10

SQRE4T15B INTAKE SYSTEM

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GENERAL INFORMATION

Overview

Description



1 - Intake Hose	2 - Turbocharger
3 - Muffler Assembly	4 - Muffler Hose
5 - Electronic Throttle Assembly	6 - Intake Pressure/Temperature Sensor
7 - Intake Manifold Gasket	8 - Intake Manifold Assembly
9 - Intercooler Gasket	10 - Intercooler Assembly
11 - Air Direct Pipe Assembly	12 - Air Filter Lower Housing
13 - Air Filter Element Assembly	14 - Air Filter Upper Housing
15 - Air Filter Outlet Hose	16 - O-ring
17 - Air Filter Bracket Assembly	

Intake system mainly consists of air direct pipe, air filter assembly, intake hose, turbocharger, booster pressure/temperature sensor, electronic throttle assembly, intake pressure/temperature sensor, and intake manifold with intercooler set, etc.

Operation

Intake system uses air filter to remove particulates and dust in the air. The filtered air is boosted through turbocharger and then flows into intake manifold assembly through electronic throttle assembly. And at the same time, cooling the air with the intercooler built in intake manifold. Then mixes with fuel at the end of intake manifold assembly port to form flammable gas mixture, which is transmitted to each cylinder uniformly to coordinate with engine operation. Electronic throttle assembly is a critical part for engine intake system. Its main function is to control intake air volume by adjusting intake passage area according to driver's driving intention to meet intake requirements in different engine operating conditions, and send back position signals of throttle valve plate to control unit to achieve accurate control and run the engine under optimal control state.

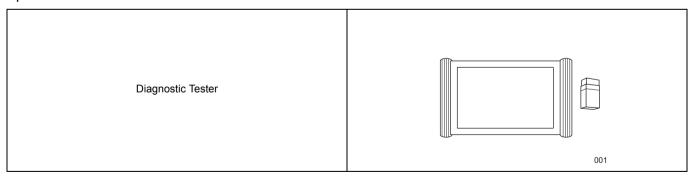
Specifications

Torque Specifications

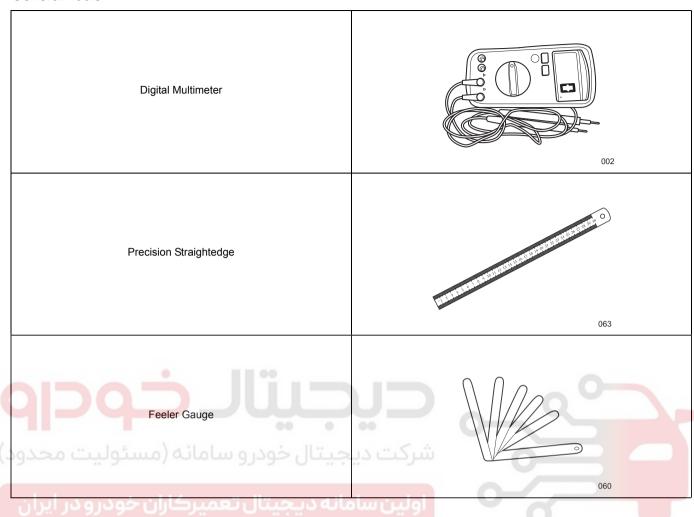
Description	Torque (N·m)
Coupling Screw Between Air Filter Upper Housing and Lower Housing	1.3 ± 0.2
Air Filter Assembly Fixing Bolt	8 ± 1.5
Air Filter Assembly Fixing Nut	8 ± 1.5
Air Direct Pipe Fixing Bolt	5 ± 1
Air Filter Bracket Fixing Bolt	5±1
Electronic Throttle Assembly Fixing Bolt	8+3
Electronic Accelerator Pedal Fixing Bolt	9 ± 1.5
Muffler Assembly Fixing Bolt	9 ± 1.5
Low Temperature Radiator Assembly Fixing Bolt	5 ± 1
Intake Manifold Fixing Bolt	20 + 5
Water Inlet Pipe Fixing Bolt	5±1

