

VIII. Workshop Manual of Cooling System

Cautions

Precautions for discharging engine coolant

Do not remove the expansion kettle cover when the engine is hot. Otherwise, high-pressure engine coolant escaping from the radiator can cause serious burns. Discharge engine coolant after engine is cooling.

Preparation

Service Tool:

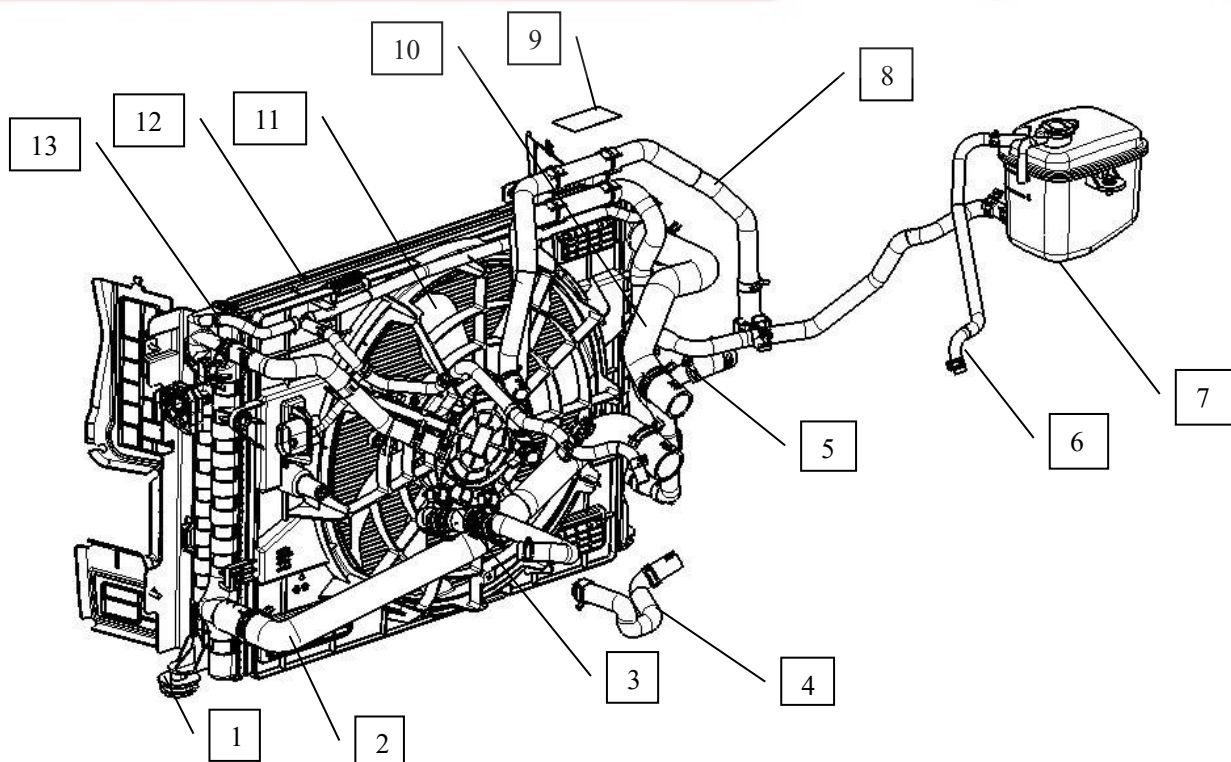
Maintenance tool list

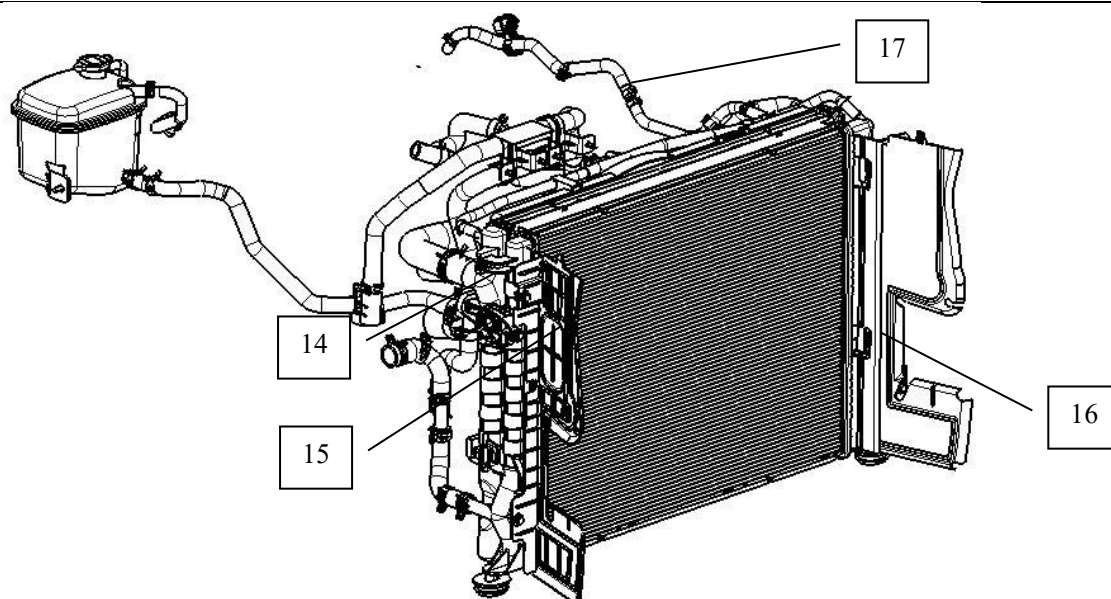
Tool	Name	Usage
	Radiator cap tester	Check radiator cover (or expansion kettle cover) and radiator

Necessary material for maintenance

Coolant	Filling amount	Concentration%
High quality ethylene glycol coolant	9.0L	50% concentration of ethylene glycol

Cooling system structure diagram





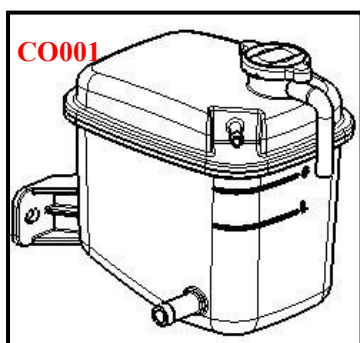
- | | | |
|---|---|--|
| 1. Radiator suspension assembly (I) | 2. Radiator water outlet pipe assembly | 3. DCT water outlet pipe assembly |
| 4. DCT water inlet pipe assembly | 5. Inter-cooling radiator water outlet pipe and water replenishment pipe assembly | 6. Expansion kettle hose assembly |
| 7. Expansion kettle assembly | 8. Electronic water pump water outlet pipe assembly | 9. Radiator fan warning label |
