# **GROUP 15**

# INTAKE AND EXHAUST

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# STEP 2. Check the gasket for cracks, damage.

Q: Is the gasket damaged?YES : Replace the gasket, then go Step 1.NO : Go to Step 3.

# STEP 3. Check for loosening in each coupling section.

Q: Is there any loosening in each section? YES : Tighten, then go to Step 1. NO : There is no action to be taken.

# GENERAL DESCRIPTION

The exhaust pipe is divided into five <3.0L Engine> or four <2.4L Engine> parts.

# **INTAKE AND EXHAUST DIAGNOSIS**

# INTRODUCTION

The occurrence of exhaust leakage or abnormal noise is caused by cracks or strain in the gasket, or by when the exhaust pipe or muffler is damaged due to impacts during travel. The exhaust leaks from these sections and causes the exhaust noise to increase. There may be cases when there is interference with the body and vibration noise is generated.

# TROUBLESHOOTING STRATEGY

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find an intake or exhaust fault.

1. Gather information from the customer.

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- 2. Verify that the condition described by the customer exists.
- 3. Find the malfunction by following the SYMPTOM CHART.
- 4. Verify malfunction is eliminated.

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# SYMPTOM CHART

SYMPTOMS	INSPECTION PROCEDURE	REFERENCE PAGE
Exhaust Leakage	1	P.15-2
Abnormal Noise	2	P.15-3

# SYMPTOM PROCEDURES

### **INSPECTION PROCEDURE 1: Exhaust Leakage**

### DIAGNOSIS

STEP 1. Start the engine. Have an assistant stay in the driver's seat. Raise the vehicle on a hoist. Have the assistant rev the engine while searching for exhaust leaks.

### Q: Is the exhaust leaking?

- YES : Go to Step 2.
- **NO**: This diagnosis is complete.

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### **INSPECTION PROCEDURE 2: Abnormal Noise**

#### DIAGNOSIS

STEP 1. Start the engine. Have an assistant stay in the driver's seat. Raise the vehicle on a hoist. Have the assistant rev the engine while searching for exhaust leaks.

Q: Is any abnormal noise generated? YES : Go to Step 2. NO : This diagnosis is complete.

STEP 2. Check for missing parts in the muffler. Tap the muffler lightly to check for loose baffles, etc.

Q: Are there any missing parts in the muffler? YES : Replace, then go to Step 1. NO : Go to Step 3.

#### STEP 3. Check the hanger for cracks.

- Q: Is the hanger cracked?
  - **YES** : Replace, then go to Step 1.
  - NO: Go to Step 4.

# STEP 4. Check for interference of the pipes and muffler with the body.

Q: Are the pipes and muffler interfering with the body?
YES : Repair, then go to Step 1.
NO : Go to Step 5.

#### STEP 5. Check the heat protectors.

Q: Are any heat protectors loose or damaged? YES : Tighten or replace, then go to Step 1. NO : Go to Step 6.

# STEP 6. Check the pipes, catalytic converters and muffler for damage.

- Q: Are the pipes, catalytic converters and muffler damaged?
  - YES : Replace, then go to Step 1. (For the removal of the catalytic converter, refer to GROUP 17 P.17-113.)
  - NO: There is no action to be taken.

# SPECIAL TOOL

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TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MD998770 Oxygen sensor wrench	MD998770-01 or general service tool	Heated oxygen sensor removal and installation

### INTAKE AND EXHAUST ON-VEHICLE SERVICE

# **ON-VEHICLE SERVICE**

# VARIABLE INDUCTION CONTROL (VIC) SYSTEM CHECK <3.0L ENGINE – with VARIABLE INDUCTION CONTROL (VIC) system>

- 1. Warm up the engine.
- 2. Disconnect the vacuum hose from the variable induction control actuator, and then connect a vacuum gauge via the Tee-fitting.
- 3. Start the engine and verify that a vacuum is applied to the vacuum gauge.
- 4. As described in the chart below, vary the engine speed to inspect the vacuum conditions. During this inspection, verify that the rod of the variable induction control actuator is operating.

