

2005 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

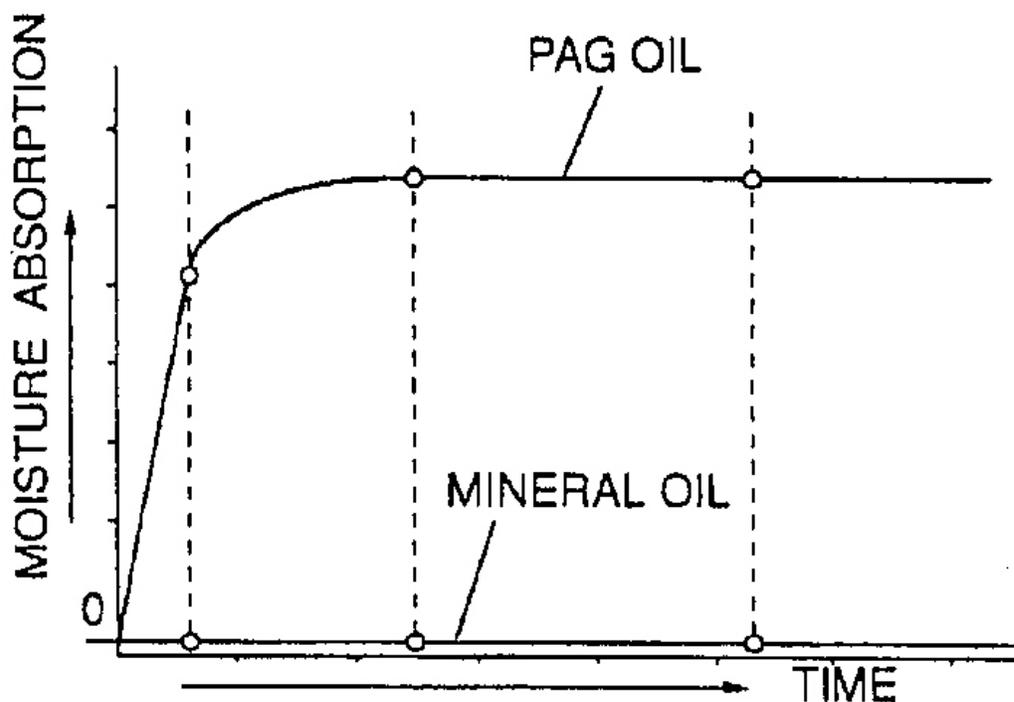
- The refrigerant container is highly pressurized. If it is subjected to high heat, it could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Store the refrigerant at temperatures below 40 °C {104 °F}.

REFRIGERANT SYSTEM SERVICE CAUTIONS

- Use only DENSO OIL8 compressor oil for this vehicle. Using 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.
- 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: Refrigerant System Service 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. Remove the caps from the high- and low-pressure side charging valves.
5. Connect the quick couplers to the charging valves.