Tools

Special Tool



General Tools



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	Possible Cause
Engine idles roughly	Electronic throttle assembly (dirty)
	Intake manifold assembly (broken, leaked)
	Activated charcoal canister solenoid valve (remains on)
	Intake Pressure/Temperature Sensor
	Throttle gasket (damaged)
	Fuel rail injector assembly (installed incorrectly)





ON-VEHICLE SERVICE

Air Filter Element

Removal

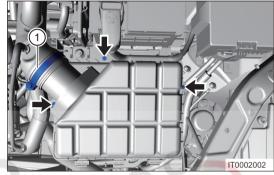
Warning/Caution/Hint

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 air filter element.
 - (a) Remove 3 coupling screws (arrow) between air filter upper housing and lower housing.

Tightening torque

1.3 ± 0.2 N·m



(b) Loosen worm clamp (1) and disconnect connection between air filter and intake hose.

Tightening torque

3 ± 0.5 N·m

- (c) Remove the air filter upper housing.
 - (d) Remove the air filter element in the direction of (arrow).



Installation

- 1. Clean the air filter upper housing and lower housing.
- 2. Install a new air filter element.
- 3. Other installation procedures are in the reverse order of removal.

Warning:

 Wasted air filter element should be handled by the specialized department according to local laws and regulations. Never discard it at will.

Air Filter Assembly and Air Filter Outlet Hose

Removal

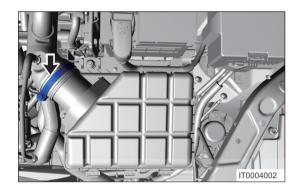
Warning/Caution/Hint

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. Wait until engine cools down.
- 2. Disconnect the negative battery cable.
- 3. Remove the air filter assembly and air filter outlet hose.
 - (a) Loosen worm clamp (arrow) and disconnect connection between air filter and intake hose.

Tightening torque

 $3 \pm 0.5 \text{ N} \cdot \text{m}$



(b) Remove the air filter assembly fixing bolt (1) and fixing nut (2).

Tightening torque

8 ± 1.5 N·m

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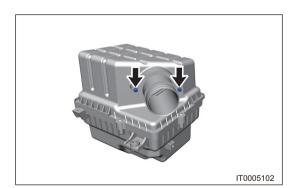
(c) Remove the air filter assembly.

Caution:

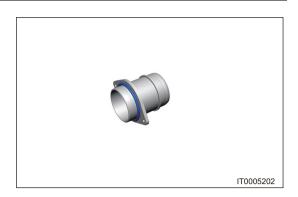
- After removing air filter assembly, block intake hose with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.
- (d) Remove 2 screws (arrow) between air filter outlet hose and air filter assembly.

Tightening torque

 $1.5 \pm 0.5 \text{ N} \cdot \text{m}$



(e) Remove air filter outlet hose and O-ring.



Installation

1. Installation is in the reverse order of removal.

Caution:

• Check for foreign matter in air filter and hose when installing. Avoid inhaling foreign matter after engine running, causing damage to the components.





Air Direct Pipe Assembly

Removal

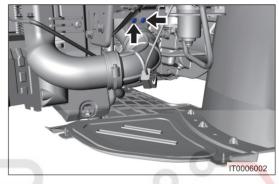
Warning/Caution/Hint

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. Wait until engine cools down.
- 2. Disconnect the negative battery cable.
- 3. Remove the front bumper assembly (See page 51-6).
- 4. Remove the front bumper crossmember assembly (See page 51-12).
- 5. Remove the air direct pipe assembly.
 - (a) Remove 2 fixing bolts (arrow) between air direct pipe assembly and air filter bracket assembly.

