removal.

Turbocharger Assembly

Removal

Warning/Caution/Hint

Warning:

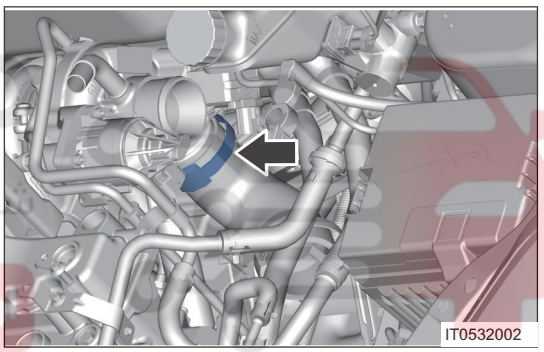
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

Caution:

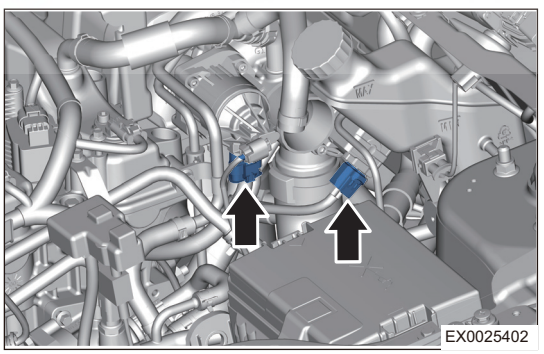
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

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. Remove air filter and inlet piper assembly.
5. Remove the engine lower protector assembly.
6. Drain the coolant.
7. Remove the precatalytic converter assembly.
8. Remove the turbocharger.

(a) Remove connection (arrow) between intercooler intake pipe Ⅰ and turbocharger.



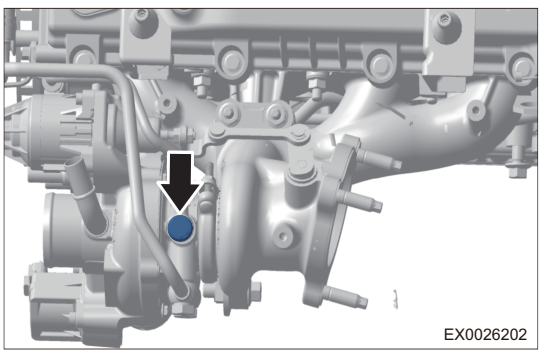
(b) Disconnect turbocharger exhaust valve connector and engine booster actuators (arrow).



(c) Remove 1 hollow bolt (arrow) from turbocharger oil supply pipe.

Tightening torque

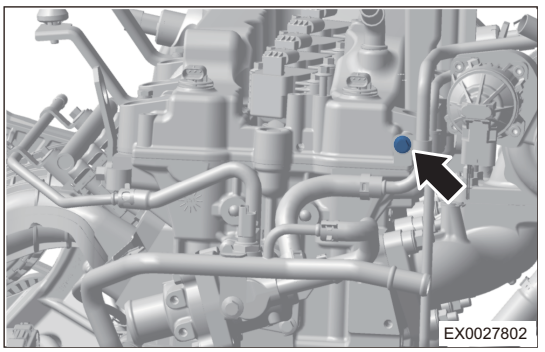
20 + 5 N·m



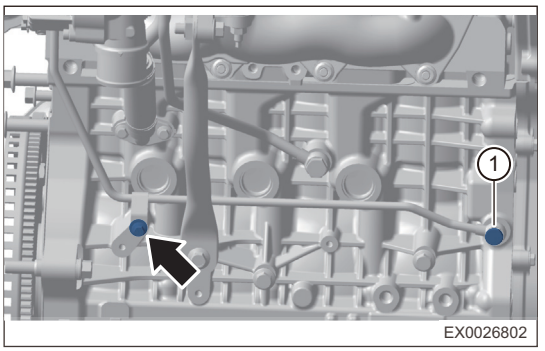
(d) Remove 1 fixing bolt (arrow) from turbocharger oil supply pipe.