ENGINE SPEED	NORMAL CONDITION	CONTROL VALVE
4,000 rpm or less	Vacuum maintained	Closed
Form 4,000 rpm or less, engine is suddenly	Vacuum not change	Closed
4,250 rpm or more	Vacuum leaks	Open

# VARIABLE INDUCTION CONTROL (VIC) SOLENOID CHECK <3.0L ENGINE – with VARIABLE INDUCTION CONTROL system>

1. Disconnect the vacuum hoses from the variable induction control solenoid.

NOTE: When disconnecting the vacuum hose, always make sure that it can be reconnected at its original position.

- 2. Disconnect the harness connector.
- 3. Connect a hand vacuum pump to nipple (B) of the variable induction control solenoid.
- 4. As described in the chart below, check airtightness by applying a vacuum with voltage applied directly from the battery to the variable induction control solenoid, and without applying voltage.

BATTERY POSITIVE VOLTAGE	NIPPLE (A) CONDITION	NORMAL CONDITION
Applied	Open	Vacuum leaks
	Closed	Vacuum maintained
Not applied	Open	Vacuum leaks





### INTAKE AND EXHAUST ON-VEHICLE SERVICE



5. Measure the resistance between the terminals of the variable induction control solenoid.

### Standard value: 29 – 35 $\Omega$ [at 20°C (68°F)]

6. Replace solenoid resistance is out of specification.



### VACUUM TANK CHECK <3.0L ENGINE – with VARIABLE INDUCTION CONTROL system> M1151010100016

- 1. Disconnect the vacuum hoses from the vacuum tank. NOTE: When disconnecting the vacuum hose, always make sure that it can be reconnected at its original position.
- 2. Connect a hand vacuum pump to nipple "A" of the vacuum tank, apply a vacuum of 67 kPa (19.7 in. Hg), and verify that the vacuum is maintained.
- 3. Disconnect the hand vacuum pump from nipple "A" and connect it to nipple "B".
- Block nipple "A" with your finger and apply a vacuum of 67 kPa (19.7 in. Hg) to nipple "B". Release your finger from nipple "A" and verify that the vacuum leaks immediately.
- 5. Replace the vacuum tank if it is faulty.

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#### **INTAKE AND EXHAUST** AIR CLEANER

# **AIR CLEANER**

### **REMOVAL AND INSTALLATION**

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Pre-removal and Post-installation Operation Battery Removal and Installation (Refer to GROUP 54A, Battery P.54A-8.)

#### <2.4L ENGINE>

<3.0L ENGINE>



### **REMOVAL STEPS**

- **AIR INTAKE HOSE** 1.
- 2. **RESONATOR A**
- 3. AIR DUCT
- AIR FLOW SENSOR ASSEMBLY 4.
- 5. AIR CLEANER COVER

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#### **REMOVAL STEPS (Continued)**

- 6. AIR CLEANER ELEMENT
- 7. AIR CLEANER BODY
- 8. AIR CLEANER BRACKET
- 9. **RESONATOR B <2.4L ENGINE>**
- 10. RESONATOR C <3.0L ENGINE>

# INTAKE MANIFOLD PLENUM

# REMOVAL AND INSTALLATION

15-7

Pre-removal Operation	Post-installation Operation
Fuel Discharge Prevention [Refer to GROUP 13B, On- vehicle Service P.13A-580.]	<ul> <li>Throttle Body Installation (Refer to GROUP 13B, Throttle Body P.13B-689.)</li> </ul>
Engine Coolant Draining [Refer to GROUP 00, Mainte-	<ul> <li>Air Cleaner Installation (Refer to P.15-6.)</li> </ul>
nance Service – Engine Coolant (Change) P.00-56.]	Engine Coolant Supplying [Refer to GROUP 00, Mainte-
Strut Tower Bar Removal (Refer to GROUP 42, Strut	nance Service – Engine Coolant (Change) P.00-56.]
Iower Bar P.42-11.)	<ul> <li>Strut Tower Bar Installation (Refer to GROUP 42, Strut</li> </ul>
Air Cleaner Removal (Refer to P.15-6.)	Tower Bar P.42-11.)
Throttle Body Removal (Refer to GROUP 13B, Throttle	<ul> <li>Drive Belt Tension Adjustment [Refer to GROUP 00,</li> </ul>
Body P.13B-689.)	Maintenance Service – Drive Belts (Check Condition)
	P.00-44.]