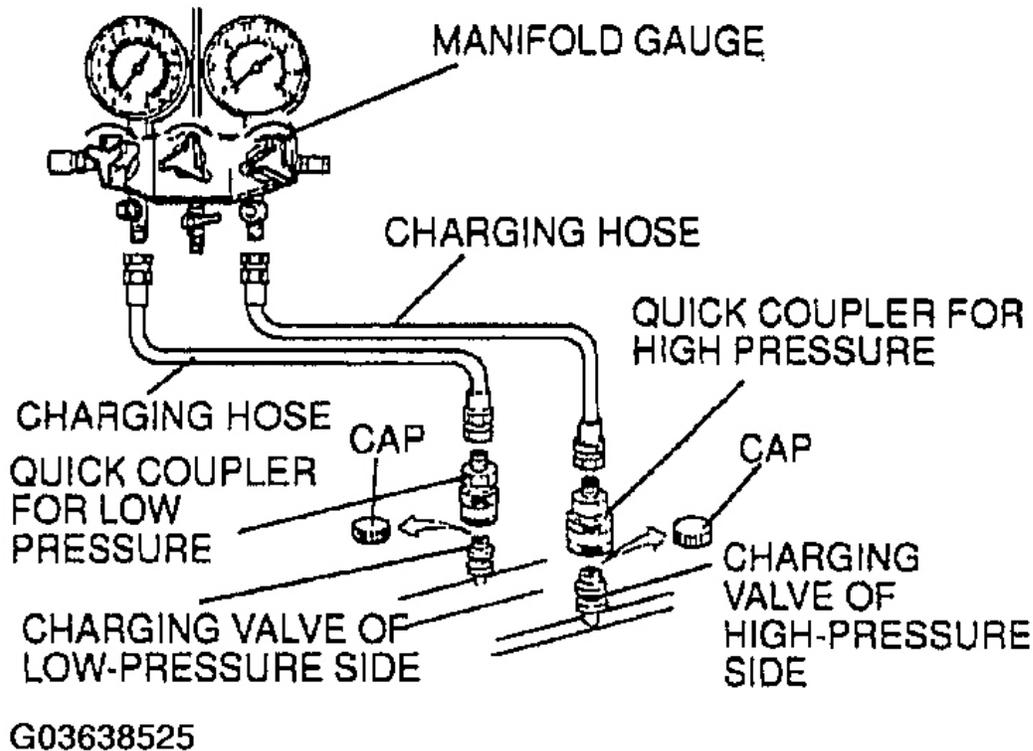


Fig. 2: Installing Manifold Gauge Set
 Courtesy of MAZDA MOTORS CORP.

REFRIGERANT SYSTEM PERFORMANCE TEST

NOTE: • After servicing the refrigerant system, test its performance.

1. Install the manifold gauge set. (See **MANIFOLD GAUGE SET INSTALLATION**.)
2. Open the hood.
3. Close all the doors and all the windows.
4. Warm up the engine and run it at a constant **1,500 RPM**.
5. Turn the A/C switch on.
6. Set the fan switch at 4th.
7. Set the REC/FRESH lever to REC.

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8. Set the mode dial to VENT.
9. Set the temperature control dial to MAX COLD.
10. Measure the center ventilator temperature and record the temperature reading.
11. Measure the ambient temperature and record the temperature reading.
12. Verify that the temperature reading is in the shaded zone (**maximum 6°C {43°F}**).
 - If the performance is not within the shaded zone, troubleshoot the refrigerant system. (See **FOREWORD** .)

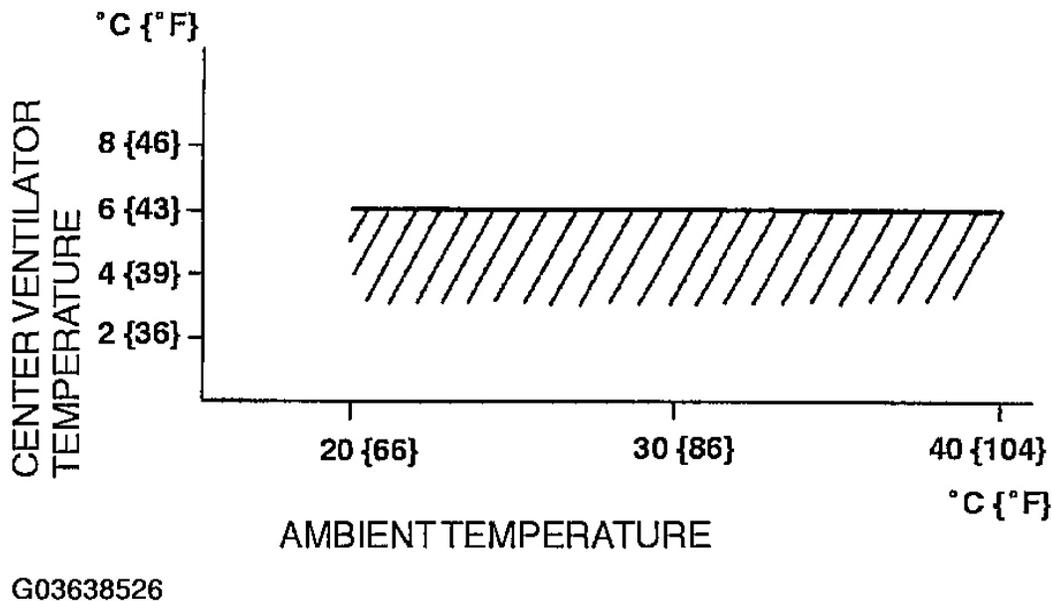


Fig. 3: Refrigerant System Performance Test Graph
Courtesy of MAZDA MOTORS CORP.