Tightening torque

5 ± 1 N·m

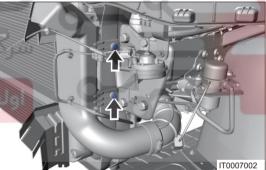


(b) Remove 2 fixing bolts (arrow) between air direct pipe assembly and body panel.

Tightening torque

5 ± 1 N·m

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(c) Remove the air direct pipe assembly.

Installation

1. Installation is in the reverse order of removal.

Air Filter Bracket

Removal

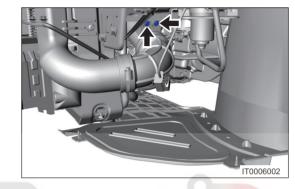
Warning/Caution/Hint

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. Wait until engine cools down.
- 2. Disconnect the negative battery cable.
- 3. Remove the air filter assembly (See page 10-8).
- 4. Remove the air filter bracket.
 - (a) Remove 2 fixing bolts (arrow) between air filter bracket and air direct pipe assembly.

Tightening torque

5 ± 1 N·m



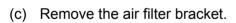
(b) Remove 2 fixing bolts (arrow) from air filter bracket.

Tightening torque

 $5 \pm 1 \, \text{N} \cdot \text{m}$

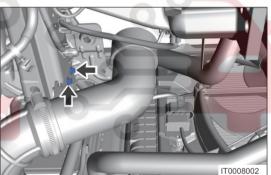
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Installation

1. Installation is in the reverse order of removal.



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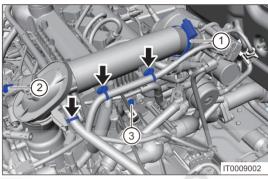
Muffler and Muffler Hose

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 intake hose assembly (See page 11-10).
- 4. Remove the muffler assembly.
 - (a) Remove fixing clips (arrow) from engine wire harness and muffler assembly.



(b) Loosen worm clamp (1) and disconnect connection between muffler assembly and turbocharger.

Tightening torque

5 ± 1 N·m

- (c) Disconnect the boost pressure/temperature sensor connector (2).
- (d) Remove the muffler assembly fixing bolt (3).

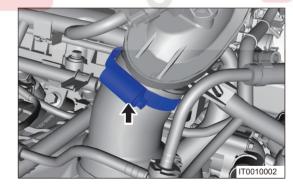
Tightening torque

9 ± 1.5 N·m

(e) Loosen worm clamp (arrow) and disconnect connection between muffler assembly and muffler hose.

Tightening torque

 $5 \pm 1 \text{ N} \cdot \text{m}$



(f) Remove the muffler assembly.

Caution:

After removing muffler assembly, block turbocharger outlet side with suitable blocking pieces
to prevent foreign matter from entering, causing damage to the components.

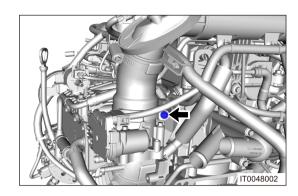
- 5. Remove the muffler hose.
 - (a) Loosen worm clamp (arrow) and disconnect connection between muffler hose and throttle assembly.

Tightening torque

 $3 \pm 0.5 \text{ N} \cdot \text{m}$

Caution:

 After removing muffler hose assembly, block throttle with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.



Installation

1. Installation is in the reverse order of removal.

Caution:

• Check for foreign matter in muffler and hose when installing. Avoid inhaling foreign matter after engine running, causing damage to the components.





Low Temperature Radiator

Removal

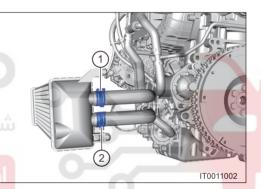
Warning/Caution/Hint

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 and install the tank lower protector (See page 51-20).
- 4. Remove the front bumper assembly (See page 51-6).

