SECTION CO
ENGINE COOLING SYSTEM

CONTENTS

KA24DE

ZD30DD

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EBS009T9

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. Information necessary to service the system safely is included in the SRS and SB section 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 SRS section.**
- **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 harness connectors.**

Precautions for Liquid Gasket

EBS008IK

REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, disconnect and remove the liquid gasket sealing using a seal cutter.

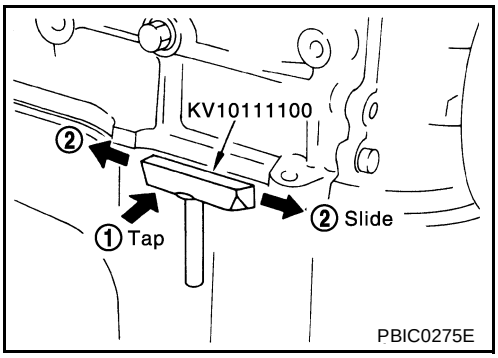
CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the area where the liquid gasket is applied.

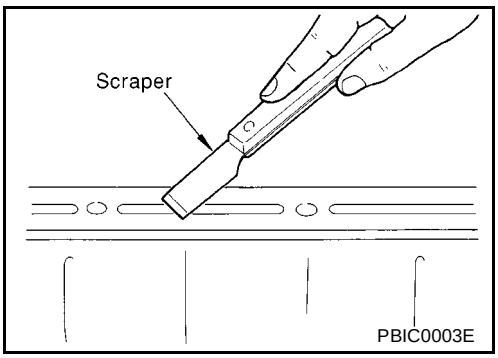
CAUTION:

If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.

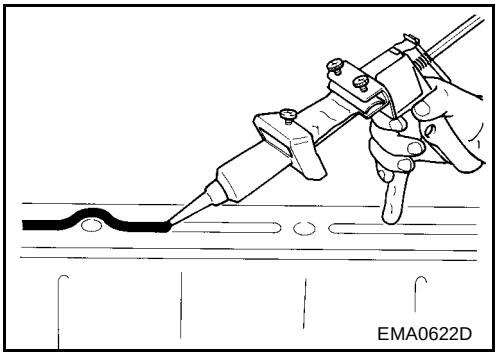


LIQUID GASKET APPLICATUION PROCEDURE

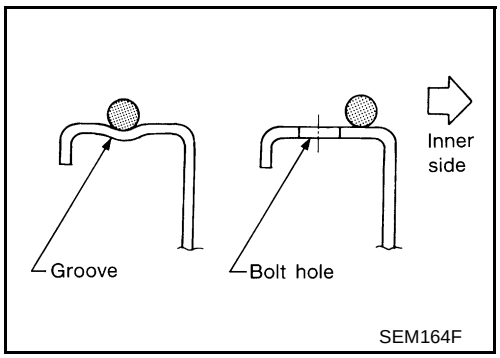
1. Using a scraper, remove the old liquid gasket adhering to the gasket application surface and the mating surface.
- Remove the liquid gasket completely from the groove of the gasket application surface, mounting bolts, and bolt holes.
2. Wipe the gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
3. Attach the liquid gasket to the tube presser.
   Use Genuine Liquid Gasket or equivalent.



4. Apply the gasket without breaks to the specified location with the specified dimensions.
- If there is a groove for the liquid gasket application, apply the gasket to the groove.



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



CAUTION:

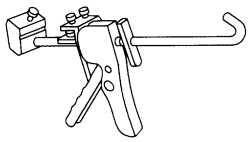
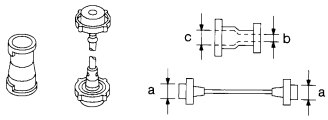
If there are specific instructions in the service manual, observe them.

PREPARATION

PFP:00002

Special Service Tools

EBS008IL

Tool number Tool name	Description
WS39930000 Tube pressure  S-NT052	Pressing the tube of liquid gasket
EG17650301 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)
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

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS008IM

	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	
			Mechanical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	—	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper coolant mixture ratio	—	—	—
	Poor coolant quality	—	—	—
	Insufficient coolant	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

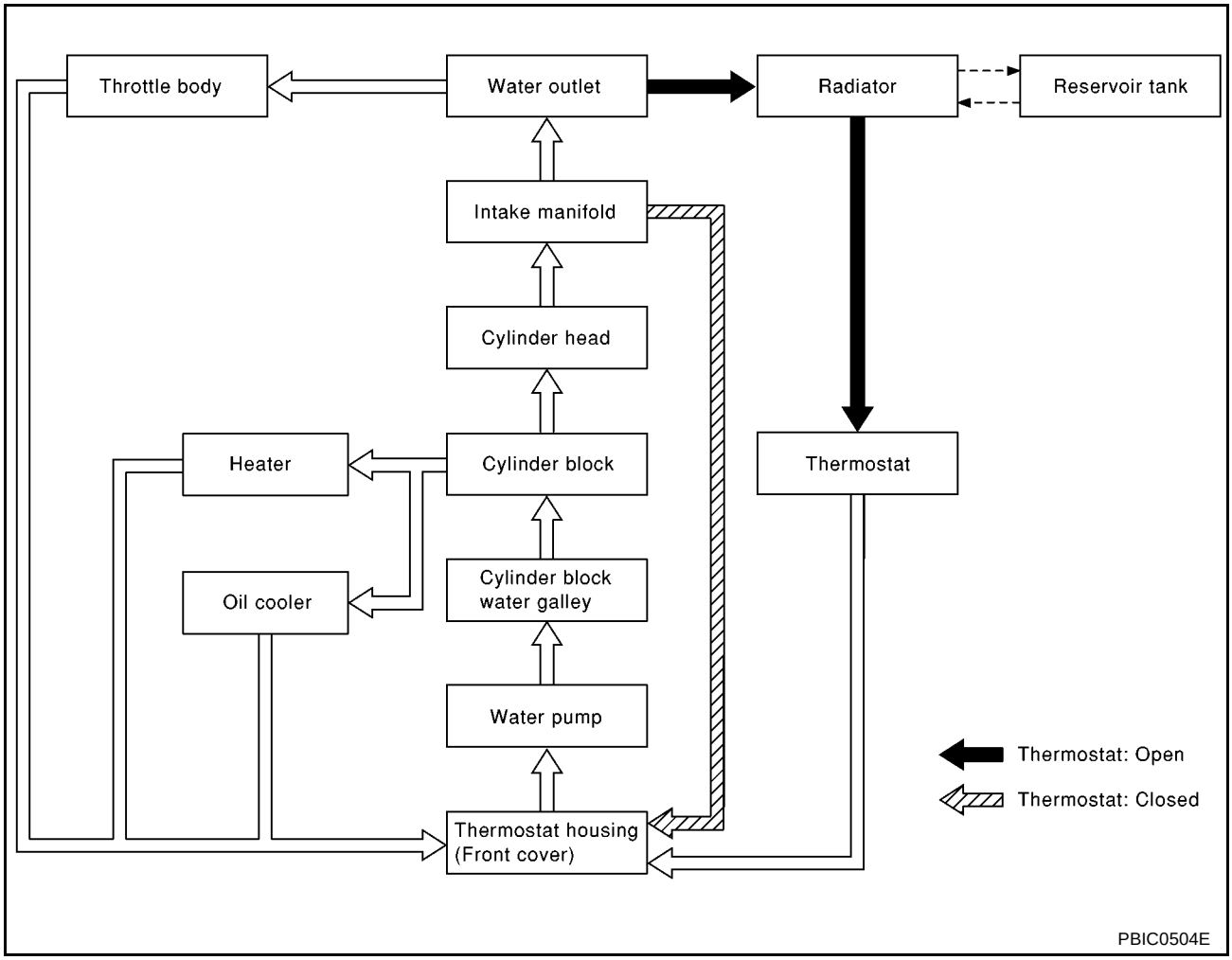
	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			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	—	
		Installed large fog lamp		

COOLING SYSTEM

PFP:21020

Cooling Circuit

EBS008IN



ENGINE COOLANT

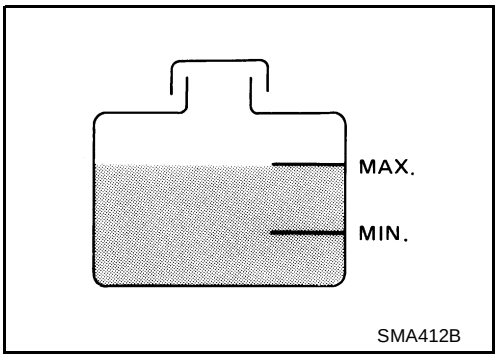
PFP:KQ100

Inspection

EBS009TC

LEVEL CHECK

- Check if the reservoir tank coolant level within MIN to MAX when engine is cool.
- Drain or refill coolant amount when it is too much or to little.



LEALK CHECK

- To check for leakage, apply pressure to the cooling system with a tester.

Testing pressure:

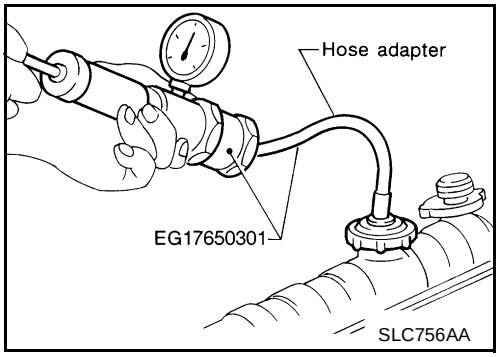
157 kPa (1.57 bar, 1.6 kg/cm^2 , 23 psi)

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure coolant escaping from the radiator.

CAUTION:

Higher pressure than specified above may cause radiator damage.



Changing Engine Coolant

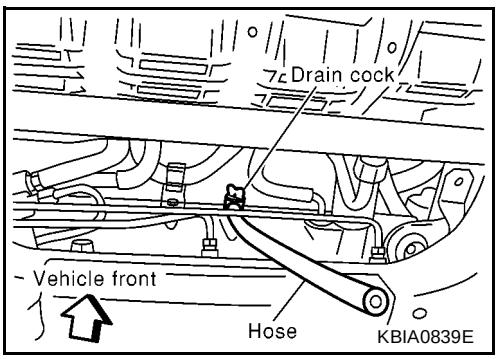
EBS009TD

WARNING:

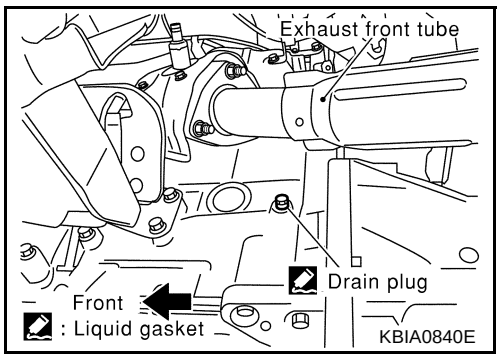
- **To avoid being scalded, never change the coolant when the engine is hot.**
- **Wrap a thick cloth around cap and carefully remove the cap. First, turn the cap a quarter of a turn to release built-up pressure. Then turn the cap all the way.**

DRAINING ENGINE COOLANT

1. Set temperature of front heater control to “FULL HOT”.
2. Open and secure engine room LH cover.
3. Remove radiator cap.
4. Remove plate under radiator.
5. Connect hose to drain cock to drain coolant.
   - Use commercially available hose. [inside diameter: approx. 9 mm (0.35 in), length: approx. 300 mm (11.81 in)].



6. Remove drain plug from cylinder block to drain coolant.
7. Drain coolant from reservoir tank.
   - Check drained coolant for contaminants such as rust, corrosion or discoloration. If contaminated flush engine cooling system, refer to CO-12, "FLUSHING COOLING SYSTEM" .



REFILLING ENGINE COOLANT

1. Install reservoir tank, radiator drain plug and cylinder block drain plugs.

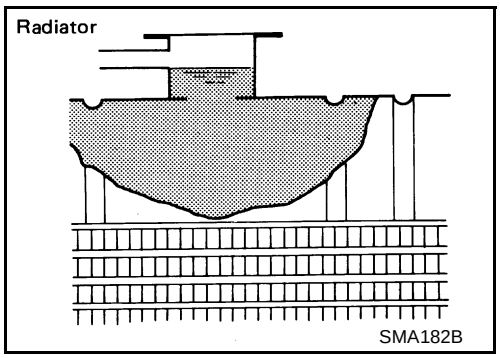
Apply sealant to the thread of cylinder block drain plugs.

- **Use Genuine Liquid Gasket or equivalent.**

: 34.3 - 44.1 N·m (3.5 - 4.5 kg-m , 26 - 32 ft-lb)

2. Fill radiator and reservoir tank to specified level.

- **Use Nissan genuine coolant or equivalent mixed with water (distilled or demineralized).**
  Refer to MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS" .