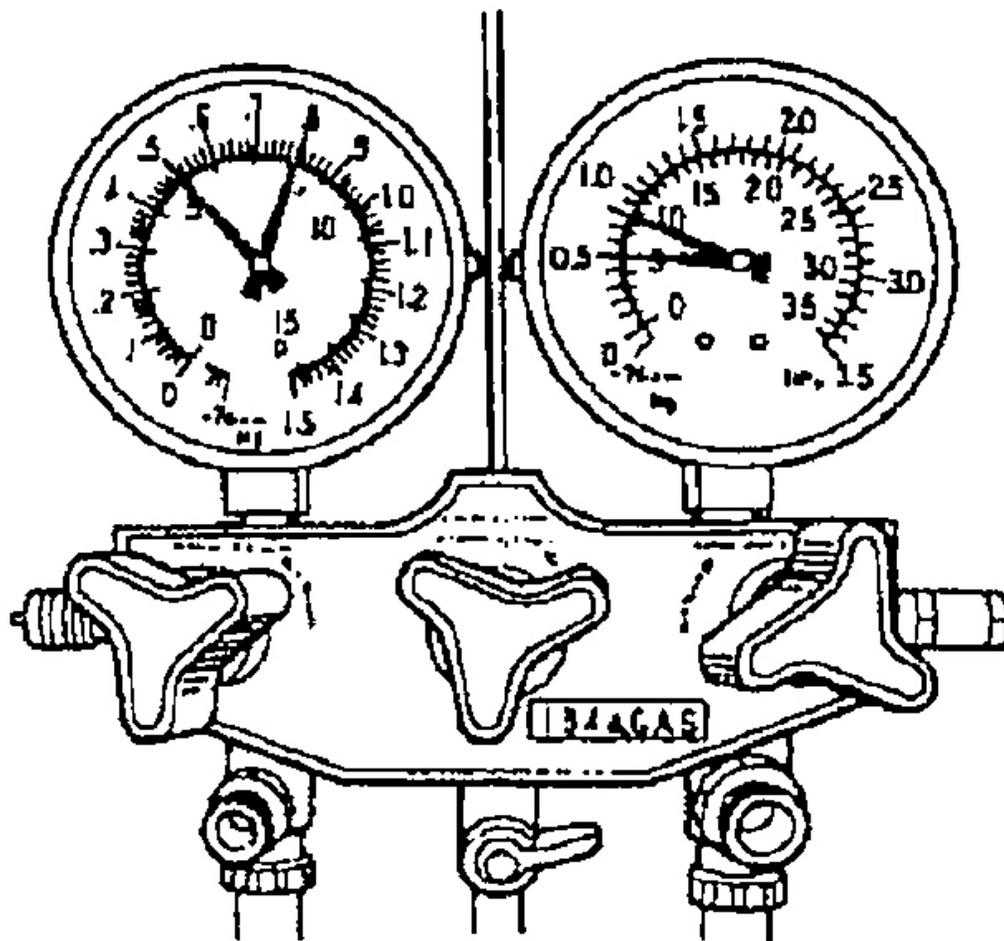
REFRIGERANT CHARGE CHECK

1. Install the manifold gauge set. (See **MANIFOLD GAUGE SET INSTALLATION**.)
2. Check the refrigerant pressure reading with the engine stopped.
3. Verify that the high- and low-pressure side readings of the manifold gauge are at **493-788 kPa {5.02-8.04 kgf/cm², 72-114 psi}**.
 - If the pressure readings are lower than specified, recharge the refrigerant amount. (See **REFRIGERANT CHARGING**.)
 - If the pressure readings are within the specification but there is insufficient cooling, go to the next step.
 - If the pressure readings are within the specification and there are no leaks, the refrigerant amount is OK.

