

2008 HVAC

Refrigerant System - Mazda CX-9

REFRIGERANT SYSTEM SERVICE WARNINGS

HANDLING REFRIGERANT

- **Avoid breathing air conditioning refrigerant or lubricant vapor. Exposure may irritate eyes, nose and throat. Also, due to environmental concerns, the use of recovery/recycling/recharging equipment is mandatory when draining R-134a from the air conditioning system. If accidental system discharge occurs, ventilate work area before resuming service.**
- **Do not perform pressure test or leak test for R-134a service equipment and/or vehicle air conditioning system using 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 INSUFFICIENT REFRIGERANT LEVEL

- **If an insufficient refrigerant level is detected at troubleshooting, do not charge (add) the refrigerant. Because an accurate amount of refrigerant cannot be determined from the pressure indicated on the manifold gauge, never charge the refrigerant. If there is too much or too little refrigerant from the refilling, there may be secondary problems such as damage to the refrigerant cycle parts, or a decrease of cooling performance. Therefore, if it is determined that the refrigerant level is insufficient, completely remove refrigerant from the refrigerant cycle and refill with refrigerant to the specified amount.**

HANDLING A/C RELATED PARTS

- **There will be no effect on either performance or quality of A/C-related parts, including but not**

limited to the piping, etc., provided that said parts are serviced/repaired in accordance with standard procedure.

- When serviced/repaired A/C units in locations where there is a considerable risk of contamination from dirt or dust, plug up the openings on the parts to prevent dust/dirt from entering.
- When using adhesive material to cover openings on A/C parts, make sure that the adhesive side of the material does not come in contact with the connectors on the parts.
- When the system is opened to atmosphere, there is no need to replace the condenser, or the receiver dryer when it is housed within the condenser, provided that the unit is plugged accordingly.

HANDLING COMPRESSOR OIL

- Use only DENSO OIL8 compressor oil for this vehicle. Using a PAG oil other than DENSO OIL8 compressor oil can damage the A/C compressor.
- Do not spill DENSO OIL8 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.
- DENSO OIL8 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.

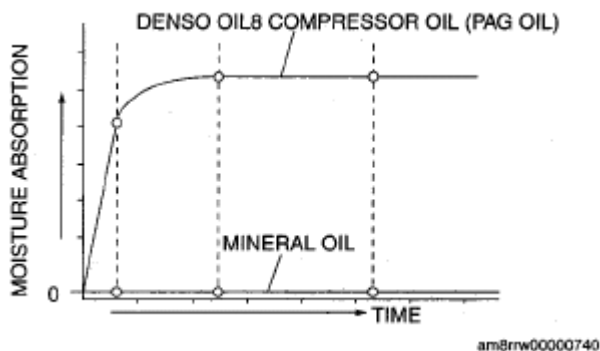
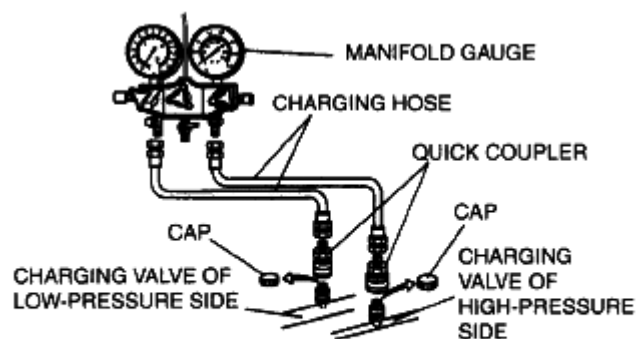


Fig. 1: DENSO OIL8 Compressor Oil Moisture Absorption Graph
Courtesy of MAZDA MOTORS CORP.

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 and 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: Identifying Manifold Gauge Set Installation
Courtesy of MAZDA MOTORS CORP.

REFRIGERANT CHARGING

- 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 PREPARATION

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.

