

# 07-10 REFRIGERANT SYSTEM

## REFRIGERANT SYSTEM SERVICE

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## REFRIGERANT SYSTEM SERVICE WARNINGS

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### Using/Handling Unapproved Refrigerant

- Using a flammable refrigerant, such as OZ-12, in this vehicle is dangerous. In an accident, the refrigerant may catch fire, resulting in serious injury or death. When servicing this vehicle, use only R-134a.
- Checking for system leakage on a vehicle that has been serviced with flammable refrigerant, such as OZ-12, is dangerous. Conventional leak detectors use an electronically generated arc which can ignite the refrigerant, causing serious injury or death. If a flammable refrigerant may have been used to service the system, or if you suspect a flammable refrigerant has been used, contact the local fire marshal or EPA office for information on handling the refrigerant.

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### Handling Refrigerant

- Avoid breathing air conditioning refrigerant or lubricant vapor. Exposure may irritate eyes, nose and throat. Also, due to environmental concerns, use service equipment certified to meet the requirements of SAE J2210 (R-134a recycling equipment) when draining R-134a from the air conditioning system. If accidental system discharge occurs, ventilate work area before resuming service.
- Do not pressure test or leak test R-134a service equipment and/or vehicle air conditioning system with compressed air. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures, if ignited, may cause injury or property damage. Additional health and safety information may be obtained from refrigerant manufacturers.
- Do not allow the refrigerant to leak near fire or any kind of heat. A poisonous gas may be generated if the refrigerant gas contacts fire or heat such as from cigarettes and heaters. When carrying out any operation that can cause refrigerant leakage, extinguish or remove the above-mentioned heat sources and maintain adequate ventilation.
- Handling liquid refrigerant is dangerous. A drop of it on the skin can result in localized frostbite. When handling the refrigerant, wear gloves and safety goggles. If refrigerant splashes into the eyes, immediately wash them with clean water and consult a doctor.

### Storing Refrigerant

- The refrigerant container is highly pressurized. If it is subjected to high heat, it could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Store the refrigerant at temperatures below 40 °C {104 °F}.

## REFRIGERANT SYSTEM SERVICE CAUTIONS

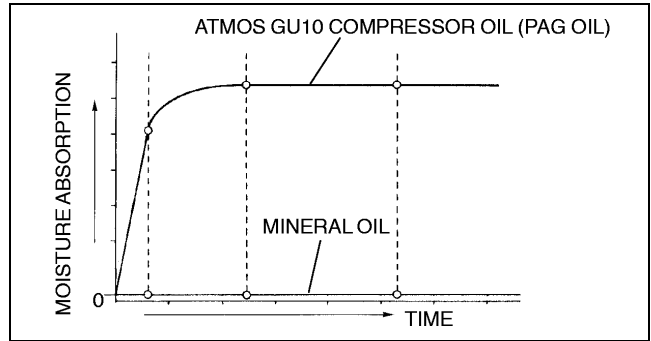
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### Handling Compressor Oil

- Use only ATMOS GU10 compressor oil for this vehicle. Using a PAG oil other than ATMOS GU10 compressor oil can damage the A/C compressor.
- Do not spill ATMOS GU10 compressor oil on the vehicle. A drop of compressor oil on the vehicle surface can eat away at the paint.
  - If oil gets on the vehicle, wipe it off immediately.

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- **ATMOS GU10 compressor oil (PAG oil) has a higher moisture absorption efficiency than the previously used mineral oil. If moisture mixes with the compressor oil, the refrigerant system could be damaged. Therefore, install caps immediately after using the compressor oil or removing refrigerant system parts to prevent moisture absorption.**



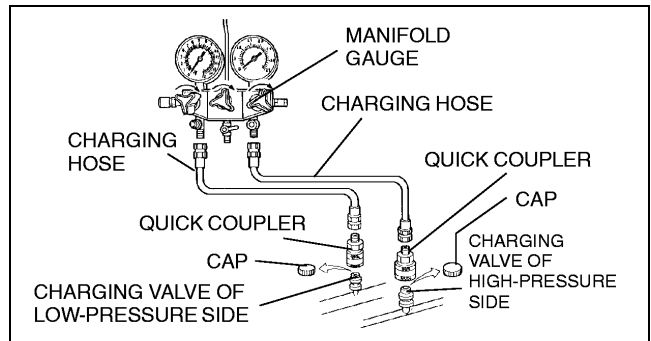
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## REFRIGERANT SYSTEM GENERAL PROCEDURES

### Manifold Gauge Set Installation

1. Fully close the valves of the manifold gauge.
2. Connect the charging hoses to the high- and low-pressure side joints of the manifold gauge.
3. Connect the quick couplers to the ends of the charging hoses.
4. Remove the caps from the charging valves.
5. Connect the quick couplers to the charging valves.