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4. Start the engine and run it at a constant **2,000 RPM**.
5. Turn the A/C switch on and set the fan switch at 4th.
6. Set the REC/FRESH lever to REC.
 - If the A/C compressor is short-cycling, note the low-pressure side reading at which the magnetic clutch kicks out.
 - If the pressure is **167 kPa {1.7 kgf/cm², 24 psi}** or lower, evacuate then recharge the refrigerant system with the proper amount of refrigerant. (See **REFRIGERANT CHARGING**.)
 - If the pressure is **206 kPa {2.1 kgf/cm², 30 psi}** or higher, inspect the thermostitch. (See **THERMOSWITCH INSPECTION** .)



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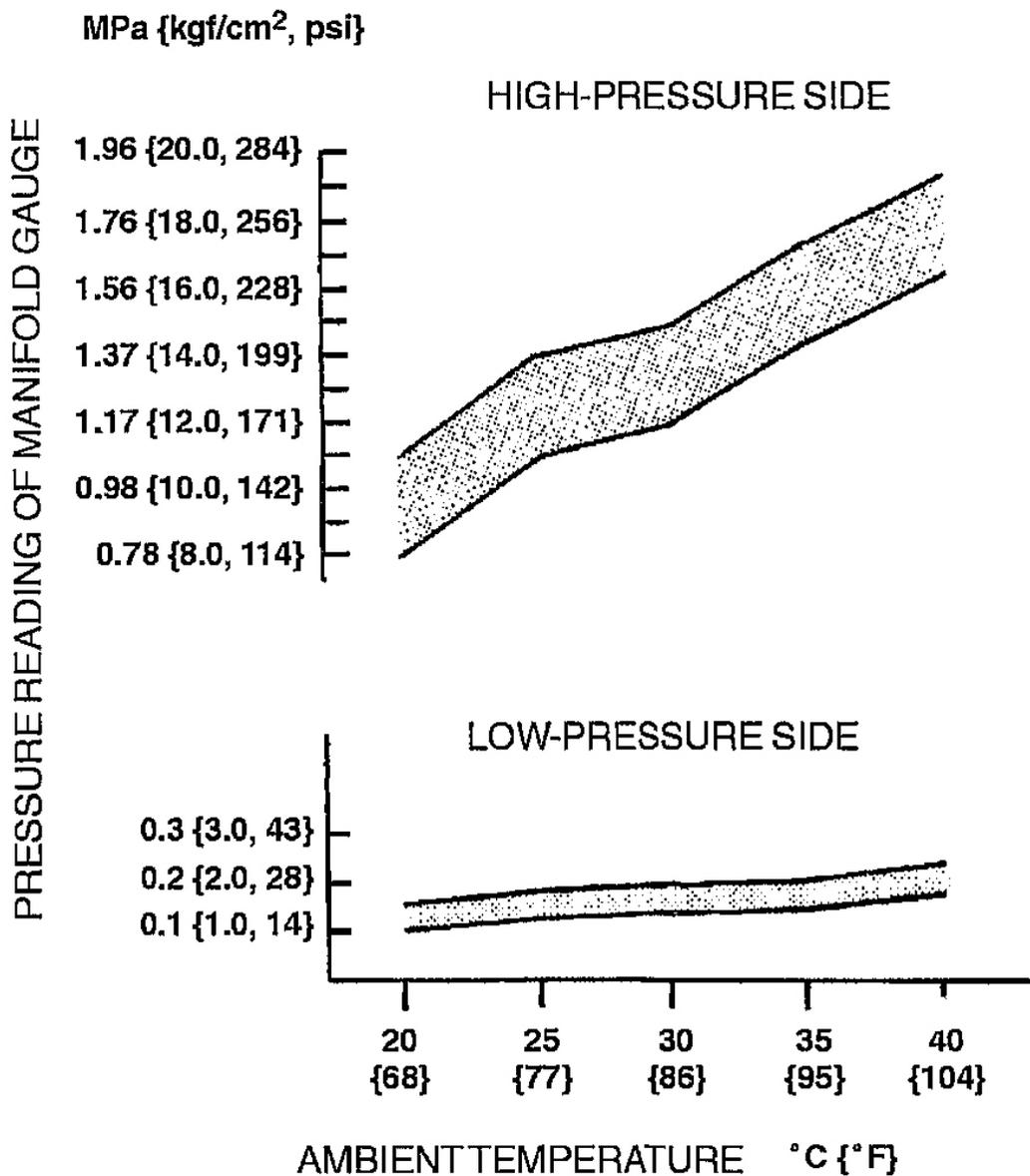
Fig. 4: Identifying Gauge Reading
Courtesy of MAZDA MOTORS CORP.

