

# REFRIGERANT

## ON-VEHICLE INSPECTION

### 1. CHECK REFRIGERANT PRESSURE USING MANIFOLD GAUGE SET

(a) This is a method to identify trouble areas by using a manifold gauge set. Read the manifold gauge pressure under the following conditions.

Test conditions:

- Engine warm.
- All doors fully open.
- A/C switch ON.
- Blower speed control switch at HI.
- Engine running at 1,500 rpm.
- Air inlet mode damper set at recirculation.
- Temperature control lever in MAX. COLD position.
- Air temperature at air inlet 30 to 35°C (86 to 95°F).

(1) When the refrigerant volume is correct, the gauge reading indicates as follows:

**Low pressure side:**

**0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm<sup>2</sup>)**

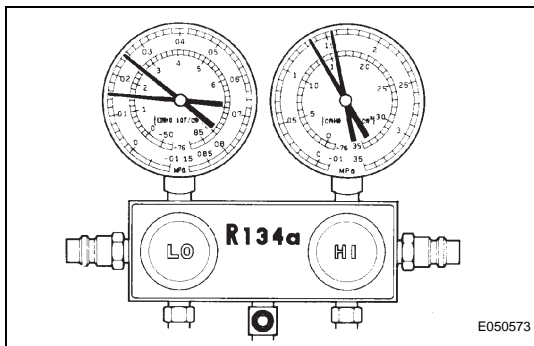
**High pressure side:**

**1.37 to 1.57 MPa (14 to 16 kgf/cm<sup>2</sup>)**

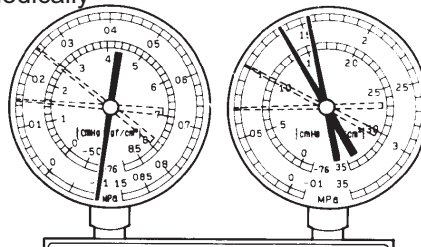
HINT:

Pressure varies in accordance with certain conditions (outside air temperature, sunlight and wind).

(2) When there is moisture in the refrigeration system:



Condition: Air conditioning system periodically cools and then fails to cool.

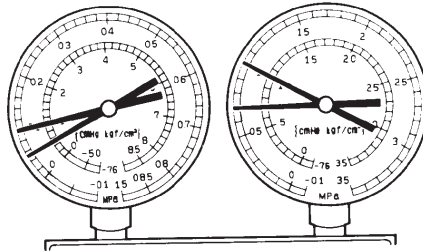


Symptoms	Probable Cause	Diagnosis	Corrective Actions
During operation, pressure on low pressure side cycles between normal and vacuum	Moisture in refrigeration system freezes at expansion valve orifice, causing temporary interruption of cycle However, when melted, returns to normal condition	<ul style="list-style-type: none"> <li>• Receiver dryer oversaturated</li> <li>• Moisture in refrigeration system freezes at expansion valve orifice and blocks refrigerant circulation</li> </ul>	<ol style="list-style-type: none"> <li>1. Replace receiver dryer</li> <li>2. Remove moisture from cycle by repeatedly evacuating air</li> <li>3. Supply appropriate volume of new refrigerant</li> </ol>

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(3) When cooling is insufficient:

Condition: Air conditioning system does not function effectively.



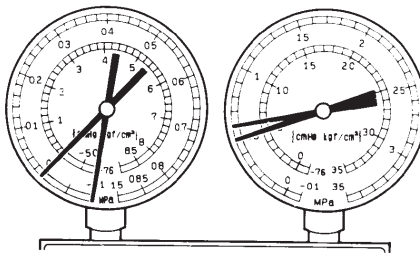
I022118E02

Symptoms	Probable Cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> <li>Pressure low on both low and high pressure sides</li> <li>Cooling performance insufficient</li> </ul>	Gas leakage from refrigeration system	<ul style="list-style-type: none"> <li>Insufficient refrigerant</li> <li>Refrigerant leakage</li> </ul>	<ol style="list-style-type: none"> <li>Check for gas leakage using gas leak detector, and repair if necessary</li> <li>Supply appropriate volume of new refrigerant</li> <li>If indicated pressure value close to 0 when connected to gauge, create vacuum after inspecting and repairing location of leakage</li> </ol>

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(4) When the circulation of the refrigerant is poor:

Condition: Air conditioning system does not function effectively.

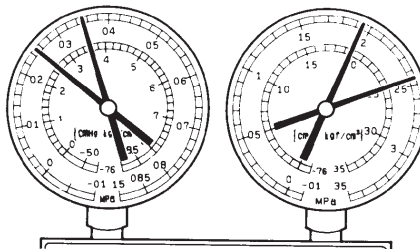


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Symptoms	Probable Cause	Diagnosis	Corrective Action
<ul style="list-style-type: none"> <li>Pressure low on both low and high pressure sides</li> <li>Frost exists on piping from condenser to A/C unit</li> </ul>	Refrigerant flow obstructed by dirt in condenser	Condenser clogged	Replace condenser

(5) When the refrigerant does not circulate:

Condition: Air conditioning system does not function or functions intermittently.