Regular amount of refrigerant (approx. quantity)

660-710 g {23.3-25.0 oz}

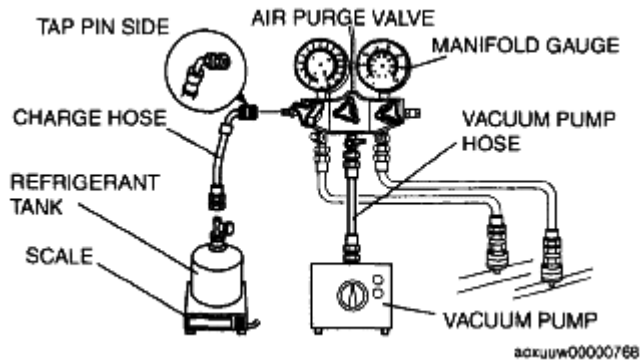


Fig. 3: Identifying Charging Preparation
Courtesy of MAZDA MOTORS CORP.

EVACUATION

1. 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 flow back into the refrigeration cycle and cause a decrease in the efficiency of the air conditioner.

2. Start the vacuum pump and let it operate for **15 min.**

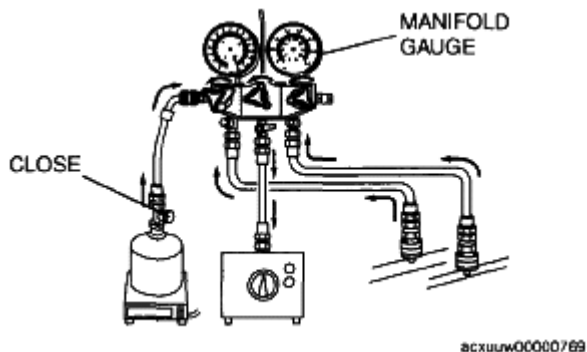


Fig. 4: Starting Vacuum Pump
Courtesy of MAZDA MOTORS CORP.

3. 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.

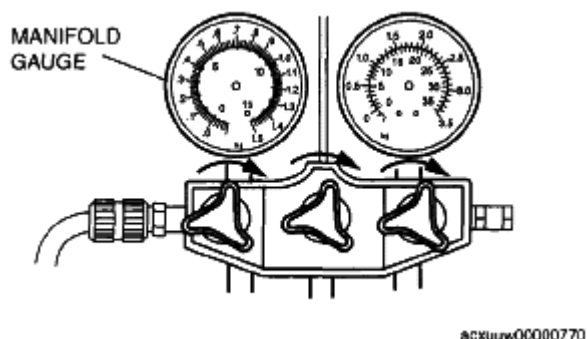


Fig. 5: Inspecting High And Low-Pressure Side Readings Of Manifold Gauge
Courtesy of MAZDA MOTORS CORP.

AIRTIGHTNESS CHECK

1. Stop the vacuum pump and wait for 5 min.
2. Check the high-and low-pressure side readings of the manifold gauge.
 - If the reading has changed, inspect for leakage and go to Evacuation. (See **EVACUATION.**)
 - If the reading has not changed, go to Charging New R-134a Refrigerant. (See **CHARGING NEW R-134A REFRIGERANT.**)

CHARGING NEW R-134A REFRIGERANT

1. Open the valve of the refrigerant tank.
2. Weigh the refrigerant tank to charge the suitable amount of refrigerant.

WARNING:

- If the refrigerant system is charged with a large amount of refrigerant when inspecting 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 inspecting for gas leakage.
- 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.

CAUTION:

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

may result.

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

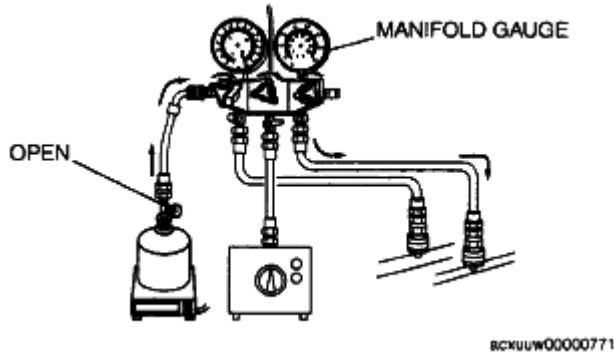


Fig. 6: Opening High-Pressure Side Valve Of Manifold Gauge
 Courtesy of MAZDA MOTORS CORP.

4. When the low-pressure side reading increases to **0.098 MPa {1.0 kgf/cm² , 14 psi}**, close the high-pressure side valve of the manifold gauge.
5. Inspect for leakage from the cooler pipe/hose connections using a gas leak tester.
 - If there is no leakage, go to Step 7.
 - If leakage is found at a loose joint, tighten the joint, then go to the next step.
6. 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 evacuation.

