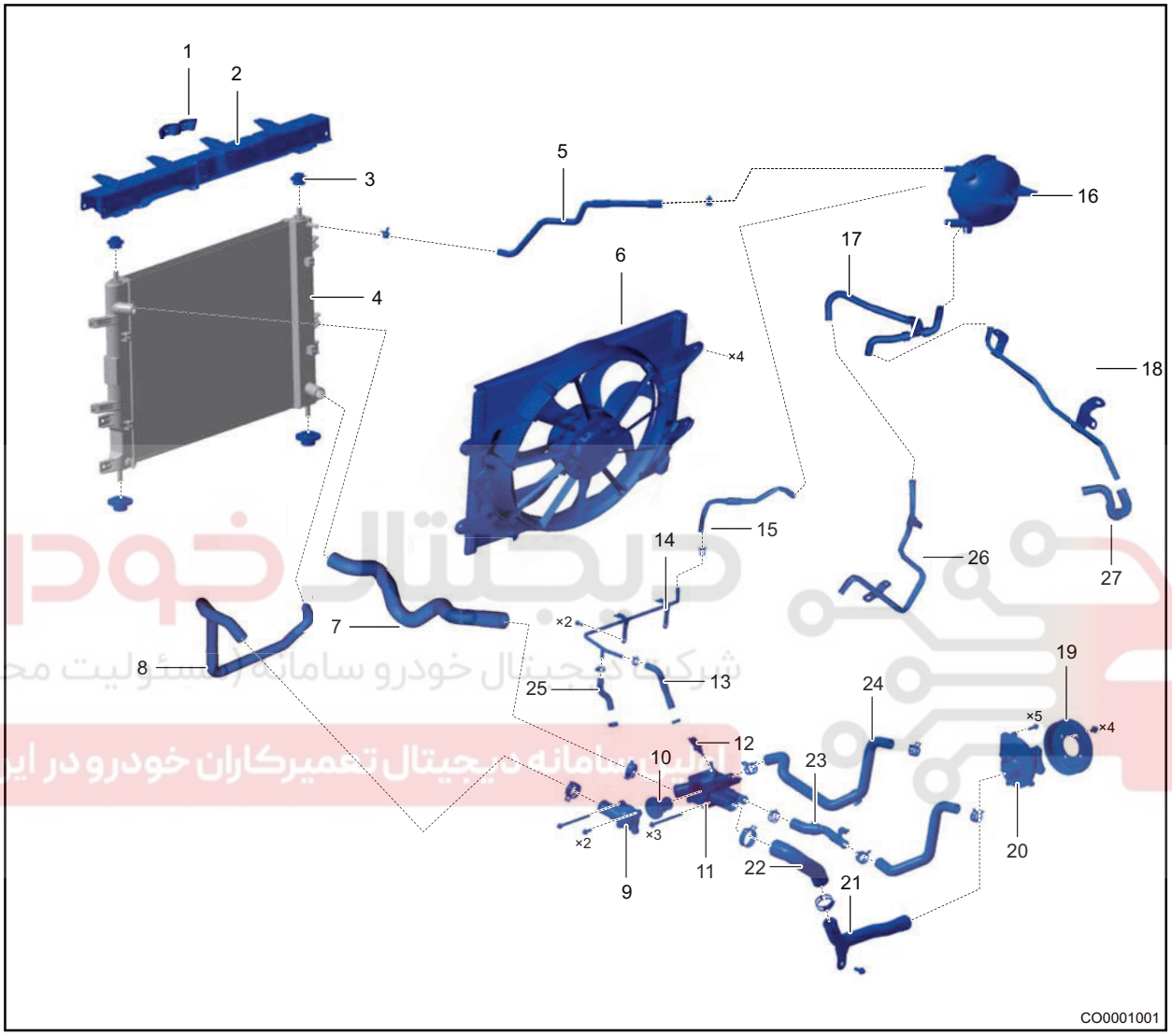
SQRE4T15B COOLING SYSTEM

GENERAL INFORMATION

Overview

Description



1 - Engine Hood Lock Secondary Lock Bracket	2 - Radiator Upper Crossmember Assembly
3 - Rubber Bushing	4 - Radiator
5 - Radiator Discharge Pipe	6 - Radiator Fan
7 - Engine Inlet Hose	8 - Engine Outlet Hose
9 - Thermostat Housing	10 - Thermostat
11 - Thermostat Seat	12 - Coolant Temperature Sensor
13 - Engine Discharge Hose Ⅰ	14 - Engine Discharge Steel Pipe
15 - Engine Discharge Hose Ⅱ	16 - Expansion Tank
17 - Expansion Tank Outlet Hose	18 - Expansion Tank Outlet Steel Pipe
19 - Water Pump Pulley	20 - Water Pump Assembly
21 - Cooling Pipe Assembly I	22 - Small Circulation Water Pipe
23 - Heater Core Outlet Pipe	24 - Heater Core Inlet Pipe
25 - Engine Discharge Hose Ⅲ	26 - Expansion Tank to Water Pump Pipe
27 - Water Pipe - Expansion Tank to Water Pump 3	

Operation

- Engine cooling system adjusts engine operating temperature by the flow of coolant and makes engine operate normally under various operating conditions.
- Engine cooling system is a forced circulation system, which supplies circulation pressure for cooling system by water pump and forces coolant to circulate in the engine cylinder block, and distributes excessive heat to radiator by the flow of coolant, and radiates it to the air by cooling fan. Also, engine cooling system provides heat to the heater core in cabin to improve driving comfort.

Specifications

Torque Specifications

Description	Torque (N·m)
Expansion Tank Fixing Bolt	5 ± 1
Thermostat Housing Fixing Bolt	8 + 3
Thermostat Seat Fixing Bolt	8 + 3
Coolant Temperature Sensor	15 ± 1
Cooling Fan Fixing Bolt	5 ± 1
Radiator Upper Crossmember Fixing Bolt	9 ± 1
Water Pump Fixing Bolt	8 + 3
Coupling Bolt Between Radiator and Condenser	7 ± 1
Water Pump Pulley Fixing Bolt	20 + 5
Discharge Steel Pipe Fixing Bolt	8 + 3

Coolant Capacity

Item	Capacity (L)
Cooling System	9.0 ± 0.5

Coolant Type

Item	Type
Cooling System	All organic antifreeze (LEC-II)

Coolant Freezing Point

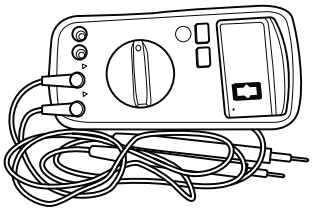
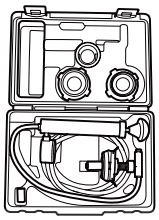
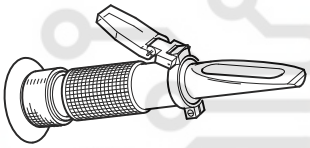
Item	Freezing Point Value (°C)
Coolant	-40