Caution:

- · Prevent scratches or damage to front bumper during removal.
- 5. Remove the front bumper guard beams assembly (See page 51-12).
- 6. Remove the left/right air deflector (See page 51-13).
- 7. Remove the low temperature radiator assembly.
 - (a) It is necessary to drain the coolant from intercooler system before removing low temperature radiator (See COOLING SYSTEM).
 - (b) Loosen elastic clamp (1) and disconnect connection between low temperature radiator water inlet pipe and low temperature radiator assembly.

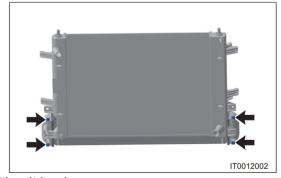


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- (c) Loosen the elastic clamp (2). Disconnect connection between low temperature radiator water outlet pipe and low temperature radiator assembly.
- (d) Remove 4 fixing bolts from low temperature radiator assembly.

Tightening torque

5 ± 1 N·m



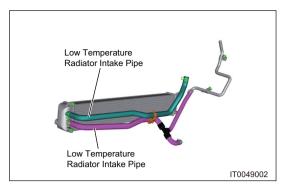
(e) Take out the low temperature radiator assembly, position it in place.

Installation

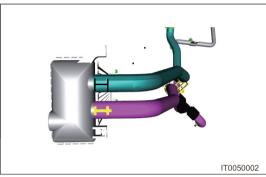
1. Installation is in the reverse order of removal.

Caution:

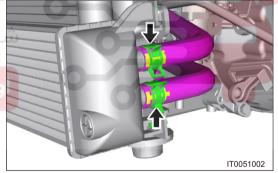
 There are no crossed or twisted conditions occur and never install water inlet pipe and water outlet pipe reversed when installing them. Make sure that elastic clamp is clamped in place with clamp pliers.



 There is " ⊥ " mark at port of water inlet pipe, and connected with low temperature radiator upper interface.



- There is " ± " mark at port of water outlet pipe, and connected with low temperature radiator lower interface.
- When installing low temperature radiator water inlet pipe, align the " \bot " mark at port with boss and align center position of elastic clamp tabs with "-" position of " \bot " mark. Elastic clamp is clamped in " \bot " mark range, tabs face towards outside and put marks with marking pen.



- When installing low temperature radiator water outlet pipe, align center position of elastic clamp tabs with center position of " \pm " mark. Elastic clamp is clamped in " \pm " mark range, tabs face towards outside.
- Pay attention to the connection principle of "Insert, Extract and Confirm" when installing front bumper assembly. And adjust the match between front bumper & headlight and fender.
- Add the coolant and perform bleeding of intercooler system (Refer to Cooling System Chapter).
- After assembly is completed, it is necessary to check relevant function items and clean engine compartment.

Electric Throttle Assembly

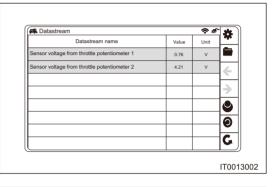
On-vehicle Inspection

- Check the electronic throttle assembly.
 - (a) When flipping it by hand with power off and it can rotate smoothly. If catching occurs, it indicates that internal components may be damaged, and replace the electronic throttle assembly.
 - (b) Connect the diagnostic tester to diagnostic interface.
 - (c) Turn ENGINE START STOP switch to ON and turn on the diagnostic tester.
 - (d) Read datastream on diagnostic tester.

Hint:

Accelerator pedal released

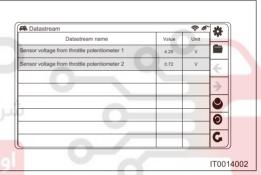
Datastream Name	Specification (V)	
Sensor voltage from throttle potentiometer 1	0.76	
Sensor voltage from throttle potentiometer 2	4.21	



Hint:

Accelerator pedal depressed fully

Datastream Name	Specification (V)
Sensor voltage from throttle potentiometer 1	4.25
Sensor voltage from throttle potentiometer 2	0.72
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If result is not as specified, check wire harness, ECM, or replace electronic throttle assembly.

