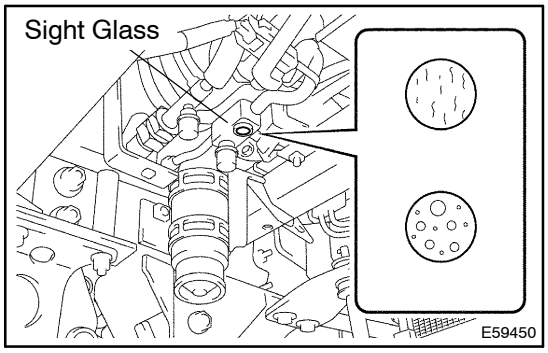
REFRIGERANT

ON–VEHICLE INSPECTION

550W9–01



1. CHECK REFRIGERANT VOLUME

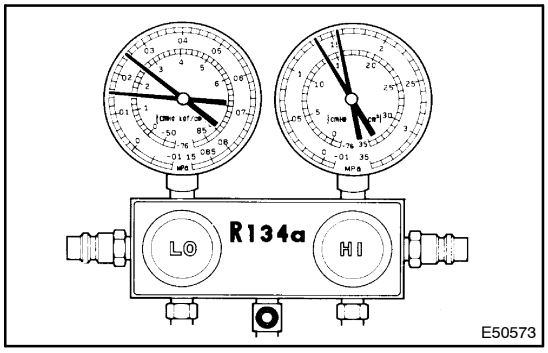
(a) Observe the sight glass on the liquid tube.
Test conditions:
- Running engine at 1,500 rpm
- Blower speed control switch at ”HI”
- A/C switch ON
- Temperature control dial at ”MAX. COOL”
- Fully open the doors

Item	Symptom	Amount of refrigerant	Corrective Actions
1	Bubbles present	Insufficient*	1. Check for gas leakage and repair if necessary 2. Add refrigerant until bubbles disappear
2	No bubbles present	None, insufficient or too much	Refer 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	1. Check for gas leakage with gas leak detector and repair if necessary 2. Add refrigerant until bubbles disappear
4	Considerable temperature difference between compressor inlet and outlet.	Correct or too much	Refer to 5 and 6
5	Immediately after air conditioning is turned off, refrigerant clear	Too much	1. Discharge refrigerant 2. Remove air and supply proper amount or purified refrigerant
6	Immediately after air conditioning is turned off, refrigerant foams and then becomes clear	Correct	–

*: Bubbles in the sight glass with ambient temperatures higher than usual can be considered normal if cooling is sufficient.

2. CHECK REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

(a) This is a method in which the trouble is located by using a manifold gauge set. Read the manifold gauge pressure when the these conditions are established.
Test conditions:
- Temperature at the air inlet with the switch set at RECIRC is 30 – 35°C (86 – 95°F)
- Engine running at 1,500 rpm
- Blower speed control switch at ”HI” position
- Temperature control dial at ”COOL” position
- A/C switch ON
- Fully open doors



(1) Normally functioning refrigeration system.

Gauge reading:

Low pressure side:

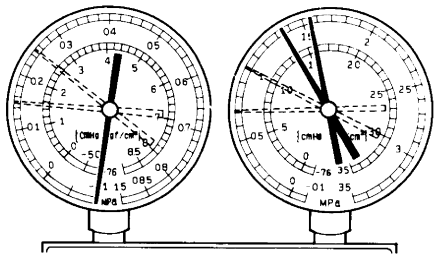
0.15 – 0.25 MPa (1.5 – 2.5 kgf/cm^2)

High pressure side:

1.37 – 1.57 MPa (14 – 16 kgf/cm$^{2)}$

(2) Moisture present in refrigeration system.

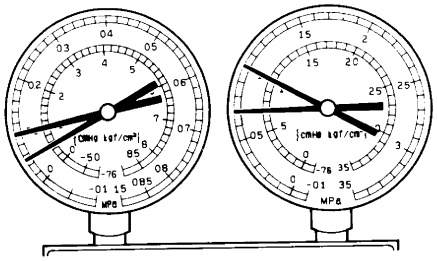
Condition : Periodically cools and then fails to cool



Symptom	Probable cause	Diagnosis	Remedy
During operation, pressure on low pressure side sometimes become a vacuum and sometimes is normal	Moisture in refrigerating system freezes at expansion valve orifice causing a temporary stop of cycle, however, when it melts, normal state is restored.	• Drier in oversaturated state • Moisture in refrigerating system freezes at expansion valve orifice and blocks circulation of refrigerant	1. Replace condenser 2. Remove moisture in cycle by repeatedly evacuating air 3. Supply proper amount of new refrigerant

(3) Insufficient cooling

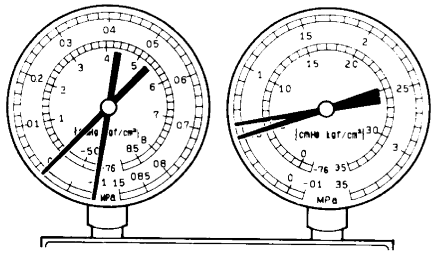
Condition: Cooling system does not function effectively.



