SECTION CO
ENGINE COOLING SYSTEM

CONTENTS

SERVICE INFORMATION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000003261211

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SUPPLEMENTAL RESTRAINT SYSTEM” and “SEAT BELTS” of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SUPPLEMENTAL RESTRAINT SYSTEM”.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution for Battery Service

INFOID:0000000001645456

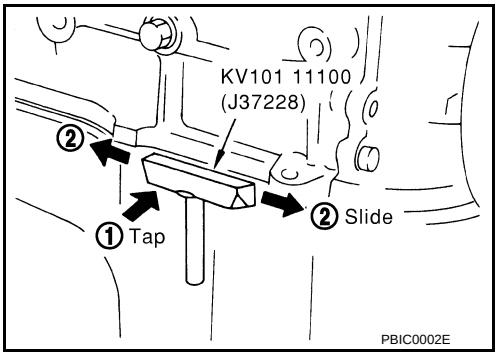
Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

Precaution for Liquid Gasket

INFOID:0000000001645457

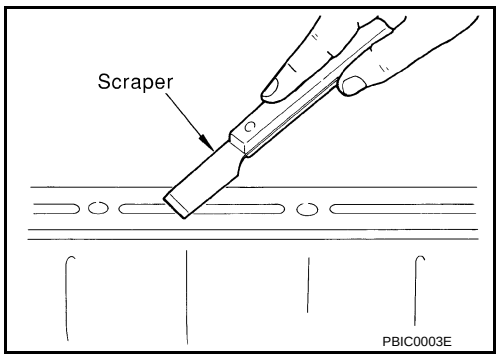
REMOVAL OF LIQUID GASKET SEALING

- After removing mounting bolts and nuts, separate the mating surface using seal cutter (SST) and remove old liquid gasket sealing.
  CAUTION:
  Be careful not to damage the mating surfaces.
- Tap seal cutter to insert it, and then slide it by tapping on the side as shown in the figure.
- In areas where seal cutter (SST) is difficult to use, use plastic hammer to lightly tap the parts, to remove it.
  CAUTION:
  If for some unavoidable reason tool such as screwdriver is used, be careful not to damage the mating surfaces.

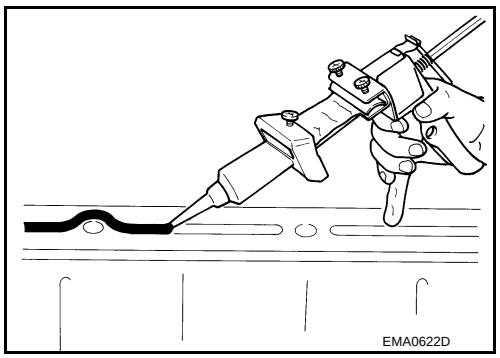


LIQUID GASKET APPLICATION PROCEDURE

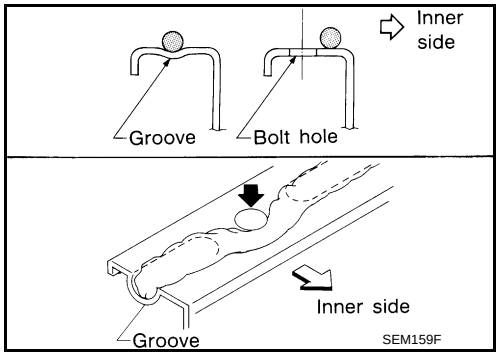
1. Using scraper, remove old liquid gasket adhering to the liquid gasket application surface and the mating surface.
   - Remove liquid gasket completely from the groove of the liquid gasket application surface, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.



3. Attach liquid gasket tube to tube presser (commercial service tool).
   Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-42.
4. Apply liquid gasket without breaks to the specified location with the specified dimensions.
   - If there is a groove for the liquid gasket application, apply liquid gasket to the groove.



- As for the bolt holes, normally apply liquid gasket inside the holes. Occasionally, it should be applied outside the holes. Check to read the text of service manual.
- Within five minutes of liquid gasket application, install the mating component.
- If liquid gasket protrudes, wipe it off immediately.
- Do not retighten mounting bolts or nuts after the installation.
- After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.



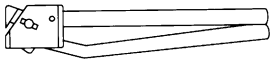
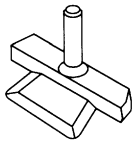
CAUTION:
If there are specific instructions in this manual, observe them.

PREPARATION

Special Service Tool

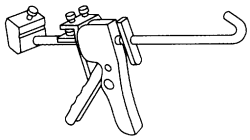
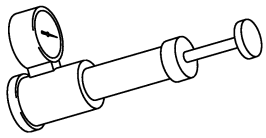
INFOID:0000000001645458

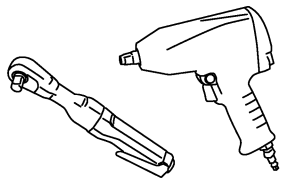
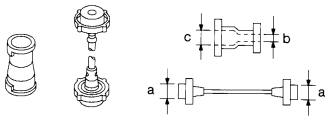
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV99103510 (—) Radiator plate pliers A  S-NT224	Installing radiator upper and lower tanks
KV99103520 (—) Radiator plate pliers B  S-NT225	Removing radiator upper and lower tanks
KV10111100 (J37228) Seal cutter  NT046	Removing chain tensioner cover and water pump cover

Commercial Service Tool

INFOID:0000000001645459

Tool name	Description
Tube presser  S-NT052	Pressing the tube of liquid gasket
Radiator cap tester  PBIC1982E	Checking radiator and radiator cap

Tool name	Description
Power tool  PBIC0190E	Loosening nuts and bolts
Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000001645460

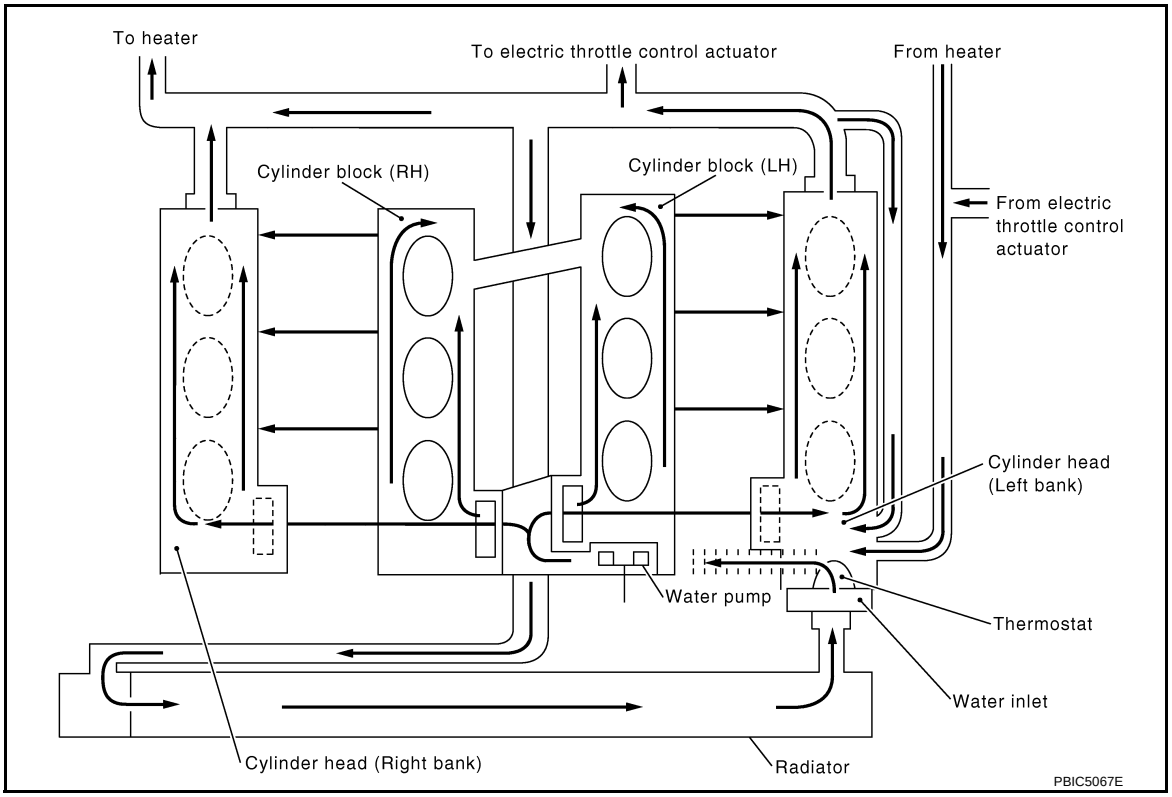
	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Physical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	Fan assembly	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper engine coolant mixture ratio	—	—	—
	Poor engine coolant quality	—	Engine coolant viscosity	—
	Insufficient engine coolant	Engine coolant leaks	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				Poor sealing
			Radiator	O-ring for damage, deterioration or improper fitting
				Cracked radiator tank
				Cracked radiator core
			Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	Blocked or restricted air flow	Blocked bumper	—	—
		Blocked radiator grille	Installed car brassiere	
			Mud contamination or paper clogging	
		Blocked radiator	—	
		Blocked condenser	Blocked air flow	
		Installed large fog lamp		