| 10. Radiator water inlet pipe assembly | 11. Radiator fan assembly | 12. Radiator and inter-cooling radiator assembly |
| 13. Radiator and inter-cooling radiator air discharging pipe assembly | 14. Radiator suspension assembly (II) | 15. Right air collector plate assembly |
| 16. Left air collector plate assembly | 17. Engine air discharging pipe assembly | |

Engine coolant

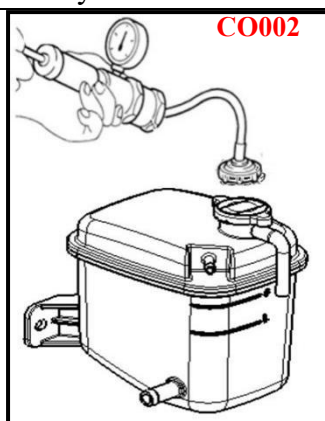
1. Check

- ① After the engine cools down, check whether the coolant level in the expansion kettle is between "L" and "F" lines

If necessary, adjust the engine coolant level.



- ② Use radiator cover leakage detector to exert $128\text{kPa} \pm 14.7\text{kPa}$ pressure on cooling system to check whether there is leakage.

**Warning:**

■ Do not remove the expansion kettle cover when the engine is hot. Otherwise, high-pressure engine coolant escaping from the expansion kettle can cause serious burns.

Attention:

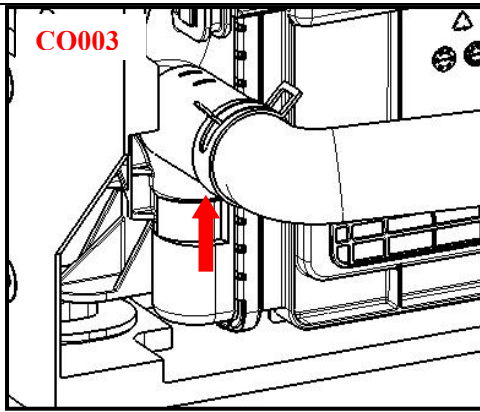
- Exceeding test pressure may damage the radiator or expansion kettle.
- When engine coolant decreases, add engine coolant to the expansion kettle.
- If parts are found damaged, please repair or replace them in time.