Engine coolant capacity (With reservoir tank):

With front and rear heater:

Approximately 9.1 ℓ (8 Imp qt)

With front heater:

Approximately 8.1 ℓ (7-1/8 Imp qt)

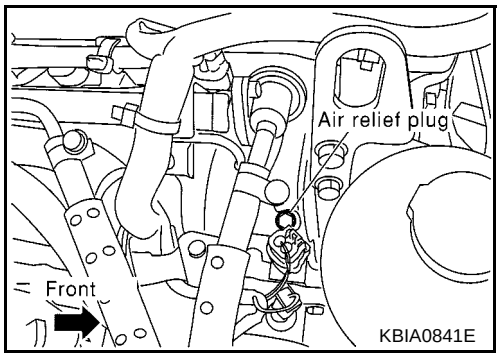
Without heater:

Approximately 6.7 ℓ (5-7/8 Imp qt)

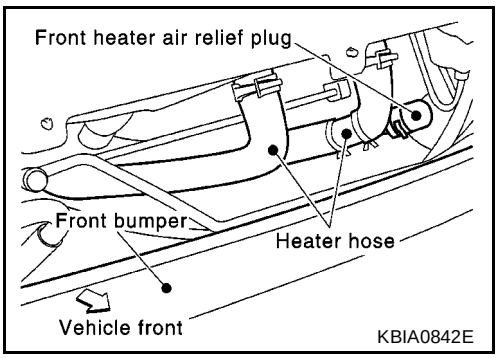
Reservoir tank capacity:

0.8 ℓ (3/4 Imp qt)

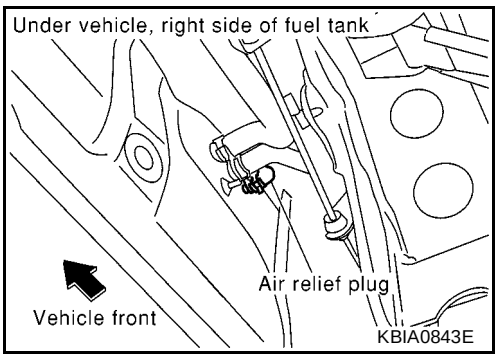
3. Make certain each hose clamp and drain plug are securely tightened.
4. Set temperature of front heater control to “FULL HOT”.
5. Remove air relief plug on engine.



6. Remove front grille, and remove front heater air relief plug.
   - For removal of front grille, refer to EI-12, "FRONT GRILLE" .

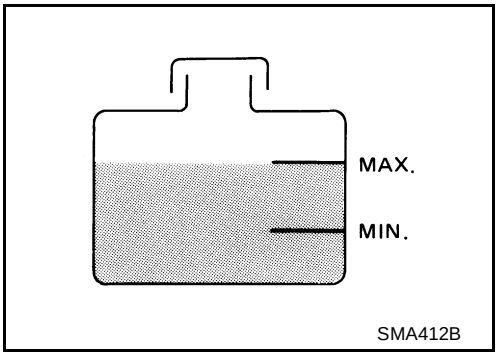


7. Remove rear heater air relief plug from right-side of fuel tank under vehicle (models with rear heater).



8. Pour coolant through coolant filler neck slowly of less than 2 ℓ (1-3/4 Imp qt) a minute to allow air in system to escape.
   - When coolant overflows air relief hole on heater hose, install air relief plug.
9. Fill reservoir tank with coolant up to the MAX level.
10. Warm up engine to normal operating temperature without radiator cap installed.
    - **If coolant overflows radiator filler hole, install filler cap.**
11. Run engine at 3,000 rpm for 10 seconds and return to idle speed with radiator cap installed.
    - Repeat two or three times.

Watch coolant temperature gauge so as not to overheat the engine.



12. Stop engine.

    CAUTION:
    Steps 10 and 11 (shown above) must be finished within one minute to prevent coolant temperature from rising.
13. Cool down to less than approximately 50°C (122°F).
    - Cool down using a fan to shorten the time.
    - If necessary, refill radiator up to filler neck with coolant.
14. Refill reservoir tank to MAX level line with coolant.
15. Repeat steps 10 through 13 two or more times with radiator cap installed until coolant level no longer drops.
16. Check cooling system for leaks with engine running.
17. Warm up engine, and check for sound of coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between COOL and WARM.

    CAUTION:
    Be careful not to overheat.
    - To check thermostat valve condition, touch lower radiator hose by hand. If water flow is hot, valve is open.
18. Stop engine.

19. After cooling engine [approx. 50°C (122°F) or lower], remove radiator cap and check coolant level. If level is low, fill up to radiator neck again and repeat from step 15.
20. When coolant level stabilizes, fill reservoir tank up to “MAX” line.

FLUSHING COOLING SYSTEM

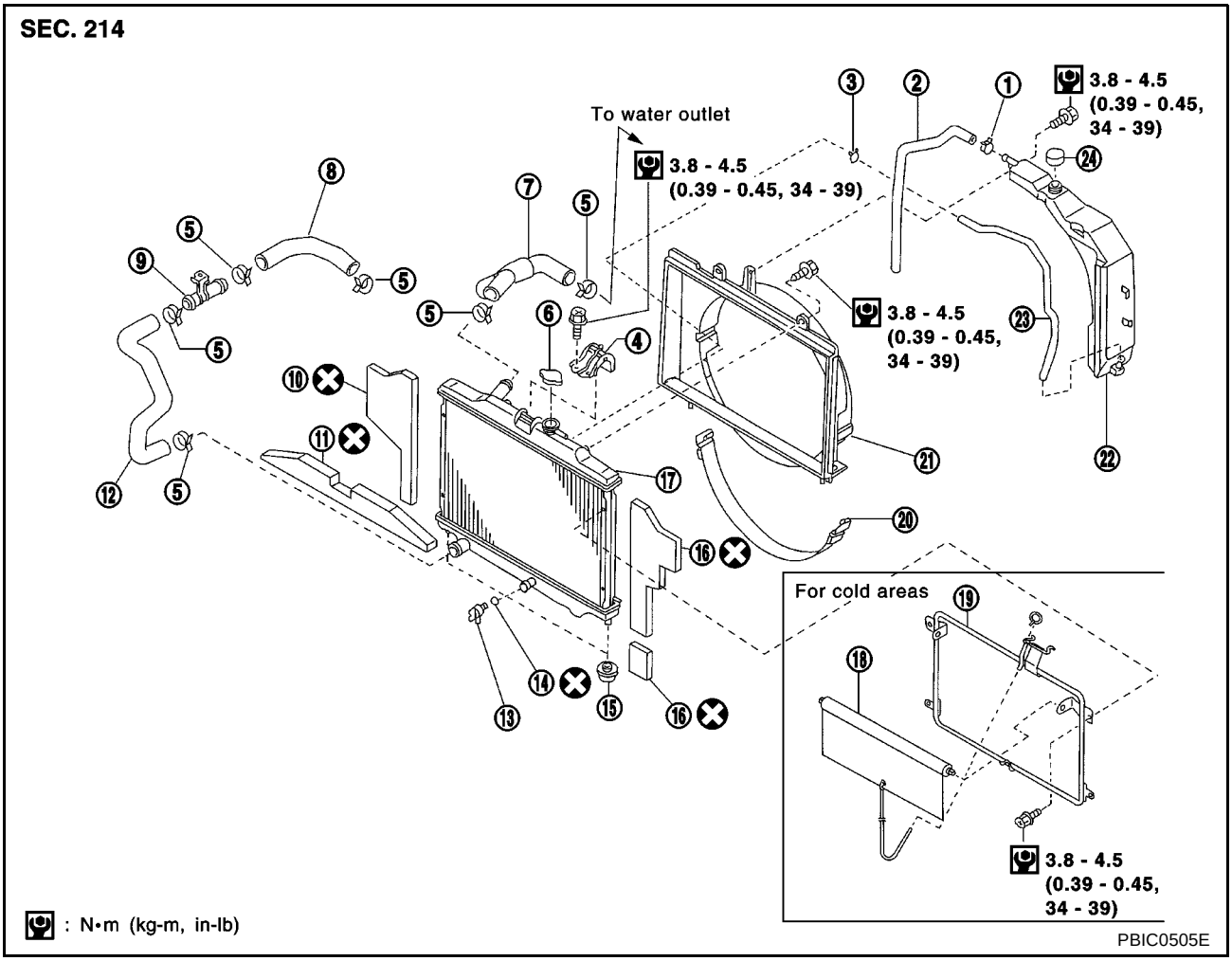
1. Open air relief plug.
2. Fill radiator with water until water spills from the air relief hole, then close air relief plug. Fill radiator and reservoir tank with water and reinstall radiator cap.
3. Run engine and warm it up to normal operating temperature.
4. Rev engine two or three times under no-load.
5. Stop engine and wait until it cools down.
6. Drain water.
7. Replace steps 1 through 6 until clear water begins to drain from radiator.

RADIATOR

PFP:21400

Removal and Installation

EBS009TE



1	Clamp	2	Reservoir tank hose	3	Clamp
4	Mounting bracket	5	Clamp	6	Radiator cap
7	Radiator hose (Upper)	8	Radiator hose (Lower)	9	Water pipe
10	Air guide	11	Air guide	12	Radiator hose (Lower)
13	Drain cock	14	O-ring	15	Mounting rubber
16	Air guide	17	Radiator	18	Radiator shutter
19	Frame	20	Radiator shroud (Lower)	21	Radiator shroud
22	Reservoir tank	23	Reservoir tank hose	24	Reservoir tank cap

WARNING:

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

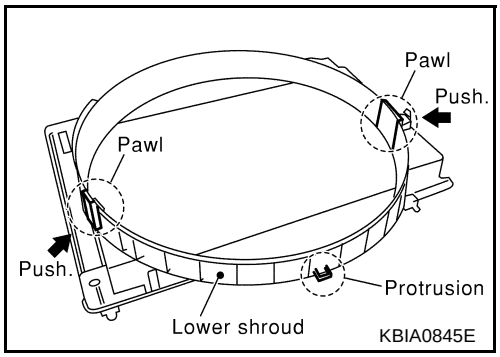
REMOVAL

1. Open and secure engine room LH cover.
2. Remove front under cover, and remove plate under radiator.
3. Remove cover from left front edge of engine room.
4. Remove RH seat. Refer to SE-4, "FRONT SEAT" .
5. Remove engine room RH cover. Refer to EM-105, "ENGINE ROOM COVER" .
6. Drain coolant. CO-9, "ENGINE COOLANT" .

CAUTION:

Perform when the engine is cold.

7. Remove reservoir tank.
8. Remove radiator upper and lower hose.
9. Remove radiator lower shroud.
10. Remove radiator mounting bracket to free radiator.
11. Remove radiator shroud.
12. Remove cooling fan. Refer to CO-20, "COOLING FAN" .
13. Lift up and remove radiator.



CAUTION:

- **Do not damage or scratch radiator core when removing.**
- **When air guide is removed from radiator, replace with new one. Once it removed the adhering force will be weakened.**

14. Remove radiator shutter (Models for cold areas).

INSTALLATION

- Install in the reverse order of removal.
- Use genuine shroud mounting bolts or equivalents. Make sure to tighten them to the specified torque.

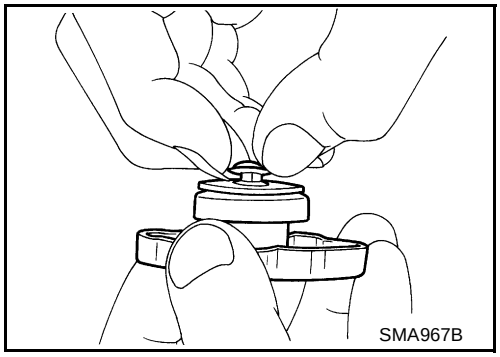
CAUTION:

- **Install radiator with air guide adhered surely.**
- **Install air guide so that no gap exists between vehicle body and air guide.**

CHECKING RADIATOR CAP

1. Pull the negative pressure valve to open it and check that it close completely when released.

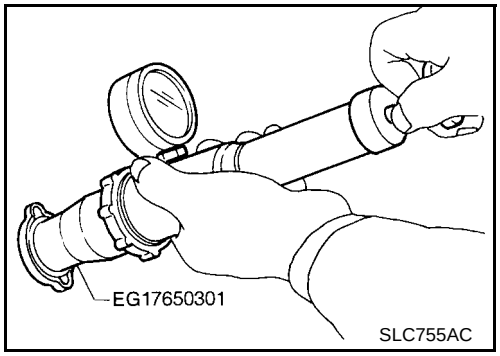
- Check that there is no dirt or damage on the valve seat of the radiator cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of the negative-pressure valve.



2. Check radiator cap relief pressure.

Standard : **78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm^2 , 11 - 14psi)**

Limit : **59 kPa (0.59 bar, 0.6 kg/cm^2 , 9 psi)**



- When connecting the radiator cap to the tester, apply engine coolant to the cap seal part.
- Replace the radiator cap if there is an unusual conditions in the negative-pressure valve, or if the open-valve pressure is outside of the limit values.

CHECKING RADIATOR

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 shroud and horns. Then tape the harness and connectors to prevent water from entering.