### <Vehicle without Variable Induction Control (VIC) System>



### INTAKE AND EXHAUST INTAKE MANIFOLD PLENUM



#### **REMOVAL STEPS**

- 15. EGR VALVE
- **16. EGR PIPE CONNECTION**
- 17. DRIVE BELT <POWER STEERING OIL PUMP>
- 18. POWER STEERING OIL PUMP BRACKET STAY
- 19. INTAKE MANIFOLD PLENUM STAY, FRONT

#### **REMOVAL STEPS (Continued)**

- 20. INTAKE MANIFOLD PLENUM STAY, REAR
- 21. ENGINE MOUNT STAY
- 22. INTAKE MANIFOLD PLENUM
- >>A<< 23. INTAKE MANIFOLD PLENUM GASKET
  - 24. MANIFOLD DIFFERENTIAL PRESSURE SENSOR

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<Vehicle with Variable Induction (VIC) System>



### INTAKE AND EXHAUST INTAKE MANIFOLD PLENUM



#### **REMOVAL STEPS**

- 25. EGR VALVE
- 26. EGR PIPE CONNECTION
- 27. DRIVE BELT <POWER STEERING OIL PUMP>
- 28. POWER STEERING OIL PUMP BRACKET STAY
- 29. INTAKE MANIFOLD PLENUM STAY, FRONT

AC106132AB REMOVAL STEPS (Continued)

- 30. INTAKE MANIFOLD PLENUM STAY, REAR
- 31. ENGINE MOUNT STAY
- 32. INTAKE MANIFOLD PLENUM
- >>A<< 33. INTAKE MANIFOLD PLENUM GASKET
  - 34. MANIFOLD DIFFERENTIAL PRESSURE SENSOR

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### INSTALLATION SERVICE POINT

### >>A<< INTAKE MANIFOLD PLENUM GASKET INSTALLA-TION

Install the gasket with the protrusion in the position illustrated.



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#### INTAKE AND EXHAUST INTAKE MANIFOLD <2.4L>

# INTAKE MANIFOLD <2.4L>

# **REMOVAL AND INSTALLATION**

Air Cleaner Removal (Refer to P.15-6.)

Fuel Discharge Prevention [Refer to GROUP 13A, On-

vehicle Service – Fuel Pump Relay Disconnection (How to Reduce Pressurized Fuel Lines) P.13A-580.]

Engine Coolant Draining [Refer to GROUP 00, Maintenance Service – Engine Coolant (Change) P.00-56.]

Throttle Body Removal (Refer to GROUP 13A, Throttle

Thermostat Case Assembly Removal (Refer to GROUP 14, Water Hose and Water Pipe P.14-28.)

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#### **Pre-removal Operation**

Body P.13A-592.)

#### Post-installation Operation

- Thermostat Case Assembly Installation (Refer to GROUP 14, Water Hose and Water Pipe P.14-28.)
- Throttle Body Installation (Refer to GROUP 13A, Throttle Body P.13A-592.)
- Air Cleaner Installation (Refer to P.15-6.)
- Engine Coolant Supplying [Refer to GROUP 00, Maintenance Service – Engine Coolant (Change) P.00-56.]
- Fuel Leakage Inspection





- 13. FUEL RETURN PIPE
- 14. FUEL HOSE

<<A>>

- 15. FUEL RAIL, INJECTOR AND FUEL PRESSURE REGULATOR 16. INSULATOR
  - 17. VACUUM PIPE

  - 18. EGR VALVE
  - 19. INTAKE MANIFOLD
  - 20. INTAKE MANIFOLD GASKET

- 22. MANIFOLD DIFFERENTIAL PRESSURE SENSOR
- 23. VACUUM PIPE
- 24. EVAPORATIVE EMISSION PURGE SOLENOID VALVE
- 25. EGR SOLENOID VALVE AND VACUUM CONTROL VALVE
- 26. ACCELERATOR CABLE CLAMP

### REMOVAL SERVICE POINT

### <<A>> FUEL RAIL, INJECTOR AND FUEL PRESSURE REG-ULATOR REMOVAL

### 

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

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

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HIGH-PRESSURE

FUEL HOSE



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### INSTALLATION SERVICE POINT

### >>A<< HIGH-PRESSURE FUEL HOSE INSTALLATION

### 

### Be careful not to allow any engine oil to enter the fuel rail.

- 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.
- 2. While turning the high-pressure fuel hose to the left and right, install it to the fuel rail.
- 3. Check that the injector turns smoothly. If it does not turn smoothly, the O-ring may be trapped. Remove the high-pressure fuel hose and then re-insert it into the fuel rail and check again.