Cooling System Test Pressure

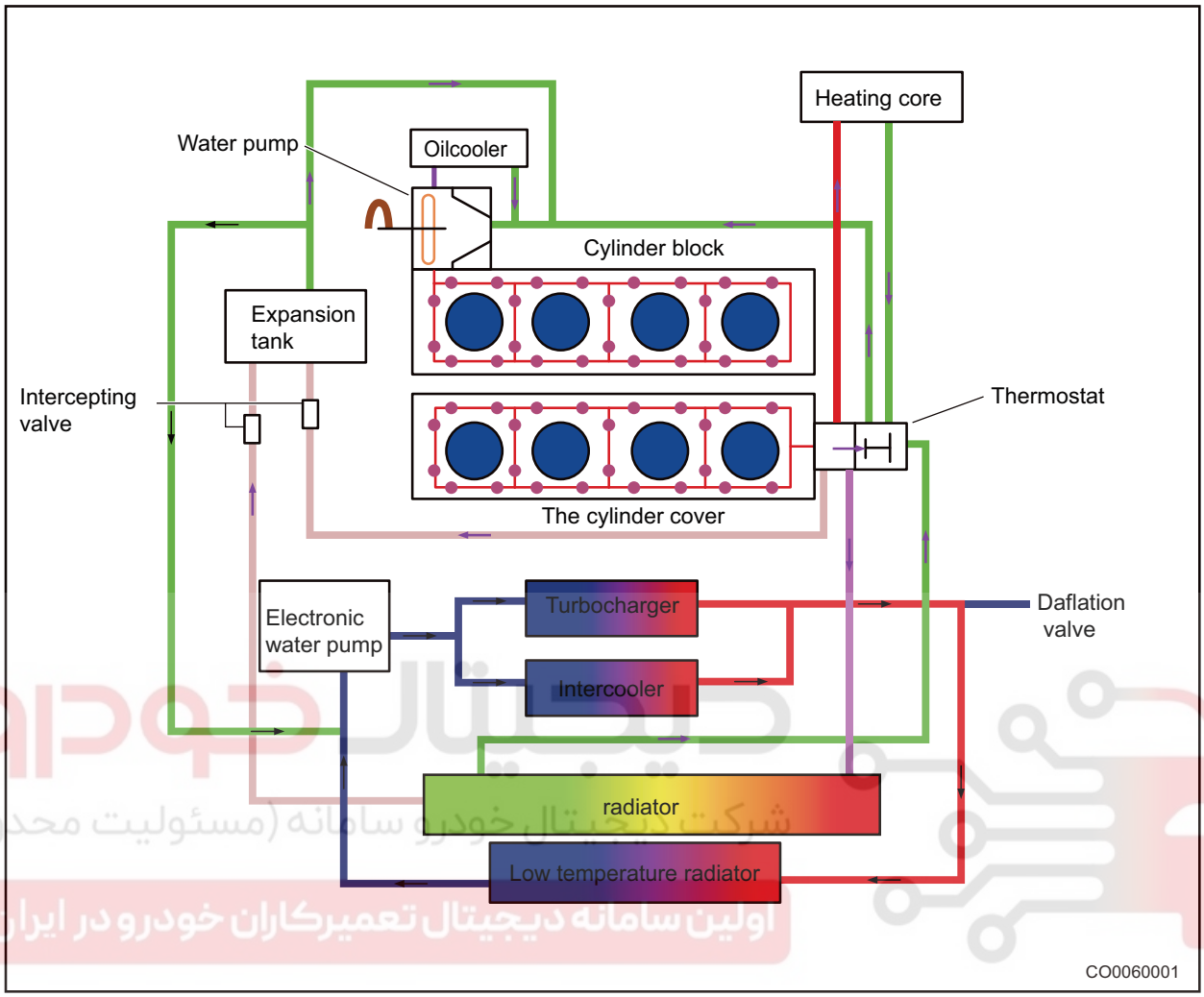
Item	Test Pressure (bar)
Cooling System (Test Pressure)	1.2

Tools

General Tools

Digital Multimeter	 002
Cooling System Pressure Tester	 055
Freezing Point Tester	 007

Cooling System Operation Flowchart



Small circulation: When coolant temperature is below 82 ± 2°C, thermostat assembly closes. Coolant only circulates inside the cylinder block and warms up other engine parts that need heat. Water pump assembly circulates engine coolant through cylinder block, oil cooler assembly, turbocharger and cylinder head. The coolant does not radiate heat through radiator.

Large circulation: When coolant temperature is higher than 95°C, thermostat assembly opens fully and all coolant flowing out of cylinder block enters radiator for radiating. It then returns to cylinder block for circulation by water pump. Due to radiating in radiator, engine coolant temperature decreases quickly to prevent engine from overheating.

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	Suspected Area
Insufficient coolant	Coolant pipe (deteriorated and leaks)
	Expansion tank (leaks)
	Radiator (leaks)
	Heater core (leaks)
	Thermostat assembly (improperly sealed)
	Thermostat seat assembly (cracked and damaged)
	Water pump (leaks)
	Engine cylinder head gasket (damaged)
	Engine cylinder head (cracked and leaks)
	Engine cylinder block (water jacket leaks and cylinder block cracked)
Engine overheating	Low coolant level
	Air resistance exists in pipe
	Expansion tank cap (damaged)
	Engine Control Module (ECM) failure
	Cooling fan
	Radiator
	Thermostat assembly
Engine undercooling	Thermostat assembly
	Cooling fan
Unable to reach normal engine temperature	Cooling fan (constantly operating)
	Thermostat assembly
Cooling fan does not operate or abnormal air speed	Fan controller
	Cooling fan
	Wire harness
	Engine Control Module (ECM) failure

Cooling System Leakage Test

Warning:

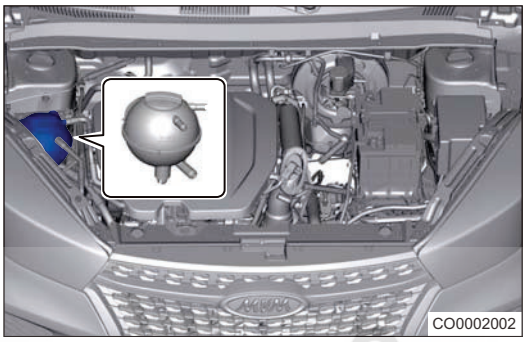
- Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.

Caution:

- When testing cooling system, please pressurize the system to specified pressure. Otherwise, system components may be damaged.
- Before testing cooling system, do not perform operation until coolant temperature drops to normal level. Otherwise, it may cause scald.

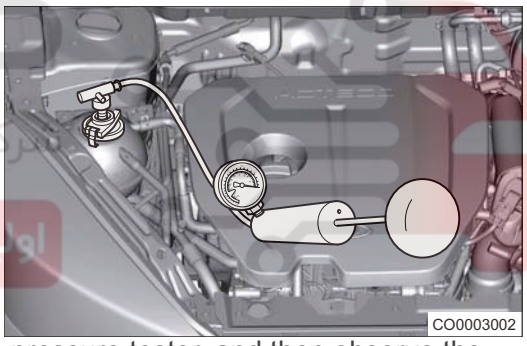
Test Procedures

1. Turn off all electrical equipment and the ignition switch.
2. Check if coolant level is between "MAX" and "MIN" lines. If coolant level is below "MIN" line, add coolant.


CO0002002

3. Connect cooling system pressure tester to coolant pressure release cap opening (expansion tank cap opening) and tighten it slowly.

   Caution:
   Make sure there is no leakage in connecting part of coolant system pressure tester, in order to avoid pressure leakage during test.


CO0003002

4. Pressurize cooling system to 1.2 bar with the cooling system pressure tester, and then observe the pressure changes. If system pressure does not drop within 2 minutes, it indicates there is no leakage in system. If pressure changes greatly, it indicates that there is a leakage in system; find the leaking area and perform troubleshooting.