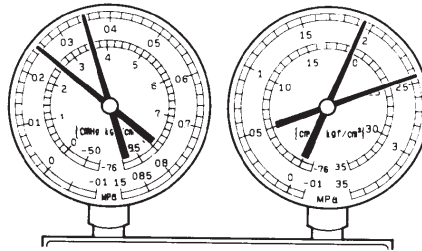


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Symptoms	Probable Causes	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> <li>Vacuum indicated on low pressure side, and extremely low pressure indicated on high pressure side</li> <li>Frost or condensation seen on piping on both sides of condenser or expansion valve</li> </ul>	<ul style="list-style-type: none"> <li>Refrigerant flow obstructed by moisture or dirt in refrigeration system</li> <li>Refrigerant flow obstructed by gas leakage from expansion valve</li> </ul>	Refrigerant does not circulate	<ol style="list-style-type: none"> <li>Check expansion valve</li> <li>Clean expansion valve with compressed air</li> <li>Replace condenser</li> <li>Evacuate air and then supply appropriate volume of new refrigerant</li> <li>For gas leakage from expansion valve, replace expansion valve</li> </ol>

(6) When the refrigerant is overcharged or cooling of condenser is insufficient:

Condition: Air conditioning system does not function effectively.

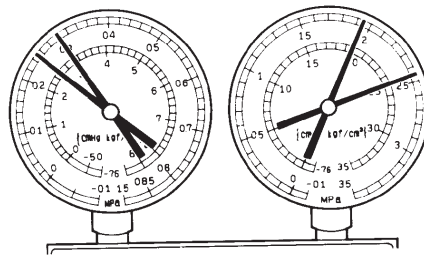


I022121E03

Symptoms	Probable Causes	Diagnosis	Corrective Actions
Pressure extremely high on both sides	<ul style="list-style-type: none"> <li>Excessive refrigerant</li> <li>Cooling performance of condenser insufficient</li> </ul>	<ul style="list-style-type: none"> <li>Excessive refrigerant</li> <li>Cooling performance of condenser insufficient</li> </ul>	<ol style="list-style-type: none"> <li>Clean condenser fins</li> <li>Check condenser fan motor operation by switching A/C ON</li> <li>If 1 and 2 normal, check amount of refrigerant and supply appropriate volume of refrigerant</li> </ol>

(7) When there is air in the refrigeration system:

Condition: Air conditioning system does not function.



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

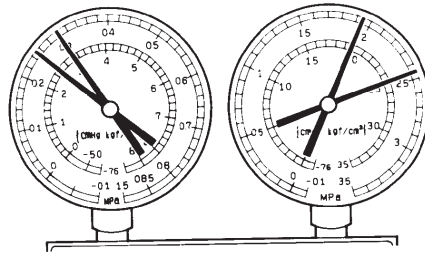
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Symptoms	Probable Causes	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> <li>Pressure extremely high on both low and high pressure sides</li> <li>Low pressure piping too hot to touch</li> </ul>	Air in refrigeration system	<ul style="list-style-type: none"> <li>Air in refrigeration system</li> <li>Insufficient vacuum purging</li> </ul>	<ol style="list-style-type: none"> <li>Check whether compressor oil dirty or insufficient</li> <li>Evacuate air and supply new refrigerant</li> </ol>

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(8) When the expansion valve malfunctions:

Condition: Air conditioning system does not function effectively.



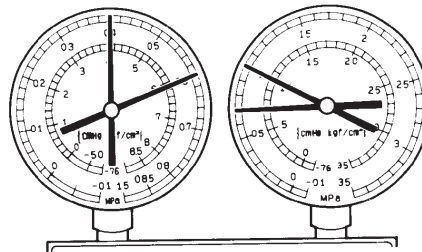
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Symptoms	Probable Causes	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> <li>Pressure extremely high on both low and high pressure sides</li> <li>Frost or condensation on piping on low pressure side</li> </ul>	Expansion valve malfunction	<ul style="list-style-type: none"> <li>Excessive refrigerant in low pressure piping</li> <li>Expansion valve opening too wide</li> </ul>	Replace expansion valve

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(9) When the compressor is defective:

Condition: Air conditioning system does not function.



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Symptoms	Probable Cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> <li>Pressure extremely high on both low and high pressure sides</li> <li>Pressure extremely low on high pressure side</li> </ul>	Internal leakage in compressor	<ul style="list-style-type: none"> <li>Compression failure of compressor</li> <li>Leakage from damaged valve or broken sliding parts in compressor</li> </ul>	Repair or replace compressor

2. INSPECT IDLING SPEED

- Warm up the engine.
- Inspect the idling speed when these conditions are established.
  - Engine warm
  - Blower speed control switch at HI
  - Temperature control lever in MAX. COLD position

Standard

Condition	Idling Speed
Switch A/C OFF	650 to 750 rpm
Switch A/C ON	750 to 850 rpm

If the idling speed is not as specified, check the idle control system.