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

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

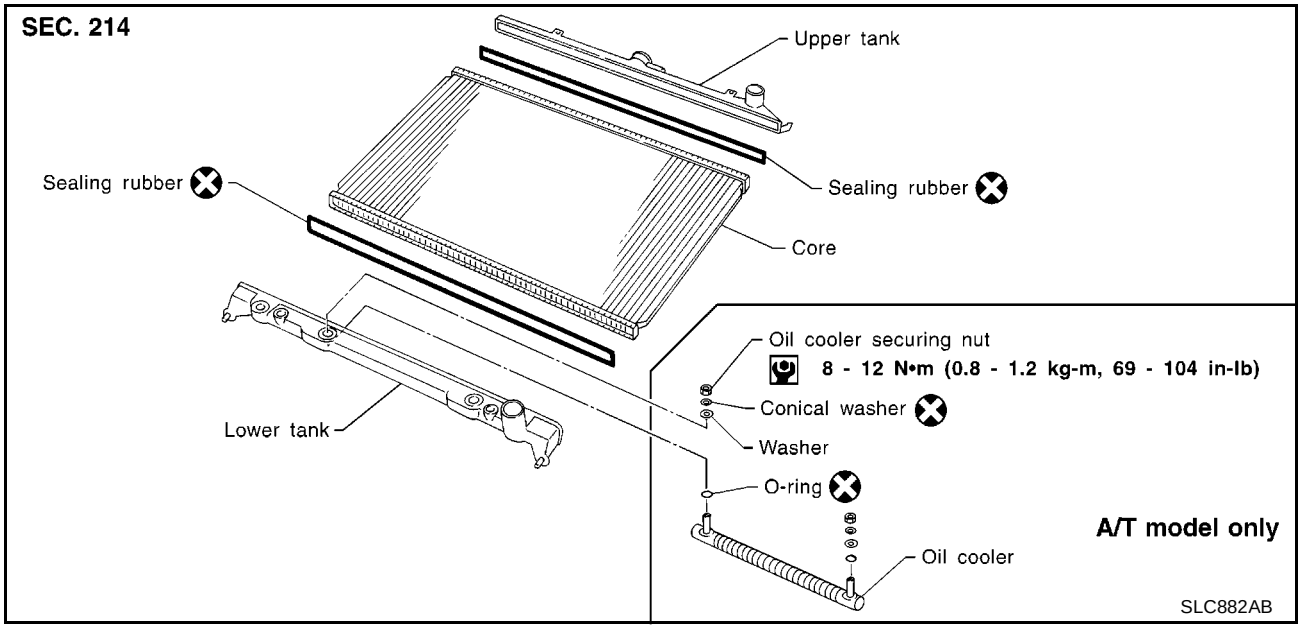
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

RADIATOR (ALUMINUM TYPE)

PFP:21460

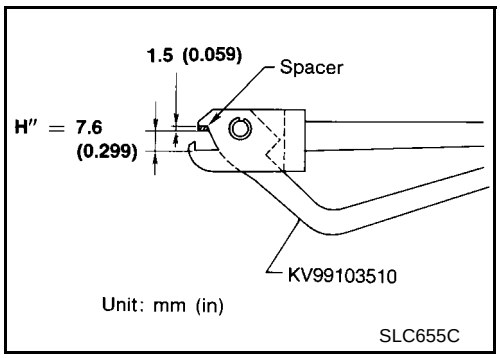
Disassembly and Assembly

EBS008IR



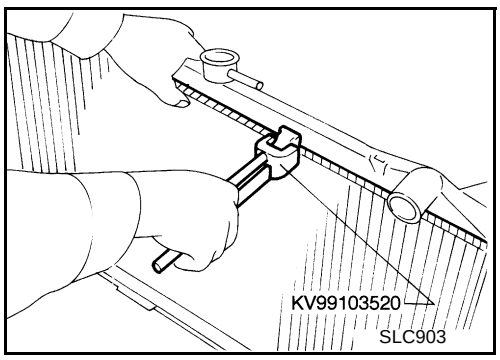
PREPARATION

1. Attach the spacer to the tip of the radiator plate pliers A. Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when radiator plate pliers A are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.



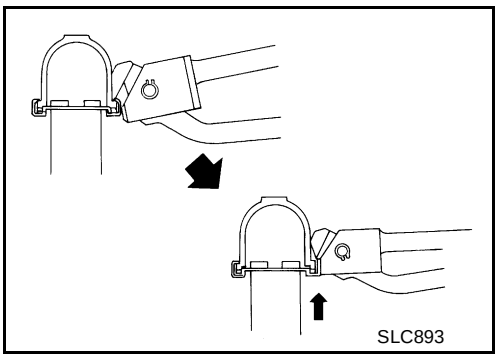
DISASSEMBLY

1. Remove tank with Tool.



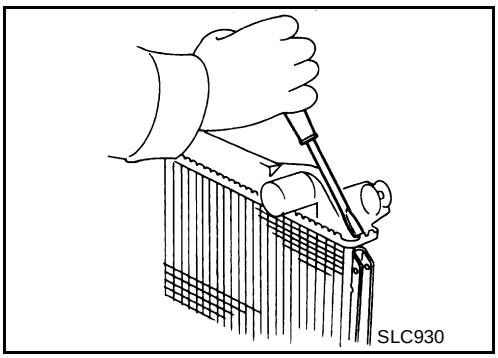
- Grip the crimped edge and bend it upwards so that Tool slips off.

Do not bend excessively.

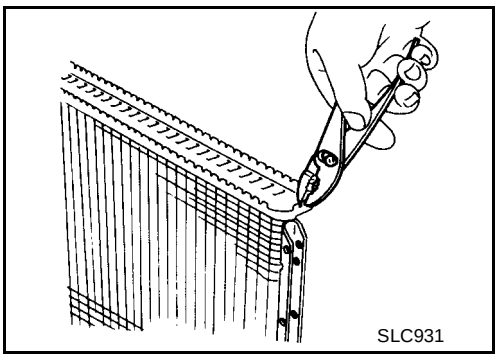


- In areas where Tool cannot be used, use a screwdriver to bend the edge up.

Be careful not to damage tank.



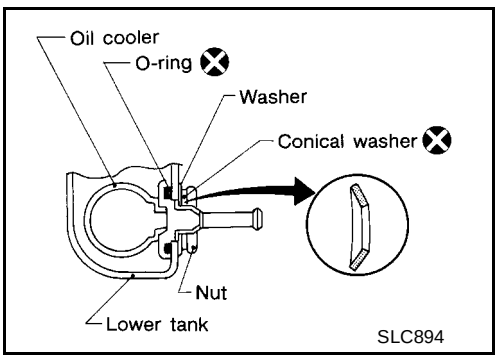
2. Make sure the edge stands straight up.
3. Remove oil cooler from tank. (A/T model only)



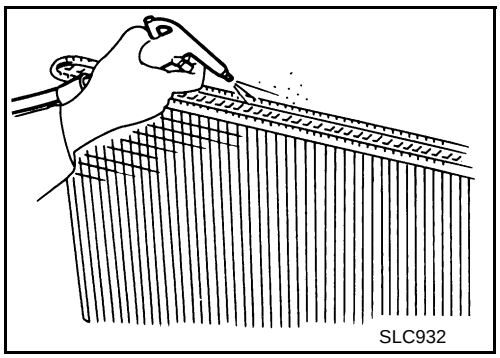
ASSEMBLY

1. Install oil cooler. (A/T model only)

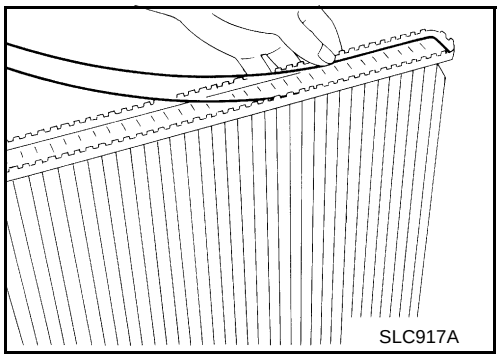
Pay attention to direction of conical washer.



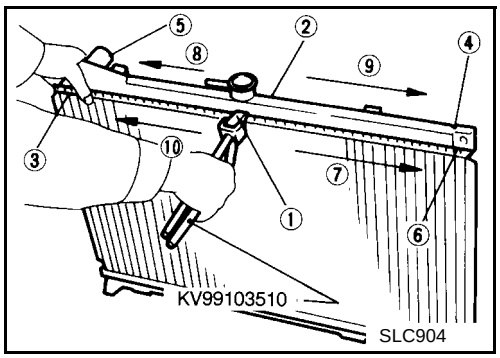
2. Clean contact portion of tank.


SLC932

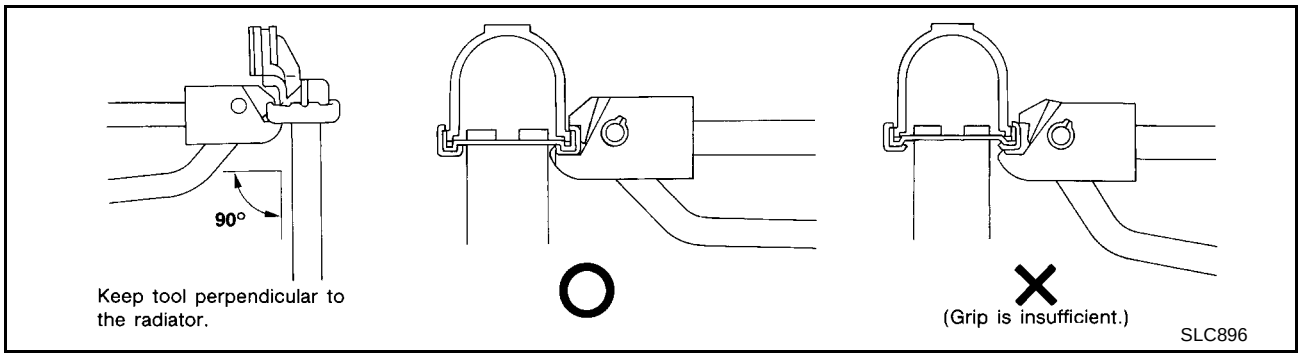
3. Install sealing rubber.
Push it in with fingers.
Be careful not to twist sealing rubber.


SLC917A

4. Caulk tank in specified sequence with Tool.

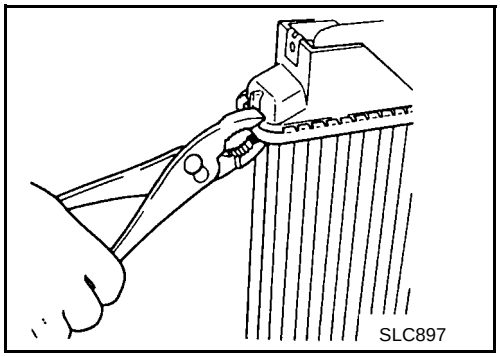


SLC904



SLC896

- Use pliers in the locations where Tool cannot be used.

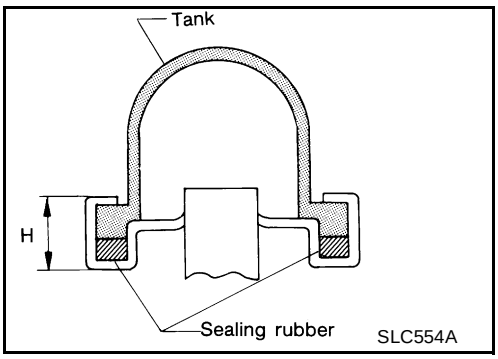

SLC897

5. Make sure that the rim is completely crimped down.

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

6. Confirm that there is no leakage.

Refer to Inspection.



INSPECTION

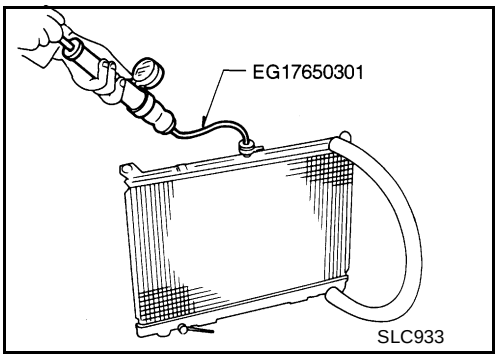
1. Apply pressure with Tool.

Specified pressure value:

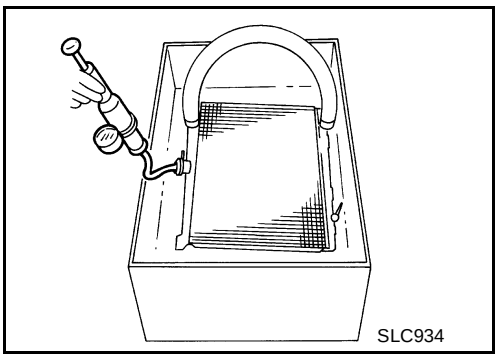
157 kPa (1.57 bar, 1.6 kg/cm^2 , 23 psi)

WARNING:

To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp.
Attach a hose to the oil cooler as well. (A/T model only)



2. Check for leakage.

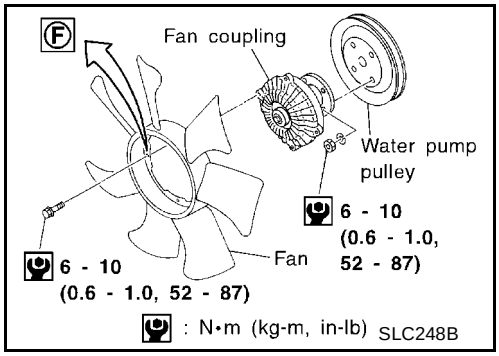


COOLING FAN

PFP:21140

Removal and Installation

EBS009TF



REMOVAL

1. Remove front side under cover.
2. Open engine room LH cover and secure it.
3. Remove RH seat. Refer to SE-4, "FRONT SEAT" .
4. Remove engine room RH cover. Refer to EM-105, "ENGINE ROOM COVER" .
5. Drain engine coolant.
   CAUTION:
   Perform when the engine is cold.
6. Remove reservoir tank.
7. Remove radiator lower shroud. Refer to CO-13, "RADIATOR" .
8. Remove radiator upper hose.
9. Remove radiator mounting bracket to free radiator.
10. Remove radiator shroud. Refer to CO-13, "RADIATOR" .
11. Remove drive belt, cooling fan and cooling fan pulley.
    Refer to EM-14, "DRIVE BELTS" for drive belt removal.

INSPECTION AFTER REMOVAL

Inspect fan coupling for oil leakage and bimetal conditions.

INSTALLATION

Install in the reverse order of removal referring the following.

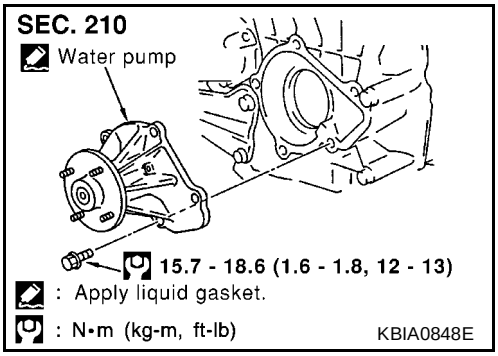
- Install cooling fan with its front mark “F” facing front of engine. Refer to “Component Parts Illustration”.