REFRIGERANT PRESSURE CHECK

1. Install the manifold gauge set. (See **MANIFOLD GAUGE SET INSTALLATION**.)
2. Open the hood.
3. Close all the doors and all the windows.
4. Warm up the engine and run it at a constant **1,500 RPM**.
5. Turn the A/C switch on.
6. Set the fan switch to 4th speed.
7. Set the REC/FRESH lever to REC.
8. Set the mode dial to VENT.
9. Set the temperature control dial to MAX COLD.
10. Measure the high- and low-pressure side readings of the manifold gauge.
 - If the high- and low-pressure side readings are in the shaded zones as shown in the figure, the refrigerant system is normal.
 - If the high- and low-pressure side readings are not as specified, troubleshoot the refrigerant system. (See **FOREWORD** .)

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Fig. 5: Refrigerant Pressure Check Chart
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

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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

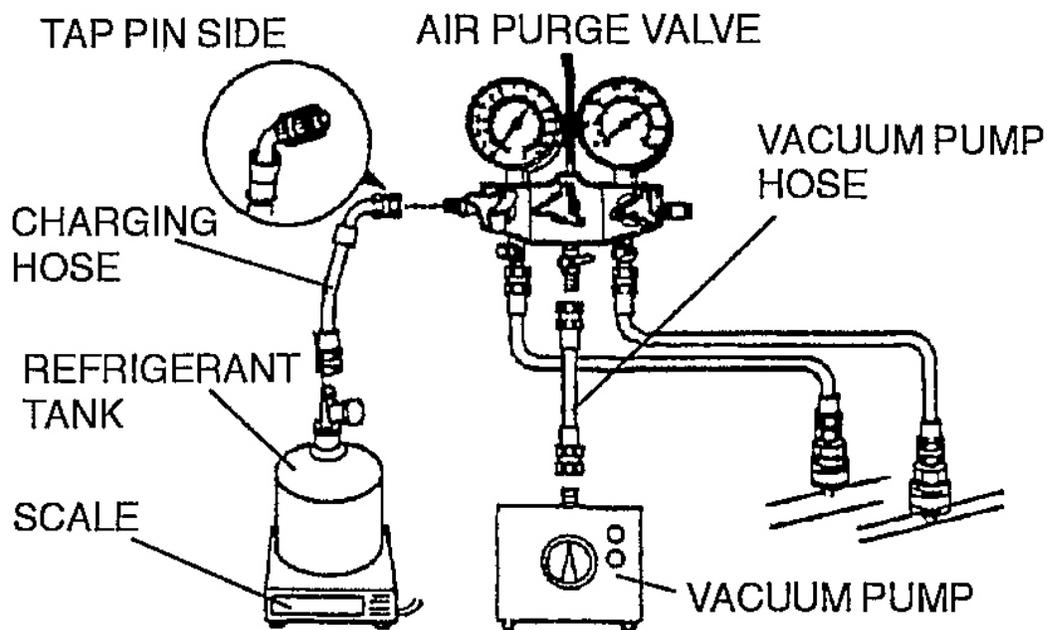
1. Install the manifold gauge set. (See MANIFOLD GAUGE SET INSTALLATION.)
2. Connect the tap pin side of the charging hose to the air purge valve of the manifold gauge.
3. Connect the vacuum pump hose to the center joint of the manifold gauge.
4. Connect the vacuum pump hose to the vacuum pump.
5. Connect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

