

## **2007 HVAC**

### **Refrigerant System - MX-5 Miata**

## **REFRIGERANT SYSTEM SERVICE WARNINGS**

### **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.**

### **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**

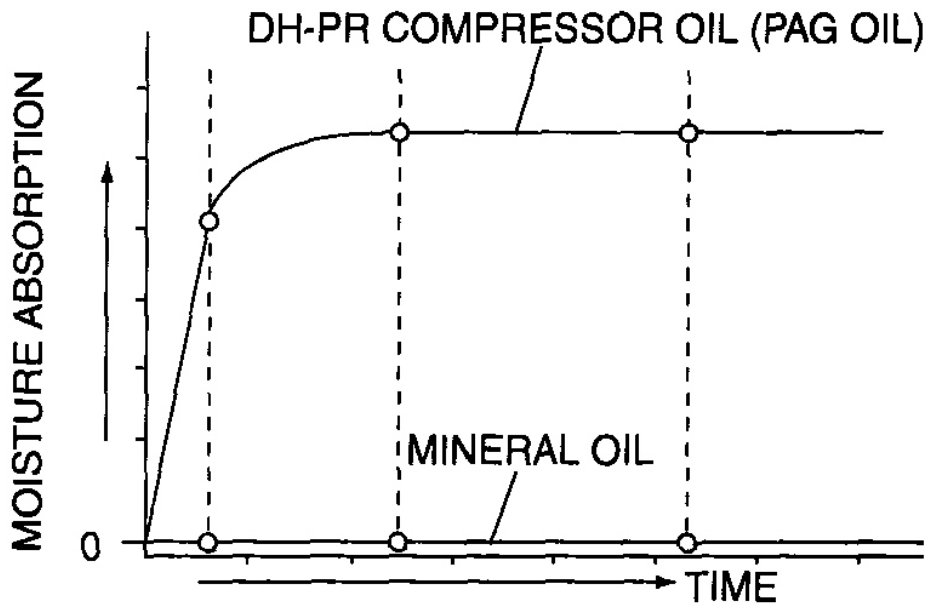
- **The refrigerant container is highly pressurized. If it is subjected to high heat, it could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Store the refrigerant at temperatures below 40°C {104°F}.**

## **REFRIGERANT SYSTEM SERVICE CAUTIONS**

### **HANDLING COMPRESSOR OIL**

- Use only DH-PR compressor oil for this vehicle. Using PAG oil other than DH-PR compressor oil can damage the A/C compressor.
- Do not spill DH-PR 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.
- DH-PR 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.



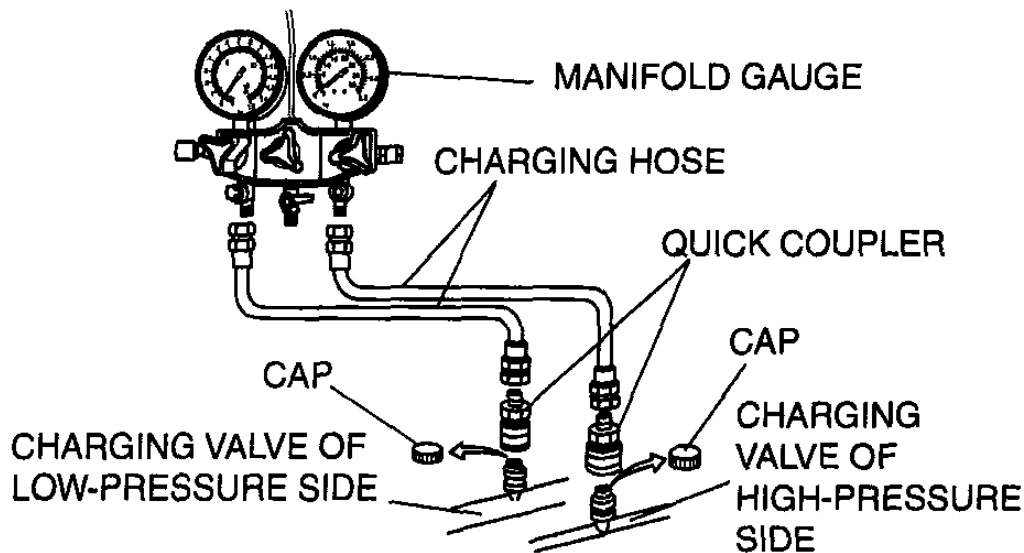
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**Fig. 1: Moisture Absorption Efficiency Graph**  
Courtesy of MAZDA MOTORS CORP.