Tightening torque

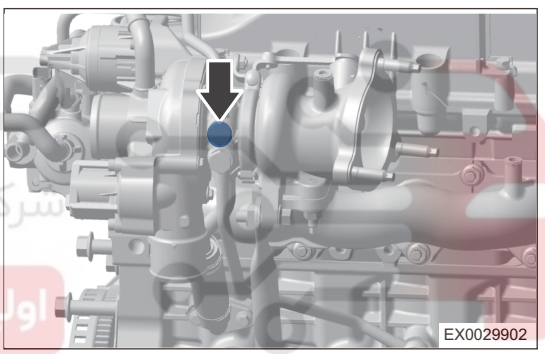
8 + 3 N·m



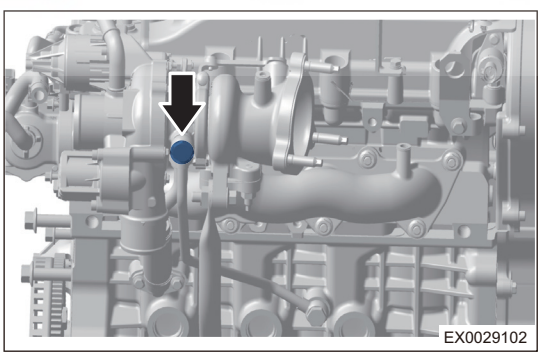
(e) Remove 1 fixing bolt and 1 hollow bolt (arrow) from turbocharger bracket oil supply pipe.



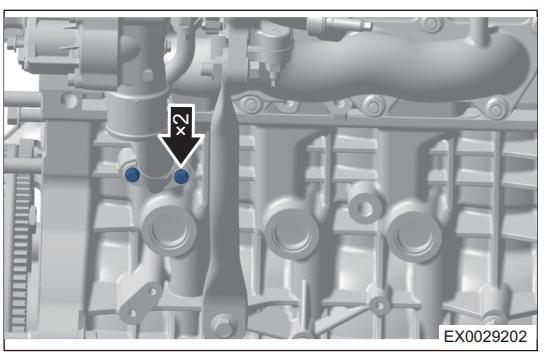
(f) Remove 1 hollow bolt (arrow) from turbocharger water inlet pipe.



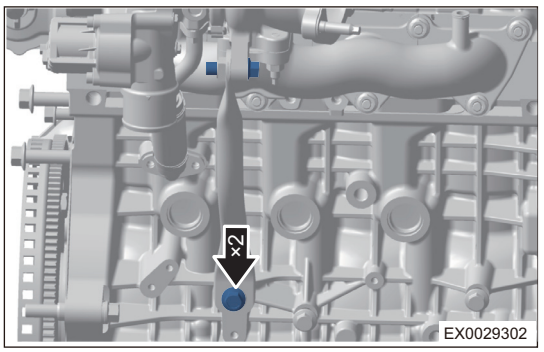
(g) Remove 1 hollow bolt (arrow) from turbocharger water outlet pipe.

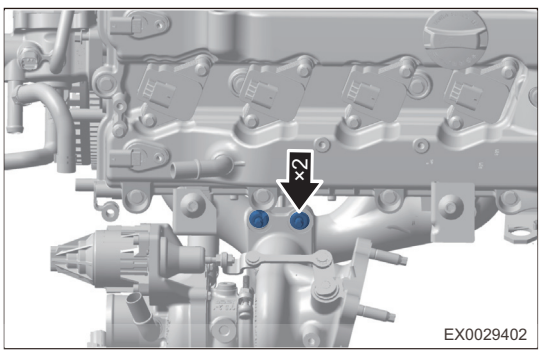


(h) Remove 2 fixing bolts (arrow) from oil return pipe, and remove oil return pipe gaskets.

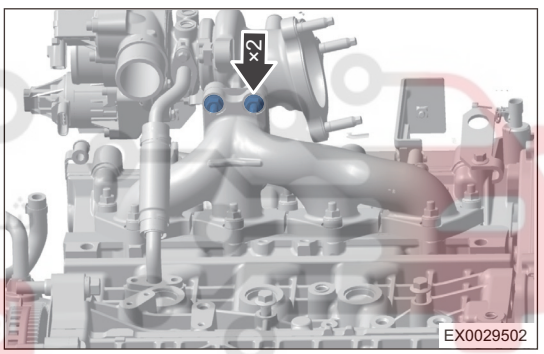


(i) Remove 2 fixing bolts from turbocharger bracket, and remove fixing bracket.