Refrigerant type

R-134a

Regular amount of refrigerant (approx.quantity)

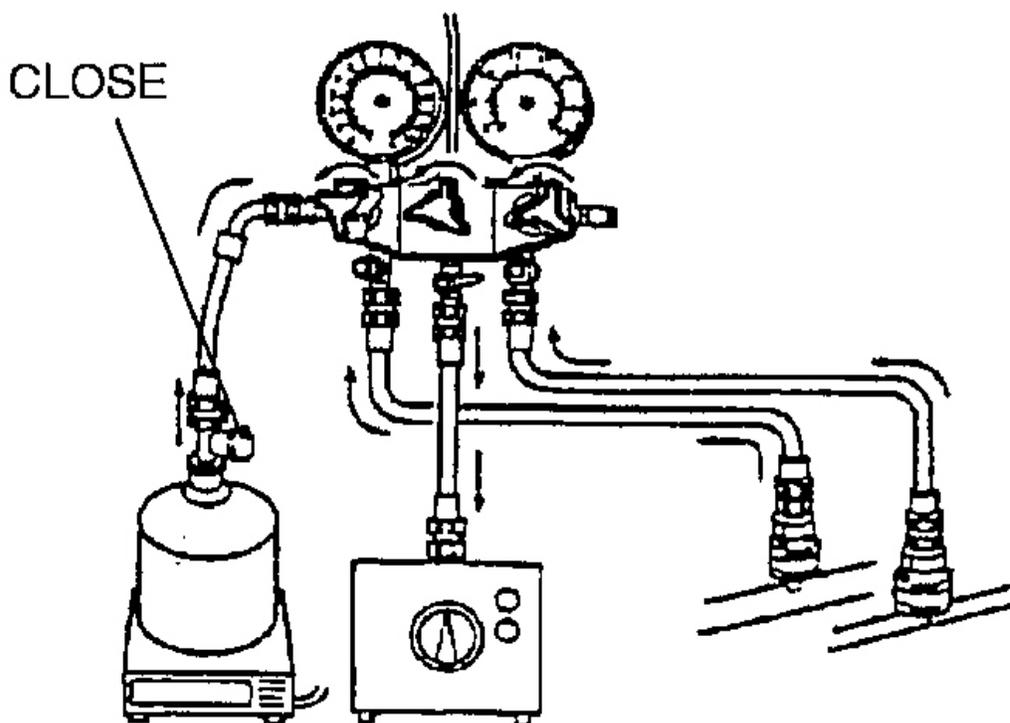
400 g {14.1 oz}



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Fig. 6: Connecting Charging Hose To Refrigerant Tank
Courtesy of MAZDA MOTORS CORP.

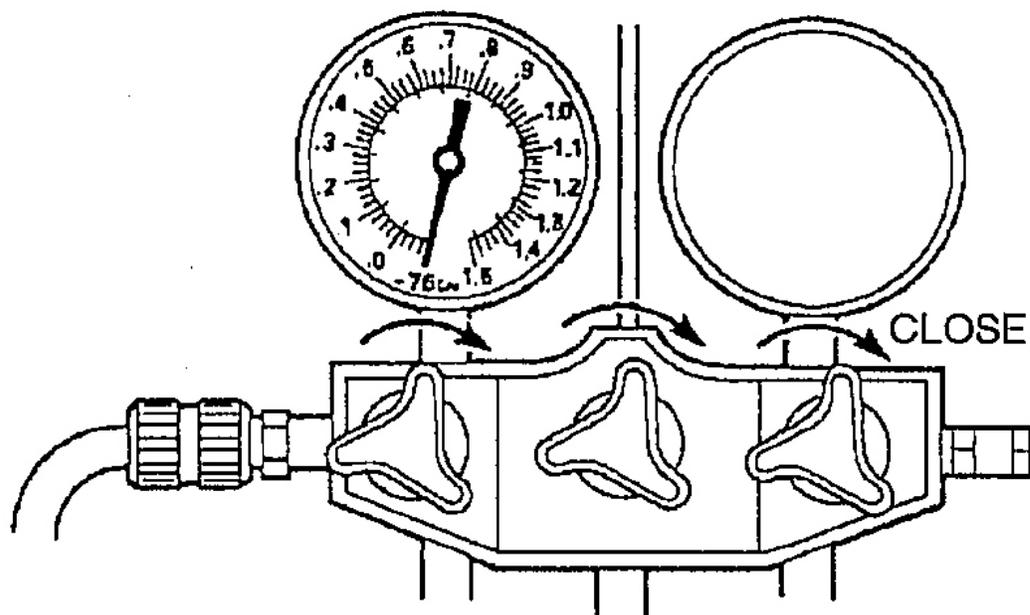
7. Open all the valves of the manifold gauge.
8. Start the vacuum pump and let it operate for **15 min.**