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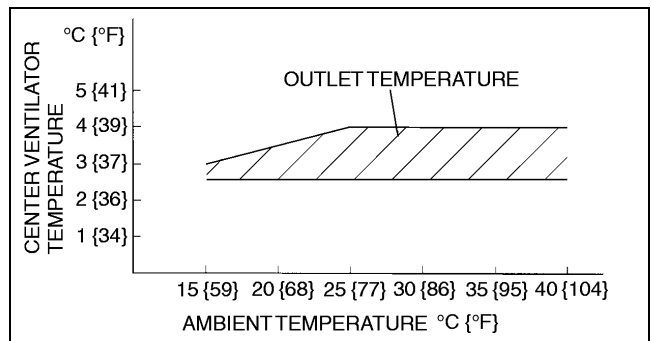


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## REFRIGERANT SYSTEM PERFORMANCE TEST

1. Perform refrigerant pressure check. (See 07-10-3 REFRIGERANT PRESSURE CHECK.)
  - If they are correct, go to the next step.
  - If not as specified, troubleshoot refrigerant system. (See 07-03-1 TROUBLESHOOTING INDEX.)
2. Place a dry-bulb thermometer in the driver-side center ventilator outlet.
3. Close the hood.
4. Warm up the engine and run it at a constant **1,500 rpm**.
5. Set the fan switch to 4th position.
6. Turn the A/C switch on.
7. Set the RECIRCULATE mode.
8. Set the temperature control to MAX COLD.
9. Set the VENT mode.
10. Close all the doors and all the windows.
11. Wait until the air conditioner output temperature stabilizes. The output temperature is stable when the A/C compressor is repeatedly turned on and off based on the A/C compressor control of A/C amplifier.
12. Record driver-side center ventilator temperature.
13. Determine and record ambient temperature.
14. Verify that the temperature reading is in the shaded zone.
  - If the performance is not within the shaded zone, troubleshoot the refrigerant system. (See 07-03-1 TROUBLESHOOTING INDEX.)

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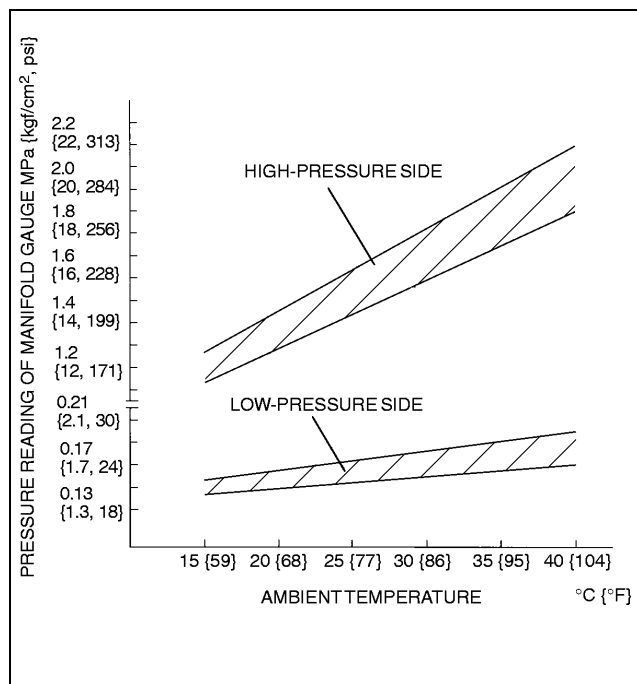
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# REFRIGERANT SYSTEM

## REFRIGERANT PRESSURE CHECK

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1. Install the manifold gauge set.
2. Close the hood.
3. Warm up the engine and run it at a constant **1,500 rpm**.
4. Set the fan switch to 4th position.
5. Turn the A/C switch on.
6. Set the RECIRCULATE mode.
7. Set the temperature control to MAX COLD.
8. Set the VENT mode.
9. Close all the doors and all the windows.
10. Measure the ambient temperature and the high- and low-pressure side readings of the manifold gauge.
  - If the high- and low-pressure side readings are in the shaded zone as shown in the figure, the refrigerant system is normal.
  - If the pressure is abnormal, see No.6 of symptom troubleshooting. (See 07-03-6 NO.6 AIR FROM VENTS NOT COLD ENOUGH.)