COOLING SYSTEM

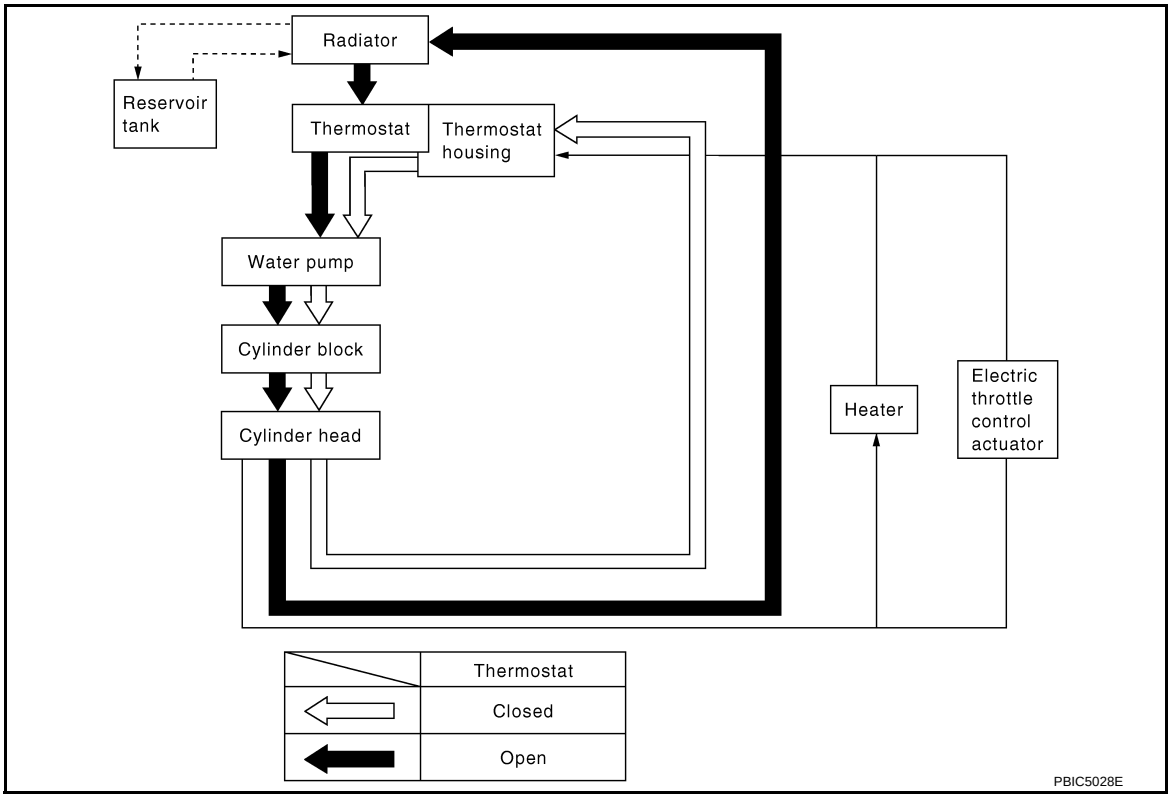
Cooling Circuit

INFOID:0000000001645461



System Chart

INFOID:0000000001645462



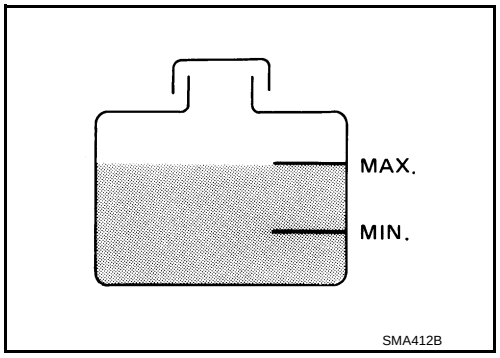
ENGINE COOLANT

Inspection

INFOID:0000000001645463

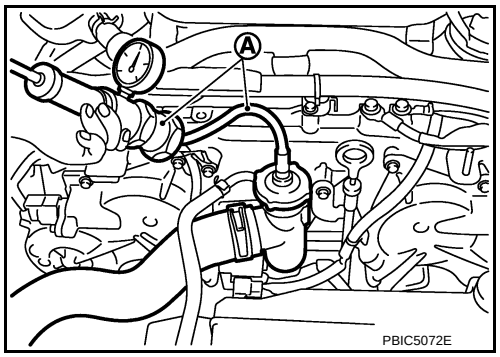
LEVEL CHECK

- Check if the reservoir tank engine coolant level is within the “MIN” to “MAX” range when engine is cool.
- Adjust the engine coolant level as necessary.



LEAK CHECK

- To check for leaks, apply pressure to the cooling system with radiator cap tester (commercial service tool) and radiator cap tester adapter (commercial service tool) (A).



Testing pressure

: 157 kPa (1.6 kg/cm^2, 23 psi)

WARNING:

Never remove radiator cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from radiator.

CAUTION:

Higher test pressure than specified may cause radiator damage.

NOTE:

In a case that engine coolant decreases, replenish radiator with engine coolant.

- If anything is found, repair or replace damaged parts.

Changing Engine Coolant

INFOID:0000000001645464

WARNING:

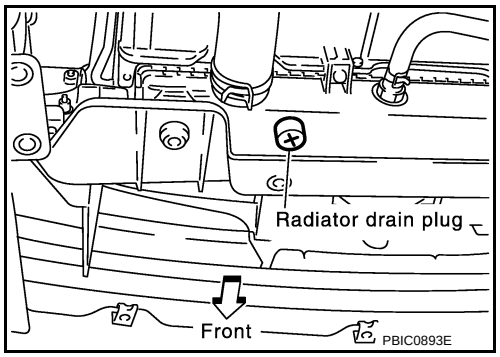
- **To avoid being scalded, never change engine coolant when engine is hot.**
- **Wrap a thick cloth around cap and carefully remove cap. First, turn cap a quarter of a turn to release built-up pressure. Then turn cap all the way.**

CAUTION:

Be careful not to allow engine coolant to contact drive belts.

DRAINING ENGINE COOLANT

1. Remove undercover with power tool.
2. Open radiator drain plug at the bottom of radiator, and then remove radiator cap.



When drain all of engine coolant in the system, open water drain plugs on engine cylinder block. Refer to EM-106, "Disassembly and Assembly".

3. Remove reservoir tank as necessary, and drain engine coolant and clean reservoir tank before installing.
4. Check drained engine coolant for contaminants such as rust, corrosion or discoloration.
   If contaminated, flush the engine cooling system. Refer to "FLUSHING COOLING SYSTEM".

REFILLING ENGINE COOLANT

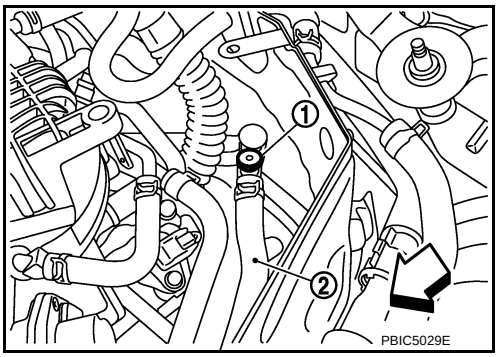
1. Install reservoir tank if removed, and radiator drain plug.
   CAUTION:
   Be sure to clean drain plug and install with new O-ring.

   Radiator drain plug:

   : 1.2 N·m (0.12 kg-m, 11 in-lb)

   If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-106, "Disassembly and Assembly".
2. Check that each hose clamp has been firmly tightened.
3. Remove air relief plug (1) on heater hose.