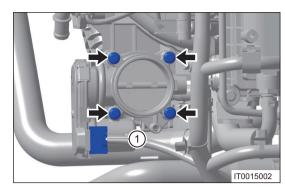
Removal

Warning/Caution/Hint

Caution:

- Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise. there is a risk of scald injury.
- 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.
- 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 muffler and muffler hose (See page 10-12).
- Remove the electronic throttle assembly.

(a) Disconnect the electronic throttle connector (1).



(b) Remove 4 fixing bolts (arrow) from electronic throttle.

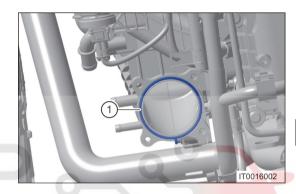
Tightening torque

8 + 3 N·m

- (c) Remove the electronic throttle assembly.
- (d) Remove throttle gasket (1) from intake manifold.

Caution:

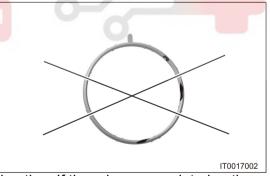
 After removing throttle assembly, block intake manifold intake port with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.



Inspection

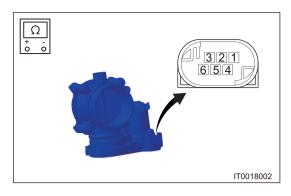
1. Check the electronic throttle assembly gasket.

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Check electronic throttle assembly gasket for wear or deterioration. If there is wear or deterioration, replace electronic throttle assembly gasket.

Multimeter Connection	Standard Condition
Terminal 2 - Terminal 3	1.067 k Ω (resistance at ambient temperature)
Terminal 6 - Terminal 2 Terminal 6 - Terminal 3	As throttle opens, resistance between terminals 6 and 2 increases. And resistance between terminals 6 and 3 decreases.
Terminal 5 - Terminal 2 Terminal 5 - Terminal 3	As throttle opens, resistance between terminals 5 and 2 decreases. And resistance between terminals 5 and 3 increases.



Cleaning

- 1. Cleaning Tool
 - (a) Thin stick: used to support throttle valve plate for cleaning the carbon deposited on contact wall between valve plate and throttle. Please use plastic, wooden or bamboo thin stick. Do not use metal thin stick to avoid scratching or deforming the valve plate.
 - (b) Clean cloth or paper towel.
- 2. Cleaning Process
 - (a) Remove electronic throttle assembly, and make the valve plate face upward in free condition. Avoid cleaner flowing into electronic element through valve plate shaft, resulting in functional failure.
 - (b) Start to clean when it is as shown in the right illustration.





- (c) Apply appropriate amount of cleaner to the inner wall of throttle valve body, and wipe off the carbon with clean cloth.
- (d) Support the throttle valve plate with a thin stick, and clean the carbon on valve plate and throttle valve body inner wall.



- (e) Turn over the throttle 180°, and clean with the same procedures as above. Repeat several times until it is clean.
- (f) Push the valve plate by hand, and check if it rotates smoothly. If it is stuck, clean again according to the cleaning procedures.

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- (g) After cleaning, wipe off the cleaner in throttle valve body with absorbent paper. **Warning:**
 - Cleaner is a kind of flammable and corrosive fluid. Follow safety cautions to prevent accidents, and avoid skin contacting with cleaner.
 - Pay attention to that the amount of cleaner should not be too much, so as to overflows into sensor and motor, resulting in functional failure.

Installation

Warning/Caution/Hint

Caution:

- Clean fitting surface of electronic throttle assembly.
- Perform throttle self-learning procedures after installation. After self-learning is completed, start the vehicle and check for proper operation.
- 1. Installation is in the reverse order of removal.