## 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/low pressure side joints of the manifold gauge.
3. Connect the quick couplers to the ends of the charging hoses.
4. Connect the quick couplers to the charging valves.



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**Fig. 2: Connecting Charging Hoses To High/Low Pressure Side Joints Of Manifold Gauge**  
Courtesy of MAZDA MOTORS CORP.

## REFRIGERANT CHARGING

### 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

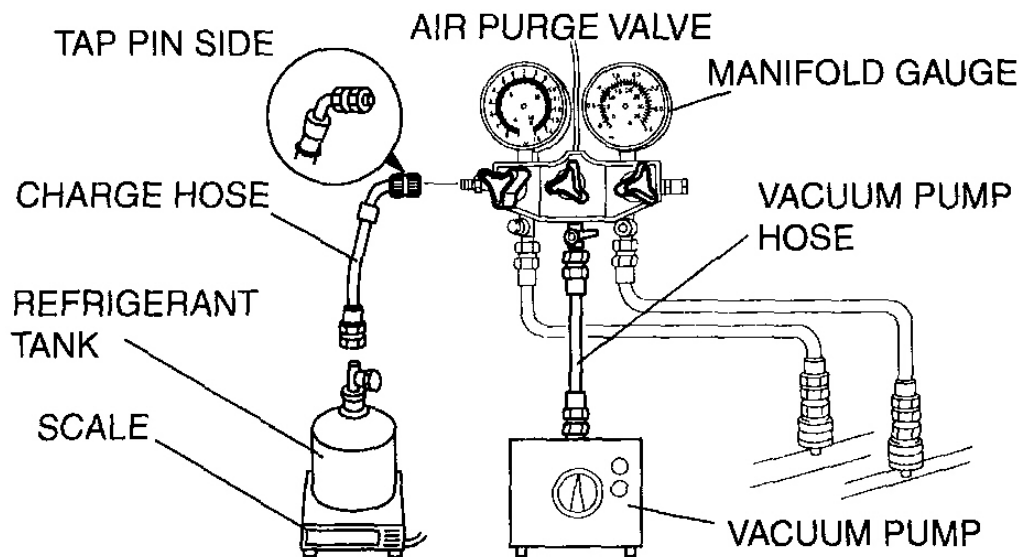
1. Connect an R-134a recovery/recycling/recharging device to the vehicle and follow the device manufacturer's instructions.

## CHARGING NEW R-134A REFRIGERANT

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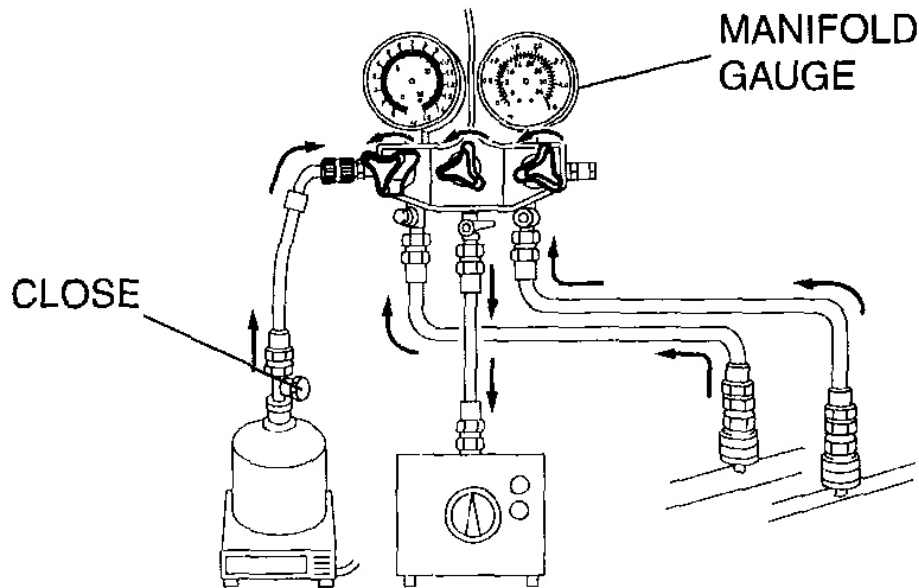
1. Install the manifold gauge set.
2. Connect the tap pin side of the charging hose to the air purge valve of the manifold gauge.
3. Connect the vacuum pump hose to the center joint of the manifold gauge.
4. Connect the vacuum pump hose to the vacuum pump.
5. Connect the charging hose to the refrigerant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