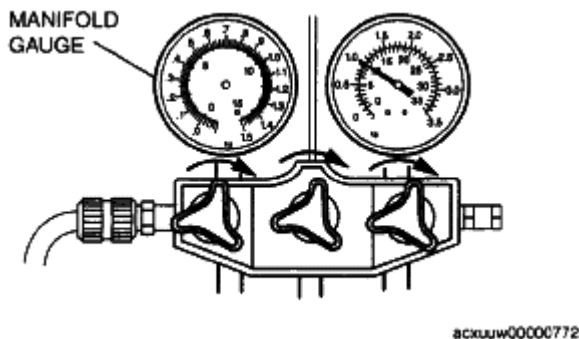


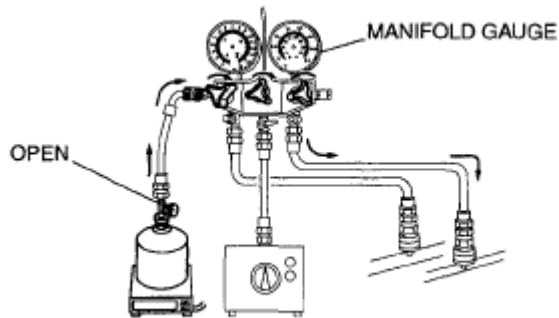
Fig. 7: Closing High-Pressure Side Valve Of Manifold Gauge
 Courtesy of MAZDA MOTORS CORP.

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.

7. Open the high-pressure side valve of the manifold gauge and charge with refrigerant until the weight of refrigerant tank has decreased 330-355 g {11.7-12.5 oz} from the amount in Step 2.



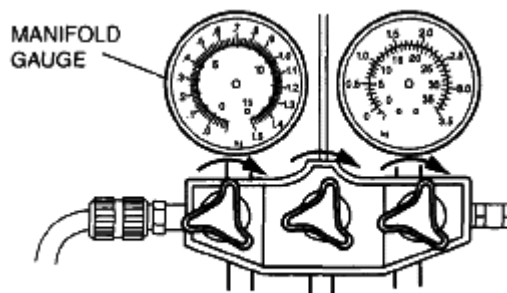
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Fig. 8: Opening High-Pressure Side Valve Of Manifold Gauge
Courtesy of MAZDA MOTORS CORP.

8. Close the low-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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Fig. 9: Closing Low-Pressure Side Valve Of Manifold Gauge
Courtesy of MAZDA MOTORS CORP.

9. Start the engine and actuate the A/C compressor.
10. Open the low-pressure side valve of the manifold gauge and charge with refrigerant until the weight of the refrigerant tank has decreased regular amount from the amount in Step 2.

11. Close the low-pressure side valve of the manifold gauge and the valve of the refrigerant tank.
12. Stop the engine and A/C compressor.

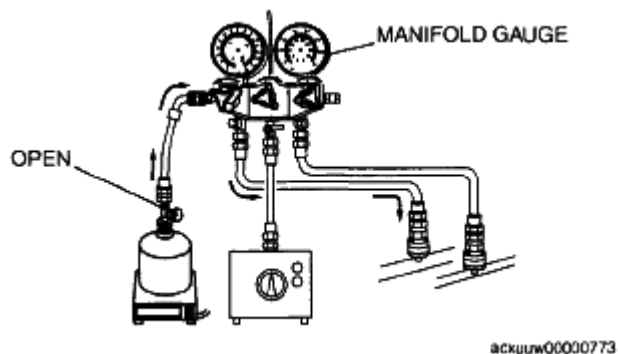


Fig. 10: Closing Low-Pressure Side Valve Of Manifold Gauge And Valve Of Refrigerant Tank
Courtesy of MAZDA MOTORS CORP.

LEAK TEST

1. Inspect for leakage using the a gas leak tester.
 - If there is no leakage, go to Step 3.
 - If leakage is found at a loose joint, tighten the joint, then go to the next step.
2. Inspect for leakage again.
 - If there is no leakage after tightening the joint, 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 evacuation.
3. Disconnect the manifold gauge from the charging valves.
4. Install the caps to the charging valves.

