INTAKE AND EXHAUST

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GENERAL INFORMATION
The intake manifold is made of an aluminium alloy. The shape provides an increased intake inertia effect and has good volumetric efficiency.

SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard Value</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake manifold</td>
<td>0.15 (0.006)</td>
<td>0.20 (0.008)</td>
</tr>
</tbody>
</table>

SPECIAL TOOL

<table>
<thead>
<tr>
<th>Tool</th>
<th>Tool Number</th>
<th>Tool Name</th>
<th>Supersession</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1309770</td>
<td></td>
<td>Oxygen sensor wrench</td>
<td></td>
</tr>
</tbody>
</table>

TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust gas leakage</td>
<td>Loose joints</td>
<td>Retighten</td>
</tr>
<tr>
<td>Broken pipe or muffler</td>
<td>Repair or replace</td>
<td></td>
</tr>
<tr>
<td>Abnormal noise</td>
<td>Broken separator in muffler</td>
<td>Replace</td>
</tr>
<tr>
<td>Broken rubber hangers</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td>Inference of a pipe or muffler with vehicle body</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td>Broken pipe or muffler</td>
<td>Repair or replace</td>
<td></td>
</tr>
</tbody>
</table>

ON-VEHICLE SERVICE

INTAKE MANIFOLD VACUUM CHECK
1.5L Engine: Refer to GROUP 11A - On-vehicle Service.
1.8L Engine: Refer to GROUP 11C - On-vehicle Service.
INTAKE MANIFOLD
REMOVAL AND INSTALLATION

(1.5L Engine)

Pre-removal Operation
(1) Fuel Discharge Prevention
(Refer to GROUP 13A - On-vehicle Service.)
(2) Thermostat Case Assembly Removal
(Refer to GROUP 14 - Water Hose and Water Pipe.)
(3) Throttle Body Removal (Refer to GROUP 13A.)

Post-installation Operation
(1) Throttle Body Installation (Refer to GROUP 13A.)
(2) Thermostat Case Assembly Installation
(Refer to GROUP 14 - Water Hose and Water Pipe.)

Removal steps
1. PCV hose
2. Crank angle sensor connector
3. Heated oxygen sensor connector
4. Intake air temperature sensor connector
5. Evaporative emission purge solenoid connector
6. EGR solenoid connector
7. Injector connector
8. Brake booster vacuum hose connection
9. Vacuum hose connection
10. High-pressure fuel hose connection
11. Fuel return hose connection
12. Fuel rail injector and pressure regulator assembly
13. Regulator
14. Regulator
15. Vacuum hose connection
16. Solenoid valve and vacuum hose assembly
17. FSR valve
18. Intake air temperature sensor
19. Ground cable
20. Intake manifold stay
21. Engine hanger
22. Intake manifold
23. Intake manifold gasket
INTAKE AND EXHAUST - Intake Manifold

Pre-removal Operation
1. Fuel Discharge Prevention
   (Refer to GROUP 13A - On-vehicle Service.)
2. Engine Coolant Draining
   (Refer to GROUP 00 - Maintenance Service.)
3. Throttle Body Removal (Refer to GROUP 13A.)

Post-installation Operation
1. Throttle Body Installation (Refer to GROUP 13A.)
2. Engine Coolant Supplying
   (Refer to GROUP 00 - Maintenance Service.)

Removal steps
1. Ignition coil connector
2. Injector connector
3. Crank angle sensor connector
4. Heated oxygen sensor connector
5. Evaporative emission purge solenoid connector
6. EGR hose connection
7. Manifold differential pressure sensor connector
8. PCV hose connection
9. Brake booster vacuum hose connection
10. High-pressure fuel hose connection
11. Fuel return hose connection
12. Fuel rail, injector and pressure regulator assembly
13. Insulator
14. Insulator
15. Vacuum hose connection
16. Balancer valve and vacuum hose assembly
17. EGR valve
18. Manifold differential pressure sensor
19. Ground cable
20. Bracket (vehicles with auto-cruise control systems)
21. Intake manifold stay
22. Intake manifold
23. Intake manifold gasket
REMOVAL SERVICE POINT

Fuel Rail, Injector and Pressure Regulator Removal

Remove the fuel rail (with the injectors and pressure regulator attached to it).