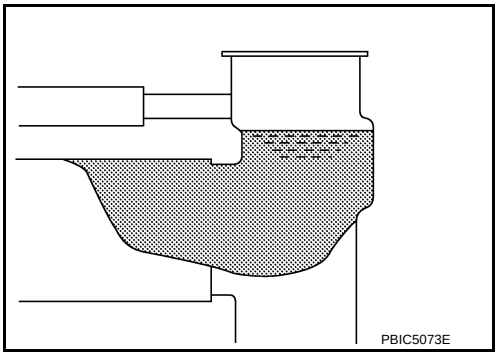
   2 : Heater hose
   ⇦ : Vehicle front



4. Fill radiator and reservoir tank to specified level.
   - **Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (2-1/8 US qt, 1-3/4 lmp qt) a minute to allow air in system to escape.**
   - **Use Genuine NISSAN Long Life Antifreeze/Coolant or equivalent mixed with water (distilled or demineralized). Refer to MA-10.**

   Engine coolant capacity
   (with reservoir tank at "MAX" level)

   : Approx. 9.0 ℓ (9-1/2 US qt, 7-7/8 lmp qt)



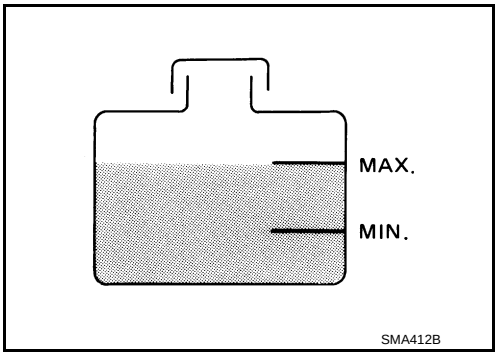
   Reservoir tank capacity (at "MAX" level)

   : 0.8 ℓ (7/8 US qt, 3/4 lmp qt)

   - When engine coolant overflows air relief hole on heater hose, install air relief plug with new O-ring.

   Air relief plug:

   : 1.2 N·m (0.12 kg-m, 11 in-lb)



5. Install radiator cap.
6. Warm up until opening thermostat. Standard for warming-up time is approximately 10 minutes at 3,000 rpm.
   - Check thermostat opening condition by touching radiator hose (lower) to see a flow of warm water.

   CAUTION:

Watch water temperature gauge so as not to overheat engine.

7. Stop engine and cool down to less than approximately 50°C (122°F).
   - Cool down using fan to reduce the time.
   - If necessary, refill radiator up to filler neck with engine coolant.
8. Refill reservoir tank to “MAX” level line with engine coolant.
9. Repeat steps 4 through 7 two or more times with radiator cap installed until engine coolant level no longer drops.
10. Check cooling system for leaks with engine running.
11. Warm up engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between “COOL” and “WARM”.
    - Sound may be noticeable at heater unit.
12. Repeat step 11 three times.
13. If sound is heard, bleed air from cooling system by repeating step 4 through 7 until engine coolant level no longer drops.

FLUSHING COOLING SYSTEM

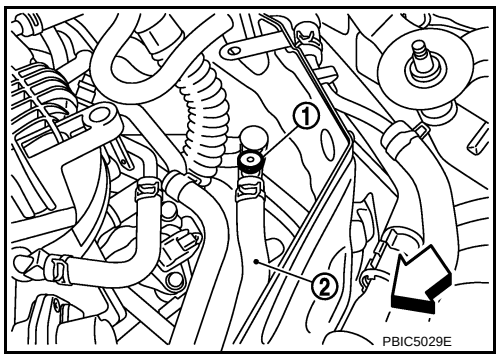
1. Install reservoir tank if removed, and radiator drain plug.
   CAUTION:
   Be sure to clean drain plug and install with new O-ring.

   Radiator drain plug:

   : 1.2 N·m (0.12 kg-m, 11 in-lb)

   If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-106, "Disassembly and Assembly".
2. Remove air relief plug (1) on heater hose.

   2 : Heater hose
   ⇦ : Vehicle front



3. Fill radiator with water until water spills from the air relief hole, then close air relief plug. Fill radiator and reservoir tank with water and reinstall radiator cap.

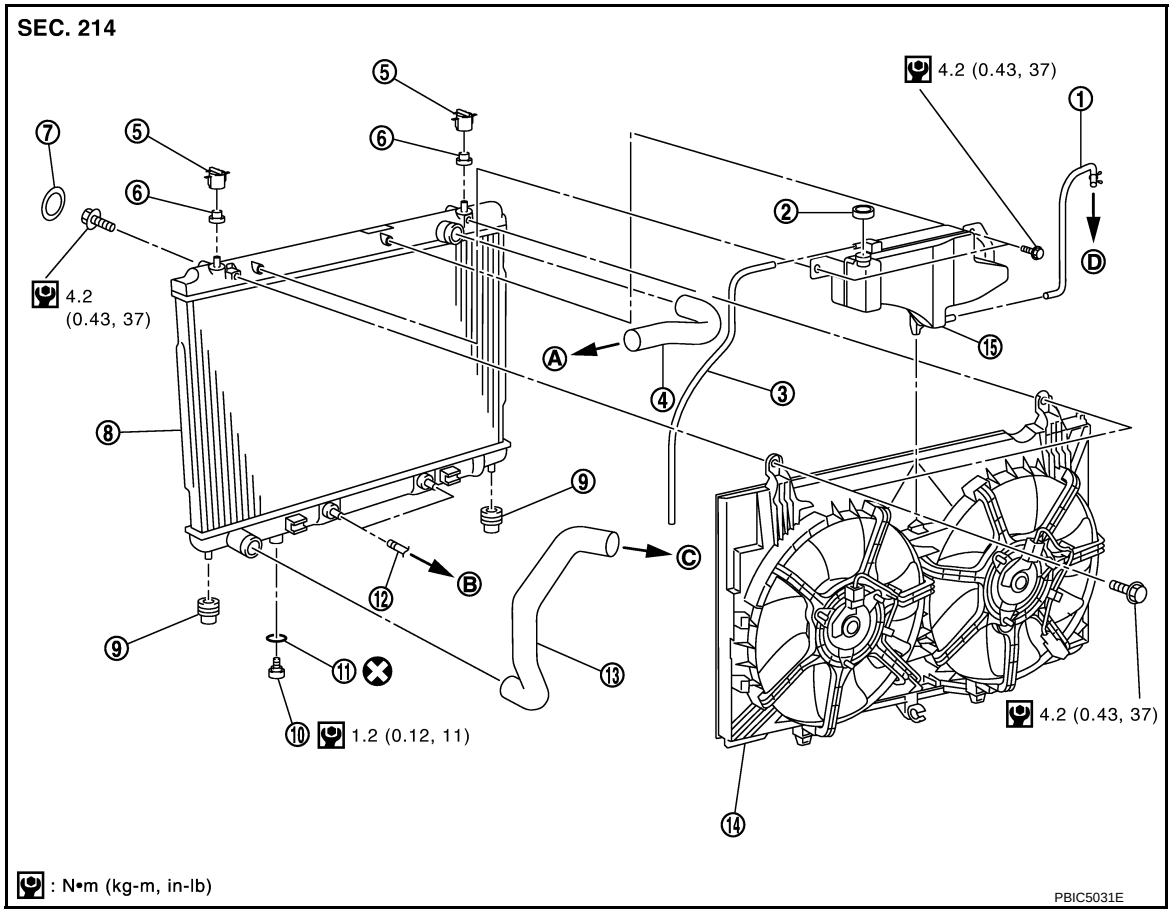
   Air relief plug:

   : 1.2 N·m (0.12 kg-m, 11 in-lb)
4. Run engine and warm it up to normal operating temperature.
5. Rev engine two or three times under no-load.
6. Stop engine and wait until it cools down.
7. Drain water from the system. Refer to "DRAINING ENGINE COOLANT".
8. Repeat steps 1 through 7 until clear water begins to drain from radiator.

RADIATOR

Removal and Installation

INFOID:0000000001645465



1. Reservoir tank hose	2. Reservoir tank cap	3. Reservoir tank hose
4. Radiator hose (upper)	5. Upper mount bracket	6. Mounting rubber (upper)
7. Cover	8. Radiator	9. Mounting rubber (lower)
10. Radiator drain plug	11. O-ring	12. A/T fluid cooler hose (A/T models)
13. Radiator hose (lower)	14. Radiator cooling fan assembly	15. Reservoir tank
A. To water outlet	B. To A/T fluid cooler tube (A/T models)	C. To water inlet
D. To water outlet		

- Refer to GI-8, "Component" for symbol marks in the figure.