# INSPECTION

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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. Clogging of the negative pressure (vacuum) outlet port, or clogging of the exhaust gas recirculation passages.
- 3. Using a straight edge and feeler gauge, check for distortion of the cylinder head installation surface.

Standard value: 0.15 mm (0.006 inch) or less Limit: 0.20 mm (0.008 inch)

# INTAKE MANIFOLD <3.0L>

# **REMOVAL AND INSTALLATION**



### **REMOVAL SERVICE POINT**

### <<A>> FUEL RAIL, INJECTOR AND FUEL PRESSURE REG-ULATOR REMOVAL

### 

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

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

# INSTALLATION SERVICE POINTS

### >>A<< INTAKE MANIFOLD GASKET INSTALLATION

Install the gasket with the protrusions in the position illustrated.







### >>B<< INTAKE MANIFOLD INSTALLATION

- 1. Coat the intake manifold mounting studs with engine oil.
- 2. Tighten the intake manifold mounting nuts by the following procedure.

ORDER	MOUNTING NUTS	TIGHTENING TORQUE
1st	Right-bank nuts	$6.4 \pm 1.4 \text{ N} \cdot \text{m} (56 \pm 13 \text{ in-lb})$
2nd	Left-bank nuts	22 ± 1 N·m (16 ± 1 ft-lb)
3rd	Right-bank nuts	22 ± 1 N·m (16 ± 1 ft-lb)
4th	Left-bank nuts	22 ± 1 N·m (16 ± 1 ft-lb)
5th	Right-bank nuts	22 ± 1 N·m (16 ± 1 ft-lb)

### >>C<< HIGH-PRESSURE FUEL HOSE INSTALLATION

### 

### Be careful not to allow any engine oil to enter the fuel rail.

- 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.
- 2. While turning the high-pressure fuel hose to the left and right, install it to the fuel rail.
- 3. Check that the injector turns smoothly. If it does not turn smoothly, the O-ring may be trapped. Remove the high-pressure fuel hose and then re-insert it into the fuel rail and check again.

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### 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 inch) or less Limit: 0.20 mm (0.008 inch)

# EXHAUST MANIFOLD <2.4L>

### **REMOVAL AND INSTALLATION**



### INTAKE AND EXHAUST EXHAUST MANIFOLD <2.4L>

### REMOVAL STEPS

- <<A>> >>A<< 1. HEATED OXYGEN SENSOR (FRONT)
  - 2. HEAT PROTECTOR
  - 3. ENGINE HANGER

### **REMOVAL STEPS (Continued)**

- 4. EXHAUST MANIFOLD
- 5. EXHAUST MANIFOLD GASKET
- 6. GASKET
- 7. EXHAUST MANIFOLD BRACKET

### **REMOVAL SERVICE POINT**

### <<A>> HEATED OXYGEN SENSOR (FRONT) REMOVAL

Use special tool MD998770 to remove the oxygen sensor.



# INSTALLATION SERVICE POINT

### >>A<< HEATED OXYGEN SENSOR (FRONT) INSTALLA-TION

Use special tool MD998770 to installation the oxygen sensor.



# INSPECTION

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

### **Exhaust Manifold Check**

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

Standard value: 0.15 mm (0.006 inch) or less Limit: 0.20 mm (0.008 inch)

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# EXHAUST MANIFOLD <3.0L>

## **REMOVAL AND INSTALLATION**



### INTAKE AND EXHAUST EXHAUST MANIFOLD <3.0L>

### **REMOVAL STEPS (Continued)**

- INTAKE MANIFOLD PLENUM **<VEHICLE WITH VARIABLE** INDUCTION CONTROL (VIC) SYSTEM> (REFER TO P.15-7.)
- 7. EGR PIPE
- 8. HEAT UPPER PROTECTOR <RIGHT BANK>
- 9. HEAT PROTECTOR < RIGHT BANK>

### **REMOVAL STEPS (Continued)**

- **10. HEAT FRONT PROTECTOR** <RIGHT BANK>
- **11. HEAT LOWER PROTECTOR** <RIGHT BANK>
- 12. EXHAUST MANIFOLD <RIGHT BANK>
- 13. EXHAUST MANIFOLD GASKET <RIGHT BANK>

### **REMOVAL SERVICE POINT**

### <<A>> LEFT BANK HEATED OXYGEN SENSOR (FRONT) REMOVAL

Use special tool MD998770 to remove the oxygen sensor.