WATER PUMP

PFP:21020

Removal and Installation

EBS009TG



WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

REMOVAL

1. Remove cooling fan and pulley. Refer to CO-20, "COOLING FAN" .
2. Remove water pump.

- Remove water pump with lightly tapping it using wooden piece.

CAUTION:

Do not disassemble water pump.

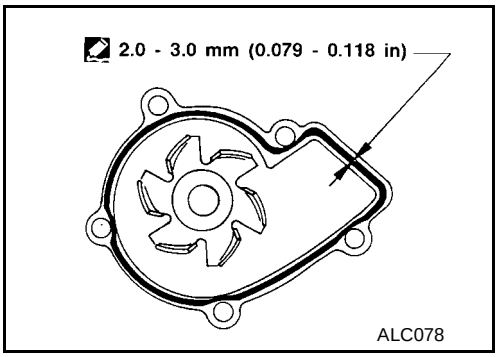
INSPECTION AFTER REMOVAL

- Visually check that there is no significant dirt or rusting on the water pump body and vane.
- Check that there is no looseness in the vane shaft, and that it turns smoothly when rotated by hand.

IINSTALLATION

Install in the reverse order of removal paying attention to the following.

- Apply liquid gasket to mounting surface of water pump as shown in the figure.
  Use genuine liquid gasket or equivalents.



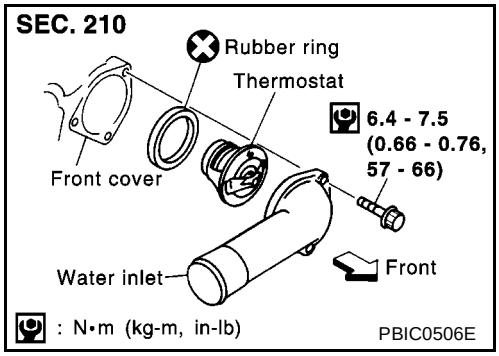
WATER INLET AND THERMOSTAT ASSY

PFP:21200

Remover and Installation

EBS00AML

REMOVAL



1. Open and secure engine compartment LH cover.
2. Remove front under cover, and remove plate under radiator.
3. Remove the RH seat. Refer to SE-4, "FRONT SEAT" .
4. Remove engine compartment RH cover. Refer to EM-12, "ENGINE ROOM COVER" .
5. Remove radiator cap, and loosen drain cock to drain coolant. Refer to CO-9, "ENGINE COOLANT" .
6. Disconnect the radiator hoses (upper/lower).

CAUTION:

When removing, be careful to keep the alternator away from coolant.

7. Remove power steering pump belt and alternator water pump belt. Refer to EM-14, "DRIVE BELTS" .
8. Remove power steering oil pump, and secure it along with reservoir tank on vehicle with a rope. Refer to PS-32, "POWER STEERING OIL PUMP" .

CAUTION:

Be careful not to leak power steering fluid from reservoir tank.

9. Remove alternator. Refer to SC-11, "CHARGING SYSTEM" .

CAUTION:

When removing or installing alternator, do not loosen mounting bolts of alternator adjusting bar.

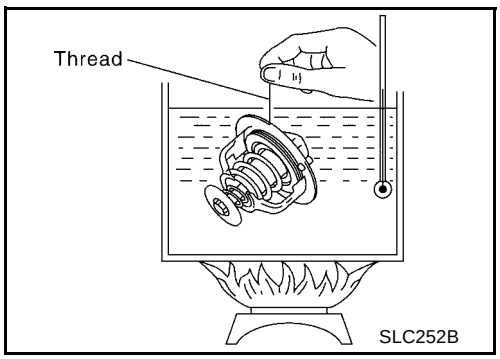
NOTE:

The mounting bolts of alternator adjusting bar are tightened together with front cover. If they are loosened, sealing performance deteriorates, resulting in oil leakage from front cover.

10. Remove water inlet and thermostat.

INSPECTION AFTER REMOVAL

- Place a thread so that it is caught in the valves of the thermostat. Immerse fully in a container filled with water. Heat while stirring. (The example in the figure shows the thermostat.)
- The valve opening temperature is the temperature at which the valve opens and falls from the thread.
- Continue heating. Check the full-open lift amount.
- After checking the full-open lift amount, lower the water temperature and check the valve closing temperature.



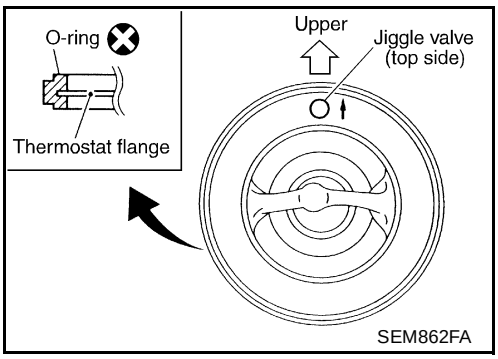
Standard values

	Thermostat
Valve opening temperature	76.5°C (170° F)
Full-open lift	More than 8 mm/ 90°C (0.31 in/ 194 °F)
Valve closing temperature	71.5°C (161°F) or higher

INSTALLATION

Install in the reverse order of removal.

- Install the thermostat with the whole circumference of each flange part fit securely inside the rubber ring.
- Install the thermostat with the jiggle-valve facing upwards.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit

EBS008IW

CAPACITY

Unit: liter (Imp qt)

Coolant capacity [With reservoir tank (MAX level)]	With front and rear heater	Approximately9.1 (8)
	With front heater	Approximately 8.1 (7-1/8)
	Without heater	Approximately 6.7 (5-7/8)
	Reservoir tank	0.8 (3/4)

THERMOSTAT

Valve opening temperature	76.5°C (170°F)
Valve lift	More than 8 mm/90°C (0.31 in/194°F)

RADIATOR

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

Cap relief pressure	Standard	78 - 98 (0.78 - 0.98, 0.8 - 1.0, 11 - 14)
	Limit	59 (0.6, 9)
Leakage test pressure		157 (1.6, 23)

Tightening Torque

EBS008IX

Unit: N·m (kg-m, ft-lb)
Unit: N·m (kg-m, in-lb)*

Cylinder block drain plug	34.3 - 44.1 (3.5 - 4.5, 26 - 32)
Radiator mounting bracket	3.8 - 4.5 (0.39 - 0.46, 34 - 39)*
Radiator shutter (For cold areas)	3.8 - 4.5 (0.39 - 0.46, 34 - 39)*
Cooling fan	6 - 9.8 (0.6 - 1.0, 54 - 86)*
Water pump	15.7 - 18.6 (1.6 - 1.8, 12 - 13)
Water inlet	6.4 - 7.5 (0.66 - 0.76, 57 - 66)*

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EBS009TA

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. Information necessary to service the system safely is included in the SRS and SB section 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 SRS section.**
- **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 harness connectors.**

Precautions for Liquid Gasket

EBS007AN

REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, disconnect and remove the liquid gasket sealing using a seal cutter.

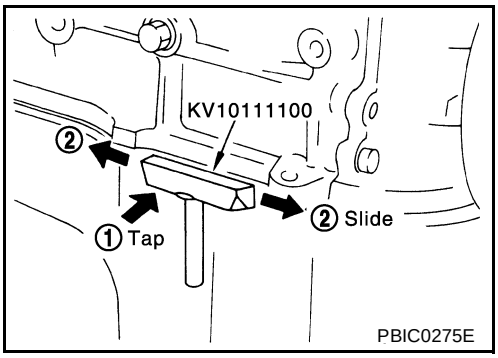
CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the area where the liquid gasket is applied.

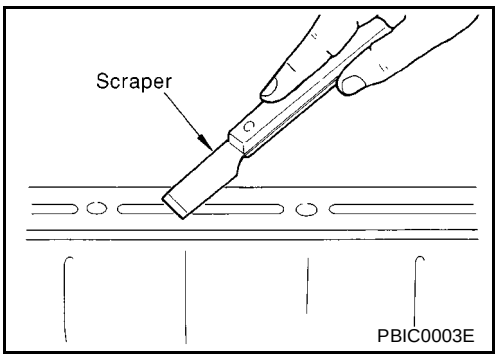
CAUTION:

If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.

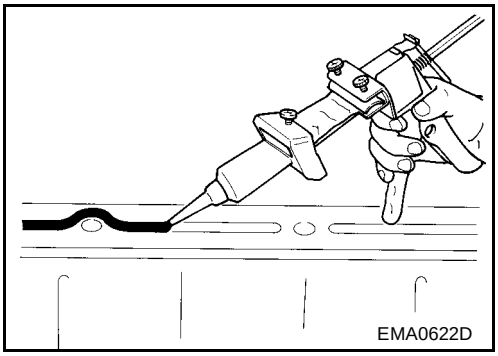


LIQUID GASKET APPLICATION PROCEDURE

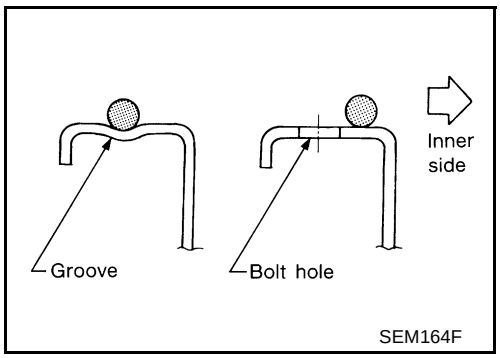
1. Using a scraper, remove the old liquid gasket adhering to the gasket application surface and the mating surface.
- Remove the liquid gasket completely from the groove of the gasket application surface, mounting bolts, and bolt holes.
2. Wipe the gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
3. Attach the liquid gasket to the tube presser.
   Use Genuine Liquid Gasket or equivalent.



4. Apply the gasket without breaks to the specified location with the specified dimensions.
- If there is a groove for the liquid gasket application, apply the gasket to the groove.



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



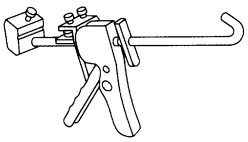
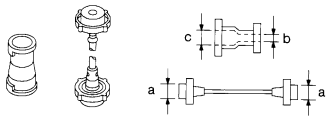
CAUTION:
If there are specific instructions in the service manual, observe them.

PREPARATION

PFP:00002

Special Service Tools

EBS007AO

Tool number Tool name	Description
WS39930000 Tube pressure  S-NT052	Pressing the tube of liquid gasket
EG17650301 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)
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

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS007AP

	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	
			Mechanical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	—	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper coolant mixture ratio	—	—	—
	Poor coolant quality	—	—	—
	Insufficient coolant	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

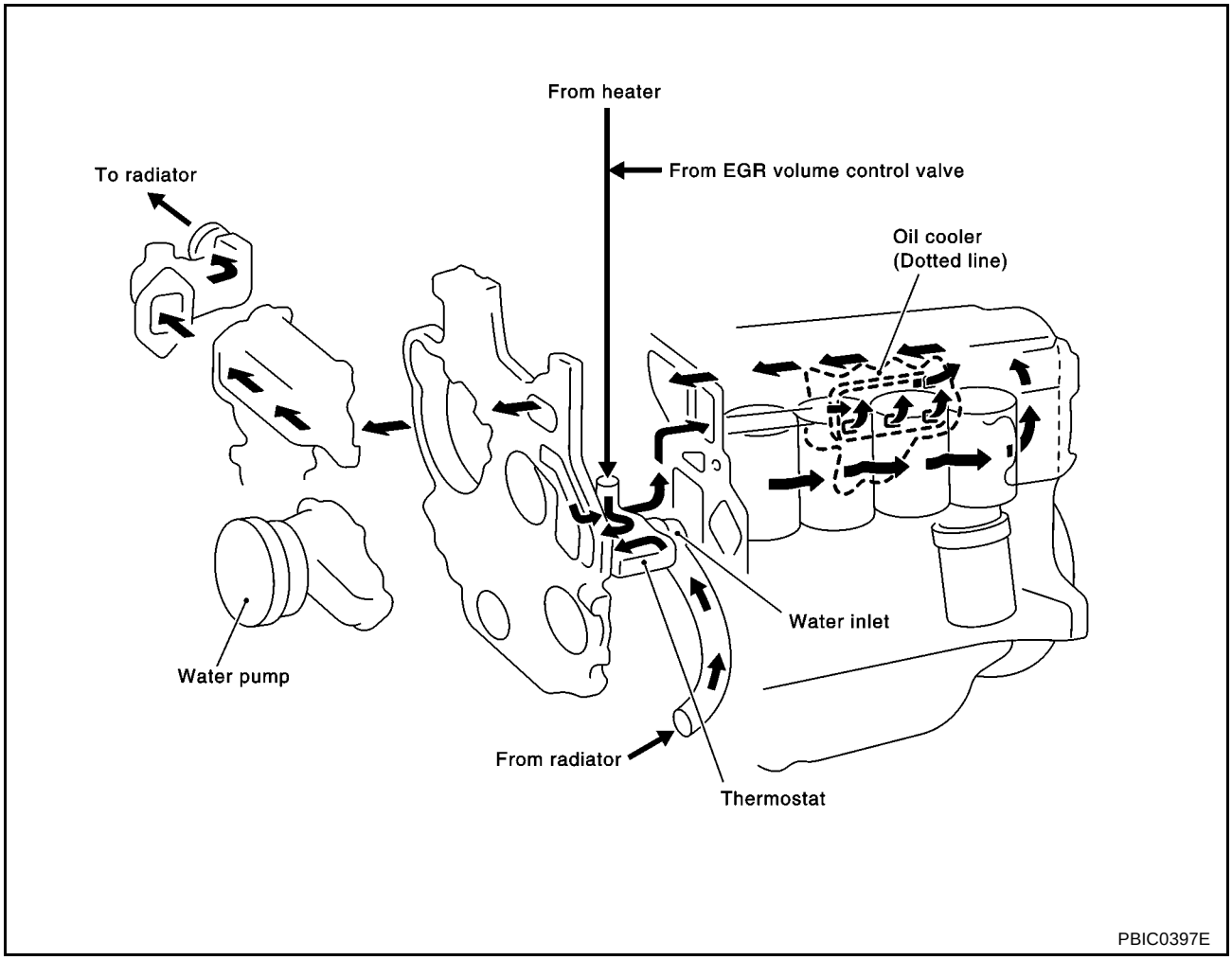
	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			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	—	
		Installed large fog lamp		