2. Replace coolant**Attention:**

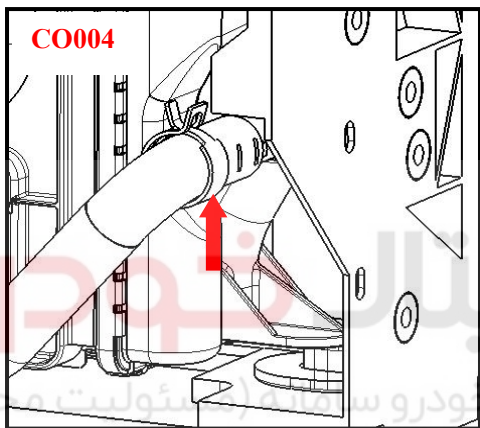
- Coolant shall be periodically replaced by following instructions on “usage manual”
- To avoid burns, do not replace the coolant when the engine temperature is high.
- The coolants of different brands can't be mixed for either storage or usage.

Discharge the coolant**Attention:**

- When replacing engine coolant, ensure that already close relay box cover and don't spray coolant to electrical equipment. If spray coolant, please clean immediately.
 - Wrap the expansion kettle with a thick cloth, slowly turn the cover until the pressure is completely released, unscrew the cover of the expansion kettle and remove it carefully.
 - Be careful not to spill engine coolant on the drive belt.
- ① Remove the strap connecting the radiator and the radiator outlet pipe assembly (at the lower left side of the radiator), then remove the cover of the expansion kettle, and drain the coolant from the engine, radiator and pipeline.



② Remove the strap connecting the inter-cooling radiator assembly and the inter-cooling radiator water outlet and water supply pipe assembly (at the lower right side of the inter-cooling radiator), and drain the coolant from the inter-cooling radiator and pipeline.



③ Remove the expansion kettle and engine degassing pipe assembly, and drain the coolant in the kettle and pipe. (Kettle fixing bolt 11254-0620F62, tightening torque 5N.m~8N.m).

Flush the cooling system:

① Install the removed expansion kettle, and install the radiator water outlet pipe and inter-cooling radiator water outlet pipe to the corresponding locating point, install the clamp ring, and put the clamp ring in the white mark on the water pipe.

② Add coolant into the expansion kettle (8.5L), then assemble the expansion kettle cover.

③ Run the engine to preheat to normal operating temperature.

④ Speed up the engine speed two or three times under no-load condition.

⑤ Turn off the engine and wait for it to cool down.

⑥ Drain coolant from the system.

⑦ Repeat steps ①~⑥ until the radiator begins to drain clear coolant.

Refill the engine coolant:

① Ensure that the radiator water outlet pipe and inter-cooling radiator water outlet pipe is

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installed to the corresponding locating point, and the clamp ring is placed in the white mark on the water pipe.

② Slowly fill the new coolant into the expansion kettle until the level up to “F”.

③ Install the expansion kettle cover.

Attention:

■ Recommended coolant type: JOA45;

Filling amount: 9.0L

■ When replacing new coolant, it may cause high temperature of the engine due to the bad cooling cycle caused by the air in the cooling system that cannot be removed, resulting in air resistance. (Check whether the temperature of the inlet and outlet water pipes of the radiator rises from the lower part of the engine). Method to eliminate air resistance: run the engine at idle speed for 5~10 minutes, step on the accelerator to increase the speed halfway, and the maximum speed is not more than 3000r/min, until the air in the pipeline is removed and check the liquid level in the expansion kettle, and add coolant if necessary.

■ Pay attention to the coolant temperature gauge during the filling process. If there is high temperature warning, stop the engine and refill again until it cools down.

Radiator, inter-cooling radiator assembly and radiator fan assembly**Attention:**

■ Please do not remove the water pipe and the expansion kettle when the engine is hot. Otherwise, high-pressure engine coolant escaping from the radiator can cause serious burns.

■ Do not let engine coolant splash on the drive belt.