(j) Remove 4 fixing nuts from turbocharger.



(k) Remove the turbocharger assembly.

Inspection

1. Firstly perform basic inspection to turbocharger system when DTC indicating too high or too low boost pressure occurs or when power decreases.

   Basic inspection:
   - Check that there are no cranks caused by overheating, biting, deformation or other damage on exhaust turbocharger turbo housing, otherwise, replace exhaust turbocharger.
   - Check that there are no deposition and blockage on turbo oil hole.
   - Check that there are no blockage, squash, deformation or other damage on oil inlet and return pipes of exhaust turbocharger.
   - Check that there are no oil leakage (inside leakage and outside leakage) on exhaust turbocharger.
   - Check that charcoal canister check valve between charcoal canister and exhaust turbocharger front intake hose as well as check valve between brake booster and intake manifold are correctly installed with arrow above pointing towards conduction direction (fault multiple points).
   - Check that all lines are connected securely without leakage, aging, breakage, etc.
2. Daily inspection of turbocharger
   (a) Check sealing and tightness of connecting lines between air filter and turbocharger, turbocharger and engine intake and exhaust pipes.
   (b) Check turbocharger oil inlet and return pipes for damage or throttling, coupling bolts at joints for looseness.
   (c) Check oil quality, clean or replace oil filter element.

(d) Check air filter and clean or replace element regularly.
(e) Check if engine crankcase blow-by gas is too large, breather is smooth, ensure that crankcase pressure is normal.

3. Other requirements of turbocharger
(a) Avoid long time idling of engine at low speed (maximum time should be less than 20 minutes).
(b) Never use the operation with “Accelerate - Stall - Neutral Sliding” before building up oil pressure on engine, the engine must be kept in idling condition (3 to 5 minutes).
(c) Before stopping engine, make it gradually decrease its temperature and speed from maximum value (3 to 5 minutes).

Installation

Warning/Caution/Hint

Caution:

- Replace high temperature nut and gasket, and remove foreign matters from 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 Solenoid Valve

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.

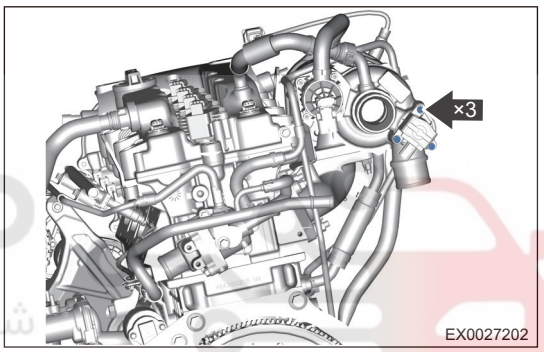
Caution:

- 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 air filter assembly.
5. Remove the pressure discharge control solenoid valve.
   (a) Disconnect exhaust by-pass solenoid valve connector, and remove 3 fixing bolts (arrow) from exhaust by-pass solenoid valve.

   Tightening torque

   8 + 3 N·m



   (b) Remove the pressure discharge control solenoid valve assembly.

Installation

1. Installation is in the reverse order of removal.

Precatalytic Converter Assembly

Removal

Warning/Caution/Hint

Warning:

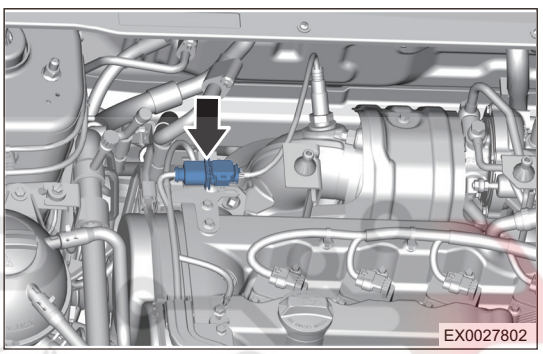
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

Caution:

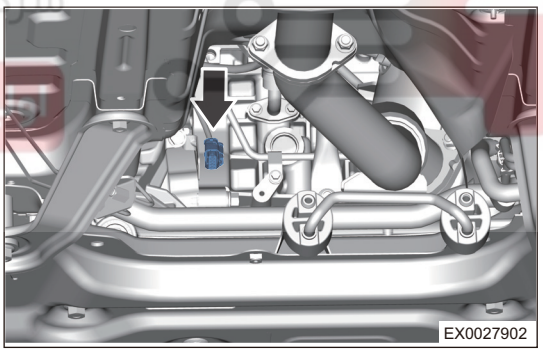
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

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 precatalytic converter assembly.