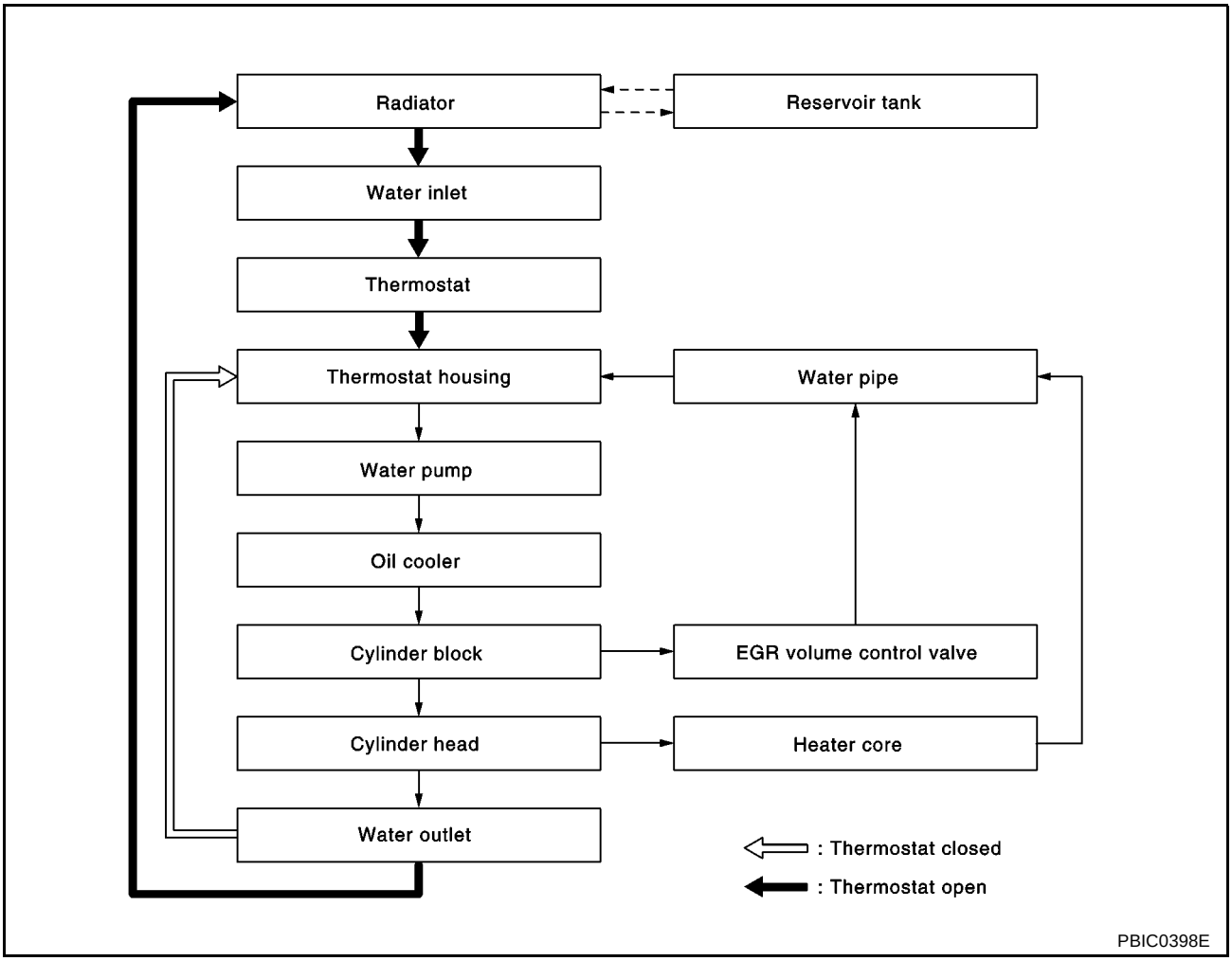
COOLING SYSTEM

PFP:21020

Cooling Circuit

EBS007AQ




Radiator
Reservoir tank
Water inlet
Thermostat
Thermostat housing
Water pipe
Water pump
Oil cooler
Cylinder block
EGR volume control valve
Cylinder head
Heater core
Water outlet
: Thermostat closed
: Thermostat open
PBIC0398E

ENGINE COOLANT

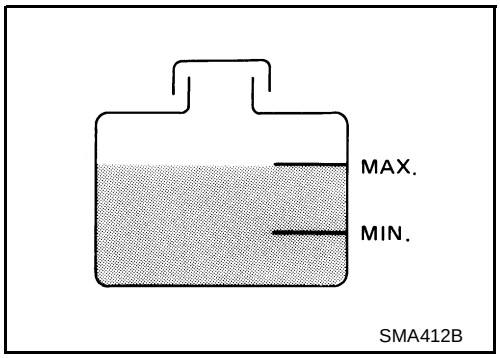
PFP:KQ100

Inspection

EBS007AR

LEVEL CHECK

- Check if the reservoir tank coolant level within MIN to MAX when engine is cool.
- Drain or refill coolant amount when it is too much or to little.



LEAK CHECK

- To check for leakage, apply pressure to the cooling system with a tester.

Testing pressure:

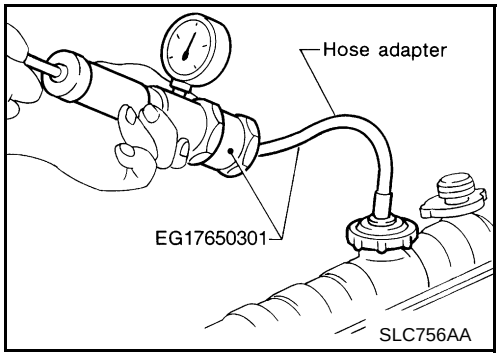
157 kPa (1.57 bar, 1.6 kg/cm^2 , 23 psi)

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure coolant escaping from the radiator.

CAUTION:

Higher pressure than specified above may cause radiator damage.



Changing Engine Coolant

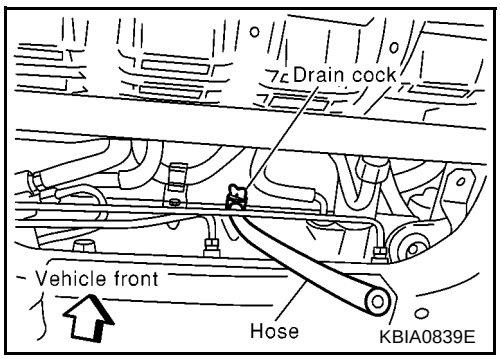
EBS007AS

WARNING:

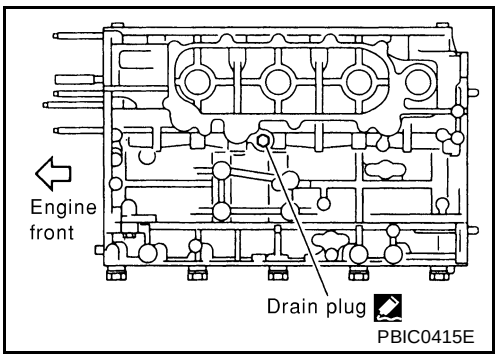
- **To avoid being scalded, never change the coolant when the engine is hot.**
- **Wrap a thick cloth around cap and carefully remove the cap. First, turn the cap a quarter of a turn to release built-up pressure. Then turn the cap all the way.**

DRAINING ENGINE COOLANT

1. Set temperature of front heater control to “FULL HOT”.
2. Open and secure engine room LH cover.
3. Remove radiator cap.
4. Remove plate from under radiator.
5. Connect hose to drain cock to drain coolant.
   - Use commercially available hose. [inside diameter: approx. 9 mm (0.35 in), length: approx. 300 mm (11.81 in)].



6. Remove drain plug from cylinder block to drain coolant.
7. Drain coolant from reservoir tank.
   - Check drained coolant for contaminants such as rust, corrosion or discoloration. If contaminated flush engine cooling system, refer to CO-34, "FLUSHING COOLING SYSTEM" .



REFILLING ENGINE COOLANT

1. Install reservoir tank, radiator drain plug and cylinder block drain plugs.

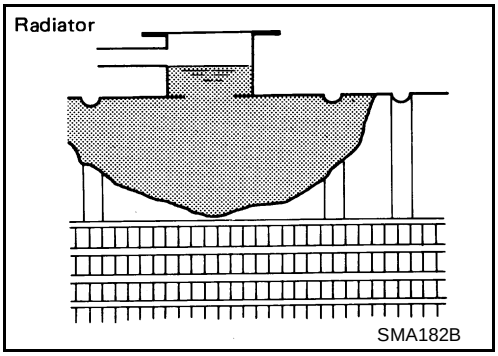
Apply sealant to the thread of cylinder block drain plugs.

- **Use Genuine Liquid Gasket or equivalent.**

: 23.5 - 26.5 N·m (2.4 - 2.7 kg-m , 18 - 19 ft-lb)

2. Fill radiator and reservoir tank to specified level.

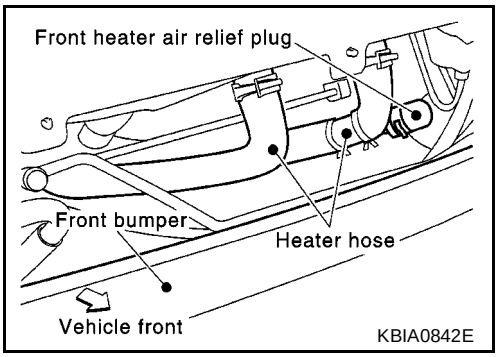
- **Use Nissan genuine coolant or equivalent mixed with water (distilled or demineralized).**
  Refer to MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS".



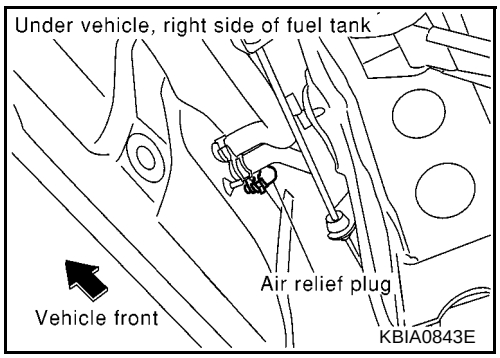
Engine coolant capacity (With reservoir tank):
With front and rear heater:
Approximately 12.6 ℓ (11-1/8 Imp qt)
With front heater:
Approximately 11.4 ℓ (10 Imp qt)
Without heater:
Approximately 10.0 ℓ (8-3/4 Imp qt)

Reservoir tank capacity:
0.8 ℓ (3/4 Imp qt)

3. Make certain each hose clamp and drain plug are securely tightened.
4. Set temperature of front heater control to “FULL HOT”.
5. Remove front grille, and remove front heater air relief plug.
   - For removal of front grille, refer to EI-12, "FRONT GRILLE" .



6. Remove rear heater air relief plug from right-side of fuel tank under vehicle (models with rear heater).



7. Pour coolant through coolant filler neck slowly of less than 2 ℓ (1-3/4 Imp qt) a minute to allow air in system to escape.

- When coolant overflows air relief hole on heater hose, install air relief plug.

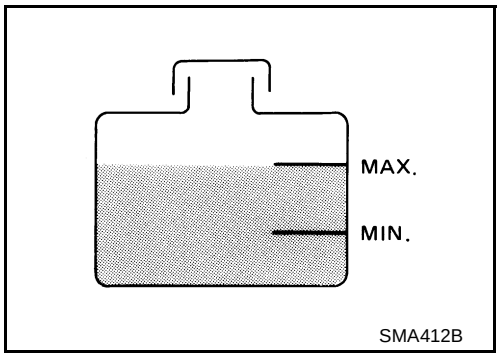
8. Fill reservoir tank with coolant up to the MAX level.
9. Warm up engine to normal operating temperature without radiator cap installed.

- **If coolant overflows radiator filler hole, install filler cap.**

10. Run engine at 3,000 rpm for 10 seconds and return to idle speed with radiator cap installed.

- Repeat two or three times.

Watch coolant temperature gauge so as not to overheat the engine.



11. Stop engine.

CAUTION:
Steps 10 and 11 (shown above) must be finished within one minute to prevent coolant temperature from rising.

12. Cool down to less than approximately 50°C (122°F).

- Cool down using a fan to shorten the time.
- If necessary, refill radiator up to filler neck with coolant.

13. Refill reservoir tank to MAX level line with coolant.
14. Repeat steps 10 through 13 two or more times with radiator cap installed until coolant level no longer drops.
15. Check cooling system for leaks with engine running.
16. Warm up engine, and check for sound of coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between COOL and WARM.

CAUTION:
Be careful not to overheat.

- To check thermostat valve condition, touch lower radiator hose by hand. If water flow is hot, valve is open.