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**Fig. 3: Connecting Vacuum Pump Hose To Center Joint Of Manifold Gauge**  
Courtesy of MAZDA MOTORS CORP.

7. Open all the valves of the manifold gauge.

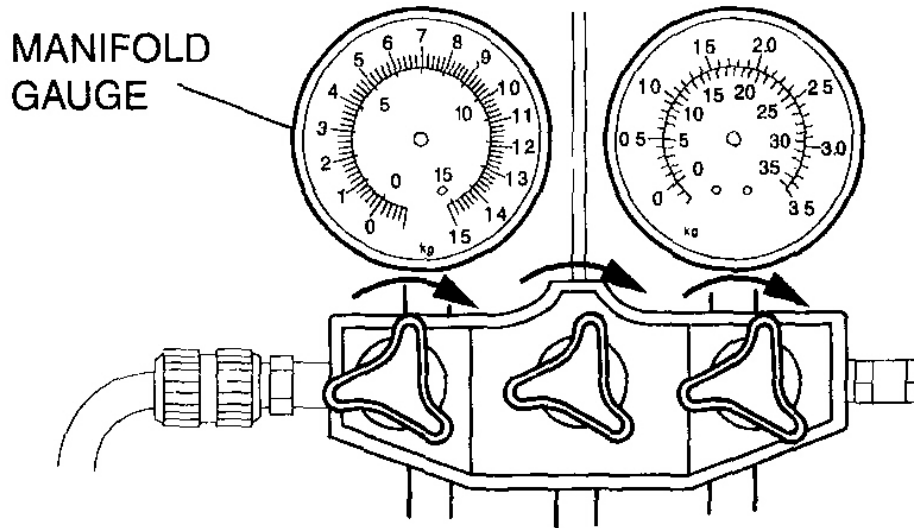


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**Fig. 4: Identifying Manifold Valves Gauge Closed**  
Courtesy of MAZDA MOTORS CORP.

- 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 min** .
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 min** .
11. Inspect the high- and low-pressure 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, go to next step.
12. Open the valve of the refrigerant tank.
13. Weigh the refrigerant tank to charge the suitable amount of refrigerant.



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**Fig. 5: View Of High & Low-Pressure Side Manifold Gauge Set**  
Courtesy of MAZDA MOTORS CORP.