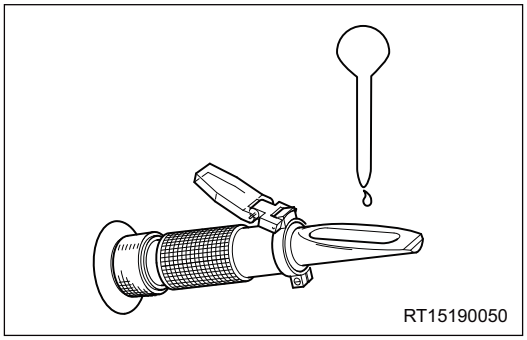
Coolant Freezing Point Test

Caution:

- DO NOT mix different colors or types of coolant.
- Please select coolant which is suitable for local climate in different areas.
- Please read measured value at the scale line. In order to distinguish the scale line more clearly, drip a drop of water on the glass of freezing point tester with a pipette, then the scale line can be clearly distinguished via a "waterline".

Test Procedures

- As shown in illustration, drip a drop of coolant on the glass of freezing point tester with a pipette, and then observe freezing point value of coolant.

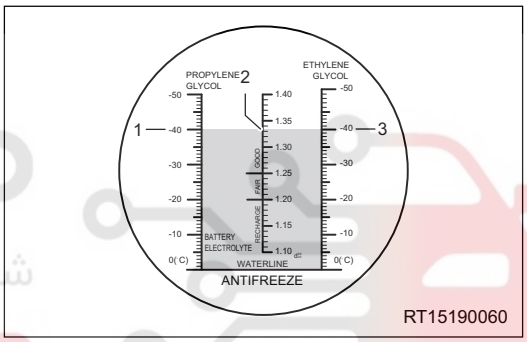

RT15190050

- As shown in illustration, observe scale 3 of freezing point tester to read ethylene glycol coolant freezing point value. The freezing point value must be kept at -40°C (value varies with geography, climate or freezing point).

  If freezing point is beyond the specified value, replace the coolant.

  Hint:

  Scale 1 is used to measure the freezing point value of propylene glycol coolant, and scale 2 is used to measure the battery electrolyte concentration.



RT15190060

ON-VEHICLE SERVICE

Coolant Replacement

Engine System Coolant Draining

Warning/Caution/Hint

Warning:

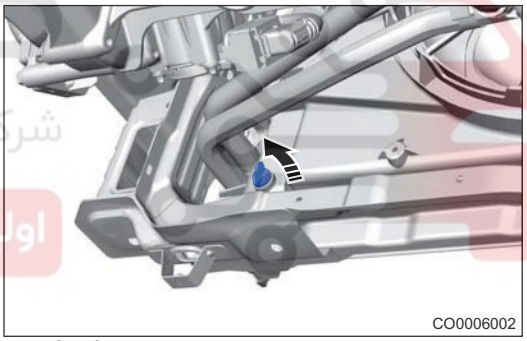
- Never remove pressure release cap when engine is operating or temperature is higher. Otherwise, it may cause scald.
- Be careful when opening pressure release cap, the high-pressurized hot engine coolant and steam may flow out and cause serious burns.
- Wait until the engine has cooled down, and then cover the pressure release cap with a piece of damp cloth and turn it one turn slowly (counterclockwise). Step back when releasing cooling system pressure. After confirming that all pressure has been released, turn the pressure release cap with cloth covered and remove it.
- Violating above descriptions may cause serious personal injury.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the expansion tank cap when engine temperature and radiator temperature are low.
4. Remove the engine lower protector assembly.
5. Drain the coolant.

(a) Put a coolant collector under the vehicle, rotate the radiator drain cock plug (arrow) counterclockwise and drain the coolant in radiator and expansion tank.

Hint:

Put a drainage device or similar tool at the radiator outlet, so that coolant can flow into the collector smoothly.



(b) After coolant stops flowing, retighten the radiator drain cock plug.

Caution:

- Tighten drain cock plug to prevent leakage.
- Wasted coolant should be handled by the specialized department according to local laws and regulations. Never discard it at will.

Turbocharger Intercooler System Coolant Draining

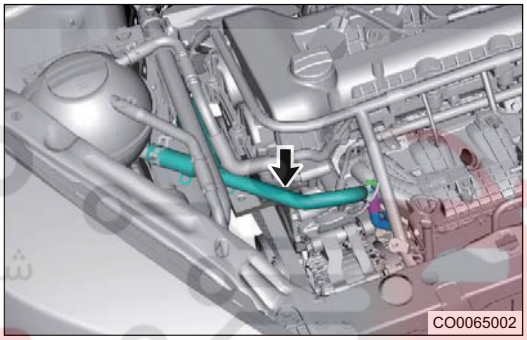
Warning/Caution/Hint

Warning:

- Never remove pressure release cap when engine is operating or temperature is higher. Otherwise, it may cause scald.
- Be careful when opening pressure release cap, the high-pressurized hot engine coolant and steam may flow out and cause serious burns.
- Wait until the engine has cooled down, and then cover the pressure release cap with a piece of damp cloth and turn it one turn slowly (counterclockwise). Step back when releasing cooling system pressure. After confirming that all pressure has been released, turn the pressure release cap with cloth covered and remove it.
- Violating above descriptions may cause serious personal injury.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the expansion tank cap when engine temperature and radiator temperature are low.
4. Remove the front bumper assembly.
5. Drain coolant from turbocharger intercooler system.

(a) Grip the water pipe (arrow) with pliers to prevent excessive antifreeze from flowing out during the intercooler system antifreeze draining.



Caution:

- When gripping the water pipe with pliers, wrap it with a soft cloth (such as a glove) to prevent the plier from being damaged.

(b) Put a coolant collector under the vehicle, rotate the low temperature radiator drain cock plug (arrow) counterclockwise with a cross screwdriver and drain the coolant in turbocharger intercooler device.

Hint:

Put a drainage device or similar tool at the low temperature radiator outlet, so that coolant can flow into the collector smoothly.

(c) After coolant stops flowing, retighten the low temperature radiator drain cock plug. remove the pliers.

Caution:

- Tighten drain cock plug to prevent leakage.
- Wasted coolant should be handled by the specialized department according to local laws and regulations. Never discard it at will.
- After adding coolant, it is necessary to bleed the turbocharger intercooler system.

Coolant Adding

Caution:

- Only use coolant that meets Chery specifications.

Coolant Capacity

Item	Capacity (L)
Cooling System	9.0 ± 0.5

Coolant Type

Item	Type
Cooling System	All organic antifreeze (LEC-II)

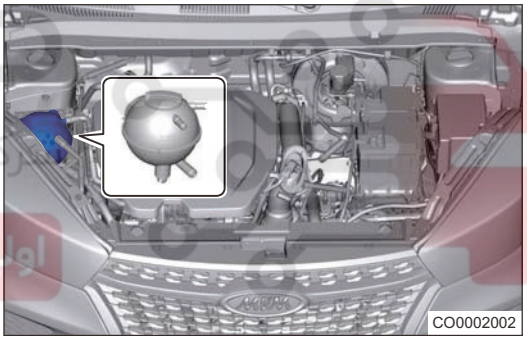
Warning:

- If it is necessary to add coolant when engine is hot, loosen expansion tank cap slightly first to release internal pressure and loosen the cap completely after waiting for a while, and then add coolant.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

Caution:

- DO NOT use inferior coolant.
- DO NOT mix different colors or types of coolant.
- Be careful when adding coolant; avoid spilling coolant on any area of engine.