17. Stop engine.
18. After cooling engine [approx. 50°C (122°F) or lower], remove radiator cap and check coolant level. If level is low, fill up to radiator neck again and repeat from step 16.
19. When coolant level stabilizes, fill reservoir tank up to “MAX” line.

FLUSHING COOLING SYSTEM

1. Open air relief plug.
2. 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.
3. Run engine and warm it up to normal operating temperature.
4. Rev engine two or three times under no-load.
5. Stop engine and wait until it cools down.
6. Drain water.

7. Replace steps 1 through 6 until clear water begins to drain from radiator.

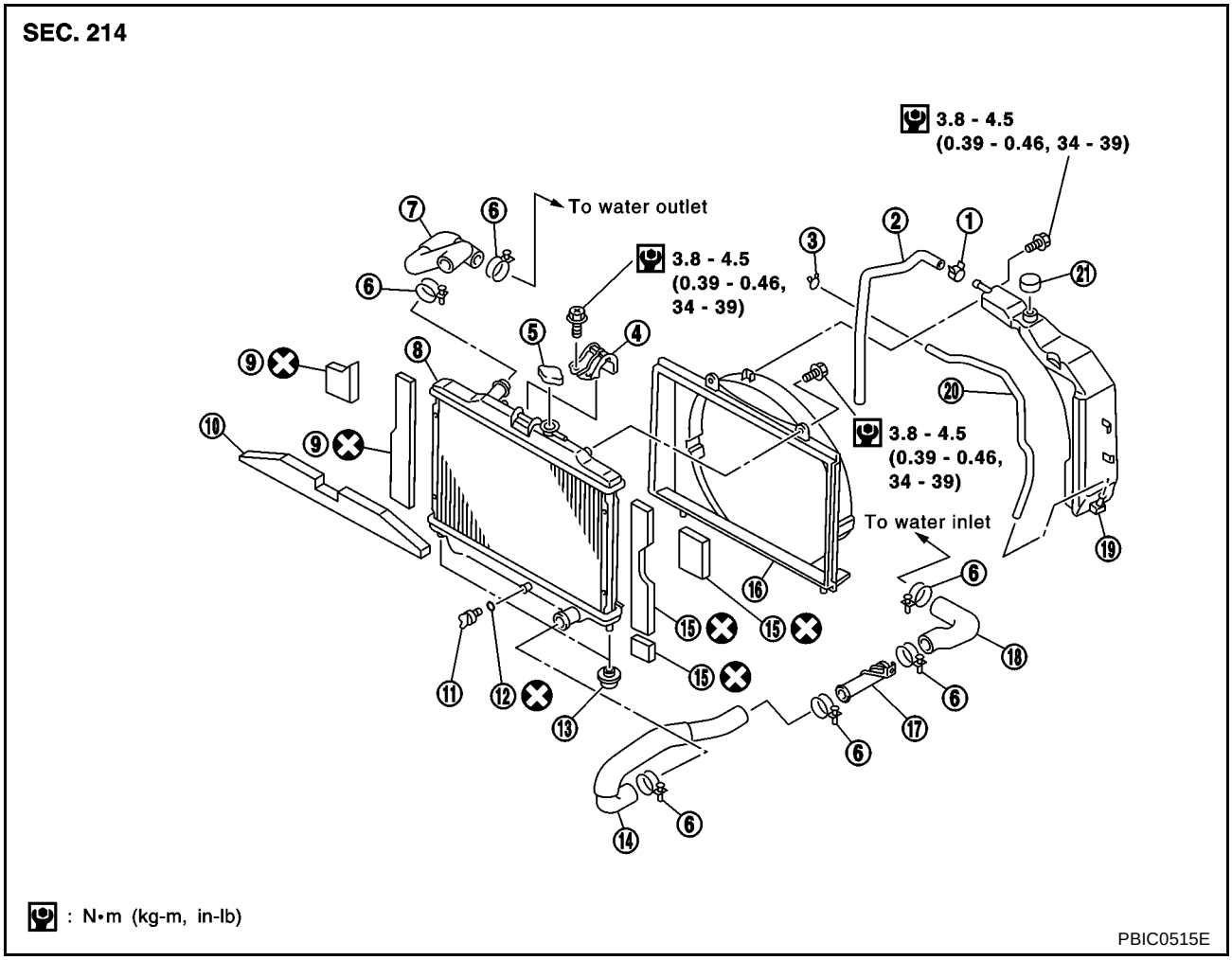
RADIATOR

PFP:21400

Removal and Installation

EBS007AT

SEC. 214



1	Clamp	2	Reservoir tank hose	3	Clamp
4	Mounting bracket	5	Radiator cap	6	Clamp
7	Radiator hose (upper)	8	Radiator	9	Air guide
10	Air guide	11	Drain cock	12	O-ring
13	Mounting rubber	14	Radiator hose (lower)	15	Air guide
16	Radiator shroud	17	Water pipe	18	Radiator hose (lower)
19	Reservoir tank	20	Reservoir tank hose	21	Cap

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

REMOVAL

1. Open and secure engine room LH cover.
2. Remove front under cover, and remove plate from under radiator.
3. Remove cover from left front edge of engine room.
4. Remove RH seat. Refer to SE-4, "FRONT SEAT" .
5. Remove engine room right side cover. Refer to EM-105, "ENGINE ROOM COVER" .
6. Drain coolant. CO-32, "ENGINE COOLANT" .

   CAUTION:
   Perform when the engine is cold.
7. Remove reservoir tank.

8. Remove radiator upper and lower hose.
9. Remove radiator mounting bracket to free radiator.
10. Remove radiator shroud.
11. Remove cooling fan. Refer to CO-42, "COOLING FAN" .
12. Lift up and remove the radiator.

CAUTION:

- **Do not damage or scratch radiator core when removing.**
- **When air guide is removed from radiator replace with new one. Once it removed the adhering force will be weakened.**

INSTALLATION

- Install in the reverse order of removal.
- Use genuine shroud mounting bolts or equivalents. Make sure to tighten them to the specified torque.

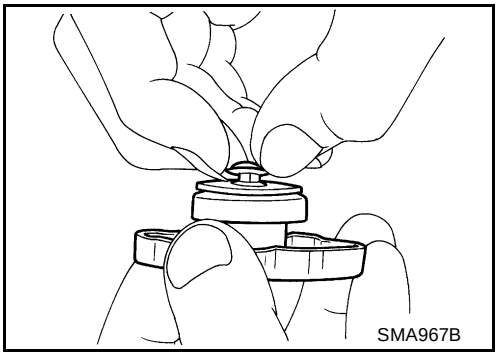
CAUTION:

- **Install radiator with air guide adhered surely.**
- **Install air guide so that no gap exists between vehicle body and air guide.**

CHECKING RADIATOR CAP

1. Pull the negative pressure valve to open it and check that it close completely when released.

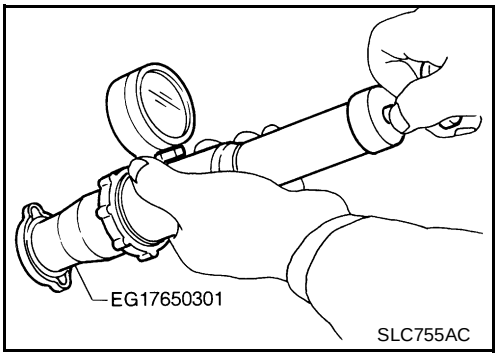
- Check that there is no dirt or damage on the valve seat of the radiator cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of the negative-pressure valve.



2. Check radiator cap relief pressure.

Standard : **108 - 127 kPa (1.08 - 1.27 bar, 1.1 - 1.3 kg/cm^2 , 16 - 18psi)**

Limit : **88 kPa (0.88 bar, 0.9 kg/cm^2 , 13 psi)**



- When connecting the radiator cap to the tester, apply coolant to the cap seal part.
- Replace the radiator cap if there is an unusual condition in the negative-pressure valve, or if the open-valve pressure is outside of the standard values.

CHECKING RADIATOR

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 shroud and horns. Then tape the harness and connectors to prevent water from entering.

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

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

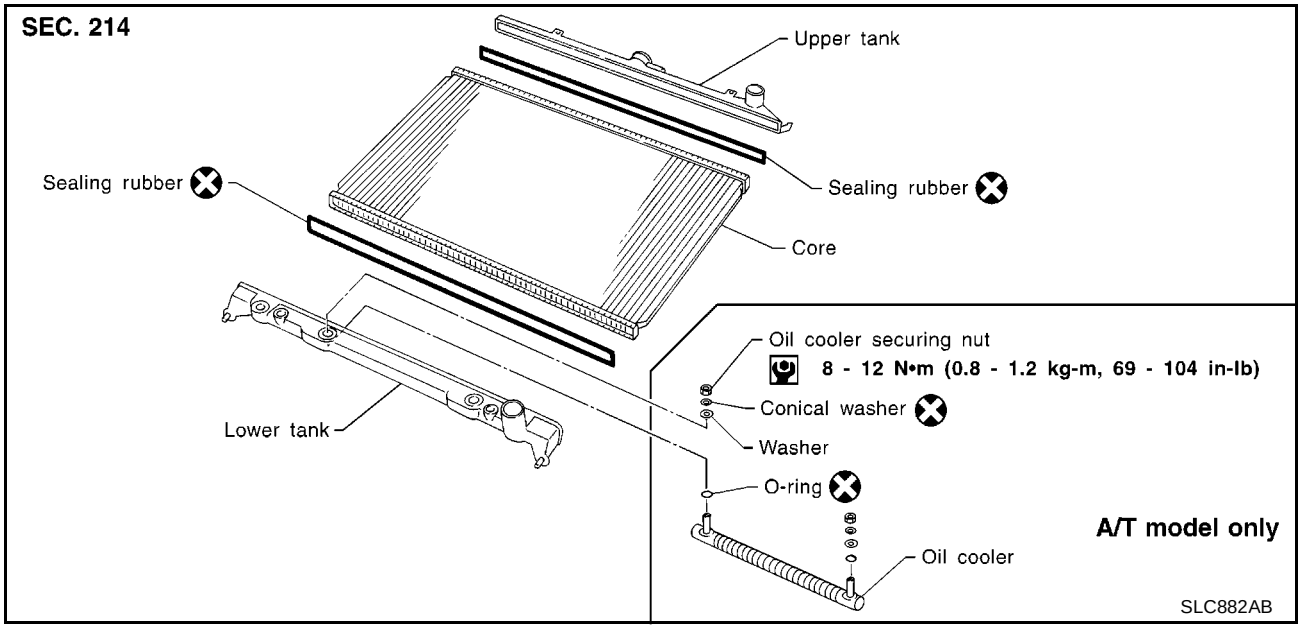
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

RADIATOR (ALUMINUM TYPE)

PFP:21460

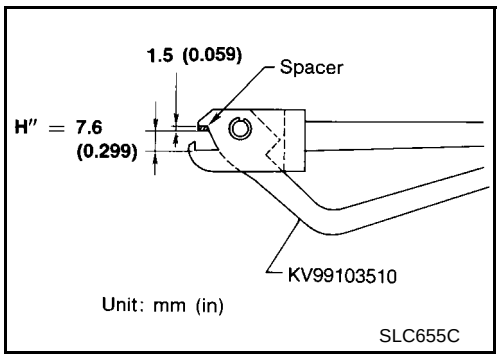
Disassembly and Assembly

EBS007AU



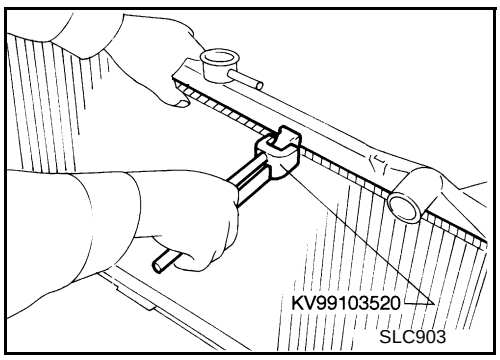
PREPARATION

1. Attach the spacer to the tip of the radiator plate pliers A. Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when radiator plate pliers A are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.



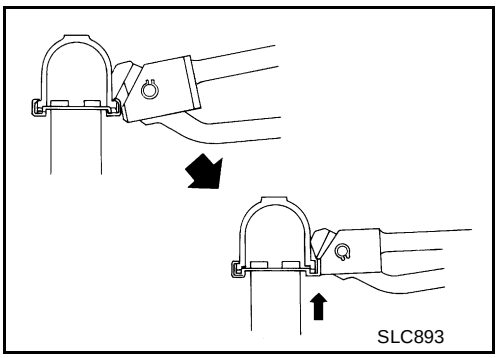
DISASSEMBLY

1. Remove tank with Tool.



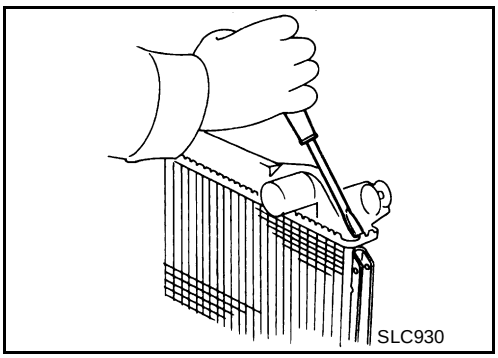
- Grip the crimped edge and bend it upwards so that Tool slips off.

Do not bend excessively.

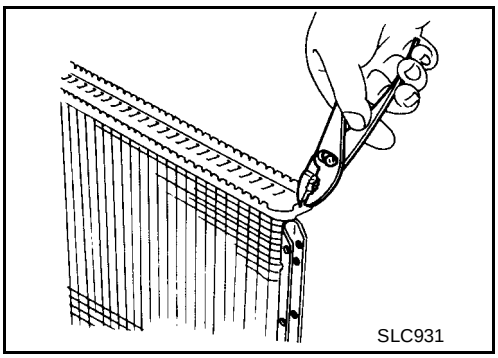


- In areas where Tool cannot be used, use a screwdriver to bend the edge up.