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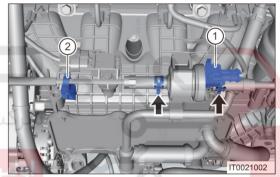
Intake Manifold Assembly

Removal

Warning/Caution/Hint

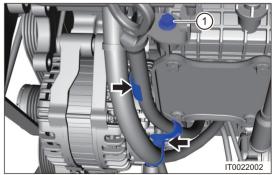
Caution:

- Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.
- 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. Fuel System Pressure Release (See page 08-8).
- 2. Turn off all electrical equipment and the ENGINE START STOP switch.
- 3. Disconnect the negative battery cable.
- 4. Remove the engine trim cover.
- 5. Remove the fuel rail injector assembly (See page 08-23).
- 6. Remove the muffler and muffler hose (See page 10-12).
- 7. Remove the electronic throttle assembly (See page 10-16).
- 8. Remove the charcoal canister solenoid valve assembly.
 - (a) Disconnect the charcoal canister solenoid valve connector (1).





- (b) Loosen 2 elastic clamps (arrow) and disconnect connection between fuel vapor hose and charcoal canister solenoid valve.
- (c) Remove fuel vapor hose from fixing tube clamp (2).
- (d) Remove the charcoal canister solenoid valve assembly.
- 9. Remove the oil dipstick guide assembly.
 - (a) Disconnect the engine wire harness fixing clip (arrow).



(b) Remove coupling bolt (1) between oil dipstick guide and intake manifold assembly.

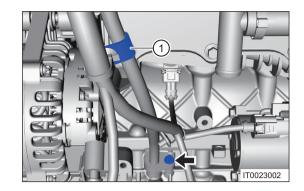
Tightening torque

8 + 3 N·m

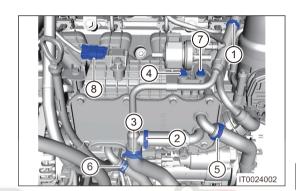
- (c) Disconnect the engine wire harness fixing clip (1).
- (d) Remove coupling bolt (arrow) between oil dipstick guide and cylinder block frame assembly.

Tightening torque

8 + 3 N·m



- (e) Remove the oil dipstick guide assembly.
- 10. Remove the intake manifold assembly.
 - (a) Loosen clamping ring (1) and disconnect connection between water outlet pipe set and intercooler water outlet pipe set.
 - (b) Loosen clamping ring (2) and disconnect connection between intercooler water outlet pipe set and intercooler assembly.
 - (c) Loosen elastic clamp (3) and disconnect connection between intercooler water outlet pipe set and low temperature radiator water inlet pipe set.
 - (d) Remove intercooler outlet pipe set fixing bolt (4), and remove intercooler outlet pipe set.



Tightening torque

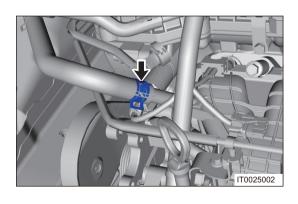
8 + 3 N·m

- (e) Loosen clamping ring (5) and disconnect connection between water inlet pipe set and intercooler assembly.
- (f) Loosen elastic clamp (6) and disconnect connection between water inlet pipe and low temperature radiator water outlet pipe set.
- (g) Remove fixing bolt (7) from brake vacuum pipe bracket.

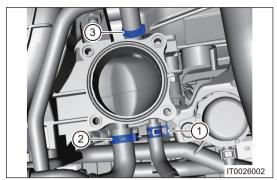
Tightening torque

8 + 3 N·m

- (h) Disconnect the intake pressure/temperature sensor connector (8).
- (i) Loosen elastic clamp (arrow) and disconnect connection between expansion tank water outlet pipe set and water inlet pipe.

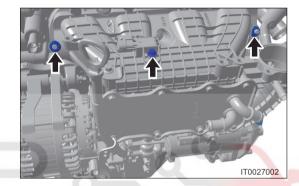


Loosen elastic clamp (1) and disconnect connection between fuel vapor outlet pipe set and intake manifold assembly.