1. Open expansion tank cap and add coolant until coolant level reaches the "MAX" line.



2. Tighten expansion tank cap, start and run engine. Maintain engine speed between 2000 and 2500 rpm to warm up the engine until cooling fan operates.
   Caution:
   - If there is no coolant in expansion tank after engine just starts, perform the followings:
     Stop the engine;
   - Wait until coolant cools down;
   - Add coolant to "MAX" line on expansion tank.
   - Run the engine at 2500 rpm until coolant level becomes stable.
3. Stop engine and wait until coolant temperature drops to the ambient temperature. Check that coolant level is between "MAX" and "MIN" lines. If coolant level is below the "MIN" line, repeat all the above procedures. If coolant level is above the "MAX" line, drain coolant until the level is between "MAX" and "MIN" lines.

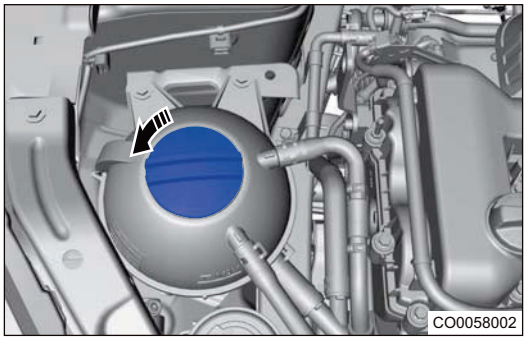
Turbocharger Intercooler System Bleeding

Turbocharger Intercooler System Bleeding

Caution:

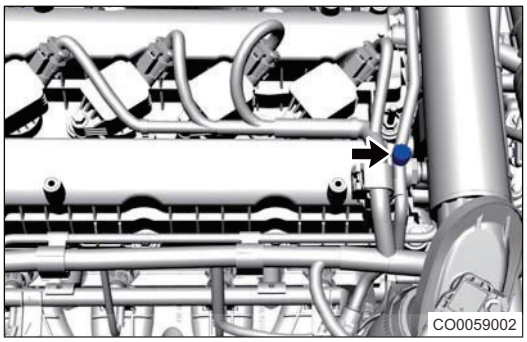
- After replacing coolant or removing and installing turbocharger intercooler system related components, it is necessary to bleed the turbocharger intercooler device cooling system.
- Never remove pressure cap from outlet pipe set with engine warmed up, to prevent coolant from spilling out, causing burns.
- Please wear protective clothing and gloves.

4. Unscrew the expansion tank cap counterclockwise with engine in cold status.

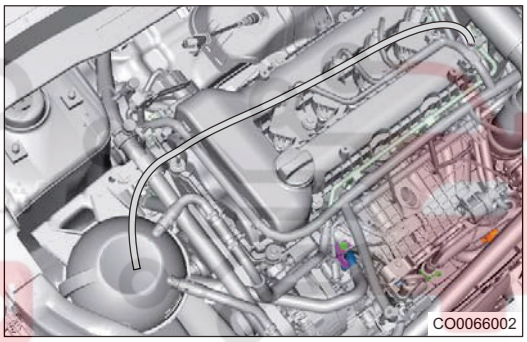

CO0058002

5. Unscrew and remove pressure cap (arrow) from outlet pipe set counterclockwise.

   Caution:
   There is a washer inside the pressure cap, take care not to lose it after removal.


CO0059002

6. Connect one end of the proper pipe to exhaust port, and place the other end to expansion tank.


CO0066002

   Hint:
   A thin water pipe about 1.5 m and a pipe for gas can be used for antifreeze bleeding.


CO0064002

7. Add the coolant.
8. Keep the engine idling. Wait for electric water pump to operate.
9. When a large amount of coolant flows out (without gas), stop engine, wait until system is cooled, install and tighten the pressure cap.
   Caution:
   - Clean the spilled coolant to prevent coolant from entering spark plug installation hole.
   - Check if pressure cap is properly sealed.
10. Add coolant to between MIN and MAX lines (if the coolant is less).
11. Tighten the expansion tank cap.
12. Start and run the engine. Maintain engine speed between 2000 and 2500 rpm to warm up the engine until cooling fan operates.

13. Check each water pipe for leakage, lack of antifreeze, if so, handle it.
    Caution:
    - Do not open the expansion tank cap at high engine temperature to prevent burns.
14. Using a diagnostic tester, check for electronic injection system DTCs (especially electric water pump DTCs).
    Caution:
    - If there is a DTC for electric water pump idling, such as P1700 00 Charge Air Cooler Coolent Pump Dry Run, it indicates that coolant is not sufficient in intercooler system, add coolant and perform bleeding.

Tank Upper Crossmember Assembly

Removal

Warning/Caution/Hint

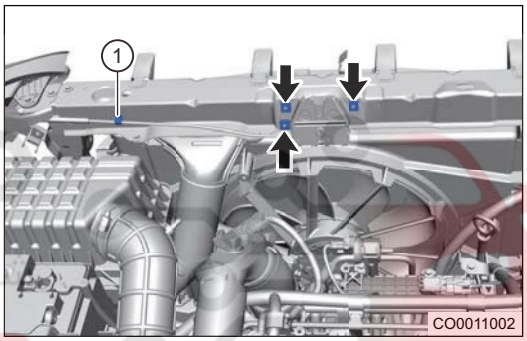
Warning:

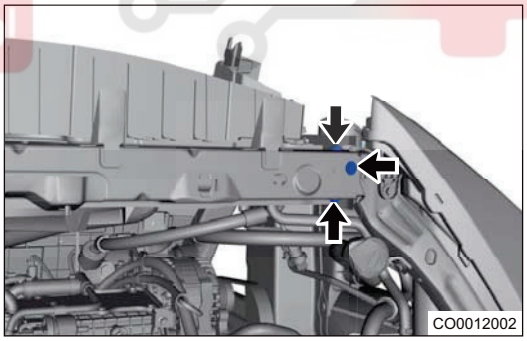
- Perform removal procedures with engine compartment at low temperature, after cooling fan stops completely; otherwise rotating cooling fan or hot components of engine compartment may cause serious injury.

Caution:

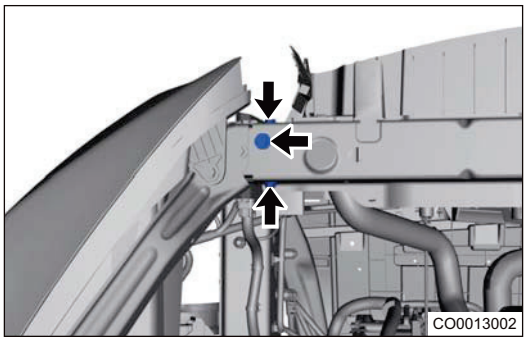
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the front bumper assembly (See page 48-6).
4. Remove the air filter assembly (See page 10-8).
5. Remove the tank upper crossmember assembly.
   (a) Remove engine hood lock cable fixing clips (1) from tank upper crossmember.
   (b) Remove 3 fixing nuts (arrow) from engine hood lock.
   Tightening torque
   9 ± 1 N·m

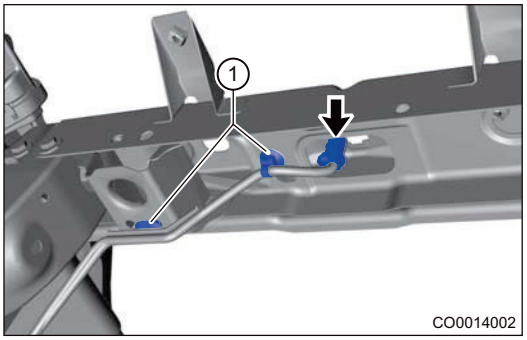




   (c) Remove 6 fixing bolts (arrow) from tank upper crossmember.
   Tightening torque
   9 ± 1 N·m



(d) Disconnect the engine hood contact switch connector (arrow).