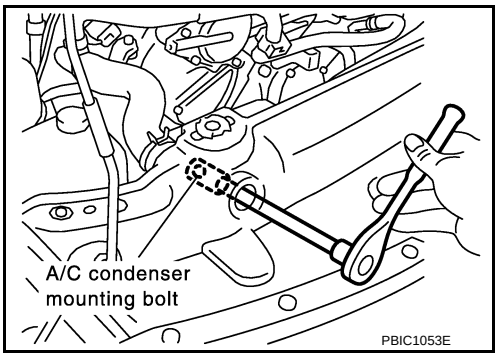
WARNING:

Never remove radiator cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

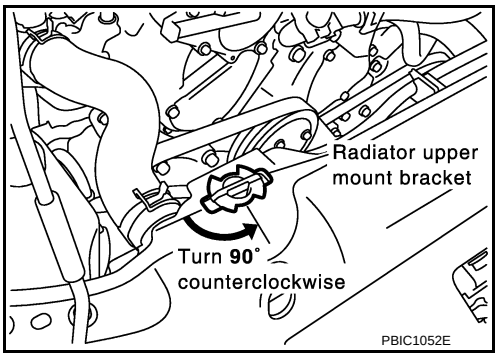
REMOVAL

1. Remove undercover with power tool.
2. Drain engine coolant from radiator. Refer to CO-9, "Changing Engine Coolant".
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Never spill engine coolant on drive belts.**
3. Remove air duct and air cleaner case assembly. Refer to EM-16.
4. Remove bracket mounting bolt for anchoring A/C piping from vehicle left side, so that A/C piping can be moved.
5. Remove reservoir tank.

6. Removal radiator hoses (upper and lower) and reservoir tank hose.
CAUTION:
Be careful not to allow engine coolant to contact drive belts.
7. Remove radiator cooling fan assembly. Refer to CO-20.
8. Disconnect A/T fluid cooler hoses. (A/T models)
• Install blind plug to avoid leakage of A/T fluid.
9. Remove cover, and then two A/C condenser mounting bolts located in upper part of radiator.

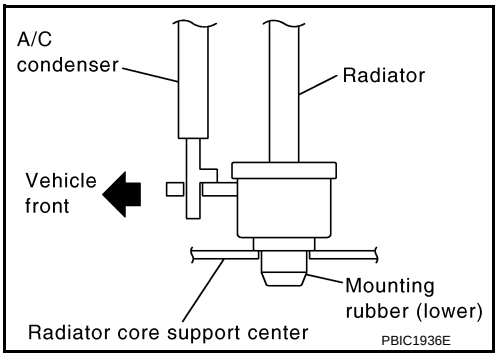


10. Rotate two radiator upper mount brackets 90 degrees in the direction as shown in the figure, and remove them.

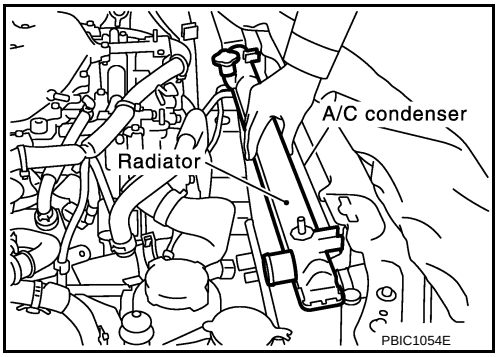


11. Remove radiator as follows:
CAUTION:
Never damage or scratch A/C condenser and radiator core when removing.

a. With lifting and pulling radiator in a rear direction, disassemble lower mount from radiator core support center.
CAUTION:
Because A/C condenser is onto the front-lower portion of radiator, moving to rear direction should be at minimum.



b. Lift A/C condenser up and remove radiator after disengaging the fitting as front-bottom surface.
CAUTION:
Lifting A/C condenser should be minimum to prevent a load to A/C piping.
c. After removing radiator, put A/C condenser on radiator core support center to prevent a load to A/C piping, and temporarily fix it with rope or similar means.



INSTALLATION

Installation is the reverse order of removal.

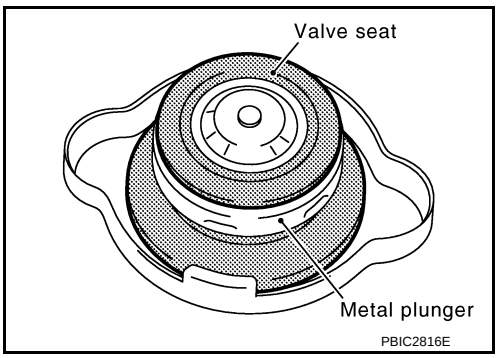
INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter (commercial service tool) and radiator cap tester (commercial service tool). Refer to CO-9, "Inspection".
- Start and warm up engine. Visually check that there is no leaks of engine coolant and A/T fluid.

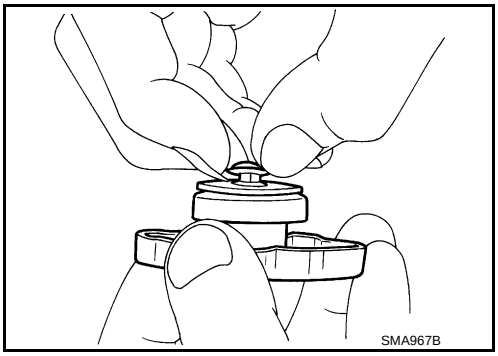
Checking Radiator Cap

INFOID:0000000001645466

- Check valve seat of radiator cap.
- Check if valve seat is swollen to the extent that the edge of the plunger cannot be seen when watching it vertically from the top.
- Check if valve seat has no soil and damage.



- Pull negative-pressure valve to open it, and check that it is completely closed when released.
- Check that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of negative-pressure valve.



- Check radiator cap relief pressure.

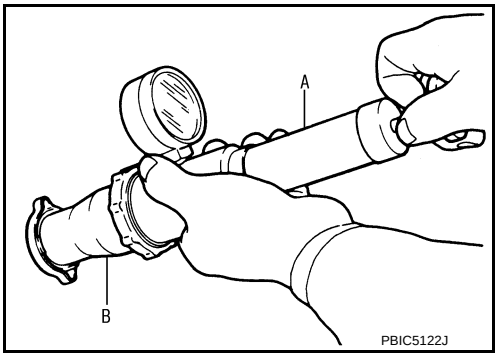
Standard:

108 - 127 kPa (1.1 - 1.3 kg/cm^2, 16 - 18 psi)

Limit:

88 kPa (0.9 kg/cm^2, 13 psi)

- When connecting radiator cap to the radiator cap tester (commercial service tool) (A) and the radiator cap tester adapter (commercial service tool) (B), apply engine coolant to the cap seal surface.



- Replace radiator cap if there is an unusualness related to the above three.

CAUTION:

When installing radiator cap, thoroughly wipe out the filler neck to remove any waxy residue or foreign material.

Checking Radiator

INFOID:0000000001645467

Check radiator for mud or clogging. If necessary, clean radiator as follows.

- Be careful not to bend or damage the radiator fins.
- When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, radiator shroud and horns. Then tape harness and electrical connectors to prevent water from entering.

1. Apply water by hose to the back side of radiator core vertically downward.
2. Apply water again to all radiator core surface once per minute.
3. Stop washing if any stains no longer flow out from radiator.
4. Blow air into the back side of radiator core vertically downward.

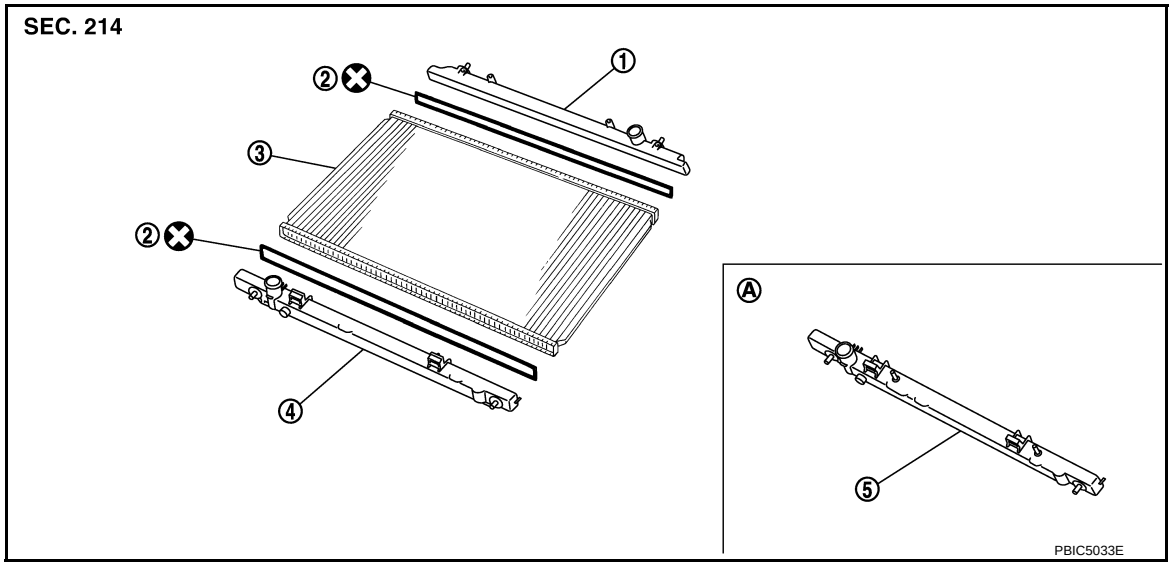
- Use compressed air lower than 490 kPa (5 kg/cm^2, 71 psi) and keep distance more than 30 cm (11.8 in).