Caution
Care must be taken when removing the fuel rail not to drop the injector.

INSTALLATION SERVICE POINT

High-Pressure Fuel Hose Installation

1. When connecting the high-pressure fuel hose to the fuel rail, apply a small amount of new engine oil to the O-ring and then insert the high-pressure fuel hose, being careful not to damage the O-ring.

Caution
Be careful not to let any engine oil get into the fuel rail.

2. While turning the high-pressure fuel hose to the left and right, install it to the fuel rail.

3. Check to be sure that the injector turns smoothly. If it does not turn smoothly, the O-ring may be pinched, remove the high-pressure fuel hose and then re-insert it into the fuel rail and check again.

INSPECTION

Check the following points; replace the part if a problem is found.

INTAKE MANIFOLD CHECK

1. Check for damage or cracking of any part.
2. Check for obstruction of the negative pressure (vacuum) outlet port, and for obstruction of the water passage or gas passage.
3. Using a straight edge and feeler gauge check for distortion of the cylinder head installation surface.

Standard value: 0.15 mm (0.006 in.) or less
Limit: 0.20 mm (0.008 in.)
EXHAUST MANIFOLD

REMOVAL AND INSTALLATION

<1.5L Engine>

Pre-removal and Post-installation Operation

- Front Exhaust Pipe Removal and installation
  (Refer to P.15-8.)

Removal steps:
1. Exhaust manifold cover
2. Engine hanger
3. Exhaust manifold
4. Exhaust manifold gasket

Removal steps:
1. Exhaust manifold cover
2. Engine hanger
3. Exhaust manifold
4. Exhaust manifold gasket
Pre-removal and Post-installation Operation

Front Exhaust Pre-removal and Installatin
(Please refer to P.15-8.)

Removal steps:
1. Exhaust manifold cover
2. Exhaust manifold bracket (A)
3. Exhaust manifold bracket (B)
4. Exhaust manifold
5. Exhaust manifold gasket

Inspection:
EXHAUST MANIFOLD CHECK
1. Check for damage or cracking of any part
2. Using a straight edge and feeler gauge, check for distortion of the cylinder head installation surface.

Standard value: 0.15 mm (.006 in.) or less
Limit: 0.20 mm (.008 in.)
EXHAUST PIPE AND MAIN MUFFLER
REMOVAL AND INSTALLATION
<Vehicles for Federal>

Main muffler removal steps
1. Muffler cutter <1.8L Engine>
2. Bolt
3. Protector
4. Main muffler
5. Dynamic damper <1.8L Engine>
6. Hanger

Center exhaust pipe removal steps
1. Bolt
3. Protector
7. Self-locking nuts
8. Heated oxygen sensor
9. Center exhaust pipe
10. Hanger
11. Bolts
12. Catalytic converter
13. From foot heat protector panel

Front exhaust pipe removal steps
11. Bolts
14. Heated oxygen sensor
15. Self-locking nuts
16. Front exhaust pipe bracket
17. Front exhaust pipe bracket
18. Hanger
Main muffler removal steps
1. Muffler cutter
2. Bolt
3. Protector
4. Main muffler
5. Dynamic damper
6. Hanger

Center exhaust pipe removal steps
2. Bolt
3. Protector
7. Self-locking nuts
8. Center exhaust pipe
9. Hanger

Exhaust pipe and Main Muffler
6, 9, 16

13 Nm 9 ft.lbs.
12 Nm 8 ft.lbs.
36 Nm 26 ft.lbs.
49 Nm 36 ft.lbs.
49 Nm 38 ft.lbs.
34 Nm 25 ft.lbs.
25 ft.lbs.
34 Nm 25 ft.lbs.
44 Nm 32 ft.lbs.
44 Nm 32 ft.lbs.

Main muffler removal steps
1. Muffler cutter
2. Bolt
3. Protector
4. Main muffler
5. Dynamic damper
6. Hanger

Center exhaust pipe removal steps
2. Bolt
3. Protector
7. Self-locking nuts
8. Center exhaust pipe
9. Hanger

10. Bolts
11. Catalytic converter
12. Front floor heat protector panel

REMOVAL SERVICE POINT
HEATED OXYGEN SENSOR REMOVAL

INSTALLATION SERVICE POINT
HEATED OXYGEN SENSOR INSTALLATION