# INSTALLATION SERVICE POINT

### >>A<< LEFT BANK HEATED OXYGEN SENSOR (FRONT) INSTALLATION

Use special tool MD998770 to installation the oxygen sensor.



M1151003400305 Check the following points; replace the part if a problem is found.

### **EXhaust Manifold Check**

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

Standard value: 0.15 mm (0.006 inch) or less Limit: 0.20 mm (0.008 inch)

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# EXHAUST PIPE, MAIN MUFFLER AND CATALYTIC CONVERTER<2.4L>

### **REMOVAL AND INSTALLATION**

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### **REMOVAL SERVICE POINT**

#### <<A>> HEATED OXYGEN SENSOR (REAR) REMOVAL

Use special tool MD998770 to remove the oxygen sensor.



### **INSTALLATION SERVICE POINT**

### >>A<< HEATED OXYGEN SENSOR (REAR) INSTALLATION

Use special tool MD998770 to install the oxygen sensor.



# EXHAUST PIPE, MAIN MUFFLER AND CATALYTIC CONVERTER<3.0L>

### **REMOVAL AND INSTALLATION**



#### FRONT EXHAUST PIPE **REMOVAL STEPS (Continued)** INTAKE MANIFOLD PLENUM

• <VEHICLE WITH VARIABLE INDUCTION CONTROL (VIC) SYSTEM> (REFER TO P.15-7.)

### FRONT EXHAUST PIPE **REMOVAL STEPS (Continued)**

- <<A>> >>A<< 14. RIGHT BANK HEATED OXYGEN SENSOR (FRONT)
  - 15. EXHAUST FITTING STAY (RH)
  - 16. FRONT CATALYTIC CONVERTER (RH)

### **REMOVAL SERVICE POINT**

<<A>> LEFT BANK HEATED OXYGEN SENSOR (REAR)/ **RIGHT BANK HEATED OXYGEN SENSOR (REAR)/RIGHT** BANK HEATED OXYGEN SENSOR (FRONT) REMOVAL Use special tool MD998770 to remove the oxygen sensor.



# INSTALLATION SERVICE POINT

>>A<< RIGHT BANK HEATED OXYGEN SENSOR (FRONT)/ **RIGHT BANK HEATED OXYGEN SENSOR (REAR)/LEFT BANK HEATED OXYGEN SENSOR (REAR) INSTALLATION** Use special tool MD998770 to install the oxygen sensor.