5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

RADIATOR (ALUMINUM TYPE)

Disassembly and Assembly

INFOID:0000000001645468

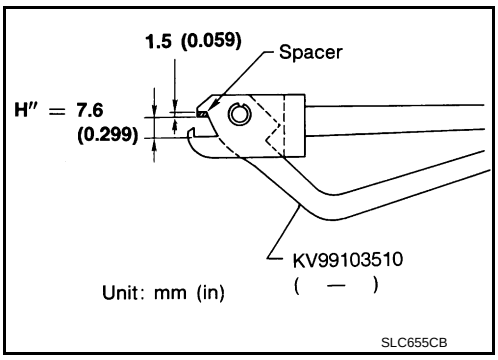


1. Upper tank
2. Sealing rubber
3. Core
4. Lower tank
5. Lower tank (with A/T fluid cooler)
A. A/T models

- Refer to GI-8, "Component" for symbol marks in the figure.

PREPARATION

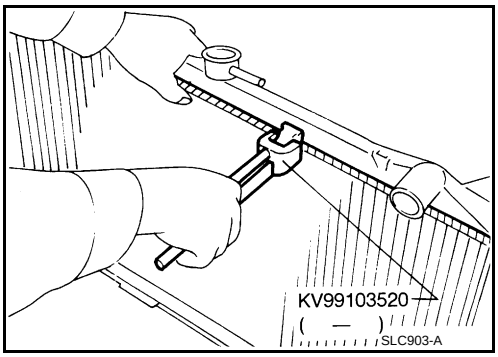
1. Attach spacer to tip of radiator plate pliers A (SST).
   Spacer specification: 18 mm (0.71 in) wide × 8.5 mm (0.335 in) long × 1.5 mm (0.059 in) thick.



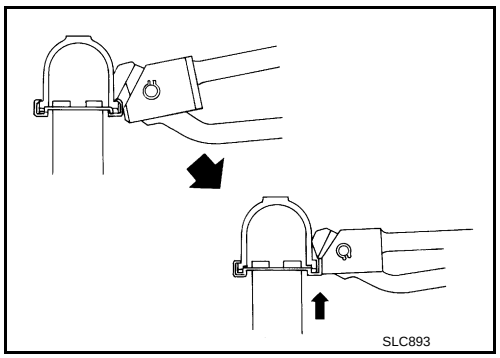
2. Check that when radiator plate pliers A [SST: KV99103510 (—)] are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with spacer, if necessary.

DISASSEMBLY

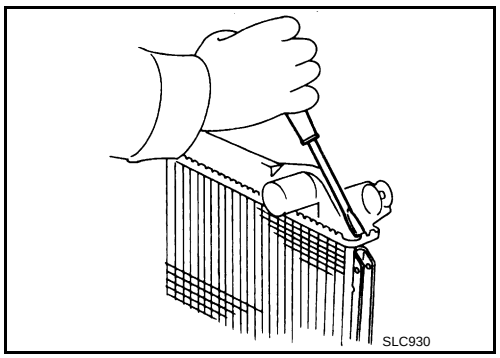
1. Remove upper and lower tanks with radiator plate pliers B (SST).
   CAUTION:
   Never disassemble lower tank and A/T fluid cooler. (A/T models)
   NOTE:
   Regard lower tank and A/T fluid cooler as an assembly. (A/T models)



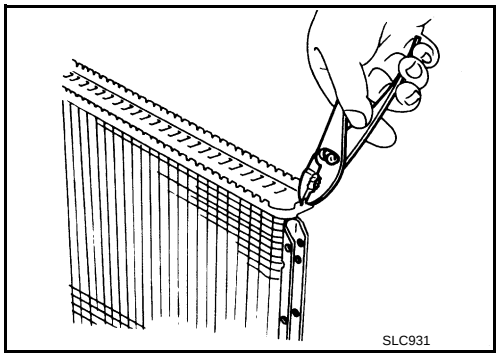
- Grip the crimped edge and bend it upwards so that radiator plate pliers B [SST: KV99103520 (—)] slips off.
  CAUTION:
  Never bend excessively.



- In areas where radiator plate pliers B [SST: KV99103520 (—)] cannot be used, use screwdriver to bend the edge up.
  CAUTION:
  Be careful not to damage tank.

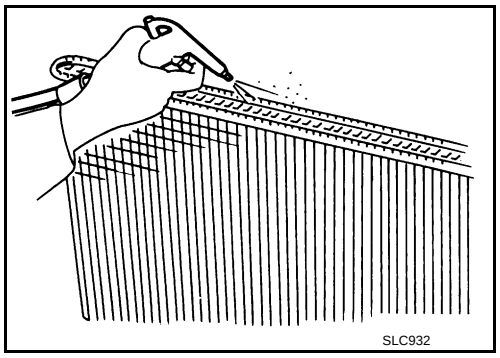


2. Remove sealing rubber.
3. Check the edge stands straight up.

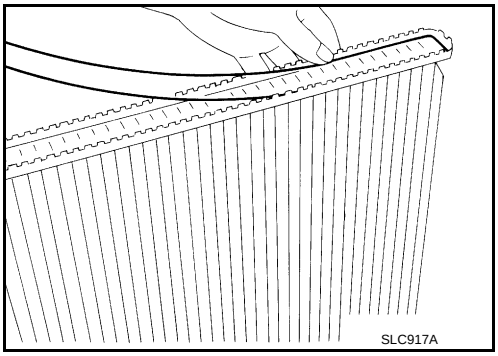


ASSEMBLY

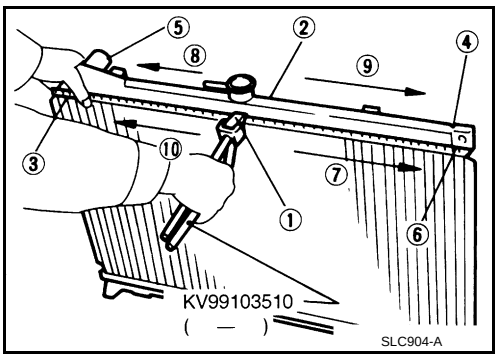
1. Clean contact portion of tank.

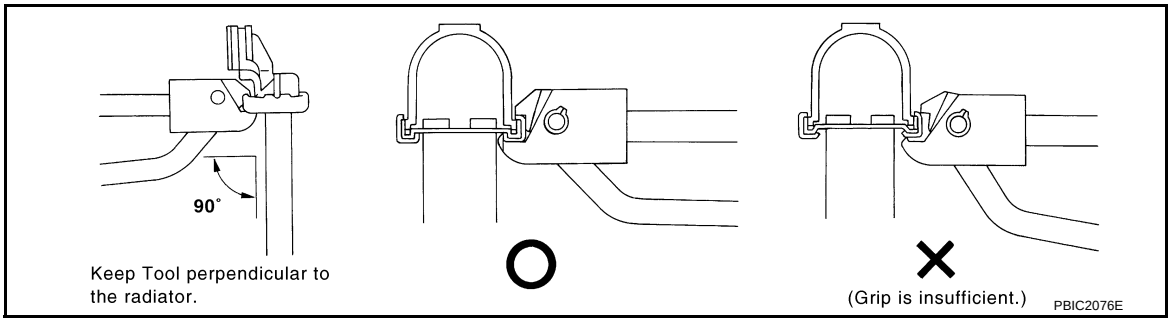


2. Install sealing rubber while pushing it with fingers.
CAUTION:
Be careful not to twist sealing rubber.

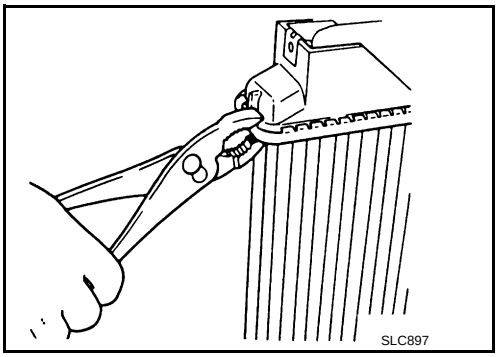


3. Caulk tank in numerical order as shown in the figure with radiator plate pliers A (SST).



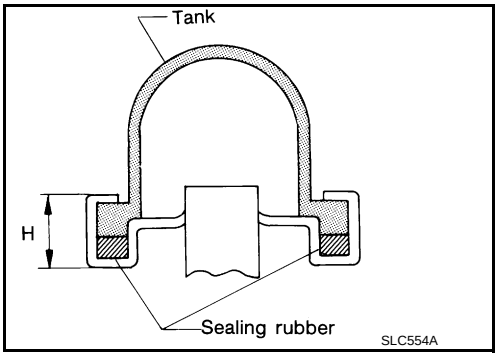


- Use pliers in the locations where radiator plate pliers A [SST: KV99103510 (—)] cannot be used.