**Refrigerant type**

**R-134a**

**Regular amount of refrigerant (approx. quantity)**

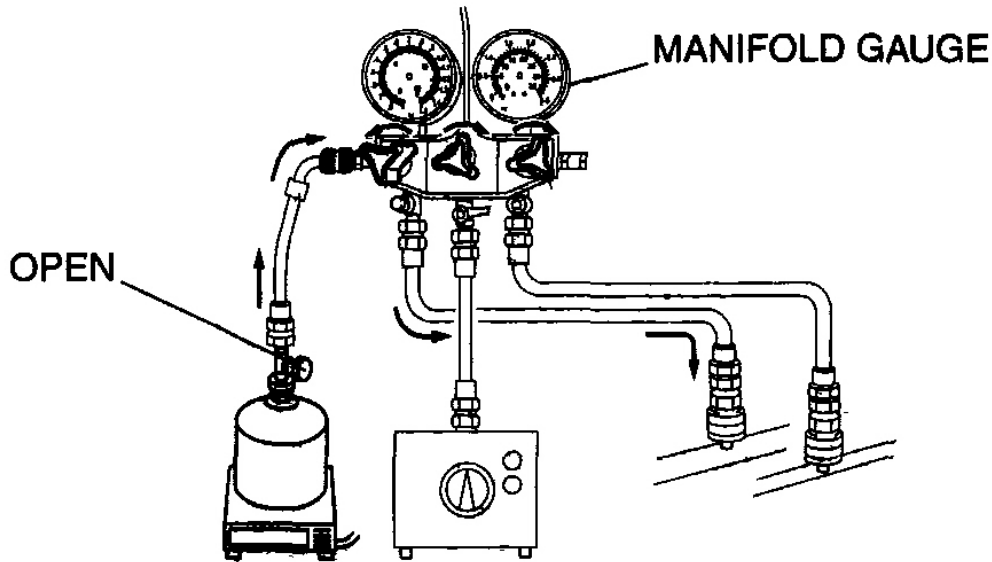
**450 g {15.9 oz}**

**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.

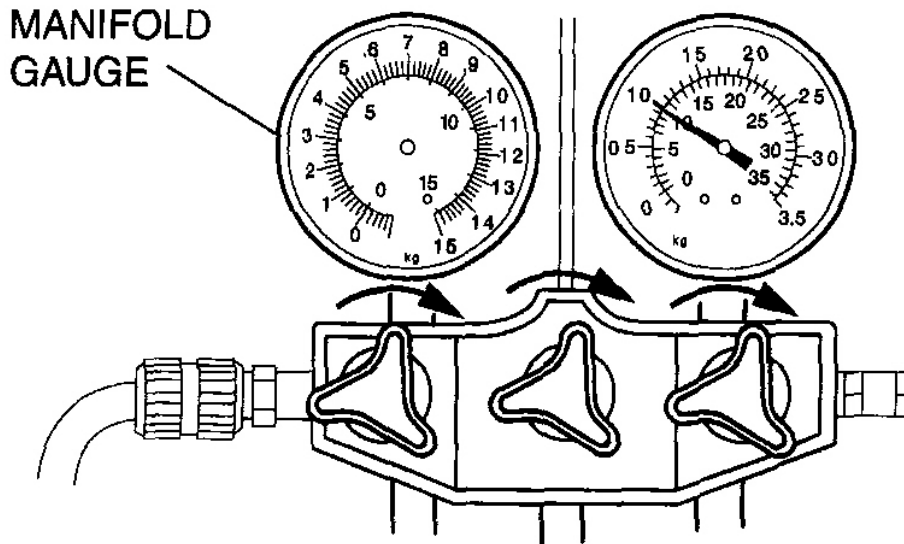
14. Open the low-pressure side valve of the manifold gauge.



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**Fig. 6: Connecting Manifold Gauge Set**  
Courtesy of MAZDA MOTORS CORP.