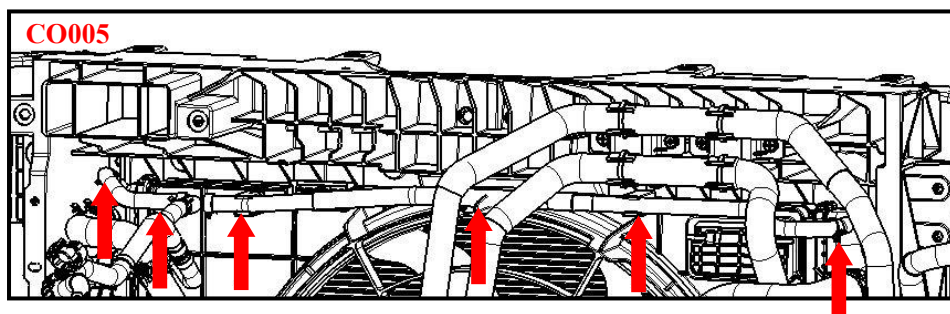
■ Prevent damage or scratches when disassembling radiator core.

Disassembly

1. Remove the expansion kettle cover.

2. Remove the strap connecting the radiator assembly and the radiator water outlet pipe assembly (at the lower left side of the radiator), and drain the coolant from the radiator; remove the strap connecting the inter-cooling radiator assembly and the inter-cooling radiator water outlet and water supply pipe assembly (at the lower right side of the inter-cooling radiator). Drain the coolant from the inter-cooling radiator, and then remove the strap (at the upper right side of the radiator) connecting the radiator assembly and the radiator water inlet pipe assembly and the strap connecting the inter-cooling radiator assembly and the inter-cooling radiator water inlet assembly (at the upper left side of the inter-cooling radiator).

3. Remove the part connecting the radiator and inter-cooling radiator degassing pipe assembly and radiator and inter-cooling radiator, and take out the pipe from the fan installation buckle, and take out the degassing pipe.



4. Remove the radiator fan wiring harness connectors.

5. Remove the fixing bolt 11254-0620F62 (installation torque 5N.m ~ 8N.m) on the radiator suspension assembly (II) of the front end module, pay attention that the condenser is installed on the inter-cooling radiator assembly, and take down the condenser after removing the suspension.

8. Take out the radiator, inter-cooling radiator and radiator fan assembly. (radiator and inter-cooling radiator assembling M6 bolt, torque 5N.m~8N.m; radiator fan fixing bolt 11254-0620F62, torque 5N.m~8N.m).

Note:

- When removing, please don't damage or scratch condenser, radiator core and inter-cooling radiator core.

- Fan assembly is set by dynamic balance. Do not disassemble separate motor or fan during maintenance. It is recommended to replace the fan and motor together.

9. Separate the radiator, intercooling radiator and radiator cooling fan from the assembly.

Check after disassembly:

Check the radiator assembly and inter-cooling radiator assembly:

Check whether there is mud or blockage on the surface of the radiator and inter-cooling radiator core. If necessary, clean the radiator and the inter-cooling radiator surface as follows.

- Don't bend or damage the radiator and the inter-cooling radiator core.

- Wrap wire harnesses and electrical connectors with adhesive tape to prevent water ingress.

1) Use the hose to flush the back of the radiator and the inter-cooling radiator core vertically from top down.

2) Flush each surface of the core every minute.

3) stop rinsing when no pollutants can be washed out from the radiator and the inter-cooling radiator .

4) Use compressed air to blow vertically into the radiator and the inter-cooling radiator core.

- Use compressed air at pressure less than 490kPa and maintain a distance of 30cm or more.

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5) Blow all surfaces of the radiator and the inter-cooling radiator core with compressed air every minute until no water is blown out.

Check radiator fan assembly:

- 1) Check the radiator fan for cracks or abnormal bends. If found, please replace the radiator fan.
- 2) Connect the power to the motor terminal and check the fan motor rotation.
- 3) Check whether there is abnormal noise when the motor is running.

Installation

Install in the reverse order of removal.

Radiator water inlet/outlet pipe assembly**Disassembly**

1. Remove the strap connecting the radiator assembly and the radiator water outlet pipe assembly (at the lower left side of the radiator), and drain the coolant from the radiator; loosen the strap connecting the radiator water outlet pipe and engine end, and remove the radiator water outlet pipe.

Attention:

- Be sure to operate after the engine is cooling.
- Do not let engine coolant splash on the drive belt.

2. Loosen the strap connecting the radiator assembly and the radiator water inlet pipe assembly (at the upper right side of the radiator), and loosen the strap connecting the water pipe and the radiator, the water pipe and the engine, and remove the radiator water inlet pipe.