Be careful not to damage tank.



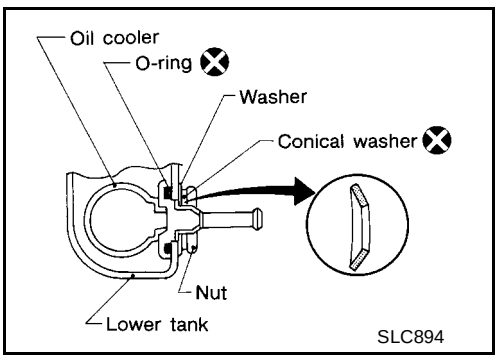
2. Make sure the edge stands straight up.
3. Remove oil cooler from tank. (A/T model only)



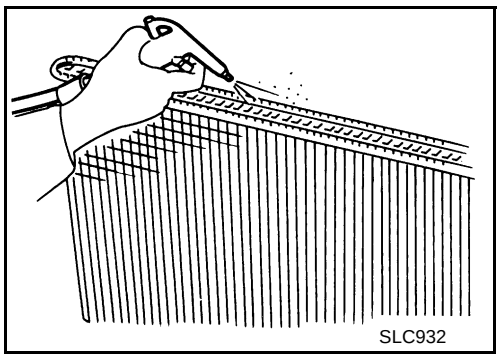
ASSEMBLY

1. Install oil cooler. (A/T model only)

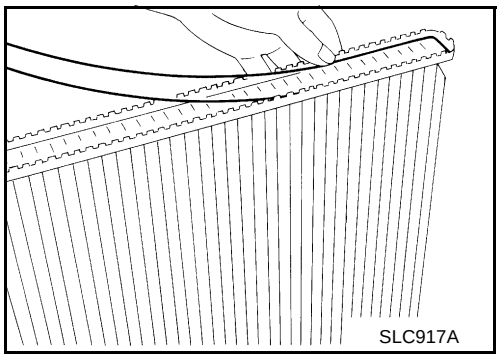
Pay attention to direction of conical washer.



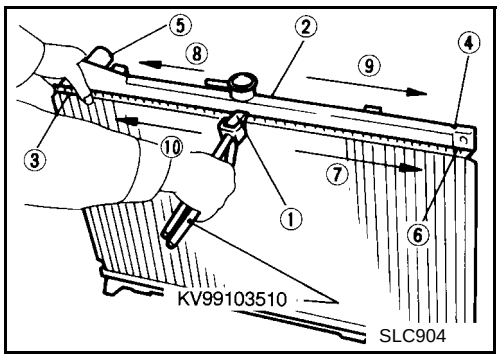
2. Clean contact portion of tank.


SLC932

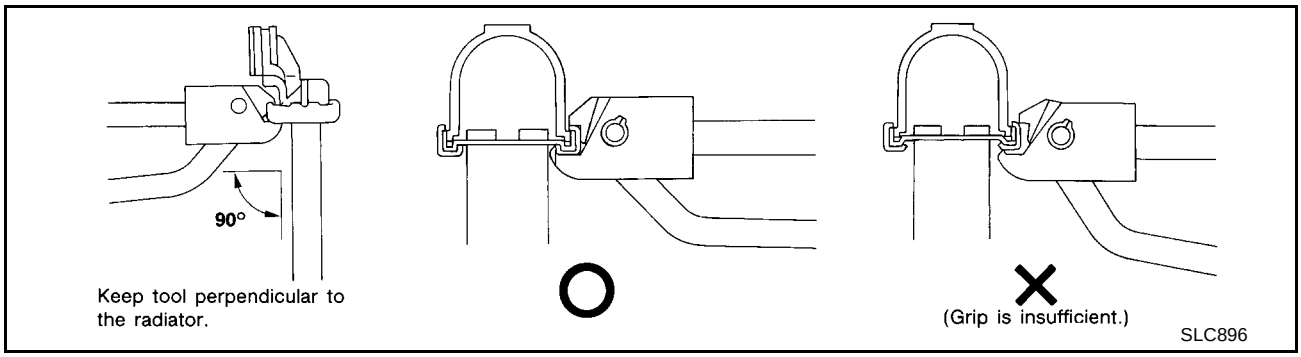
3. Install sealing rubber.
Push it in with fingers.
Be careful not to twist sealing rubber.


SLC917A

4. Caulk tank in specified sequence with Tool.

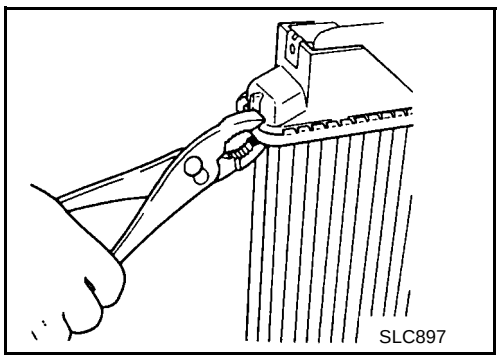


SLC904



SLC896

- Use pliers in the locations where Tool cannot be used.

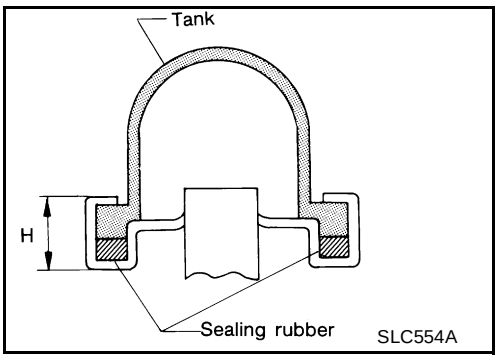

SLC897

5. Make sure that the rim is completely crimped down.

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

6. Confirm that there is no leakage.

Refer to Inspection.



INSPECTION

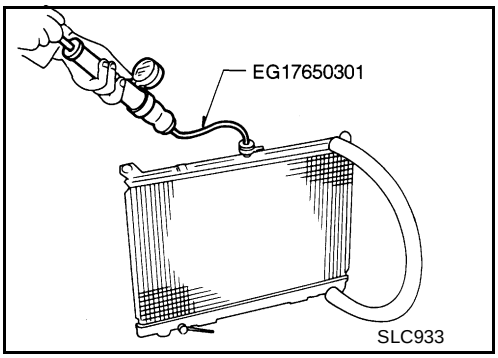
1. Apply pressure with Tool.

Specified pressure value:

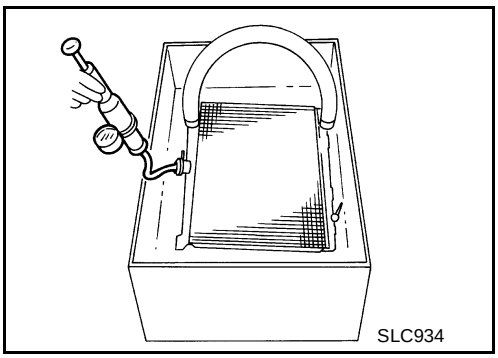
157 kPa (1.57 bar, 1.6 kg/cm^2 , 23 psi)

WARNING:

To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp.
Attach a hose to the oil cooler as well. (A/T model only)



2. Check for leakage.

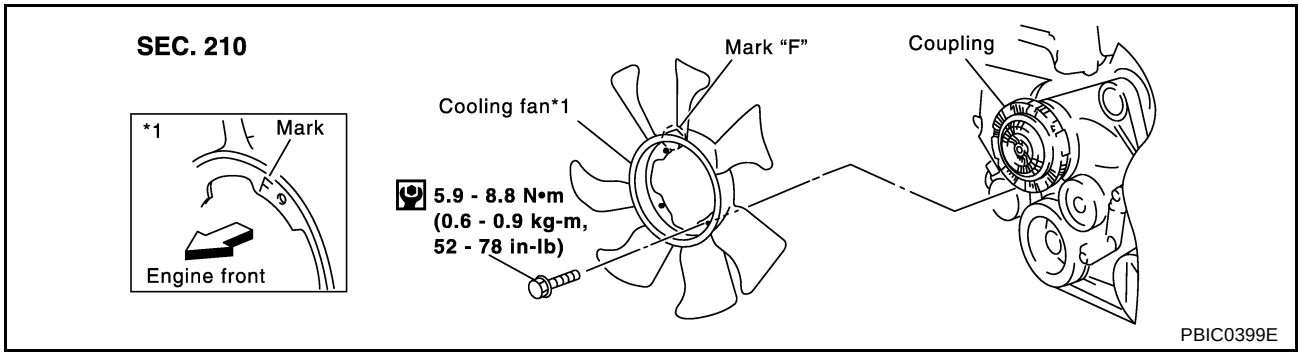


COOLING FAN

PFP:21140

Removal and Installation

EBS007AV



REMOVAL

1. Remove front side under cover.
2. Open and secure engine room LH cover.
3. Remove RH seat. Refer to SE-4, "FRONT SEAT" .
4. Remove engine room RH cover. Refer to EM-105, "ENGINE ROOM COVER" .
5. Drain engine coolant.

   CAUTION:
   Perform when the engine is cold.
6. Remove reservoir tank.
7. Remove radiator upper hose.
8. Remove radiator shroud. Refer to CO-36, "RADIATOR" .
9. Remove cooling fan.

INSTALLATION

Install in the reverse order of removal referring the following.

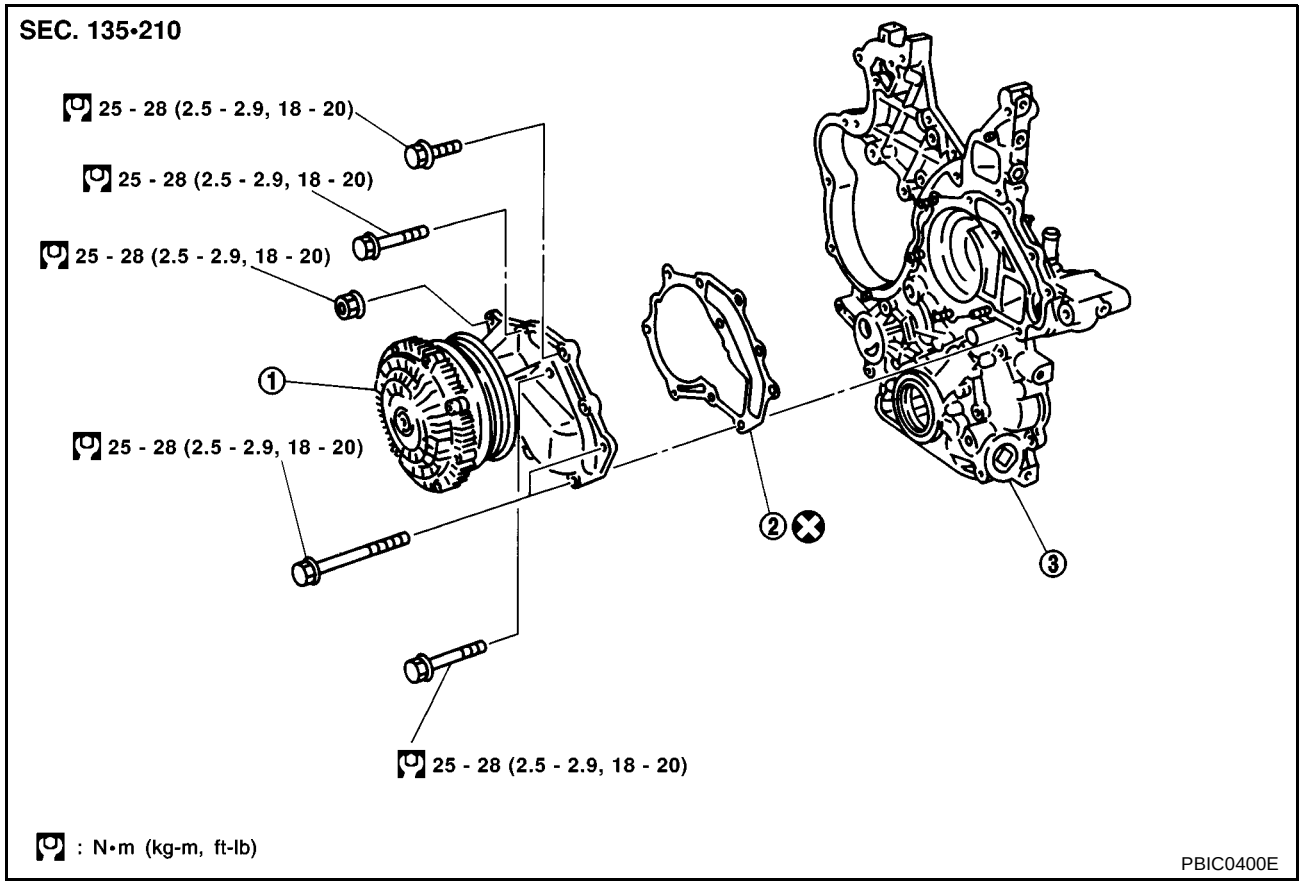
- Install cooling fan with its front mark “F” facing front of engine. Refer to “Component Parts Illustration”.