4. Check that the rim is completely crimped down.

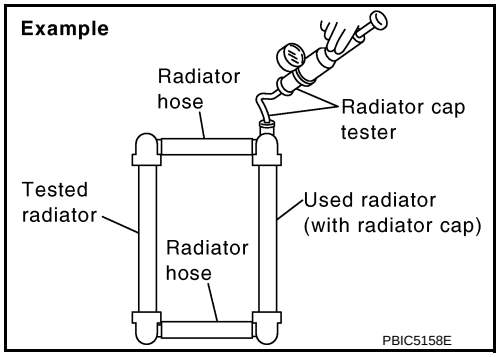
Standard height “H” : 8.0 - 8.4 mm (0.315 - 0.331 in)



5. Check that there is no leakage.
Refer to "INSPECTION".

INSPECTION

1. Apply pressure with radiator cap tester adapter (commercial service tool) and radiator cap tester (commercial service tool).
   • Provide used radiator and connect it to tested radiator using radiator hoses as shown in the figure.
   NOTE:
   The used radiator should be tested beforehand to confirm it has no leakage. If used one is not available, it is possible to use new service part as a radiator testing tool.

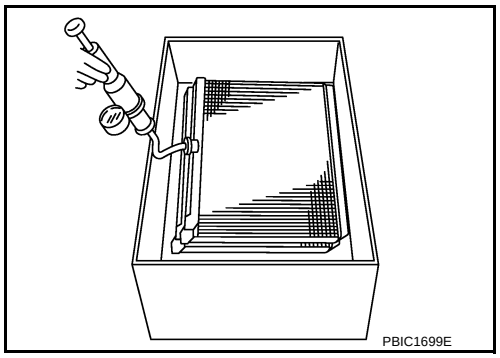


Testing pressure

: 157 kPa (1.6 kg/cm^2, 23 psi)

WARNING:
To prevent the risk of hose coming undone while under pressure, securely fasten it down with hose clamp.
CAUTION:
Attach hose to A/T fluid cooler to seal its inlet and outlet. (A/T models)

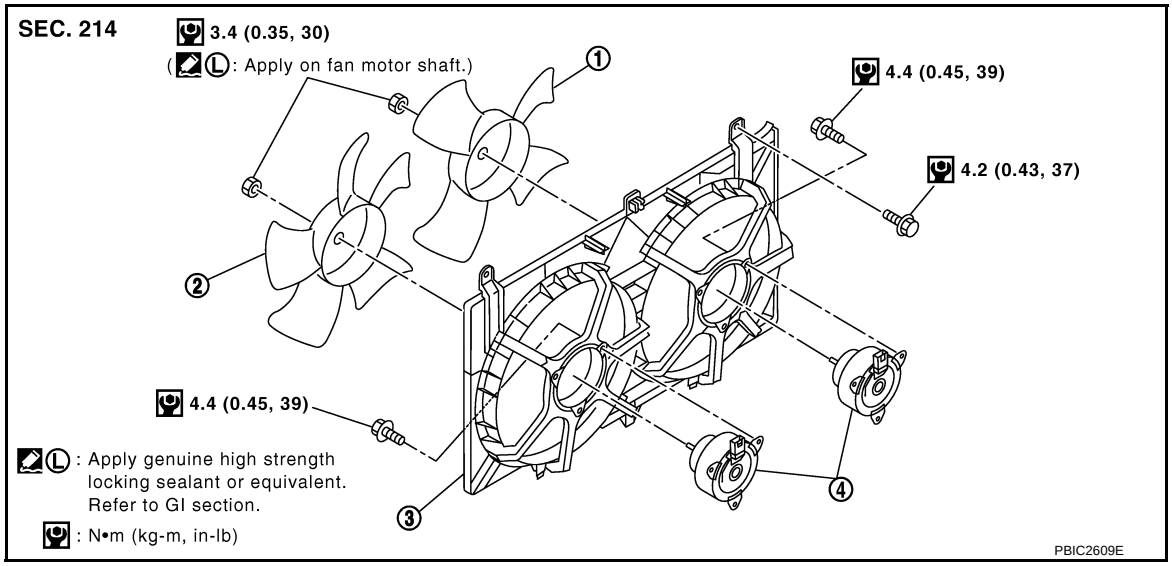
2. Check for leakage by soaking radiator in water container with the testing pressure applied.



COOLING FAN

Removal and Installation

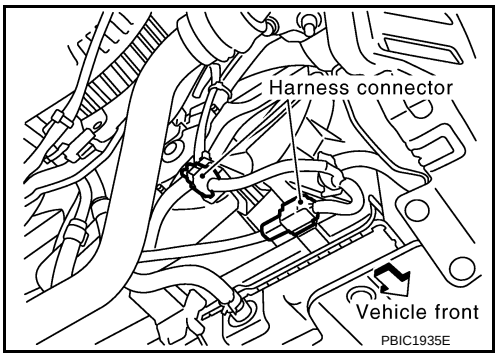
INFOID:0000000001645469



1. Cooling fan (RH)
2. Cooling fan (LH)
3. Fan shroud
4. Fan motor

REMOVAL

1. Remove engine cover with power tool. Refer to EM-18.
2. Drain engine coolant from radiator. Refer to CO-9, "Changing Engine Coolant".
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Never spill engine coolant on drive belts.**
3. Remove air cleaner case assembly (RH and LH). Refer to EM-16.
4. Remove reservoir tank. Refer to CO-12.
5. Disconnect radiator hose (upper) at radiator side. Refer to CO-12.
6. Disconnect fan motor harness connectors at the right-lower portion of fan shroud.



7. Remove mounting bolts to lift up and radiator cooling fan assembly.
   CAUTION:
   Be careful not to damage or scratch on radiator core.

INSTALLATION

Installation is the reverse order of removal.

NOTE:

Cooling fans are controlled by ECM. For details, refer to EC-509.

Disassembly and Assembly

INFOID:0000000001645470

DISASSEMBLY

1. Remove cooling fans (RH and LH) from fan motors.
2. Remove fan motors from fan shroud.

INSPECTION AFTER DISASSEMBLY

Cooling Fan

Inspect cooling fan for crack or unusual bend.

- If anything is found, replace cooling fan.

ASSEMBLY

Assembly is the reverse order of disassembly.

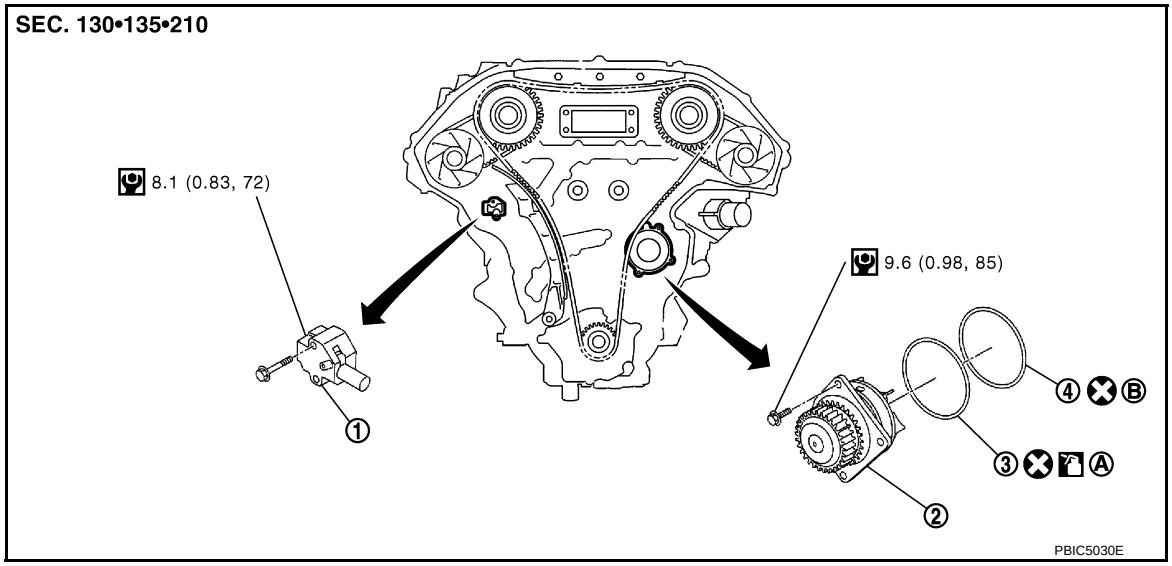
CAUTION:

RH and LH cooling fans are different. Be careful not to misassemble them.