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## REFRIGERANT RECOVERY

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### Warning

- Avoid breathing air conditioning refrigerant or lubricant vapor. Exposure may irritate eyes, nose and throat. Also, due to environmental concerns, use service equipment certified to meet the requirements of SAE J2210 (R-134a recycling equipment) when draining R-134a from the air conditioning system. If accidental system discharge occurs, ventilate work area before resuming service.

1. Connect an R-134a recovery/recycling/recharging device to the vehicle and follow the device manufacturer's instructions.

## REFRIGERANT CHARGING

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### Warning

- Avoid breathing air conditioning refrigerant or lubricant vapor. Exposure may irritate eyes, nose and throat. Also, due to environmental concerns, use service equipment certified to meet the requirements of SAE J2210 (R-134a recycling equipment) when draining R-134a from the air conditioning system. If accidental system discharge occurs, ventilate work area before resuming service.

### Caution

- Do not exceed the specification when charging the system with refrigerant. Doing so will decrease the efficiency of the air conditioner or damage the refrigeration cycle parts.

### Charging Recycled R-134a Refrigerant

1. Connect an R-134a recovery/recycling/recharging device to the vehicle and follow the device manufacturer's instructions.

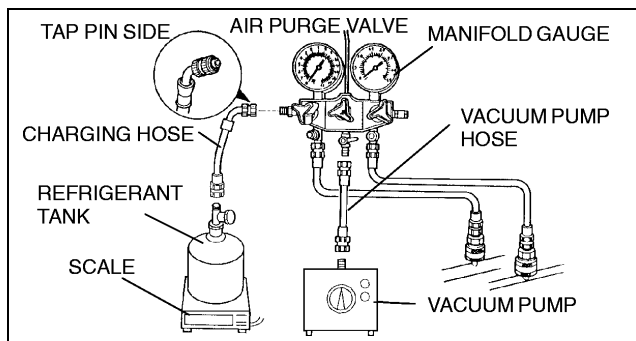
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## Charging New R-134a Refrigerant

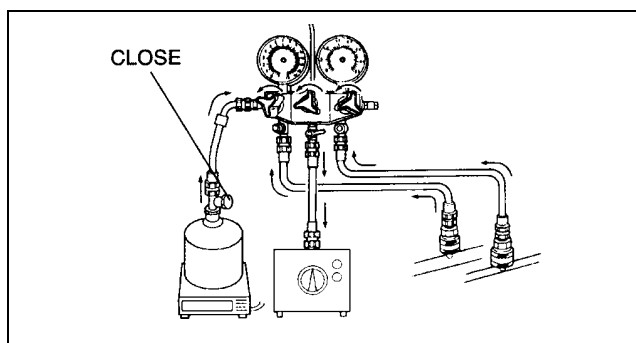
1. Install the manifold gauge set.
2. Connect the tap pin side of the charging hose to the air purge valve of the manifold gauge.
3. Connect the vacuum pump hose to the center joint of the manifold gauge.
4. Connect the vacuum pump hose to the vacuum pump.
5. Connect the charging hose to the refrigerant tank.
6. Place the refrigerant tank on the scale.
7. Open all the valves of the manifold gauge.

### Caution

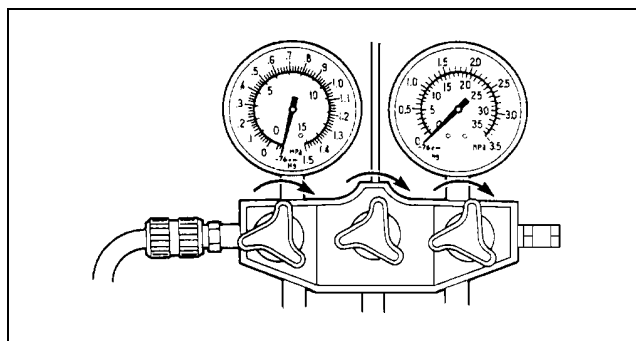
- Close the manifold gauge valve immediately after stopping the vacuum pump. If the valve is left open, the vacuum pump oil will back flow into the refrigeration cycle and cause a decrease in the efficiency of the air conditioner.