15. When the high-pressure side reading increases to **98 kPa {1.0 kgf/cm<sup>2</sup>, 14 psi}**, close the low-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, go to next step.
17. Inspect for leakage again.
  - If there is no leakage after tightening the joint, go to 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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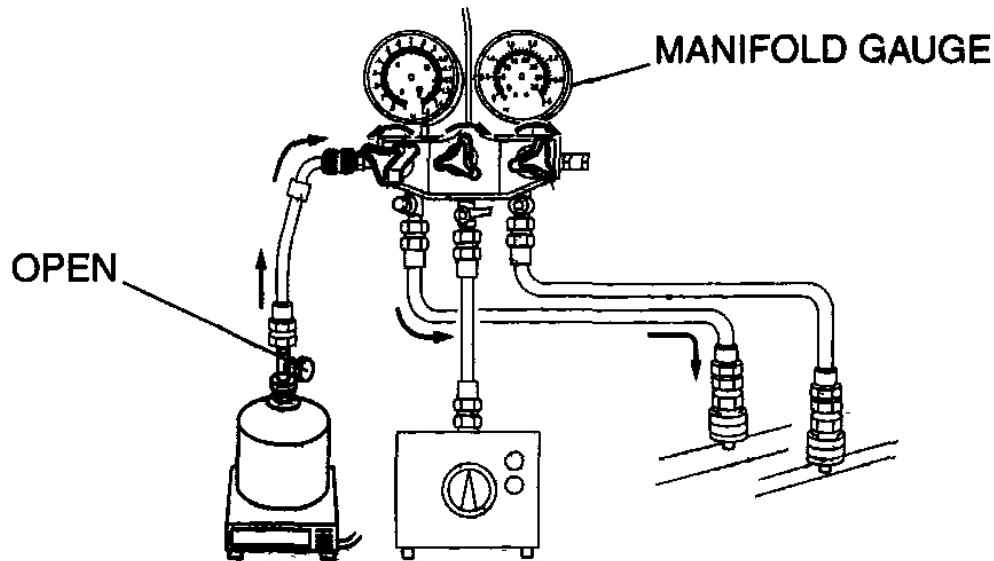
**Fig. 7: Identifying High & Low-Pressure Side Readings Of Manifold Gauge**  
Courtesy of MAZDA MOTORS CORP.

**WARNING:**

- 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.

18. Open the low-pressure side valve of the manifold gauge and charge with refrigerant until the weight of refrigerant tank has decreased **200 g {7.06 oz}** from the amount in Step 13.





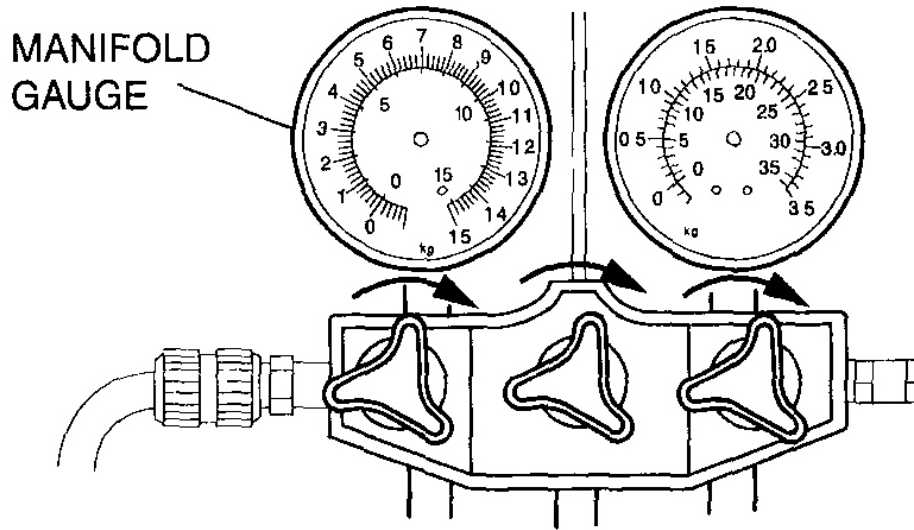
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**Fig. 8: Connecting Manifold Gauge Set**  
Courtesy of MAZDA MOTORS CORP.