- (k) Loosen elastic clamp (2) and disconnect connection between brake vacuum pipe and intake manifold assembly.
- (I) Loosen clamping ring (3) and disconnect connection between crankcase ventilation tube and intake manifold assembly.
- (m) Remove 3 fixing bolts (arrow) from intake manifold assembly.

Tightening torque 20 + 5 N·m



(n) Remove the intake manifold assembly.

Caution:

- After removing intake manifold assembly, block both ends of intake manifold and intake port of cylinder head with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.
- 11. Remove intake pressure/temperature sensor and water inlet pipe.
 - (a) Remove 2 fixing bolts (arrow) from water inlet pipe.

Tightening torque

5 ± 1 N·m



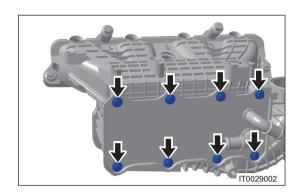
(b) Remove the intake pressure/temperature sensor fixing bolt (1).

Tightening torque

7 ± 1 N·m

(c) Remove intake pressure/temperature sensor and water inlet pipe.

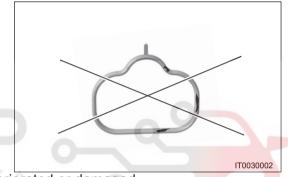
- 12. Remove the intercooler assembly.
 - (a) Remove 8 intercooler fixing bolts (arrow).



(b) Remove intercooler assembly and gasket.

Inspection

1. Check the intake manifold gasket.

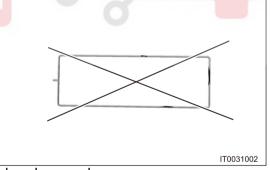


:پجيتالـ خودرو

Check the intake manifold gasket, and replace if it is deteriorated or damaged.

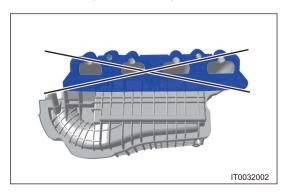
2. Check the intercooler gasket.

ولین سامانه دیجیتال تعمیرکاران خودرو در ایران

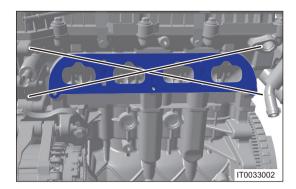


Check the intercooler gasket, and replace if it is deteriorated or damaged.

- 3. Check flatness on intake manifold fitting surface.
 - (a) Clean and check contact surface between intake manifold assembly side and cylinder head.
 - (b) Using a precision straightedge and feeler gauge, measure intake manifold flatness. If warpage on surface is greater than 0.8 mm, replace intake manifold assembly.



- 4. Check warpage on cylinder head surface on installation side of intake manifold.
 - (a) Clean and check contact surface between intake manifold assembly and cylinder head side.
 - (b) Using a precision straightedge and feeler gauge, measure warpage on cylinder head side surface. If warpage on surface is greater than 0.04 mm, replace cylinder head assembly.



Installation

Warning/Caution/Hint

Caution:

- · Clean the fitting surface of intake manifold assembly.
- Replace the intake manifold gasket if it is damaged during installation.
- 1. Installation is in the reverse order of removal.

Caution:

 Check for foreign matter in intake manifold when installing. Avoid inhaling foreign matter after engine running, causing damage to the components.

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

ولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Electronic Accelerator Pedal

Removal

Warning/Caution/Hint

Caution:

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent interior 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 electronic accelerator pedal.
 - (a) Disconnect the electronic accelerator pedal connector (1).



(b) Remove 3 fixing nuts (arrow) from electronic accelerator pedal.

Tightening torque

10 ± 1.5 N·m

(c) Remove the electronic accelerator pedal.

شرکت دیجیتال خودر و سامانه (مسئو Installation

1. Installation is in the reverse order of removal.