8. Start the vacuum pump and let it operate for 15 minutes.



9. Verify that high- and low-pressure side readings of the manifold gauge are at **-101 kPa {-760 mmHg, -29.9 inHg}**. Close each valve of the manifold gauge.
10. Stop the vacuum pump and wait for 5 minutes.
11. Inspect the high- and low-pressure side readings of the manifold gauge.
  - If the reading has changed, inspect for leakage and then repeat from Step 7.
  - If the reading has not changed, and go to next step.
12. Open the valve of the refrigerant tank.
13. Weigh the refrigerant tank.



**Regular amount of refrigerant (approximate quantity)**  
**600 g {21.2 oz}**

### Warning

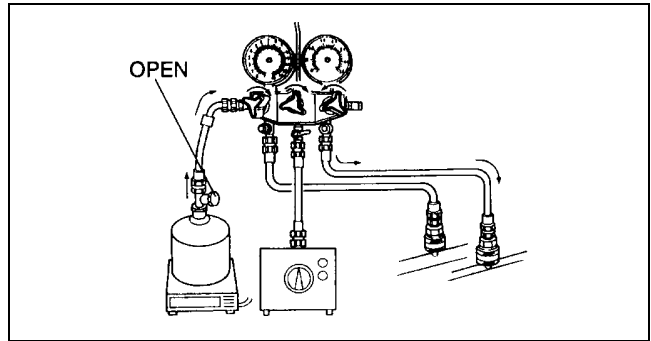
- If the refrigerant system is charged with a large amount of refrigerant when checking for gas leakage, and if any leakage should occur, the refrigerant will be released into the atmosphere. In order to prevent the accidental release of refrigerant which can destroy the ozone layer in the stratosphere, follow the proper procedures and charge with only a small amount of refrigerant when checking for gas leakage.
- If charging the system with refrigerant by service cans or refrigerant tank, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans or refrigerant tank will increase and they could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.

### Caution

- Always begin charging of refrigerant from the high-pressure side. If charging is begun from the low-pressure side, the vanes of the A/C compressor will not be released and abnormal noise may result.

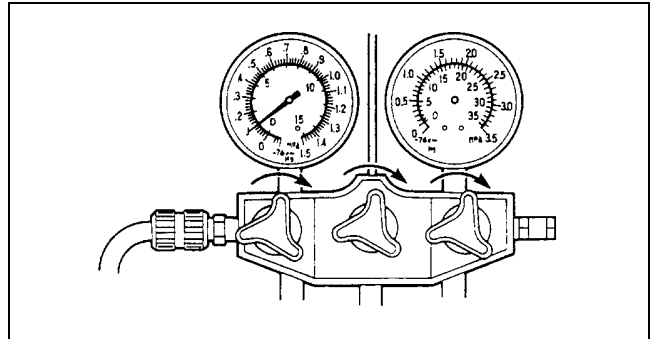
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14. Open the high-pressure side valve of the manifold gauge.



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15. When the low-pressure side reading increases to **0.098 MPa {1.0 kgf/cm<sup>2</sup>, 14 psi}**, close the high-pressure side valve of the manifold gauge.
16. Inspect for leakage from the cooler pipe/hose connections using a gas leak tester.
- If there is no leakage, go to Step 18.
  - If leakage is found at a loose joint, tighten the joint, then go to the next step.
17. Inspect for leakage again.
- If there is no leakage after tightening the joint, go to the next step.
  - If there is still a leakage at the same joint, discharge the refrigerant and then repair the joint. Repeat the charging procedure from Step 7.