#### INTAKE AND EXHAUST SPECIFICATIONS

# SPECIFICATIONS

# FASTENER TIGHTENING SPECIFICATIONS

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ITEMS	SPECIFICATIONS	
Air cleaner		
Air cleaner bolt	8.8 ± 1.0 N·m (78 ± 9 in-lb)	
Air flow sensor nut	8.8 ± 1.0 N·m (78 ± 9 in-lb)	
Air intake hose clamp bolt		3.9 ± 1.0 N·m (38 ± 8 in-lb)
Exhaust manifold <2.4L Engine>		
Engine hanger nut	$29 \pm 3 \text{ N} \cdot \text{m} (22 \pm 2 \text{ ft-lb})$	
Exhaust manifold bracket bolt		35 ± 6 N·m (26 ± 4 ft-lb)
Exhaust manifold nut	M8	29 ± 3 N·m (22 ± 2 ft-lb)
	M10	49 ± 5 N·m (36 ± 4 ft-lb)
Front exhaust pipe nut		49 ± 10 N·m (37 ± 7 ft-lb)
Heat protector bolt		$14 \pm 1 \text{ N} \cdot \text{m} (120 \pm 13 \text{ in-lb})$
Heated oxygen sensor (front)		44 ± 5 N·m (33 ± 3 ft-lb)
Exhaust manifold <3.0L Engine>		
EGR pipe bolt	59 ± 10 N·m (44 ± 7 ft-lb)	
EGR pipe gasket bolt		$18 \pm 2 \text{ N} \cdot \text{m} (13 \pm 2 \text{ ft-lb})$
Exhaust manifold nut		44 ± 5 N·m (33 ± 3 ft-lb)
Heat front protector <right bank=""> bolt</right>	$14 \pm 1 \text{ N} \cdot \text{m} (120 \pm 13 \text{ in-lb})$	
Heat lower protector <left bank=""> bolt</left>		$14 \pm 1 \text{ N} \cdot \text{m} (120 \pm 13 \text{ in-lb})$
Heat lower protector <right bank=""> bolt</right>		$14 \pm 1 \text{ N} \cdot \text{m} (120 \pm 13 \text{ in-lb})$
Heat protector <left bank=""> bolt</left>		$14 \pm 1 \text{ N} \cdot \text{m} (120 \pm 13 \text{ in-lb})$
Heat protector <right bank=""> bolt</right>		$14 \pm 1 \text{ N} \cdot \text{m} (120 \pm 13 \text{ in-lb})$
Heat upper protector <left bank=""> bolt</left>		$14 \pm 1 \text{ N} \cdot \text{m} (120 \pm 13 \text{ in-lb})$
Heat upper protector <right bank=""> bolt</right>		$14 \pm 1 \text{ N} \cdot \text{m} (120 \pm 13 \text{ in-lb})$
Left bank heated oxygen sensor (front)		44 ± 5 N·m (33 ± 3 ft-lb)
Exhaust pipe and main muffler <2.4L Engine>		
Center exhaust pipe bolt		35 ± 4 N·m (26 ± 3 ft-lb)
Front exhaust pipe nut		49 ± 10 N·m (37 ± 7 ft-lb)
Hanger bolt		$12 \pm 2 \text{ N} \cdot \text{m} (107 \pm 17 \text{ in-lb})$
Heated oxygen sensor (rear)	44 ± 5 N·m (33 ± 3 ft-lb)	
Exhaust pipe and main muffler <3.0L Engine>		
Center exhaust pipe bolt		$35 \pm 4 \text{ N} \cdot \text{m} (26 \pm 3 \text{ ft-lb})$
Exhaust fitting stay (LH)	M8	$12 \pm 2 \text{ N} \cdot \text{m} (107 \pm 17 \text{ in-lb})$
	M12	32 ± 7 N·m (24 ± 5 ft-lb)
Exhaust fitting stay (RH)	M8	$12 \pm 2 \text{ N} \cdot \text{m} (107 \pm 17 \text{ in-lb})$
M12		32 ± 7 N·m (24 ± 5 ft-lb)
Front catalytic converter (LH) nut	$35 \pm 4 \text{ N} \cdot \text{m} (26 \pm 3 \text{ ft-lb})$	
Front catalytic converter (RH) nut	35 ± 4 N·m (26 ± 3 ft-lb)	