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

**WARNING:**

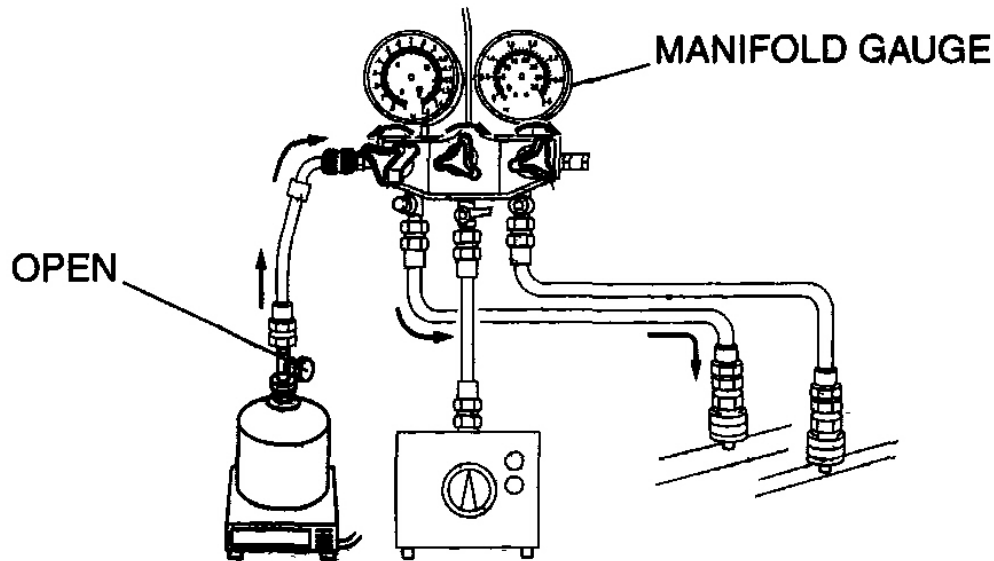
- If charging the system with refrigerant by service cans or refrigerant tank, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans or refrigerant tank will increase and they could explode, scattering metal fragments and liquid refrigerant that can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



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**Fig. 9: View Of High & Low-Pressure Side Manifold Gauge Set**  
Courtesy of MAZDA MOTORS CORP.

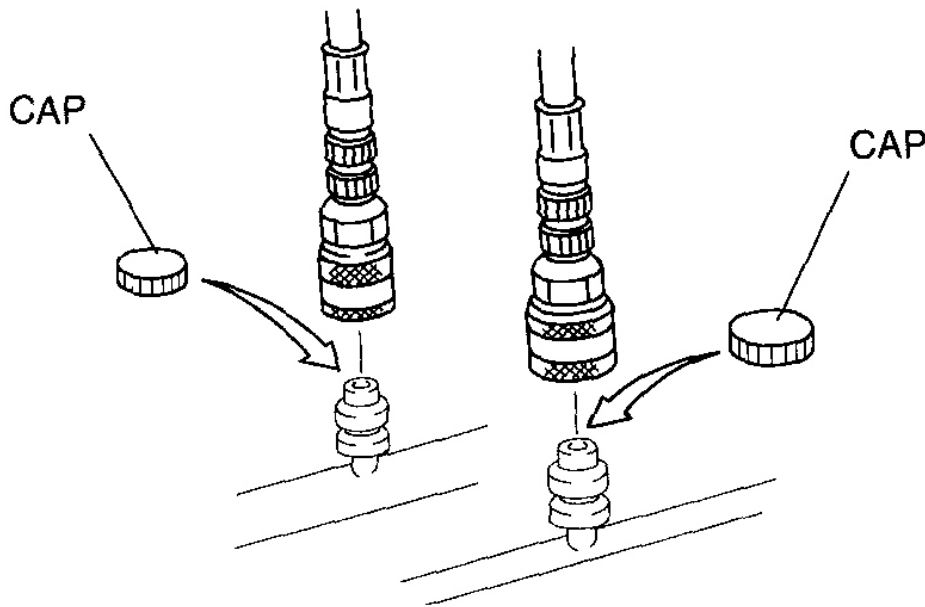
20. Start the engine and actuate the A/C compressor.
21. Open the low-pressure side valve of the manifold gauge and charge with refrigerant until the weight of the refrigerant tank has decreased **450 g {15.9 oz}** from the amount in Step 13.
22. Close the low-pressure side valve of the manifold gauge 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, then go to next step.



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**Fig. 10: Connecting Manifold Gauge Set**  
Courtesy of MAZDA MOTORS CORP.

25. Inspect for leakage again.
  - If there is still leakage after tightening the joint, go to 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. Remove the manifold gauge set.
27. Install the caps to the charging valves.