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



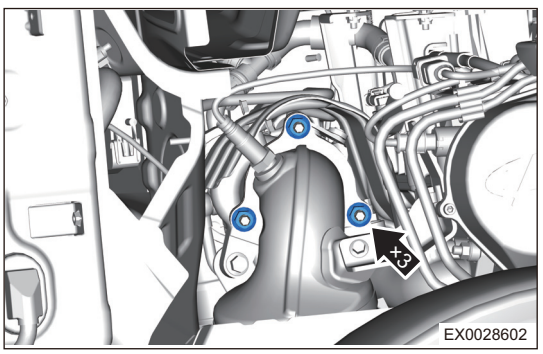
(b) Disconnect the downstream oxygen sensor connector (arrow).



(c) Remove 3 fixing bolts (arrow) between precatalytic converter and turbocharger.

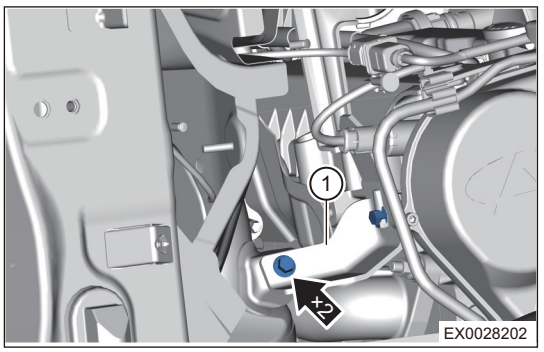
Tightening torque

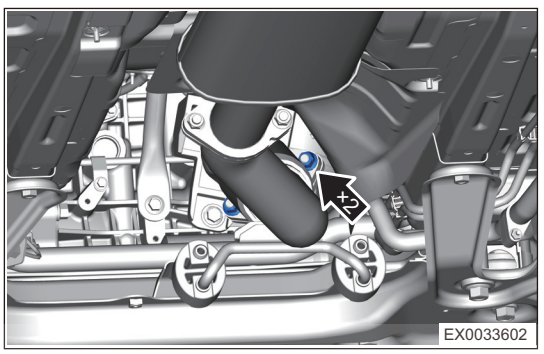
45 ± 5 N·m



(d) Remove 2 fixing bolts (arrow) and precatalytic converter bracket (1).

Tightening torque
25 ± 3.5 N·m



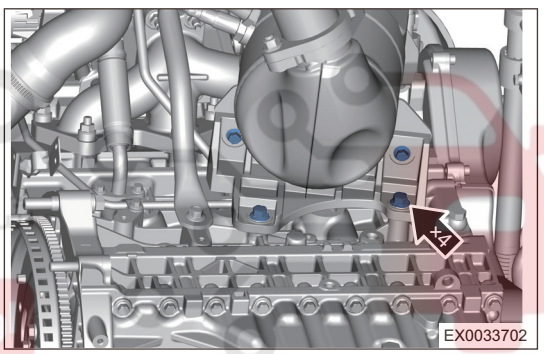


(e) Remove 2 fixing bolts (arrow) from main catalytic converter.

Tightening torque
45 ± 5 N·m

Remove 4 fixing bolts (arrow) between precatalytic converter bracket and cylinder block.

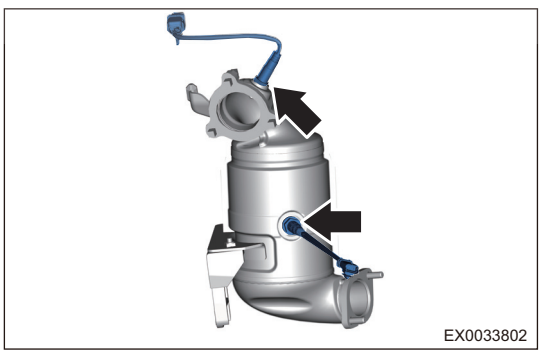
Tightening torque
45 ± 5 N·m



(f) Remove precatalytic converter and its gasket.