(e) Remove the tank upper crossmember assembly.

Installation

1. Installation is in the reverse order of removal.

Expansion Tank

Removal

Warning/Caution/Hint

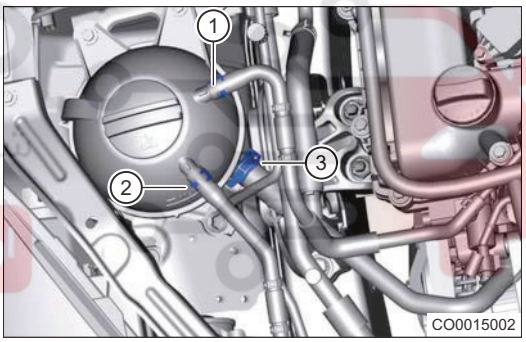
Warning:

- Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

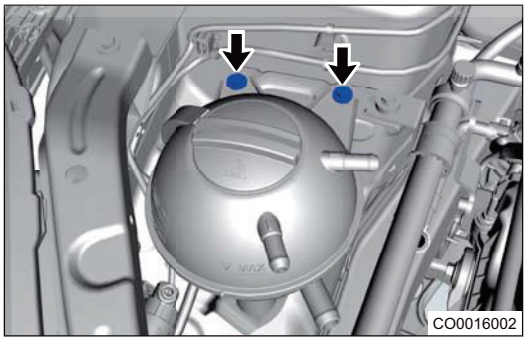
Caution:

- 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 ignition switch.
2. Disconnect the negative battery cable.
3. Drain the coolant.
4. Remove the expansion tank.
   (a) Loosen elastic clamp (1) and disconnect connection between expansion tank and engine discharge pipe.
   (b) Loosen elastic clamp (2) and disconnect connection between expansion tank and radiator discharge pipe.
   (c) Loosen elastic clamp (3) and disconnect connection between expansion tank and water supply pipe.



   (d) Remove 2 fixing bolts (arrow) from expansion tank.
   Tightening torque
   5 ±1 N·m



   (e) Remove the expansion tank assembly.

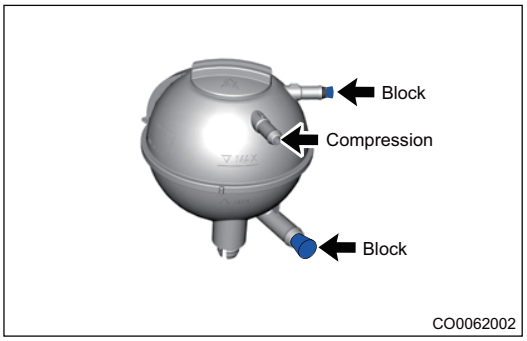
Inspection

Expansion Tank

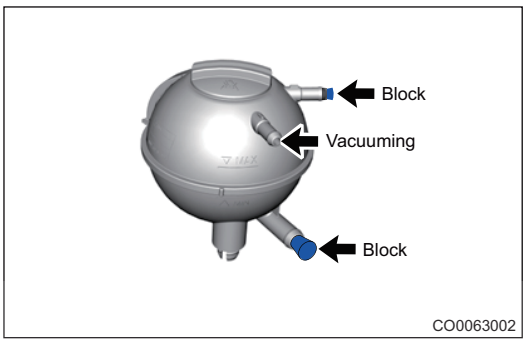
1. Check that the expansion tank is welded firmly, and there are no defects such as fractures and cracks at the weld.
2. The expansion tank should be colorless and transparent. During use of vehicle, expansion tank assembly is not allowed to have discoloration that affects the appearance and function, and scale line should be clearly visible.

Expansion Tank Cap

3. Block two holes of expansion tank and pressurize one of them. When pressure reaches the opening pressure of relief valve (120 - 150 kpa), the pressure in expansion tank should be maintained at the relief valve opening pressure value.



4. Block two holes of expansion tank and vacuumize one of them. When vacuum pressure reaches the opening pressure of vacuum valve (-2 - 10 kpa), vacuum pressure in expansion tank should be maintained at the vacuum valve opening pressure value.



Installation

1. Installation is in the reverse order of removal.

Caution:

- When connecting water supply pipe and expansion tank, align the " 土 " mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of " 土 " mark, align the edge of elastic clamp with lower edge of " 二 " position of " 土 " mark.
- When connecting engine discharge pipe and expansion tank, align the " 工 " mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of " 工 " mark, align the edge of elastic clamp with lower edge of " 二 " position of " 工 " mark.
- When connecting radiator discharge pipe and expansion tank, align the " 工 " mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of " 工 " mark, align the edge of elastic clamp with lower edge of " 二 " position of " 工 " mark.
- Check that coolant has been added to the specified level after installation.

Thermostat Assembly

Removal

Warning/Caution/Hint

Warning:

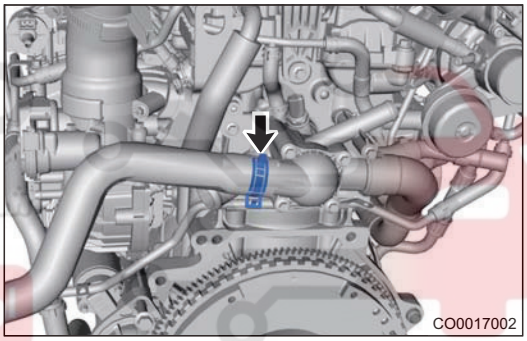
- Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

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 ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the intake hose assembly.
5. Drain the coolant.
6. Remove the thermostat assembly.

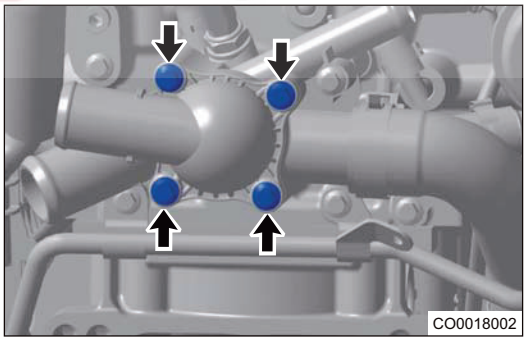
(a) Loosen elastic clamp (arrow) and disconnect connection between engine inlet pipe and thermostat housing.



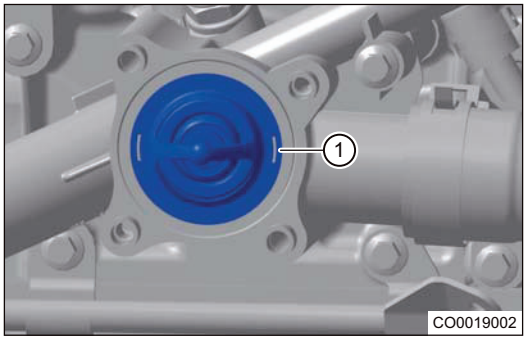
(b) Remove 4 fixing bolts (arrow) from thermostat housing.

Tightening torque

8 + 3 N·m



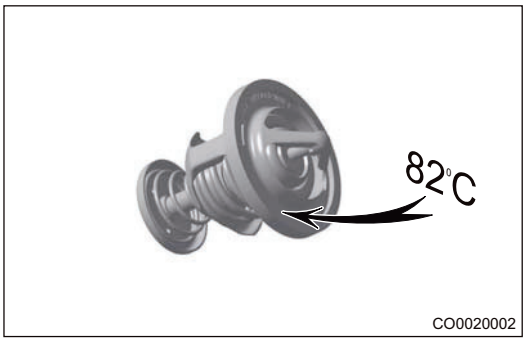
(c) Remove thermostat housing and remove thermostat assembly (1) from thermostat seat.