Check after disassembly:

Check if there is crack, damage or aging on the water pipe, and replace if necessary.

Installation

Please note the following items and install in the reverse order of disassembly.

- Insert the two ends of the pipe into the locating points of the corresponding connector, place the clamp ring on the clamp ring position limit mark on the water pipe.

Inter-cooling radiator water inlet pipe, inter-cooling radiator water outlet and water supply pipe assembly, electronic water pump water outlet pipe assembly**Dismantling**

1. Remove the strap connecting the inter-cooling radiator assembly and the inter-cooling radiator water outlet and water supply pipe assembly (at the lower right side of the inter-cooling radiator), and drain the coolant from the inter-cooling radiator.

Attention:

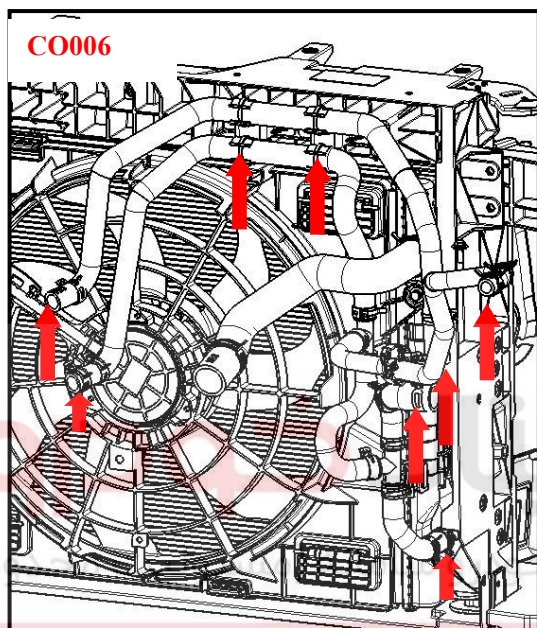
- Be sure to operate after the engine is cooling.
- Do not let engine coolant splash on the drive belt.

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2. Loosen the strap connecting the inter-cooling radiator water inlet pipe assembly respectively, and disconnect the connection of water pipe and inter-cooling radiator, water pipe and the engine, remove the inter-cooling radiator water inlet pipe.

3. Loosen the clamp rings that the inter-cooling radiator water outlet and water supply pipe assembly connects to the electronic water pump, the engine water supply end and expansion kettle end, and then disconnect all the connections. And take out the water pipe from the fixing bracket.

4. Loosen the clamp ring that electronic water pump water outlet pipe connects to the engine and electronic water pump, and take out the water pipe from the fixing bracket.

**Check after disassembly:**

Check if there is crack, damage or aging on the water pipe, and replace if necessary.

Installation

Please note the following items and install in the reverse order of disassembly.

Insert the two ends of the pipe into the locating points of the corresponding connector, place the clamp ring on the clamp ring position limit mark on the water pipe, and insert the water pipe clamp into the water pipe bracket and figure of eight pipe clamp.

Radiator and inter-cooling radiator degassing piping assembly and engine degassing piping assembly**Dismantling**

1. Loosen the strap connecting the radiator and inter-cooling radiator degassing piping assembly and the radiator and inter-cooling radiator, disconnect the connection of engine degassing piping assembly and inter-cooling radiator degassing piping, and take out the pipe from the fan pipe installation buckle and front end module fixing hole.

Attention:

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- Be sure to operate after the engine is cooling.
- Do not let engine coolant splash on the drive belt.

2. Loosen the clamp of engine degassing pipe assembly, and disconnect the connection with the engine.

Check after disassembly:

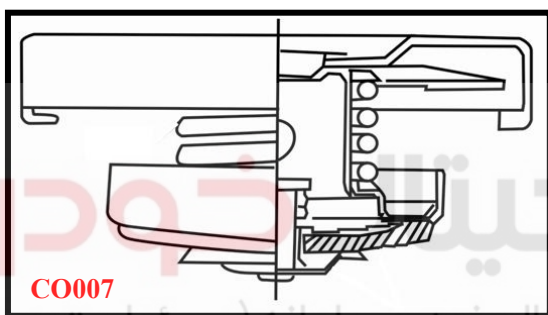
Check if there is crack, damage or aging on the water pipe, and replace if necessary.

Installation

Follow the opposite sequence of the disassembly procedures.