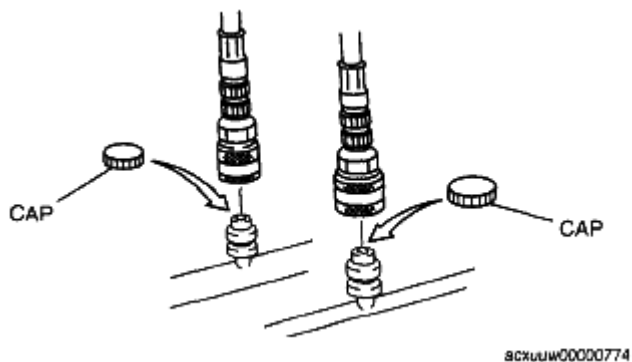


Fig. 11: Installing Caps To Charging Valves
Courtesy of MAZDA MOTORS CORP.

REFRIGERANT RECOVERY

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. (See **REFRIGERANT SYSTEM GENERAL PROCEDURES**.)
2. Start the engine and after it is warmed up, run it at a constant **1,500 rpm**.
3. Set the fan speed MAX HI.
4. Turn the A/C switch on.
5. Set to RECIRCULATE mode.
6. Set the temperature control to MAX COLD.
7. Set to VENT mode.
8. Close all the doors and all the windows.
9. Measure the ambient temperature and high-and low-pressure side reading of the manifold gauge.
10. Verify that the intersection of the pressure reading of the manifold gauge and ambient temperature is in the shaded zone.
 - If there is any malfunction, inspect the refrigerant system according to the troubleshooting chart.

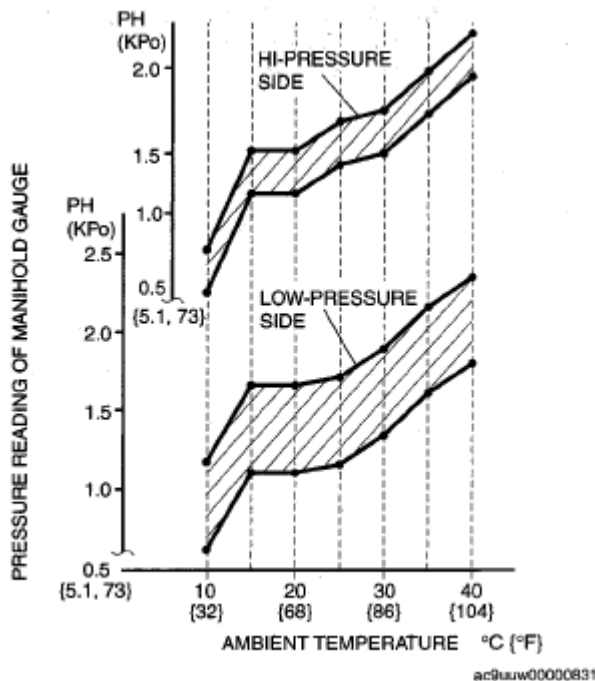


Fig. 12: Ambient Temperature And High-And Low-Pressure Side Graph
 Courtesy of MAZDA MOTORS CORP.

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 after it is warmed up, run it at a constant **1,500 rpm**.
4. Set the fan speed to MAX HI.
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 windows.
10. Wait until the air conditioner output temperature stabilizes.

Stabilized condition

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

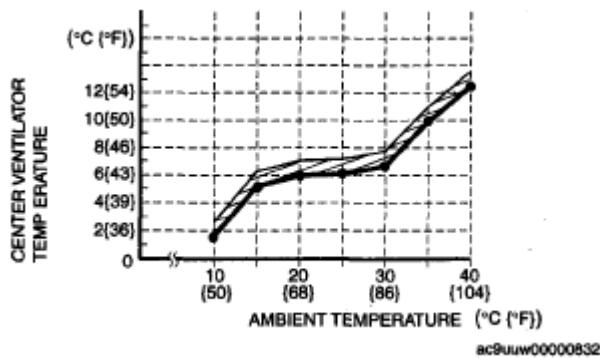


Fig. 13: Ambient Temperature Graph
Courtesy of MAZDA MOTORS CORP.