Inspection

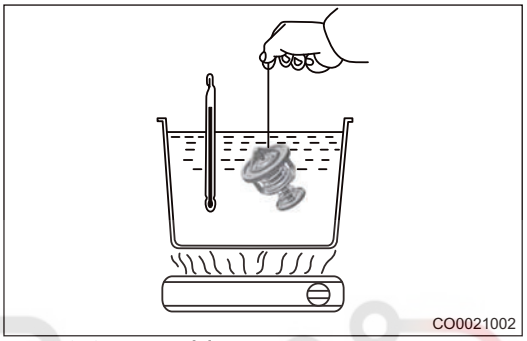
1. Check opening temperature and maximum lift of thermostat assembly.

Hint:
Opening temperature of thermostat is engraved in the thermostat assembly.



(a) Soak thermostat assembly into water, heat water gradually and perform inspection.

- Opening temperature of thermostat assembly is 82 ± 2°C.
- Maximum lift of thermostat assembly is no less than 8.5 mm.
- Temperature is 95°C when thermostat assembly opens fully.



(b) If above inspection conditions are not met, replace thermostat assembly.

12 Installation

1. Installation is in the reverse order of removal.

Caution:

- When connecting engine outlet pipe and thermostat housing, position the " ⊥ " mark on pipe port right above, and rotate elastic clamp and center line of mark 90°.
- Check that coolant has been added to the specified level after installation.

Thermostat Seat Assembly

Removal

Warning/Caution/Hint

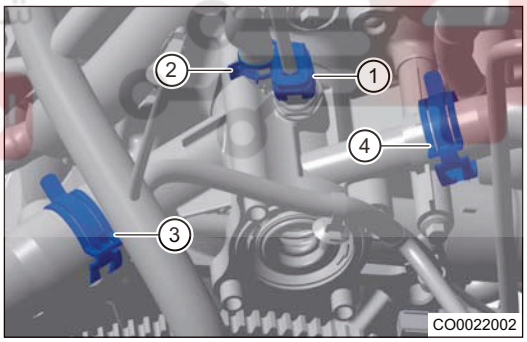
Warning:

- Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

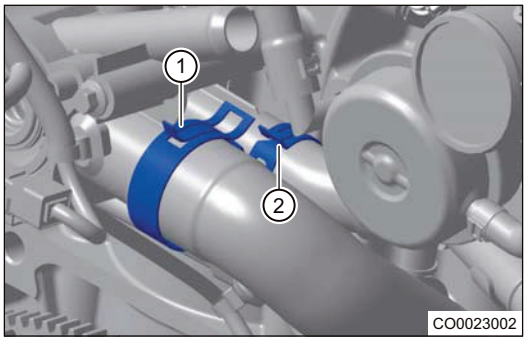
Caution:

- 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 ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the battery.
5. Remove the battery tray.
6. Drain the coolant.
7. Remove the air filter assembly (See page 10-8).
8. Remove the intake hose.
9. Remove the thermostat assembly.
10. Remove the thermostat seat assembly.
    (a) Disconnect the coolant temperature sensor connector (1).
    (b) Loosen elastic clamp (2) and disconnect connection between engine discharge pipe and thermostat seat assembly.



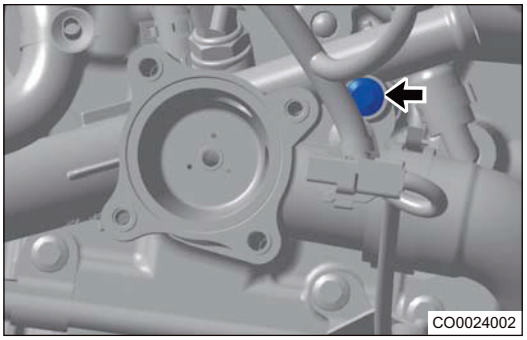
    (c) Loosen elastic clamp (3) and disconnect connection between engine outlet hose and thermostat seat assembly.
    (d) Loosen elastic clamp (4) and disconnect connection between heater core outlet hose and thermostat seat assembly.
    (e) Loosen elastic clamps (1) and disconnect connection between small circulation water pipe and thermostat seat assembly.



    (f) Loosen elastic clamp (2) and disconnect connection between heater core inlet hose and thermostat seat assembly.

(g) Remove fixing bolt (arrow) from thermostat seat assembly.

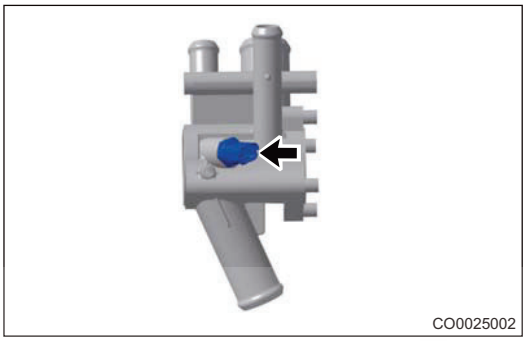
Tightening torque
8 + 3 N·m



(h) Remove the thermostat seat assembly and O-ring.

(i) Remove coolant temperature sensor (arrow) from thermostat seat assembly.

Tightening torque
15 ±1 N·m



Installation

1. Installation is in the reverse order of removal.

Caution:

- Replace thermostat seat O-ring with a new one during installation, and removed thermostat seat O-ring cannot be reused.
- When connecting engine discharge hose and thermostat seat, align the "T" mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of "T" mark, align the edge of elastic clamp with lower edge of " 一 " position of "T" mark.
- When connecting small circulation water pipe and thermostat seat, align the "T" mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of "T" mark, align the edge of elastic clamp with lower edge of " 一 " position of "T" mark.
- When connecting engine inlet pipe and thermostat seat, align the "工" mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of " 工 " mark, align the edge of elastic clamp with lower edge of " 二 " position of " 工 " mark.
- When connecting heater inlet pipe and thermostat seat, position the " 土 " mark on pipe port right above, and align center position of elastic clamp tabs with "I" position of " 土 " mark, align the edge of elastic clamp with lower edge of " 二 " position of " 土 " mark.
- When connecting heater outlet pipe and thermostat seat, align the " 工 " mark on pipe port with limited post, and align center position of elastic clamp tabs with "I" position of " 工 " mark, align the edge of elastic clamp with lower edge of " 二 " position of " 工 " mark.
- Check that coolant has been added to specified level after installation, and check for leakage at the removal and installation position.

Discharge Steel Pipe Assembly

Removal

Warning/Caution/Hint

Warning:

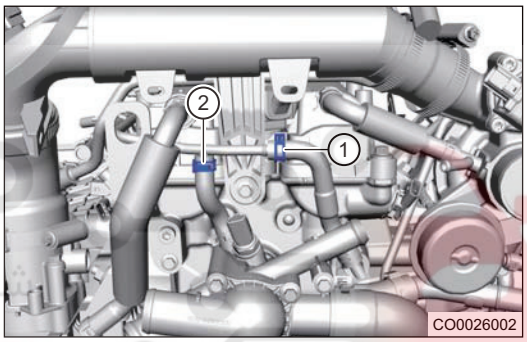
- Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

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.

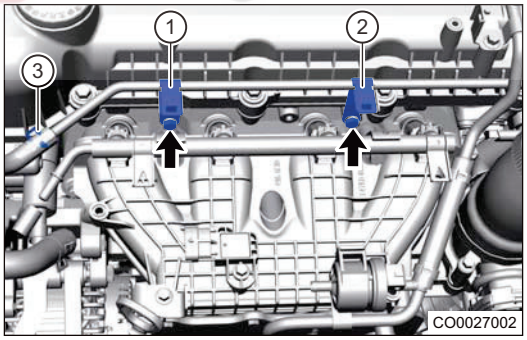
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the discharge steel pipe assembly.