WATER PUMP

Removal and Installation

INFOID:0000000001645471



1. Timing chain tensioner (primary)
2. Water pump
3. O-ring
4. O- ring

A. Identify with yellow paint mark
B. Identify with light blue paint mark
Apply engine coolant

- Refer to GI-8, "Component" for symbol marks in the figure.

CAUTION:

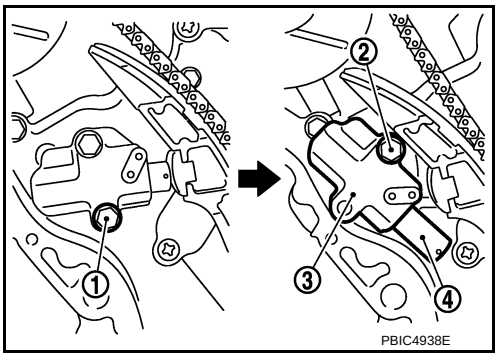
- **When removing water pump assembly, be careful not to get engine coolant on drive belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester (commercial service tool) and radiator cap tester adapter (commercial service tool).**

REMOVAL

1. Remove front timing chain case. Refer to EM-44.
2. Remove timing chain tensioner (primary) as follows:

a. Remove lower mounting bolt (1).

b. Loosen upper mounting bolt (2) slowly, and then turn chain tensioner (primary) (3) on the upper mounting bolt so that plunger (4) is fully expanded.
NOTE:
Even if plunger is fully expanded, it is not dropped from the body of timing chain tensioner (primary).



c. Remove upper mounting bolt, and then remove timing chain tensioner (primary).

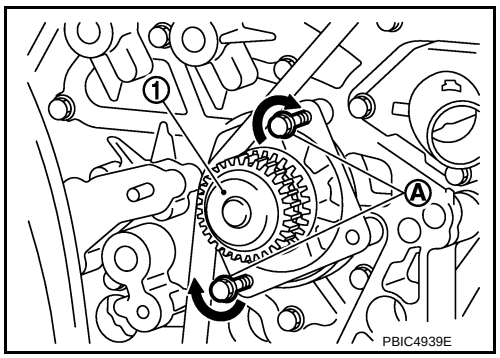
3. Remove water pump as follows:

a. Remove three water pump mounting bolts. Secure a gap between water pump gear and timing chain, by turning crankshaft counterclockwise until timing chain looseness on water pump sprocket becomes maximum.

b. Screw M8 bolts (A) [pitch: 1.25 mm (0.049 in) length: approx. 50 mm (1.97 in)] into water pumps upper and lower mounting bolt holes until they reach timing chain case. Then, alternately tighten each bolt for a half turn, and pull out water pump (1).

CAUTION:

- **Pull straight out while preventing vane from contacting socket in installation area.**
- **Remove water pump without causing sprocket to contact timing chain.**



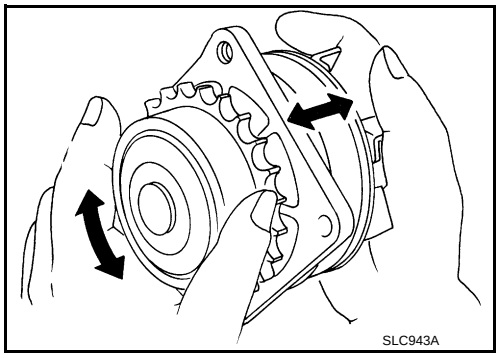
c. Remove M8 bolts and O-rings from water pump.

CAUTION:

Never disassemble water pump.

INSPECTION AFTER REMOVAL

- Check for badly rusted or corroded water pump body assembly.
- Check for rough operation due to excessive end play.
- Replace water pump, if necessary.

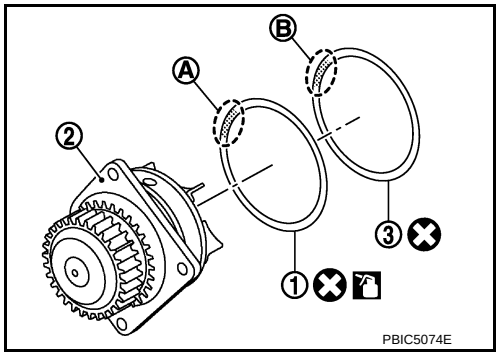


INSTALLATION

1. Install new O-rings to water pump.
   - Apply engine oil to O-rings (1) and engine coolant to O-ring (3) as shown in the figure.

     2 : Water pump

   - Locate O-ring with yellow paint mark (A) to engine front side.
   - Locate O-ring with light blue paint mark (B) to rear side.



2. Install water pump.

CAUTION:

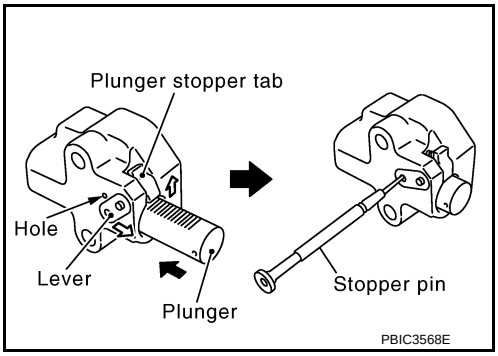
Never allow cylinder block to nip O-rings when installing water pump.

- Check that timing chain and water pump sprocket are engaged.
- Insert water pump by tightening mounting bolts alternately and evenly.

3. Install timing chain tensioner (primary) as follows:

a. Turn crankshaft clockwise so that timing chain on the timing chain tensioner (primary) side is loose.

b. Pull plunger stopper tab up (or turn lever downward) so as to remove plunger stopper tab from the ratchet of plunger.
NOTE:
Plunger stopper tab and lever are synchronized.



c. Push plunger into the inside of tensioner body.
d. Hold plunger in the fully compressed position by engaging plunger stopper tab with the tip of ratchet.
e. To secure lever, insert stopper pin through hole of lever into tensioner body hole.
   • The lever parts and the tab are synchronized. Therefore, the plunger will be secured under this condition.
   NOTE:
   Figure shows the example of 1.2 mm (0.047 in) diameter thin screwdriver being used as the stopper pin.
f. Install timing chain tensioner (primary).
   • Remove dust and foreign material completely from backside of timing chain tensioner (primary) and from installation area of rear timing chain case.
g. Remove stopper pin.
h. Check again that timing chain and water pump sprocket are engaged.
4. Install in the reverse order of removal after this step.
   • **After starting engine, let idle for three minutes, then rev engine up to 3,000 rpm under no load to purge air from the high-pressure chamber of chain tensioner. Engine may produce a rattling noise. This indicates that air still remains in the chamber and is not a matter of concern.**

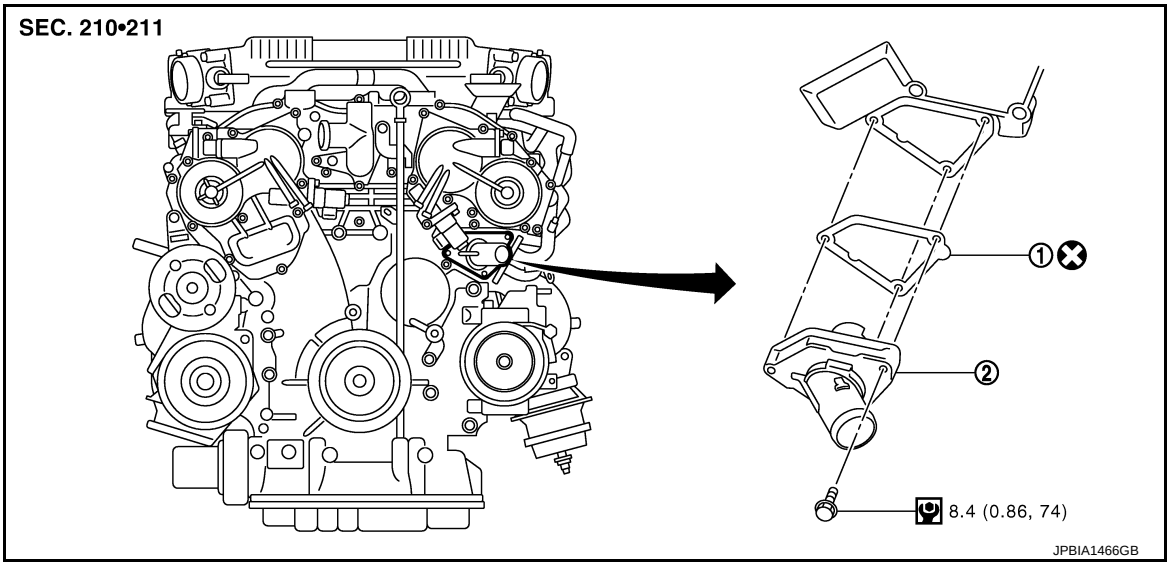
INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter (commercial service tool) and radiator cap tester (commercial service tool). Refer to CO-9, "Inspection".
- Start and warm up engine. Visually check that there is no leaks of engine coolant.

