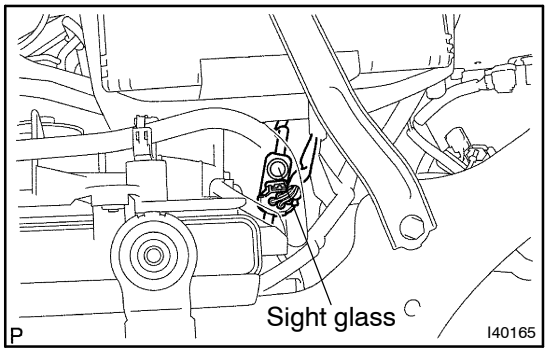
# REFRIGERANT

## ON–VEHICLE INSPECTION

551BU–01




**1. INSPECT REFRIGERANT VOLUME**

(a) Check the sight glass on the cooler refrigerant liquid pipe 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 at ”MAX. COLD”
- Doors are fully open

| Item | Symptom | Amount of refrigerant | Corrective Actions |
|---|---|---|---|
| 1 | Bubbles exist | Insufficient* | (1) Check for gas leakage and repair if necessary<br>(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<br>(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<br>(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 | – |

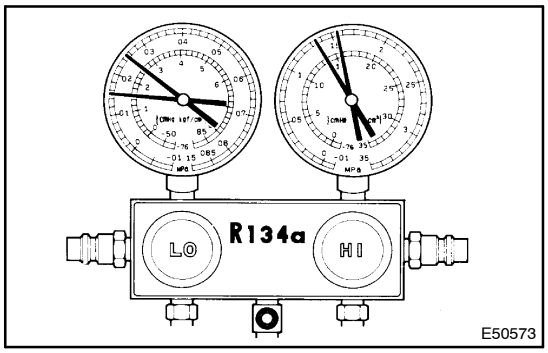
*: Bubbles in the sight glass with room temperature higher than usual can be considered normal if cooling is sufficient.

**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 switch is at "COOL"
- A/C switch is ON
- Doors are fully open

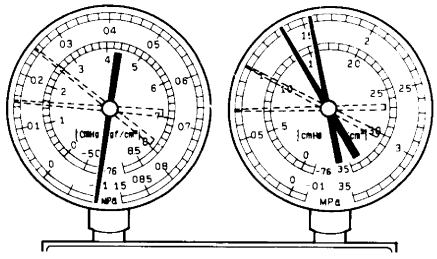



(1) Normally functioning refrigeration system

**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 is present in refrigeration system

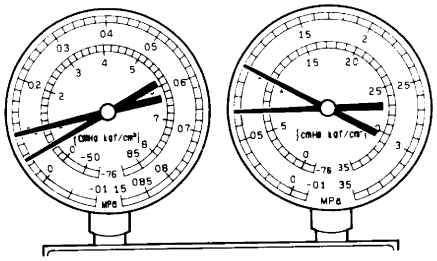
Condition : Periodically cools and then fails to cool.




| Symptom | Probable cause | Diagnosis | Corrective Actions |
|---|---|---|---|
| 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 oversaturated state<br>• Moisture in refrigeration system freezes at expansion valve orifice and blocks circulation of refrigerant | (1) Replace condenser<br>(2) Remove moisture in cycle by repeatedly evacuating air<br>(3) Supply proper amount of new refrigerant |

### (3) Insufficient cooling

Condition: Cooling system does not function effectively.

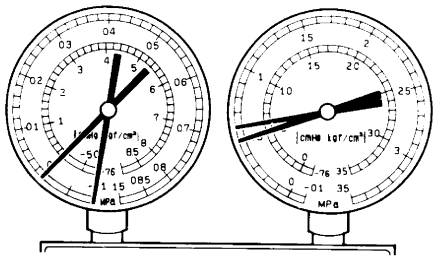


I22118

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

### (4) Poor circulation of refrigerant

Condition: Cooling system does not function effectively.

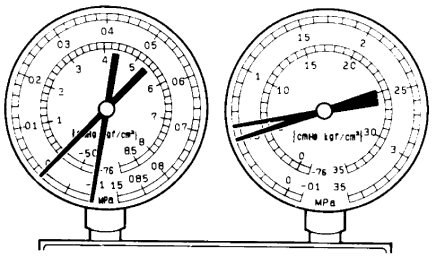


I22119

| Symptom | Probable cause | Diagnosis | Corrective Action |
|---|---|---|---|
| • Pressure is low on both low and high pressure sides<br>• 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).

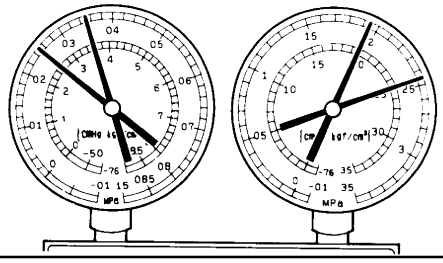


I22120

| Symptom | Probable cause | Diagnosis | Corrective Actions |
|---|---|---|---|
| • Vacuum is indicated on low pressure side and very low pressure is indicated on high pressure side<br>• Frost or condensation is seen on piping on both sides of receiver/ drier or expansion valve | • Refrigerant flow is obstructed by moisture or dirt in refrigeration system<br>• Refrigerant flow is obstructed by a gas leak from expansion valve | Refrigerant does not circulate | (1) Check the expansion valve<br>(2) Clean out dirt in expansion valve by blowing air<br>(3) Replace condenser<br>(4) Evacuate air and supply proper amount of new refrigerant<br>(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.

