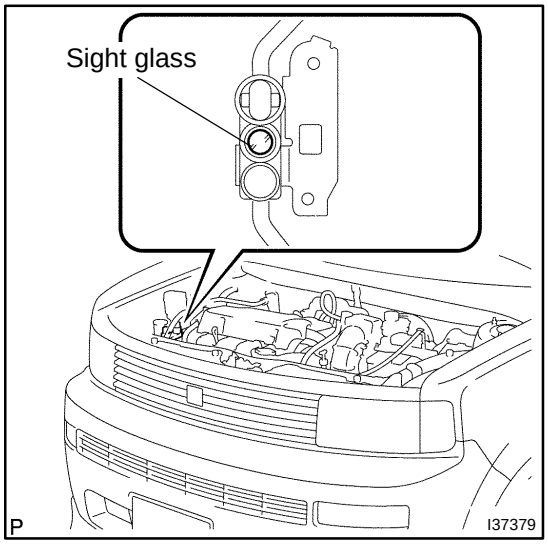
REFRIGERANT

ON–VEHICLE INSPECTION

5511T–01



1. INSPECT REFRIGERANT VOLUME

(a) Check the sight glass on the liquid tube sub–assy A.

Test conditions:

- Engine is running at 1,500 rpm.
- Blower speed control switch is at ”HI”.
- A/C switch is on.
- Temperature control dial is in the ”MAX. COOL”position.
- Doors are fully open.

Item	Symptom	Amount of refrigerant	Corrective Action
1	Bubbles exist	Insufficient*	(1) Check for gas leakage and repair if necessary (2) Add refrigerant until bubbles disappear
2	No bubbles exist	Empty, insufficient or excessive	Refer to 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	Proper or excessive	Refer to 5 and 6
5	Immediately after air conditioning is turned off, refrigerant clears	Excessive	(1) Discharge refrigerant (2) Remove air and supply proper amount of purified refrigerant
6	Immediately after air conditioning is turned off, refrigerant foams and then becomes clear	Proper	–

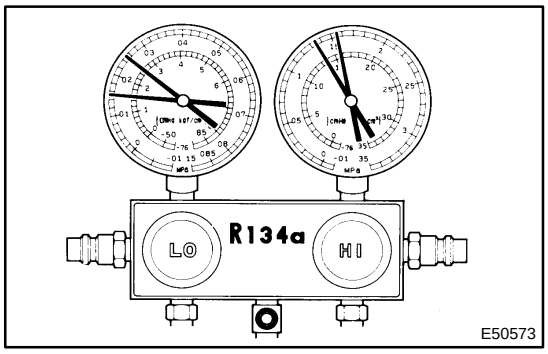
*: Bubbles in the sight glass with ambient temperatures higher than usual can be considered normal if cooling is sufficient.

2. INSPECT 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 these conditions are established.

Test conditions:

- Temperature at the air inlet with the switch set at RECIRC is 30 to 35 °C (86 to 95 °F).
- Engine is running at 1,500 rpm .
- Blower speed control switch is at "HI".
- Temperature control dial is at "COOL".
- A/C switch is on.
- Doors are fully open.



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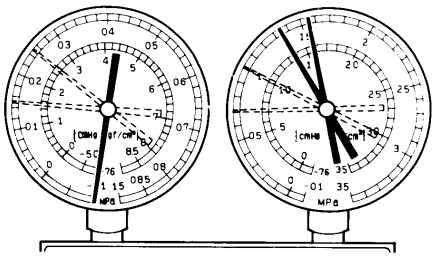
(1) Normally functioning refrigeration system.

Gauge reading:
Low pressure side:
0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm^2)
High pressure side:
1.37 to 1.57 MPa (14 to 16 kgf/cm$^{2)}$

(2) Moisture present in refrigeration system.