Symptom	Probable cause	Diagnosis	Corrective Actions
• Pressure low on both low and high pressure sides • Bubbles seen through sight glass continuously • Insufficient cooling performance	Gas leakage in refrigeration system	• Insufficient refrigerant • Refrigerant leaking	1. Check for gas leakage and repair if necessary 2. Supply proper amount of new refrigerant 3. If indicated pressure value is close to 0 when connected to gauge, create the vacuum after inspecting and repairing location of leak

(4) Poor circulation of refrigerant

Condition: Cooling system does not functioning effectively.

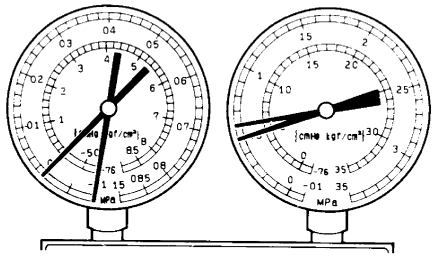


I22119

Symptom	Probable cause	Diagnosis	Corrective Action
• Pressure low on both low and high pressure sides • Frost on pipe from condenser to unit	Refrigerant flow obstructed by dirt in receiver	Receiver clogged	Replace condenser

(5) Refrigerant does not circulate

Condition: Cooling system does not function. (Sometimes it may function)

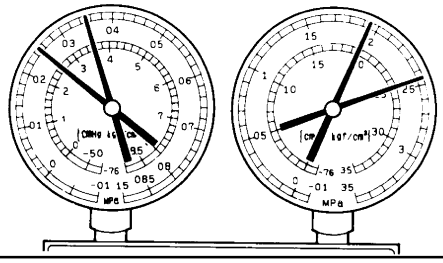


I22120

Symptom	Probable cause	Diagnosis	Corrective Actions
• Vacuum indicated on low pressure side, very low pressure indicated on high pressure side • Frost or dew seen on piping before and after receiver/ drier or expansion valve	• Refrigerant flow obstructed by moisture or dirt in refrigerating system • Refrigerant flow obstructed by gas leaked from expansion valve	Refrigerant does not circulate	1. Check expansion valve 2. Clean out dirt in expansion valve by air blowing 3. Replace condenser 4. Evaporate air and supply proper amount of new refrigerant 5. For gas leakage from expansion valve, replace expansion valve

(6) Refrigerant overcharged or insufficient cooling of condenser

Condition: Cooling system does not function effectively.

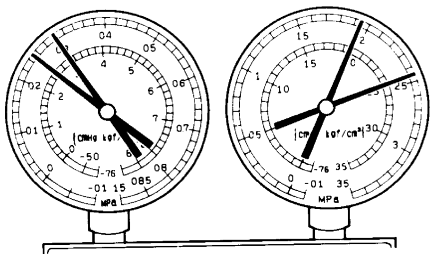


I22121

Symptom	Probable cause	Diagnosis	Remedy
• Pressure too high on both low and high pressure sides • No air bubbles seen through the sight glass even when the engine rpm is lowered	• Unable to develop sufficient performance due to excessive use of refrigerating system • Insufficient cooling of condenser	• Excessive refrigerant in cycle→too much refrigerant supplied • Condenser cooling insufficient→condenser fins clogged at cooling fan	1. Clean condenser 2. Check cooling fan with cooling fan motor operation 3. If (1) and (2) are in normal state, check amount of refrigerant and supply proper amount of refrigerant

(7) Air present in refrigeration system

Condition: Cooling system does not function.



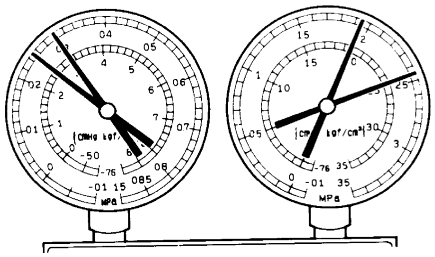
NOTE : These gauge indications are shown when the refrigerating system has been opened and the refrigerant charged without vacuum purging.

I22122

Symptom	Probable cause	Diagnosis	Corrective Actions
• Pressure too high on both low and high pressure sides • The low pressure piping is too hot to touch	Air entered in refrigerating system	• Air present in refrigerating system • Insufficient vacuum purging	1. Check compressor oil to see if it is dirty or insufficient 2. Evacuate air and supply new refrigerant

(8) Expansion valve functions improperly

Condition: Refrigerant functions insufficiently.

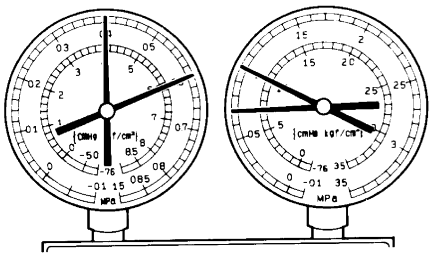


I22123

Symptom	Probable cause	Diagnosis	Corrective Actions
• Pressure too high on both low and high pressure sides • Frost or large amount of dew on piping on low pressure side	Trouble in expansion valve	• Excessive refrigerant in low pressure piping • Expansion valve opened too wide	Check expansion valve

(9) Defective compression compressor

Condition : Refrigerant is not effective.



I22124

Symptom	Probable cause	Diagnosis	Corrective Actions
• Pressure too high on low pressure side • Pressure too low on high pressure side	Internal leak in compressor	• Compression failure • Leakage from damaged valve or broken sliding parts	Repair or replace compressor

Gauge readings (Reference)