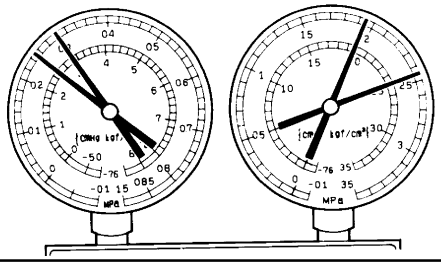


I22121

| Symptom | Probable cause | Diagnosis | Corrective Actions |
|---|---|---|---|
| • Pressure is too high on both low and high pressure sides<br>• 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<br>• Cooling effectiveness of condenser is insufficient | • Excessive refrigerant in cycle → excessive refrigerant is supplied<br>• Condenser cooling effectiveness is insufficient → condenser fins are clogged at cooling fan | (1) Clean condenser<br>(2) Check cooling fan with cooling fan motor operation<br>(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.



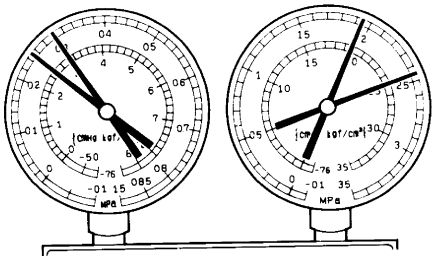
NOTE: These gauge indications occur when the refrigeration system opens and the refrigerant is charged without vacuum purging.

I22122

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

## (8) Expansion valve malfunction

Condition: Insufficient cooling

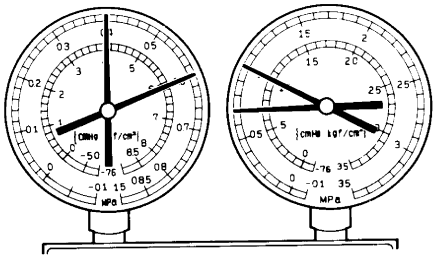


I22123

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

(9) Defective compressor

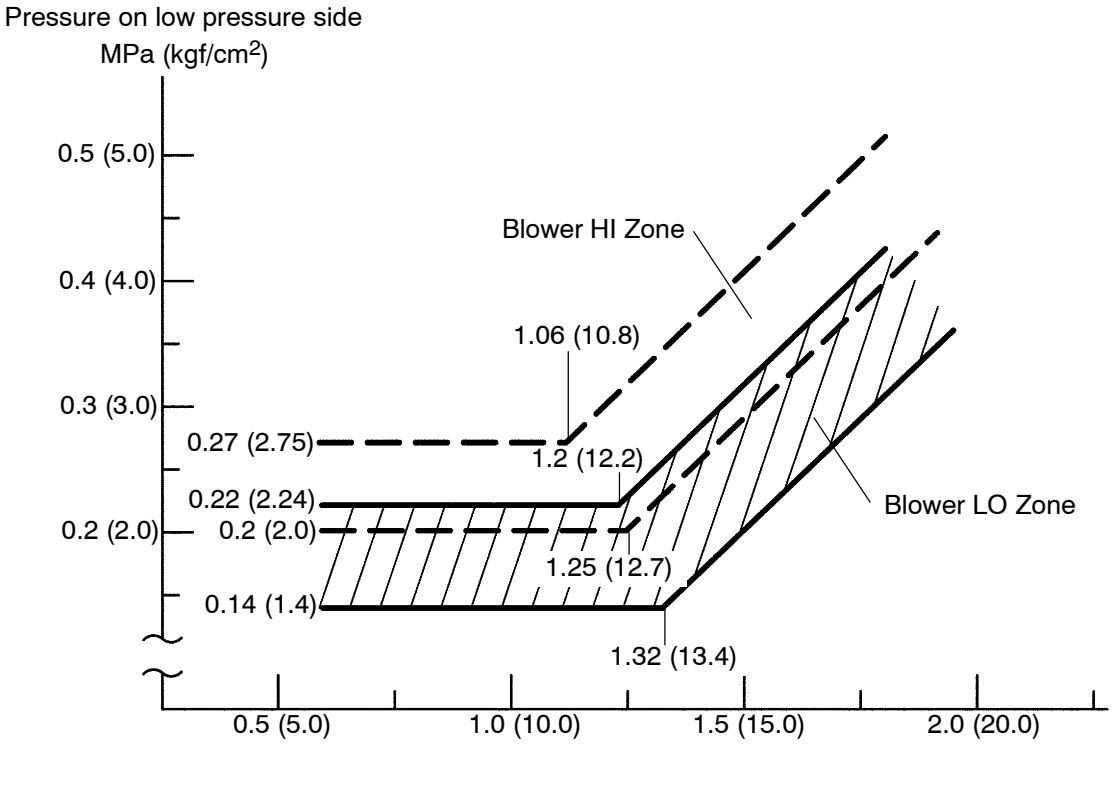
Condition : Insufficient cooling



I22124

| Symptom | Probable cause | Diagnosis | Corrective Actions |
|---|---|---|---|
| • Pressure is too high both on low and high pressure sides<br>• Pressure is too low on high pressure side | Internal leak in compressor | • Compression failure<br>• Leakage from damaged valve or broken sliding parts | Repair or replace compressor |

**Gauge readings (Reference)**




I30081