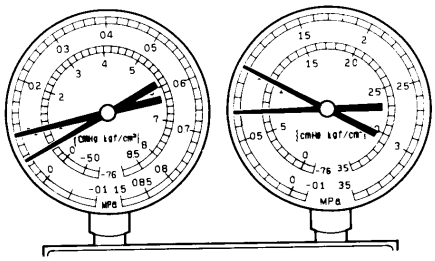
Condition : Periodically cools and then fails to cool


I22117

Symptom	Probable cause	Diagnosis	Corrective Action
During operation, pressure on low pressure side cycles between normal and vacuum	Moisture in refrigeration system freezes at expansion valve orifice, causing a temporary stop of cycle. However, when it melts, normal state is restored.	• Drier in over–saturated state • Moisture in refrigeration 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.

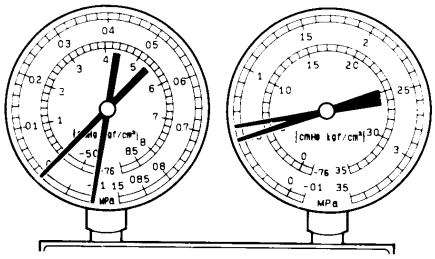


I22118

Symptom	Probable cause	Diagnosis	Corrective Action
• Pressure is low on both low and high pressure sides • Bubbles are 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 the gauge, create vacuum after inspecting and repairing the location of leakage.

(4) Poor circulation of refrigerant

Condition: Cooling system dose not function effectively.

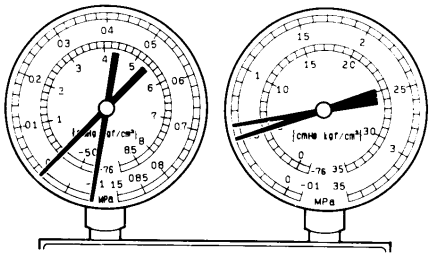


I22119

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

(5) Refrigerant does not circulate

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

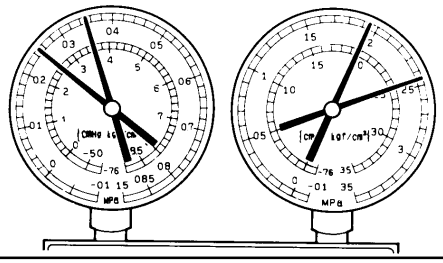


I22120

Symptom	Probable cause	Diagnosis	Corrective Action
• Vacuum is indicated on low pressure side and very low pressure is indicated on high pressure side • Frost or dew is seen on piping on both sides of receiver/drier or expansion valve	• Refrigerant flow is obstructed by moisture or dirt in refrigeration system • Refrigerant flow is obstructed by gas leak from expansion valve	Refrigerant does not circulate	(1) Check the expansion valve (2) Clean out dirt in expansion valve by blowing air (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 is overcharged or cooling effectiveness of condenser is insufficient

Condition: Cooling system does not function.

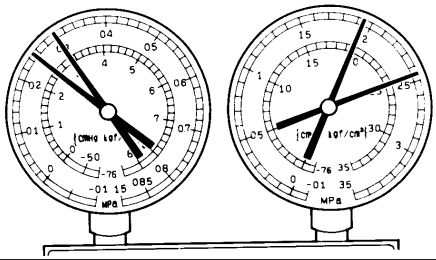


I22121

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

(7) Air present in refrigeration system

Condition: Cooling system does not function.



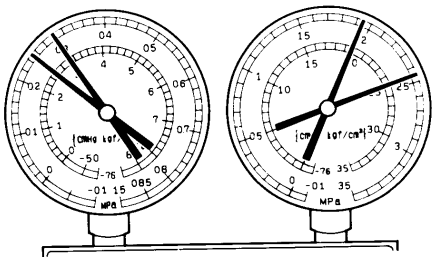
NOTE: These gauge indications occur when the refrigeration system opens and the refrigerant is charged without vacuum purging.

I22122

Symptom	Probable cause	Diagnosis	Corrective Action
• Pressure is too high on both low and high pressure sides • The low pressure piping is too hot to touch • Bubbles can be seen through sight glass	Air in system	• Air present in refrigeration system • Insufficient purging	(1) Check compressor oil to see if it is dirty or insufficient (2) Vacuum and supply new refrigerant

(8) Expansion valve malfunction

Condition: Insufficient cooling.