WATER PUMP

PFP:21020

Removal and Installation

EBS007AX



1. Water pump
2. Gasket
3. Gear case

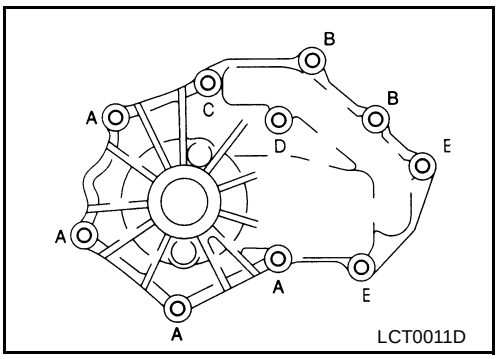
WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

REMOVAL

1. Remove cooling fan. Refer to COOLING FAN CO-42, "Removal and Installation" .
2. Remove drive belt. Refer to EM-107, "DRIVE BELTS" .
3. Remove insulator from front surface of chain cover.
4. Remove vacuum pipe.
5. Remove TDC sensor with bracket.
6. Drain coolant up to the level where no coolant spills from water pump. Refer to CO-32, "ENGINE COOLANT" .
7. Remove water pump.

- Remove installation bolts and nuts (A to E) shown in figure. (In figure, coupling is omitted for ease of illustration.)



NOTE:

Bolts E pass through gear case to the matching holes in water inlet pipe. Therefore, when bolts E are removed, water inlet pipe is separated from engine body.

CAUTION:

Do not disassemble water pump.

INSPECTION AFTER REMOVAL

- Visually check that there is no significant dirt or rusting on the water pump body and vane.
- Check that there is no looseness in the vane shaft, and that it turns smoothly when rotated by hand.
- Visually check that there is no fluid leakage from the cooling fan pump part and the cooling fan speed control solenoid part.
- If there are any unusual conditions, replace the water pump assembly.

INSTALLATION

- Following instructions below, install in reverse order of removal.

Installation of Water Pump

- Bolts and nuts vary depending on installation location. Refer to figure to install them.

  Bolt length:

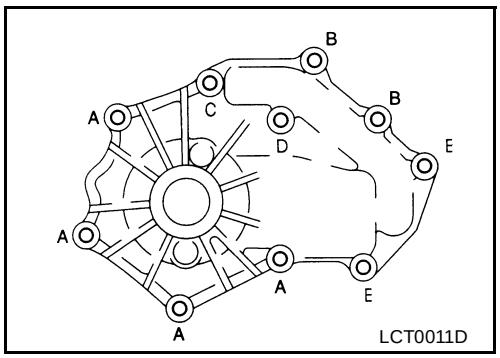
  A: — (Nut)

  B: 30 mm (1.18 in)

  C: 50 mm (1.97 in)

  D: 65 mm (2.56 in)

  E: 90 mm (3.54 in)



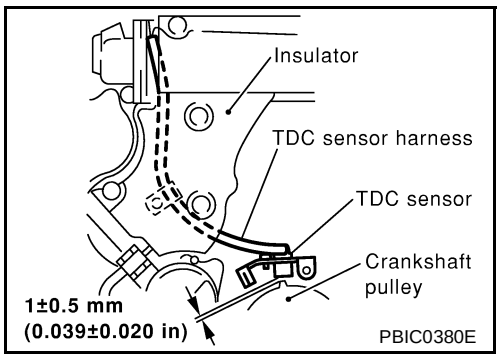
- If threads of bolts E are difficult to engage, move water inlet to adjust thread position.

Installation of TDC Sensor

- Align knock pin on bracket with hole on gear case, and tighten installation bolt.
- With sensor installed, confirm that clearance between top of sensor and protrusion on crankshaft pulley for TDC signal detection is within specifications shown below.

  Standard : 1±0.5 mm (0.039±0.020 in)

- If it is outside the specifications, check for installation condition and bracket deformation.
- Route TDC sensor harness as shown in figure.



CAUTION:

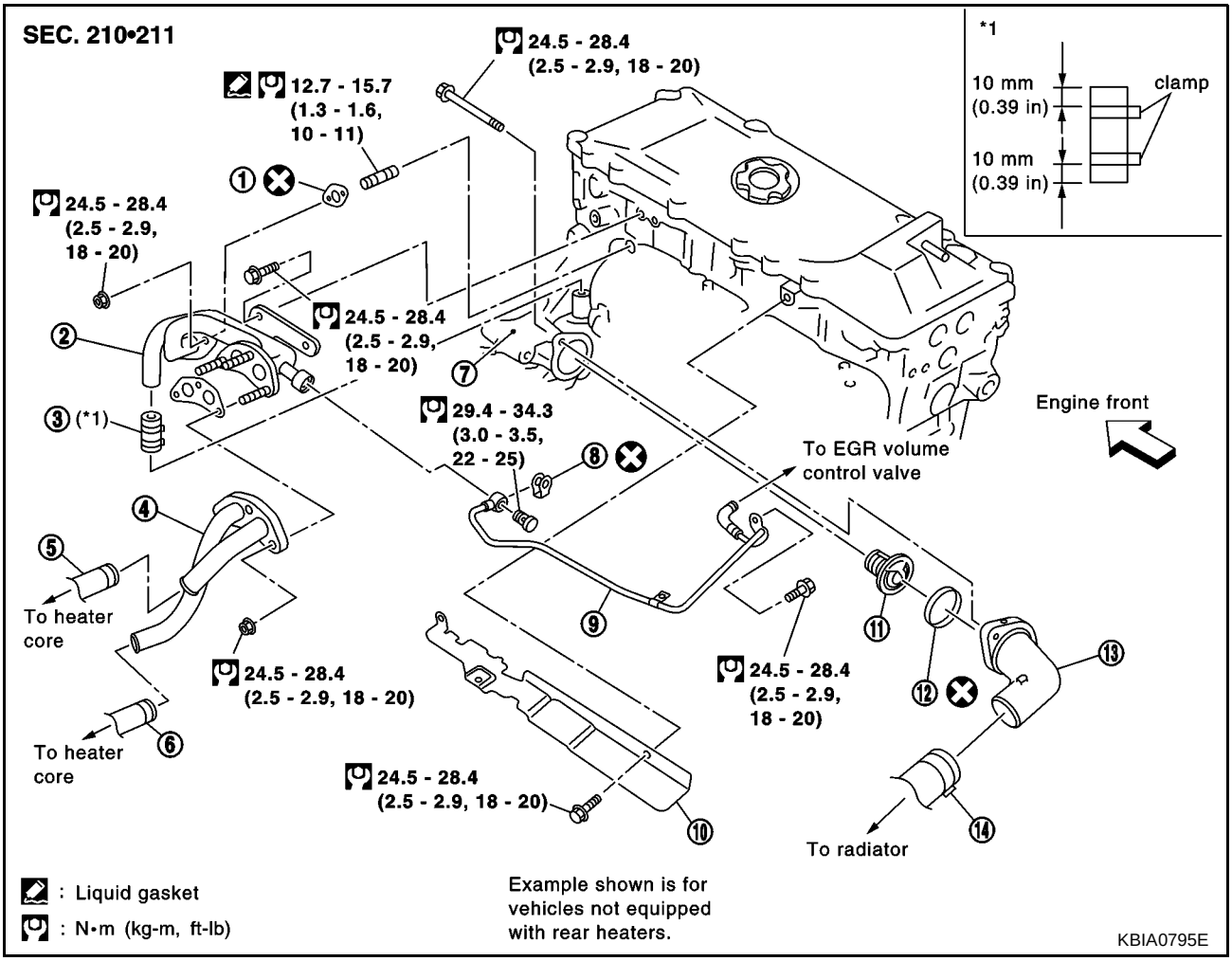
When installing harness clamp, be careful not to loosen harness around crankshaft pulley.

THERMOSTAT AND WATER PIPING

PFP:21200

Removal and Installation

EBS007AY



1. Gasket
2. Heater pipe
3. Water hose
4. Heater pipe
5. Heater hose
6. Heater hose
7. Thermostat housing
8. Washer
9. Water pipe
10. Harness bracket
11. Thermostat
12. Rubber ring
13. Water inlet pipe
14. Radiator lower hose

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

REMOVAL

1. Remove front side and rear side under cover.
2. Open engine room LH cover and secure it.
3. Drain engine coolant.

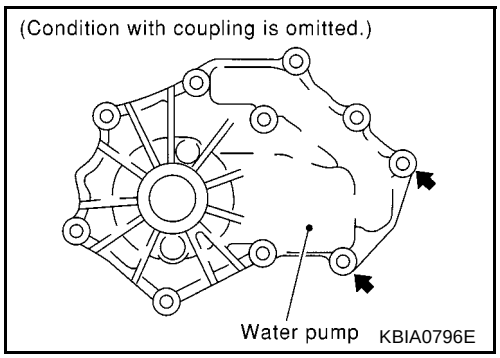
CAUTION:

Perform when the engine is cold.

4. Remove drive belt. Refer to EM-107, "DRIVE BELTS" .
5. Remove radiator lower hose from water inlet pipe-side.

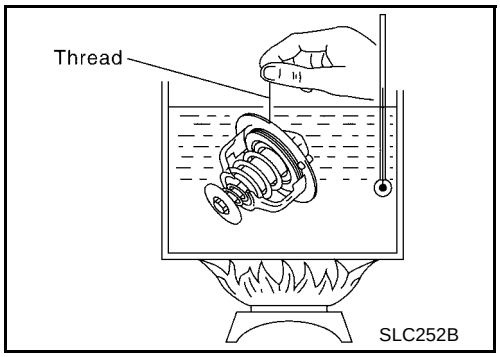
6. Remove installation bolts (2) shown by arrows in figure, and remove water inlet valve.
7. Remove thermostat.
8. Following steps below, remove heater pipe.

a. Remove heater hose from heater pipe.
b. Remove water pipe for EGR volume control valve (except models with rear heater).
c. Remove A/C compressor and A/C compressor bracket. Refer to MTC-94, "A/C CYCLE" .
d. Remove heater pipe.



INSPECTION AFTER REMOVAL

- Place a thread so that it is caught in the valves of the thermostat. Immerse fully in a container filled with water. Heat while stirring. (The example in the figure shows the thermostat.)
- The valve opening temperature is the temperature at which the valve opens and falls from the thread.
- Continue heating. Check the full-open lift amount.
- After checking the full-open lift amount, lower the water temperature and check the valve closing temperature.



Standard values

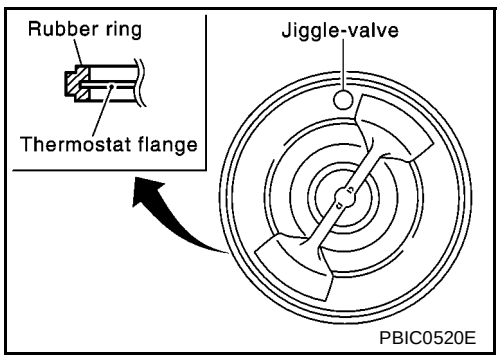
	Thermostat
Valve opening temperature	80 - 84°C (176 - 183° F)
Full-open lift	More than 10 mm/ 95°C (0.39 in/ 203 °F)
Valve closing temperature	77°C (171°F) or higher

INSTALLATION

- Install in the reverse order of removal.

Installation of Thermostat

- Install the thermostat with the whole circumference of each flange part fit securely inside the rubber ring. (The example in the figure shows the thermostat.)
- Install the thermostat with the jiggle-valve facing upwards.



Installation of Heater Pipe

- If stud bolt is removed from cylinder head, apply liquid gasket to thread of stud bolt and tighten it.

NOTE:
Liquid gasket must be applied because stud bolt passes through coolant path in cylinder head.

- Water hose (heater pipe-thermostat) clamps must be installed 10 mm (0.39 in) from both edges of hose. Refer to Component Parts Illustration.

Installing Water Pipe for EGR Volume Control Valve

- The pipe cannot be installed in models with rear heater, because their piping path is different from other models.

- Install eye-bolt gasket with its connection facing downward.
- Temporarily tighten eye-bolt and installation bolts, then tighten them to the specified torque.

INSPECTION AFTER INSTALLATION

- After engine is warmed up, check pipes for coolant leakage.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit

EBS007AZ

CAPACITY

Unit: liter (Imp qt)

Coolant capacity [With reservoir tank (MAX level)]	With front and rear heater	Approximately 12.6 (11-1/8)
	With front heater	Approximately 11.4 (10)
	Without heater	Approximately 10.0 (8-3/4)
	Reservoir tank	0.8 (3/4)

THWEMOSTAT

Valve opening temperature	80 - 84°C (176 - 183°F)
Valve lift	More than 10 mm/95°C (0.39 in/203°F)

WATER CONTROL VALVE

Valve opening temperature	93.5 - 96.5°C (200 - 206°F)
Valve lift	More than 8 mm/108°C (0.315 in/226°F)

RADIATOR

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

Cap relief pressure	Standard	108 - 127 (1.08 - 1.27, 1.1 - 1.3, 16 - 18)
	Limit	88 (0.88, 0.9, 13)
Leakage test pressure		157 (1.57, 1.6, 23)

Tightening Torque

EBS00AMM

Unit: N·m (kg-m, ft-lb)
Unit: N·m (kg-m, in-lb)*

Cylinder block drain plug		23.5 - 26.5 (2.4 - 2.7, 18 - 19)
Radiator mounting bracket		3.8 - 4.5 (0.39 - 0.46, 34 - 39)*
Cooling fan		5.9 - 8.8 (0.6 - 0.9, 53 - 77)*
Water pump		24.5 - 28.4 (2.5 - 2.9, 18 - 20)
Water inlet pipe		24.5 - 28.4 (2.5 - 2.9, 18 - 20)
heater pipe		24.5 - 28.4 (2.5 - 2.9, 18 - 20)
EGR volume control valve water pipe	(M8 bolt)	24.5 - 28.4 (2.5 - 2.9, 18 - 20)
	(Eye bolt)	29.4 - 34.3 (3.0 - 3.5, 22 - 25)