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**Fig. 11: Installing Caps To Charging Valves**  
Courtesy of MAZDA MOTORS CORP.

## REFRIGERANT RECOVERY

**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.

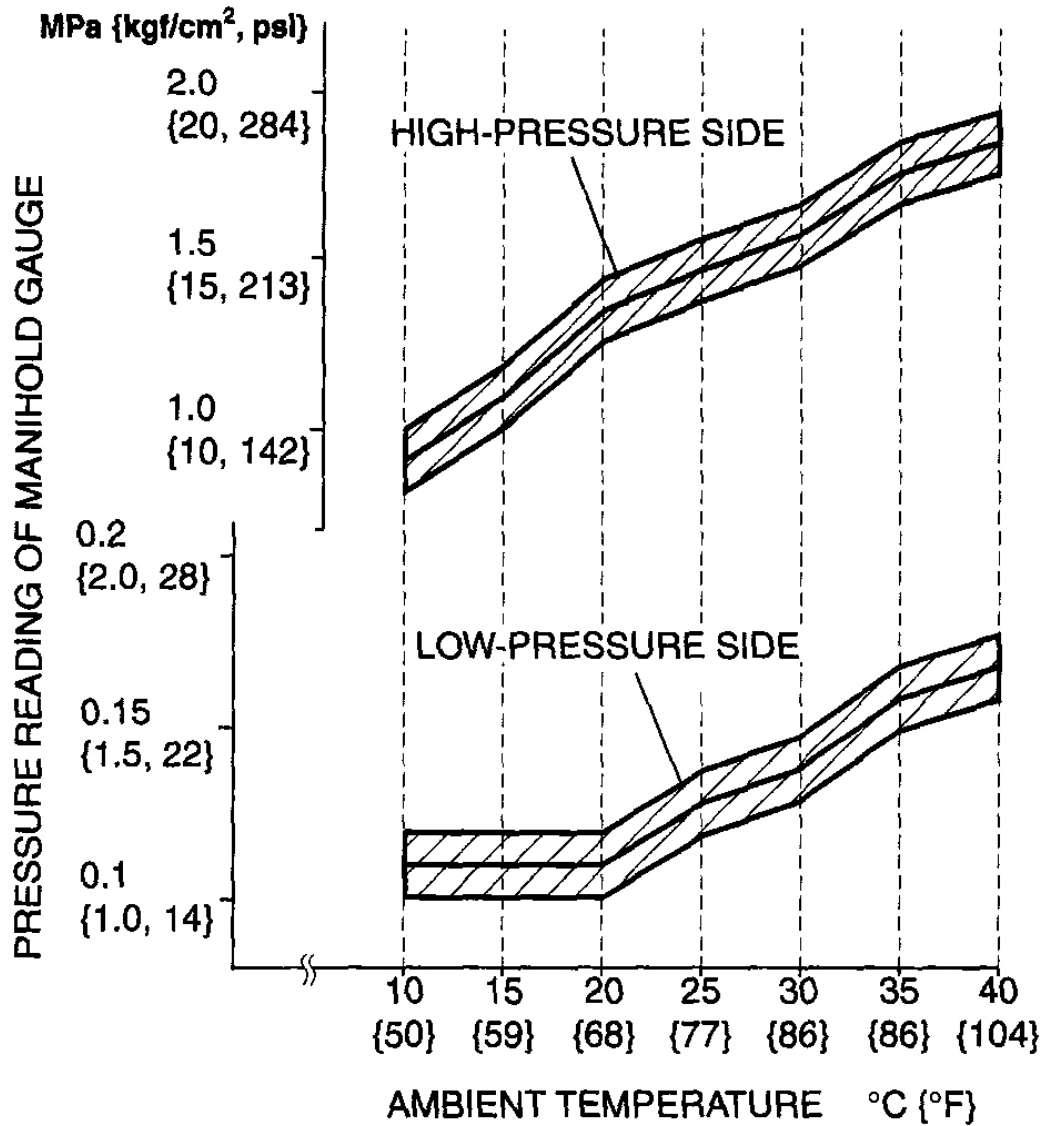
## REFRIGERANT PRESSURE CHECK

1. Connect the manifold gauge.
2. Start the engine and allow it to reach operating temperature.
3. During pressure check, run the engine at a constant **1,500 rpm**.
4. Set the fan speed MAX-HI.