WATER INLET AND THERMOSTAT ASSEMBLY

Removal and Installation

INFOID:0000000001645472

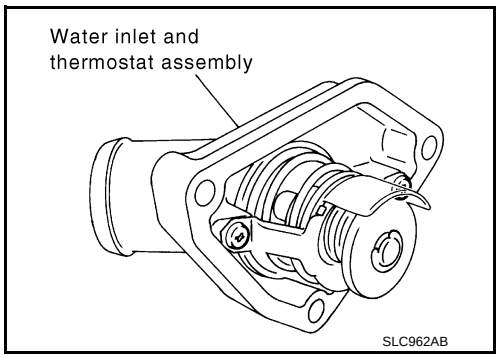


1. Gasket
2. Water inlet and thermostat assembly

- Refer to GI-8, "Component" for symbol marks in the figure.

REMOVAL

1. Remove undercover with power tool.
2. Drain engine coolant from radiator drain plug at the bottom of radiator. Refer to CO-9, "Changing Engine Coolant".
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Never spill engine coolant on drive belts.**
3. Remove air duct and air cleaner case (LH). Refer to EM-16.
4. Disconnect radiator hose (lower) from water inlet and thermostat assembly.
5. Remove intake valve timing control solenoid.
6. Remove water inlet and thermostat assembly.
   CAUTION:
   Never disassemble water inlet and thermostat assembly. Replace them as a unit, if necessary.



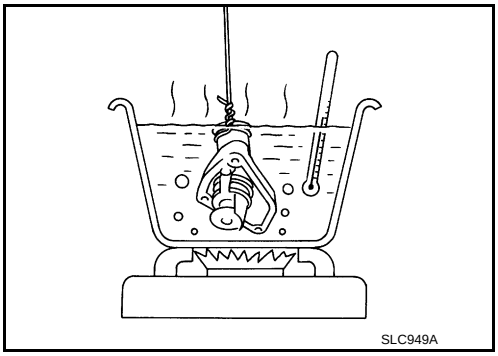
INSPECTION AFTER REMOVAL

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.

2. Check valve operation.

Thermostat	Standard
Valve opening temperature	82°C (180°F)
Maximum valve lift	9.0 mm/95°C (0.354 in/203°F)
Valve closing temperature	77°C (171°F)

- If the malfunctioning condition, when valve seating at ordinary room temperature, or measured values are out of the standard, replace water inlet and thermostat assembly.


SLC949A

INSTALLATION

Note the following, and install in the reverse order of removal.

- **Be careful not to spill engine coolant over engine room. Use rag to absorb engine coolant.**

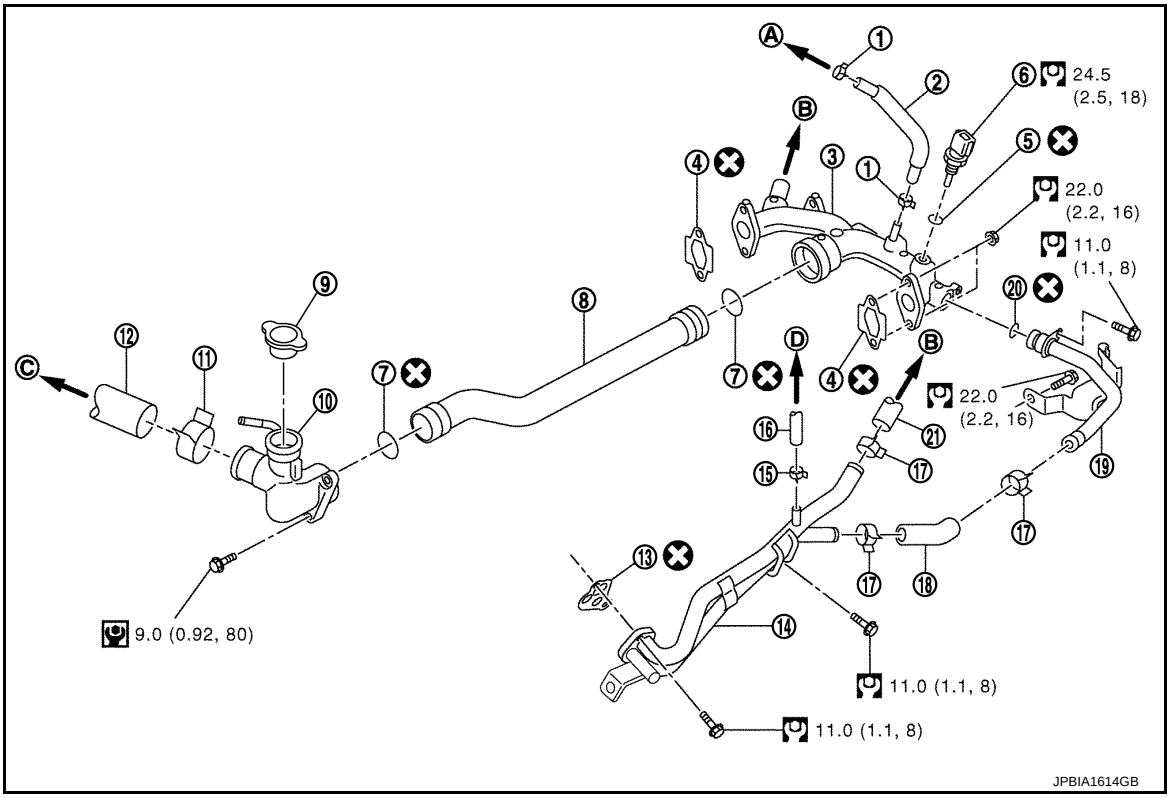
INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter (commercial service tool) and radiator cap tester (commercial service tool). Refer to CO-9, "Inspection".
- Start and warm up engine. Visually check that there is no leaks of engine coolant.

WATER OUTLET AND WATER PIPING

Removal and Installation

INFOID:0000000001645473



1. Clamp	2. Water hose	3. Water outlet (rear)
4. Gasket	5. Washer	6. Engine coolant temperature sensor
7. O-ring	8. Water outlet pipe	9. Radiator cap
10. Water outlet (front)	11. Clamp	12. Radiator hose (upper)
13. Gasket	14. Heater pipe	15. Clamp
16. Water hose	17. Clamp	18. Heater hose
19. Water bypass pipe	20. O-ring	21. Heater hose
A. To EVAP piping	B. To heater core	C. To radiator
D. To electric throttle control actuator		

- Refer to GI-8, "Component" for symbol marks in the figure.

REMOVAL

1. Remove undercover with power tool.
2. Drain engine coolant from radiator drain plug at the bottom of radiator, and from water drain plug at the front of cylinder block. Refer to CO-9, "Changing Engine Coolant" and CO-22.
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Never spill engine coolant on drive belts.**
3. Remove engine cover with power tool. Refer to EM-18.
4. Remove air duct and air cleaner case (RH and LH). Refer to EM-16.
5. Remove radiator hose (upper), heater hoses and water hoses.
6. Remove the following parts, when remove water outlet.
   - A/T fluid charging pipe (A/T models): Refer to AT-229.
   - Intake manifold collector: Refer to EM-18.
7. Remove engine coolant temperature sensor as necessary.
   CAUTION:

Be careful not to damage engine coolant temperature sensor.

8. Remove oil level gauge and guide. Refer to EM-44.
9. Remove water outlet, heater pipe, water bypass hoses and water pipe.

INSTALLATION

Note the following, and install in the reverse order of removal.

- Securely insert each hose, and install clamp at a position where it does not interfere with the pipe bulge.
- When inserting water pipe into water outlet, apply neutral detergent to O-ring.

INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter (commercial service tool) and radiator cap tester (commercial service tool). Refer to CO-9, "Inspection".
- Start and warm up engine. Visually check that there is no leaks of engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

Standard and Limit

INFOID:0000000001645474

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	9.0 (9-1/2, 7- 7/8)
Reservoir tank engine coolant capacity (At “MAX” level)	0.8 (7/8, 3/4)

RADIATOR

Unit: kPa (kg/cm^2, psi)

Cap relief pressure	Standard	108 - 127 (1.1 - 1.3, 16 - 18)
	Limit	88 (0.9, 13)
Leakage test pressure		157 (1.6, 23)

THERMOSTAT

Valve opening temperature	82°C (180°F)
Maximum valve lift	9.0 mm/95°C (0.354 in/203°F)
Water closing temperature	77°C (171°F)