#### INTAKE AND EXHAUST SPECIFICATIONS

TEMS		SPECIFICATIONS
Front exhaust pipe nut	ont exhaust pipe nut	
Hanger bolt	$12 \pm 2 \text{ N} \cdot \text{m} (107 \pm 17 \text{ in-lb})$	
Left bank heated oxygen sensor (rear)	44 ± 5 N·m (33 ± 3 ft-lb)	
Right bank heated oxygen sensor (front)	44 ± 5 N·m (33 ± 3 ft-lb)	
Right bank heated oxygen sensor (rear)		44 ± 5 N⋅m (33 ± 3 ft-lb)
Intake manifold <2.4L Engine>		
Accelerator cable clamp bolt		11 ± 1 N·m (98 ± 8 in-lb)
EGR solenoid valve bolt		8.8 ± 1.0 N·m (78 ± 9 in-lb)
EGR valve bolt		21 ± 4 N·m (16 ± 3 ft-lb)
Evaporative emission purge solenoid valve bolt		8.8 ± 1.0 N·m (78 ± 9 in-lb)
Fuel rail bolt		$12 \pm 1 \text{ N} \cdot \text{m} (100 \pm 13 \text{ in-lb})$
High pressure fuel hose connection bolt		4.9 ± 1.0 N⋅m (44 ± 8 in-lb)
Intake manifold bolt		4.9 ± 1.0 N⋅m (44 ± 8 in-lb)
Intake manifold nut		$20 \pm 2 \text{ N} \cdot \text{m} (14 \pm 2 \text{ ft-lb})$
Intake manifold stay bolt	30 ± 3 N⋅m (23 ± 2 ft-lb)	
Manifold differential pressure sensor and ignition failure sensor bolt		4.9 ± 1.0 N⋅m (44 ± 8 in-lb)
Oil dipstick guide bolt		14 ± 1 N·m (117 ± 13 in-lb)
Pressure hose bolt		$12 \pm 2 \text{ N} \cdot \text{m} (100 \pm 22 \text{ in-lb})$
Vacuum pipe bolt		11 ± 1 N·m (98 ± 8 in-lb)
Intake manifold <3.0L Engine>		
Bracket bolt		23 ± 3 N·m (17 ± 3 ft-lb)
Fuel rail bolt		$12 \pm 1 \text{ N} \cdot \text{m} (100 \pm 13 \text{ in-lb})$
High pressure fuel hose connection bolt	4.9 ± 1.0 N·m (44 ± 8 in-lb)	
Intake manifold nut		$22 \pm 1 \text{ N} \cdot \text{m} (16 \pm 1 \text{ ft-lb})$
Timing belt front upper cover bolt	M6	11 ± 1 N·m (98 ± 8 in-lb)
	M8	14 ± 1 N·m (117 ± 13 in-lb)
Intake manifold plenum <3.0L Engine>		
Control wiring harness connector bracket bolt	5.0 ± 1.0 N·m (44 ± 9 in-lb)	
EGR pipe connection bolt		$18 \pm 2 \text{ N} \cdot \text{m} (13 \pm 2 \text{ ft-lb})$
EGR valve bolt	21 ± 4 N·m (16 ± 2 ft-lb)	
Engine mount stay bolt	$36 \pm 6 \text{ N} \cdot \text{m} (27 \pm 4 \text{ ft-lb})$	
Evaporative emission purge solenoid valve bolt [Vehicle wir induction control (VIC) system]	9.0 ± 1.0 N⋅m (80 ± 9 in-lb)	
Ground wire attaching bolt [Vehicle with variable induction control (VIC) system]		5.0 ± 1.0 N·m (44 ± 9 in-lb)
Heater pipe bolt		$18 \pm 2 \text{ N} \cdot \text{m} (13 \pm 2 \text{ ft-lb})$
Intake manifold plenum bolt and nut		18 ± 2 N·m (13 ± 2 ft-lb)
Intake manifold plenum stay bolt, front and rear	M8	18 ± 2 N·m (13 ± 2 ft-lb)
	M10	36 ± 6 N·m (27 ± 4 ft-lb)
Manifold differential pressure sensor bolt		$5.0 \pm 1.0 \text{ N} \cdot \text{m} (44 \pm 9 \text{ in-lb})$

#### INTAKE AND EXHAUST SPECIFICATIONS

ITEMS	SPECIFICATIONS	
Power steering oil pump bracket stay bolt (bolt, washer ass	44 ± 10 N·m (33 ± 7 ft-lb)	
Power steering oil pump bracket stay bolt (bolt, flange)	$24 \pm 4 \text{ N} \cdot \text{m} (18 \pm 3 \text{ ft-lb})$	
Power steering oil pump nut	42 ± 7 N·m (31 ± 5 ft-lb)	
Sensor connector assembly bolt	11 ± 1 N·m (98 ± 8 in-lb)	
Vacuum control valve [Vehicle with variable induction contr	11 ± 1 N·m (98 ± 8 in-lb)	
Vacuum pipe assembly bolt		11 ± 1 N·m (98 ± 8 in-lb)
Vacuum tank bolt [Vehicle with variable induction control (VIC) system]	M6	9.0 ± 1.0 N·m (80 ± 9 in-lb)
	M8	$18 \pm 2 \text{ N} \cdot \text{m} (13 \pm 2 \text{ ft-lb})$
Valve assembly bolt		9.0 ± 1.0 N⋅m (80 ± 9 in-lb)

# SERVICE SPECIFICATION

ITEM	STANDARD VALUE	LIMIT
Variable induction control solenoid coil resistance [at 20°C (68°F)] $\Omega$	29 – 35	-
Manifold distortion of the installation surface mm (in)	0.15 (0.006) or less	0.20 (0.008)