(a) Loosen elastic clamp (1) and disconnect connection between discharge hose Ⅰ and discharge steel pipe assembly.



(b) Loosen elastic clamp (2) and disconnect connection between discharge hose Ⅲ and discharge steel pipe assembly.

(c) Disconnect engine wire harness fixing clips (1), (2) from discharge steel pipe assembly.



(d) Loosen elastic clamp (3) and disconnect connection between discharge hose Ⅱ and discharge steel pipe assembly.

(e) Remove 2 fixing bolts (arrow) from discharge steel pipe assembly.

Tightening torque

8 + 3 N·m

(f) Remove the discharge steel pipe assembly.

Installation

1. Installation is in the reverse order of removal.

   Caution:

   - When connecting discharge hose 1 and discharge steel pipe, align the "T" mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of "T" mark, align the edge of elastic clamp with lower edge of " 一 " position of "T" mark.
   - When connecting discharge hose 2 and discharge steel pipe, align the "土" mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of " 土 " mark, align the edge of elastic clamp with lower edge of " 二 " position of " 土 " mark.
   - When connecting discharge hose 3 and discharge steel pipe, align the "T" mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of "T" mark, align the edge of elastic clamp with lower edge of " 一 " position of "T" mark.
   - Check that coolant has been added to specified level after installation, and check for leakage at the removal and installation position.

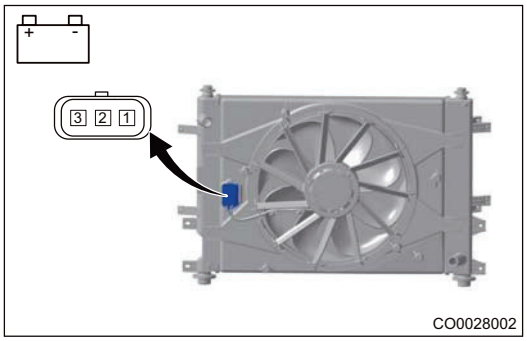
Cooling Fan Assembly

On-vehicle Inspection

1. Using a digital multimeter, measure resistance of cooling fan.

   (a) Cooling fan

Measurement Condition	Condition	Specification (Ω)
Terminal 1 - Terminal 2	Normal temperature (20°C)	0.8 ± 0.1
Terminal 1 - Terminal 3	Normal temperature (20°C)	0.6 ± 0.1

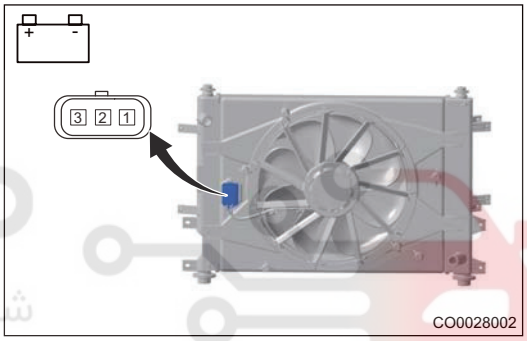


If inspection result is not as specified, replace cooling fan assembly.

2. Connect battery positive (+) and negative (-) to cooling fan connector terminal as shown in table below, to observe if cooling fan runs smoothly.

   (a) Cooling fan

Measurement Condition	Condition	Specified Condition
Battery positive (+) - Terminal 2 Battery negative (-) - Terminal 1	Always	Runs at low speed
Battery positive (+) - Terminal 3 Battery negative (-) - Terminal 1	Always	Runs at high speed



If inspection result is not as specified, replace cooling fan assembly.

Removal

Warning/Caution/Hint

Warning:

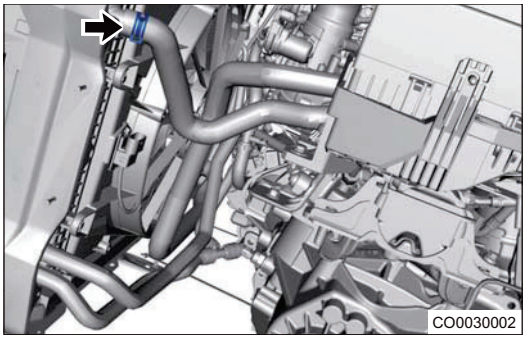
- Perform removal procedures with engine compartment at low temperature, after cooling fan stops completely, to prevent accidents.

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 ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly (See page 10-8).
4. Drain the coolant.
5. Remove the cooling fan assembly.

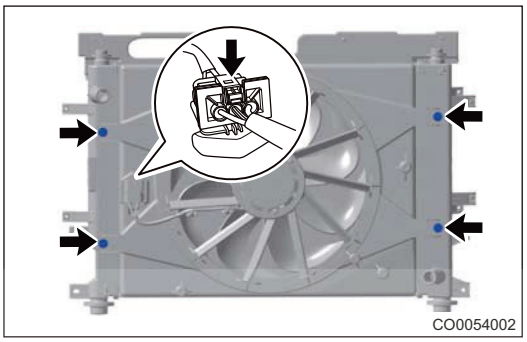
(a) Loosen elastic clamp (arrow) and disconnect connection between engine outlet hose and radiator.



(b) Disconnect the cooling fan connector (arrow).

(c) Remove 4 fixing bolts (arrow) connecting cooling fan and radiator.

Tightening torque
5 ±1 N·m



(d) Remove the cooling fan assembly.

Inspection

1. Check cooling fan blade for dirt. If so, clean the cooling fan.
2. Check cooling fan blade for missing, cracks, etc. If so, replace cooling fan.

Installation

Warning/Caution/Hint

Caution:

- Check that coolant has been added to the specified level after installation.

1. Installation is in the reverse order of removal.

Radiator Assembly

Removal

Warning/Caution/Hint

Warning:

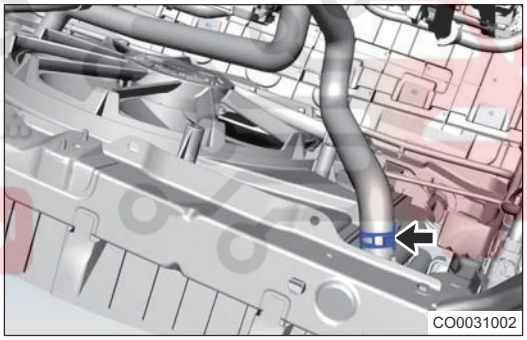
- Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

Caution:

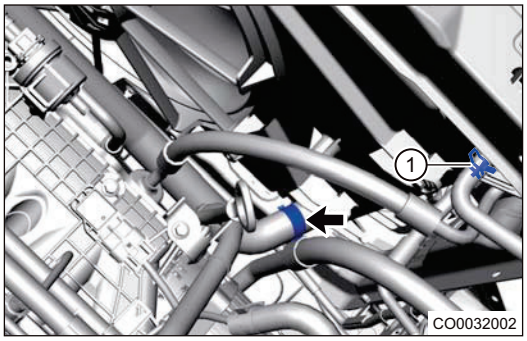
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the front bumper assembly (See page 48-6).
4. Remove the tank upper crossmember assembly.
5. Drain the coolant.
6. Remove the cooling fan assembly.
7. Remove the low temperature radiator assembly.
8. Remove the radiator assembly.

(a) Loosen elastic clamp (arrow) and disconnect connection between engine outlet hose and radiator assembly.