(g) Remove upstream oxygen sensor and downstream oxygen sensor assemblies (arrow).

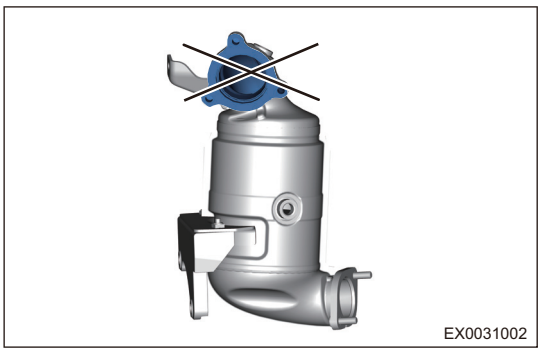
Tightening torque
45 ± 5 N·m



Inspection

1. Check warpage on precatalytic converter connection surface.

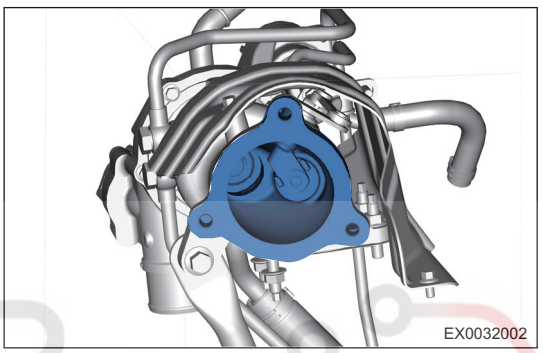
(a) Using a precision straightedge and feeler gauge, measure connection surface between precatalytic converter and turbocharger, replace it if surface warpage is greater than 0.5 mm.


EX0031002

(b) Check precatalytic converter internal carrier for cracks, blockage, etc. If so, replace precatalytic converter assembly.

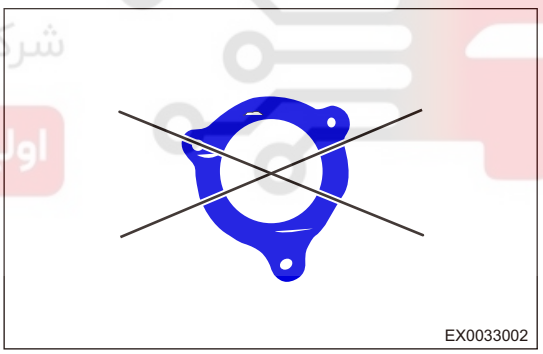
2. Check curvature on turbocharger connection surface.

(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 gasket between turbocharger and precatalytic converter.

(a) Check gasket between turbocharger and precatalytic converter for scratches or roughness. If so, replace it.


EX0033002

Installation

Warning/Caution/Hint

Caution:

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

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.

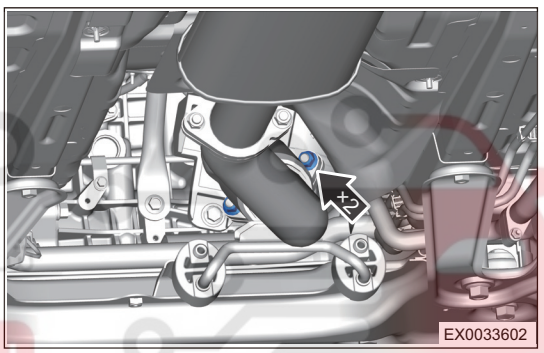
Caution:

- When removing main catalytic converter assembly, an assistant is needed to hold front exhaust pipe assembly. 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 main catalytic converter assembly.

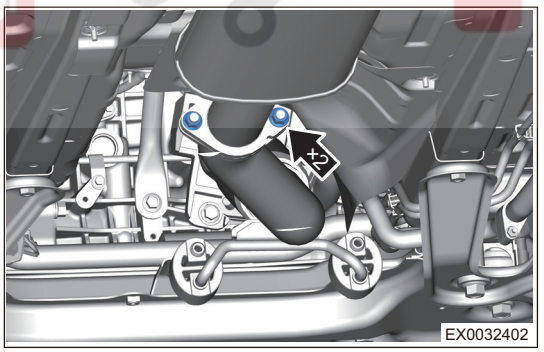
(a) Remove 2 fixing bolts (arrow) from main catalytic converter.