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5. Turn the A/C switch on.
6. Set to RECIRCULATE mode.
7. Set the temperature control to MAX COLD.
8. Set to VENT mode.
9. Close all the doors and all the windows.
10. Measure the manifold gauge reading and ambient temperature.
11. Verify that the high and low pressure readings are within each shaded zone.
  - If there is any malfunction, inspect the refrigerant system according to the troubleshooting chart. See **SYMPTOM TROUBLESHOOTING** .



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**Fig. 12: Pressure Readings Of Manifold Gauge & Ambient Temperature Graph**  
 Courtesy of MAZDA MOTORS CORP.

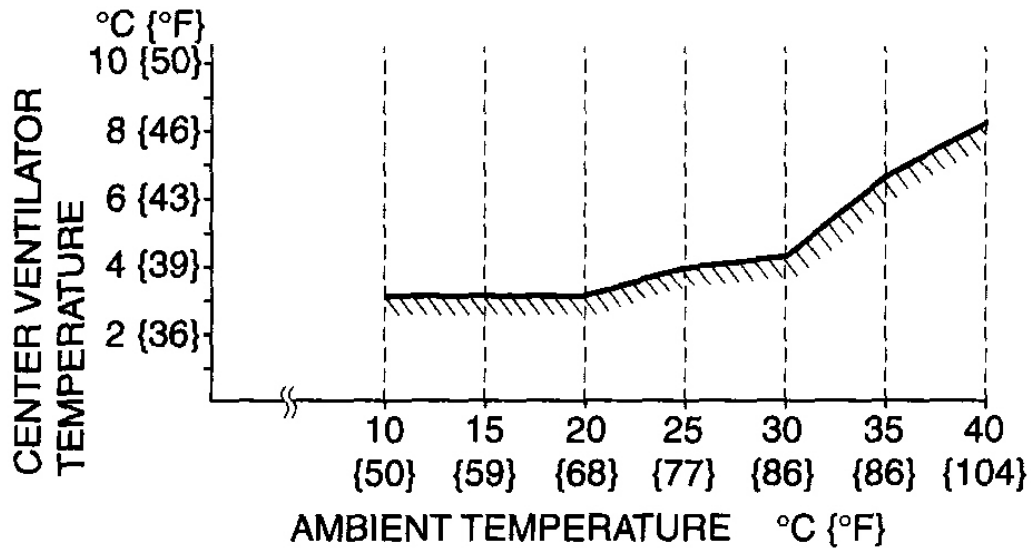
## REFRIGERANT SYSTEM PERFORMANCE TEST

1. Inspect the refrigerant pressure. (See **REFRIGERANT PRESSURE CHECK** .)
2. Place a dry-bulb thermometer in the driver-side center ventilator outlet.
3. Start the engine and allow it to reach operating temperature.

4. During pressure check, run the engine at a constant **1,500 rpm** .
5. Set the fan speed MAX-HI.
6. Turn the A/C switch on.
7. Set to RECIRCULATE mode.
8. Set the temperature control to MAX COLD.
9. Set to VENT mode.
10. Close all the doors and windows.
11. Wait until the air conditioner output temperature stabilizes.

**Stabilized condition**

- The A/C compressor repeatedly turns on and off at regular intervals.
12. After the blower air is stabilized, read the dry-bulb thermometer.
  13. Verify the ambient temperature.
  14. Verify that the temperature reading is in the shaded zone.
    - If there is any malfunction, inspect the refrigerant system according to the troubleshooting chart. See **SYMPTOM TROUBLESHOOTING** .



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**Fig. 13: Center Ventilation Temperature Graph**  
 Courtesy of MAZDA MOTORS CORP.