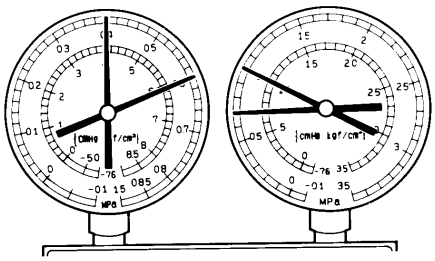


I22123

Symptom	Probable cause	Diagnosis	Corrective Action
• Pressure is 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

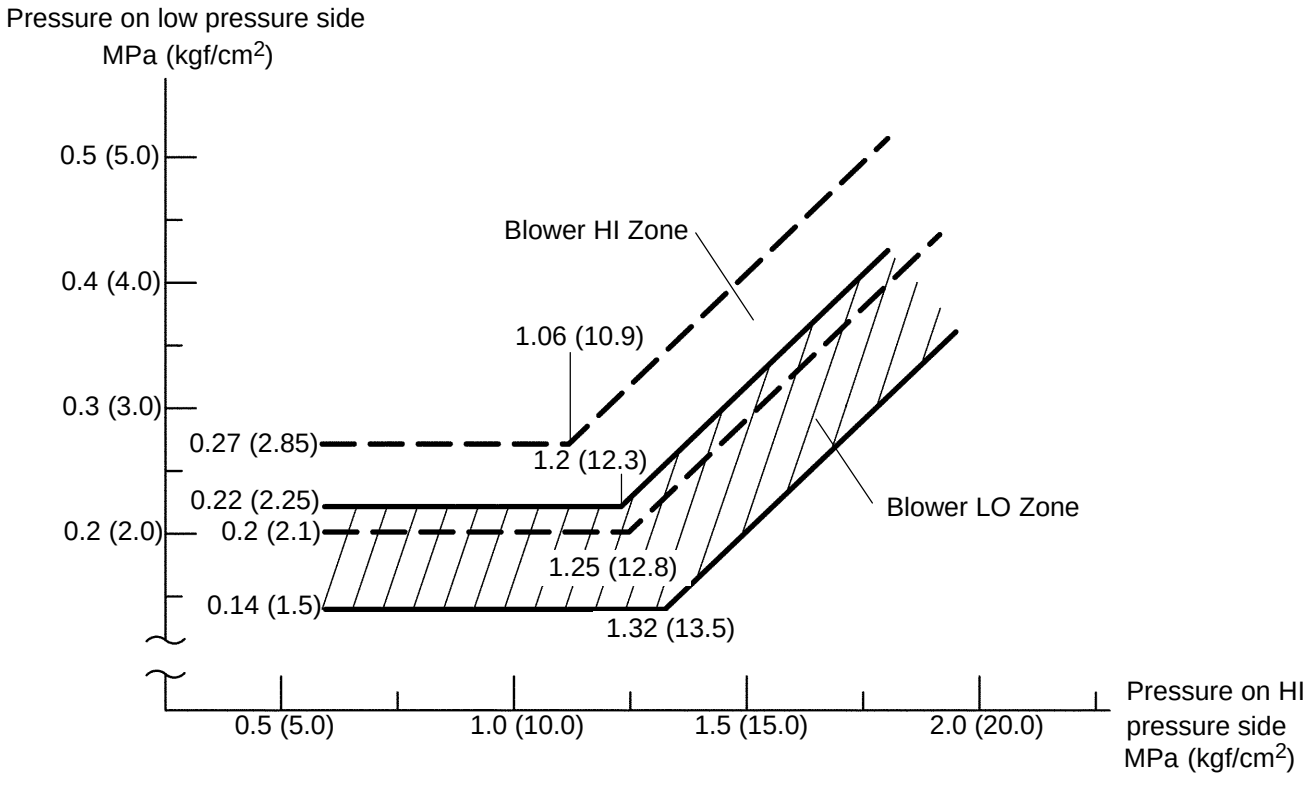
Condition : Insufficient cooling.



I22124

Symptom	Probable cause	Diagnosis	Corrective Actions
• Pressure is too high on both low and high pressure sides • Pressure is 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)



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