Expansion kettle**Check expansion kettle cover:**

1. Check if there is damage, crack or sealing washer aging in the expansion kettle cover.



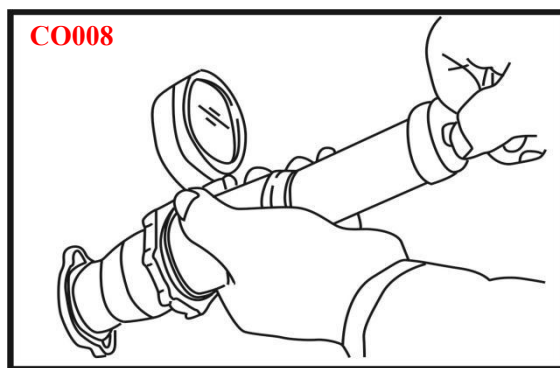
2. Check the opening pressure of the expansion kettle cover.

1) Remove the radiator kettle cover, use engine coolant to moistening the sealed part, and install the radiator kettle cover on the leakage-detection device.

Note:

■ Make sure the expansion kettle cover is clean before test, because the expansion kettle sealing parts have rust or other foreign materials will lead to instructions is not correct.

- 2) Apply $128\text{kPa} \pm 14.7\text{kPa}$ pressure.



3) Replace the expansion kettle cover if the reading does not remain stable for approximately 10 seconds.

Dismantling

1. Remove the 2 fixing bolts of expansion kettle on the vehicle body. (Expansion kettle fixing bolt 11254-0620F62, installation torque 5N.m~8N.m)
2. Remove the expansion kettle cover, loosen the clamp ring of the expansion kettle and inter-cooling radiator water outlet and water supply pipe assembly, disconnect the connection, and then drain the coolant in the kettle.

Attention:

- Be sure to operate after the engine is cooling.
 - Do not let engine coolant splash on the drive belt.
3. Loosen the clamp ring connecting the expansion kettle and degassing pipe, expansion kettle and engine degassing pipe, and then disconnect the connection, take out the expansion kettle.

Check after disassembly

Check if there is crack, damage or aging on kettle, and replace if necessary.

Installation

Follow the opposite sequence of the disassembly procedures.

Air accumulating plate**Dismantling**

1. Dismantle the front bumper device.
2. Remove anti-collision beam
3. Remove the 4 bolts (fixing bolt 11254-0620F62, installation torque 5N.m~8N.m) connecting left/right air accumulating plate and front end module, disconnect the buckles of left/right air accumulating plate and upper air accumulating plate, and take out the left/right accumulating plate.

Check after disassembly

Check if there is crack, damage or aging on air accumulating plate, and replace if necessary.

Installation

Install in the reverse order of removal.

Malfunction Diagnosis

Cooling System Malfunction Troubleshooting List

System	Symptoms		Inspection Item	
Cooling system components failure	Bad cooling	Water pump failure	Drive belt worn or loose	
		Thermostat stuck in closed position	Replace	
		The heat sink is damaged	Dust or jammed	
			Mechanical damage	
		Radiator jammed	Excessive foreign matter (corrosion, dirt, sand, etc.)	
	Insufficient air flow	Radiator fan not work	Fan assembly	
		Fan rotation resistance is too large		
		Fan blades damaged		
	Windshield damaged	—	—	
	Incorrect mixing ratio of coolant	—	—	
	Engine coolant quality is poor	—	If engine coolant is viscous	
	Insufficient engine coolant	engine coolant leaking	Coolant hose	Clamps loose
				Hose ruptured
			Water pump	Poor sealing
		Radiator	Radiator cover	is loose
				Poor sealing
			Radiator	O-ring damaged, aged or incorrectly installed
				Expansion kettle damaged
				Radiator core cracked
		Fluid reservoir	Kettle broken	
Parts other than cooling system malfunction	Engine temperature Too high	Engine overload	Abnormal driving	Engine speed is too high under no-load conditions
				Long time driving
				Over-speed driving
		Others	Transmission system failure	
			Incorrect size wheels and tires installed	
			Braking retardation	

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System	Symptoms	Inspection Item
	Poor air circulation	Ignition timing is incorrect
		Dust or paper jammed
		If vehicle cover is installed
		Dust or paper jammed
	Condenser clogged	Poor air circulation

Repair Data and Specification

Repair Data and Specification List

engine coolant volume	
Coolant filling amount	9.0 L
Expansion kettle coolant volume (liquid reservoir in MAX)	F line is 1.5L, total amount is 2.1L
Cooling system pressure	
Normal working pressure	128 kPa±14.7 kPa

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