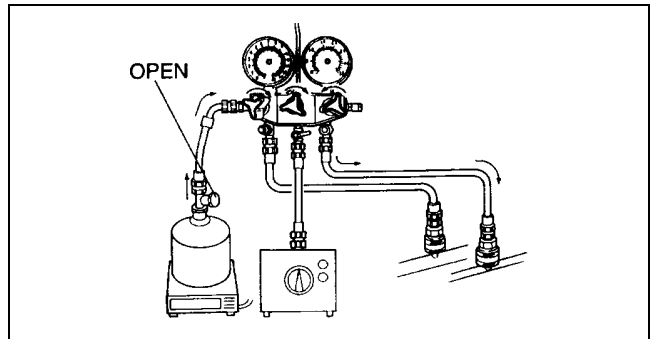
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### Warning

- **If charging the system with refrigerant using service cans, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans will increase and the cans could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.**

18. Open the high-pressure side valve of the manifold gauge and charge with refrigerant until the weight of refrigerant tank has decreased **300 g {10.6 oz}** from the amount in Step 13.

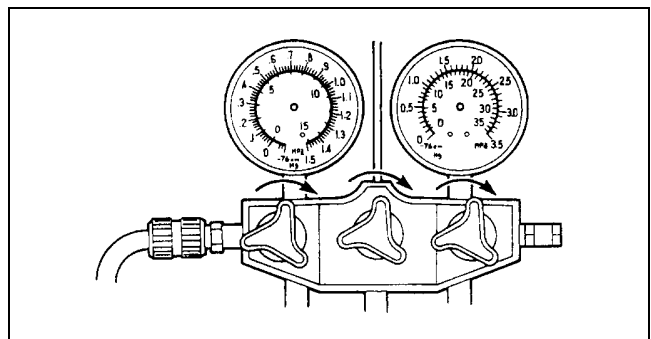


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19. Close the high-pressure side valve of the manifold gauge.

### Warning

- **If charging the system with refrigerant using service cans, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans will increase and the cans could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.**

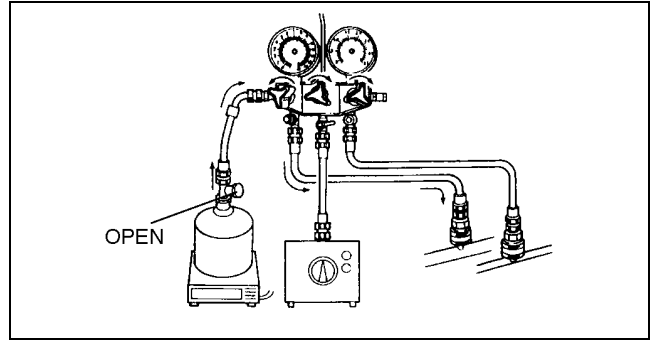


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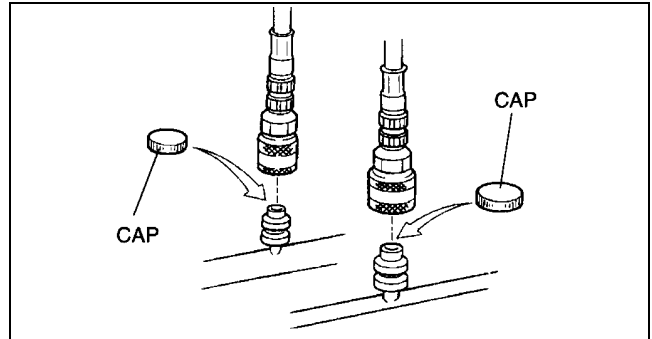
20. Start the engine and actuate the A/C compressor.

## REFRIGERANT SYSTEM

21. Open the low-pressure side valve of the manifold gauge and charge with refrigerant until the weight of the refrigerant tank has decreased **600 g {21.2 oz}** from the amount in Step 13.
22. Close the low-pressure side valve of the manifold gauge and the valve of the refrigerant tank.
23. Stop the engine and A/C compressor.
24. Inspect for leakage using a gas leak tester.
  - If there is no leakage, go to Step 26.
  - If leakage is found at a loose joint, tighten the joint, go to the next step.
25. Inspect for leakage again.
  - If there is no leakage after tightening the joint, and go to the next step.
  - If there is still leakage at the same joint, discharge the refrigerant and then repair the joint. Repeat the charging procedure from Step 7.
26. Disconnect the quick couplers from the charging valves.
27. Install the caps to the charging valves.



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