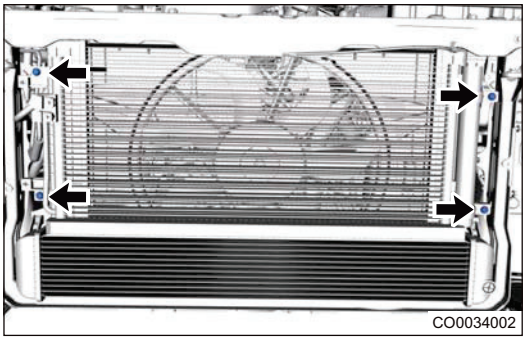
(b) Loosen elastic clamp (1) and disconnect connection between radiator discharge hose and radiator assembly.



(c) Loosen elastic clamp (arrow) and disconnect connection between engine inlet hose and radiator assembly.

(d) Remove 4 fixing bolts connecting radiator assembly and condenser.

Tightening torque
7 ±1 N·m



(e) Remove the radiator assembly.

Inspection

1. Check radiator surface for dirt. If so, clean radiator surface.

Installation

1. Installation is in the reverse order of removal.
   Caution:
   - When connecting engine outlet pipe and radiator, align the " 工 " mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of " 工 " mark, align the edge of elastic clamp with lower edge of " 二 " position of " 工 " mark.
   - When connecting engine inlet pipe and radiator, align the " 土 " mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of " 土 " mark, align the edge of elastic clamp with lower edge of " 二 " position of " 土 " mark.
   - Check that coolant has been added to specified level after installation, and check for leakage at the removal and installation position.

Water Pump Assembly

Removal

Warning/Caution/Hint

Warning:

- Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

Caution:

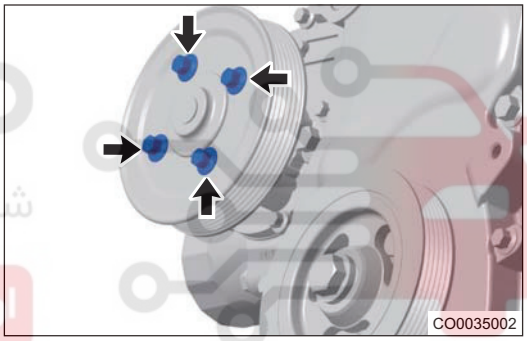
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine lower protector assembly .
4. Drain the coolant.
5. Move away the accessory drive belt.
6. Remove the water pump assembly.

(a) Remove 4 fixing bolts (arrow) from water pump pulley, and remove water pump pulley assembly.

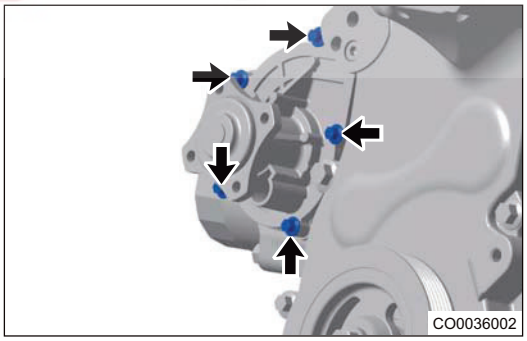
Tightening torque
20 + 5 N·m

Hint:
Loosen water pump pulley fixing bolts with a wrench, and then move away accessory drive belt.



(b) Remove 5 fixing bolts (arrow) from water pump assembly.

Tightening torque
8 + 3 N·m



(c) Remove the water pump assembly and seal ring.

Inspection

1. Inspect the water pump seal ring.
   (a) Inspect water pump seal ring for wear or deterioration. If there is wear or deterioration, replace seal ring.
2. Inspect water pump assembly. If any of the following occurs, replace the water pump assembly immediately.
   (a) Impeller of water pump assembly is damaged
   (b) Bearing of water pump assembly is loose
   (c) There is abnormal noise when water pump assembly works

Installation

Warning/Caution/Hint

Caution:

- Clean installation surface of water pump assembly.
- If water pump is damaged, replace rather than attempt to repair it.
- Check that coolant has been added to the specified level after installation.
- Perform cooling system pressure test after adding coolant, to check cooling system for leakage.

Electric Water Pump Assembly

Removal

Warning/Caution/Hint

Warning:

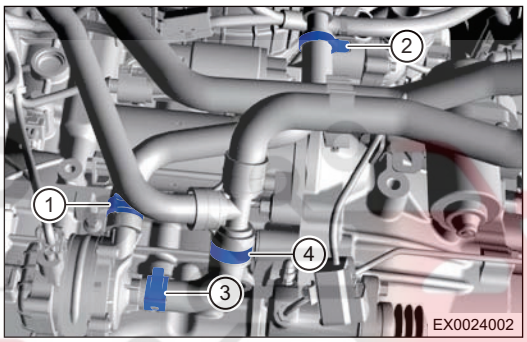
- Be sure that engine cooling system is at low temperature before handling. If engine is in hot status, high-pressurized hot coolant may flow out, causing serious personal injury.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

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 ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Drain the coolant.
5. Remove electric water pump inlet and outlet pipes.

   (a) Loosen elastic clamp (1) and disconnect connection between electric water pump assembly and electric water pump outlet hose.



   (b) Loosen clamping ring (2) and disconnect connection between electric water pump outlet hose and inlet pipe set.

   (c) Loosen elastic clamp (3) and disconnect connection between electric water pump inlet hose and electric water pump assembly.

   (d) Loosen elastic clamp (4) and disconnect connection between electric water pump inlet hose and low temperature radiator outlet hose.

   (e) Remove electric water pump inlet and outlet pipe assembly.

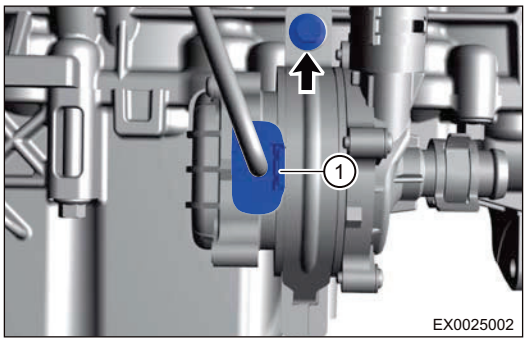
6. Remove the electric water pump assembly.

   (a) Disconnect the electric water pump assembly connector (1).

   (b) Remove fixing bolt (arrow) from electric water pump assembly.

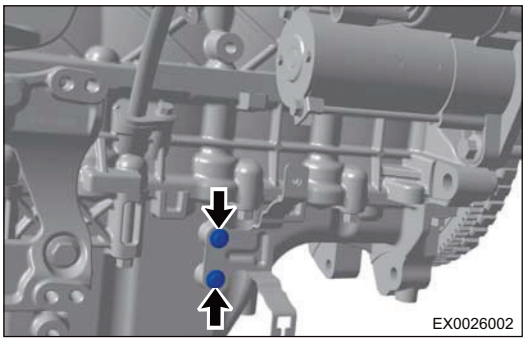
   Tightening torque

   8 + 3 N·m



   (c) Remove the electric water pump assembly.

7. Remove the electric water pump assembly mounting bracket.
   (a) Remove 2 fixing bolts (arrow) from electric water pump assembly bracket.
   Tightening torque
   8 + 3 N·m



   (b) Remove the electric water pump assembly bracket.

Installation

1. Installation is in the reverse order of removal.
   Caution:
   - Check that coolant has been added to the specified level after installation, perform turbocharger intercooler system bleeding and check for leakage at the removal and installation position.