Tightening torque
45 ± 5 N·m

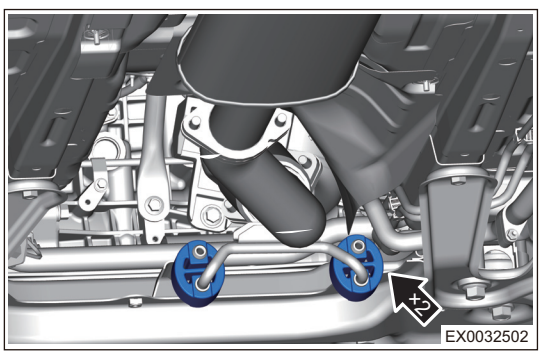


(b) Remove 2 fixing nuts (arrow) between main catalytic converter and front muffler.

Tightening torque
45 ± 5 N·m



(c) Remove 2 fixing hanger blocks 2 (arrow) from front of main catalytic converter assembly.



(d) Remove main catalytic converter assembly, and remove 2 gaskets.

Installation

Warning/Caution/Hint

Warning:

- If precatalytic converter rear 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.

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:

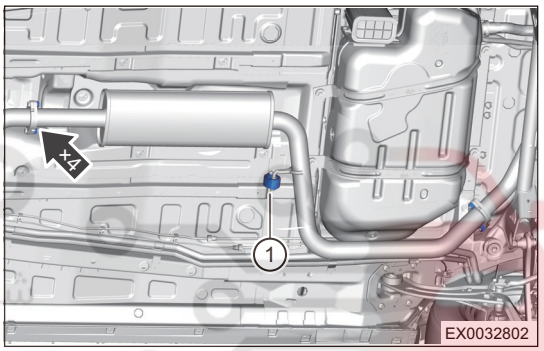
- When removing front muffler assembly, an assistant is needed to hold it. This can prevent front muffler assembly from dropping during operation, which may cause an accident.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being 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 fixing nuts between main catalytic converter and front muffler, and 2 fixing nuts (arrow) between front muffler and rear muffler, and separate 1 hanger block 2 (1) between muffler assembly and body hook.

   Tightening torque

   45 ± 5 N·m



   (b) Remove the front muffler assembly.

Installation

Warning/Caution/Hint

Caution:

- If precatalytic converter rear 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:

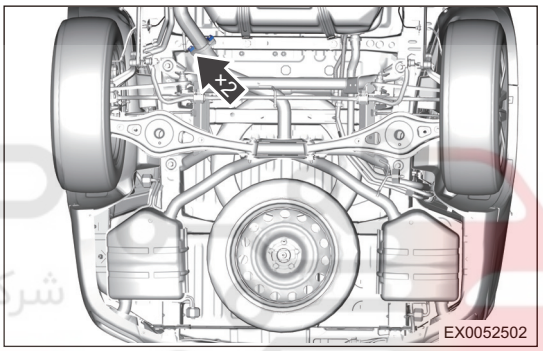
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

Caution:

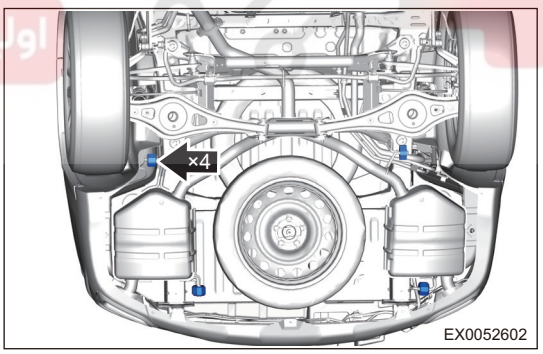
- When removing rear muffler assembly, an assistant is needed to hold it. This can prevent rear muffler assembly from dropping during operation, which may cause an accident.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being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



(b) Separate 4 hanger blocks 2 (arrow) between rear muffler assembly and body hook.



(c) Remove the rear muffler assembly.

Installation

Warning/Caution/Hint

Caution:

- If precatalytic converter rear 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.