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Fig. 7: Starting Vacuum Pump
Courtesy of MAZDA MOTORS CORP.

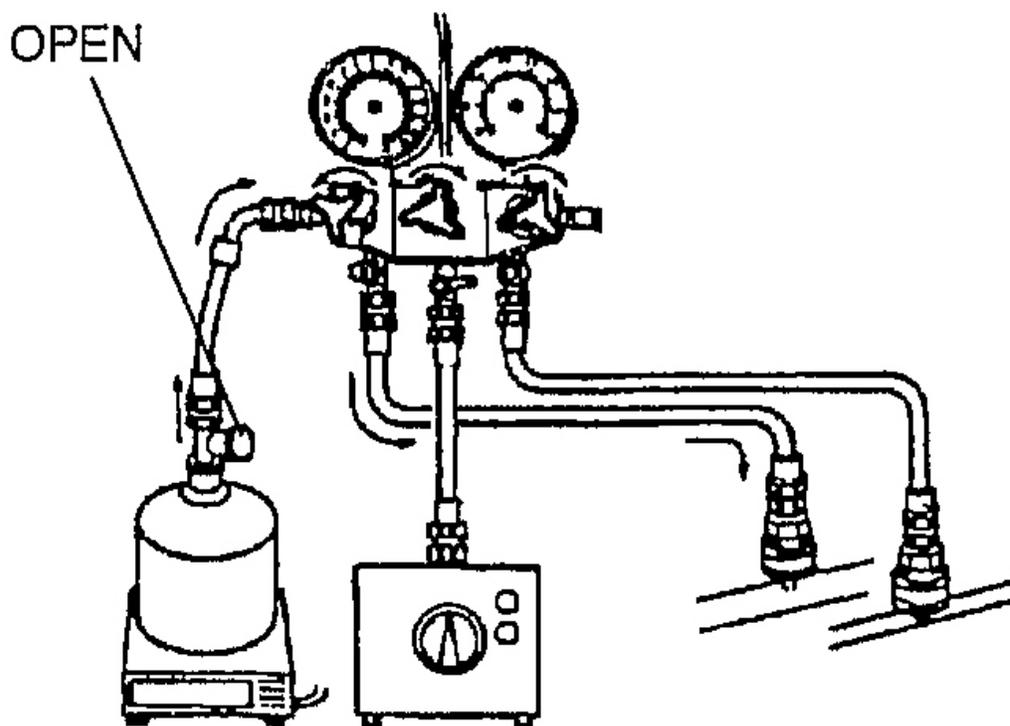
9. Verify that the high- and low-pressure side readings of the manifold gauge are at **-101 kPa {-760 mmHg, -29.9 inHg}**. Close each valve of the manifold gauge.
10. Stop the vacuum pump and wait for about **5 min**.
11. Inspect the low-pressure side reading of the manifold gauge.
 - If the reading has changed, check for leaks 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.



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Fig. 8: Opening Valve Of Refrigerant Tank
Courtesy of MAZDA MOTORS CORP.

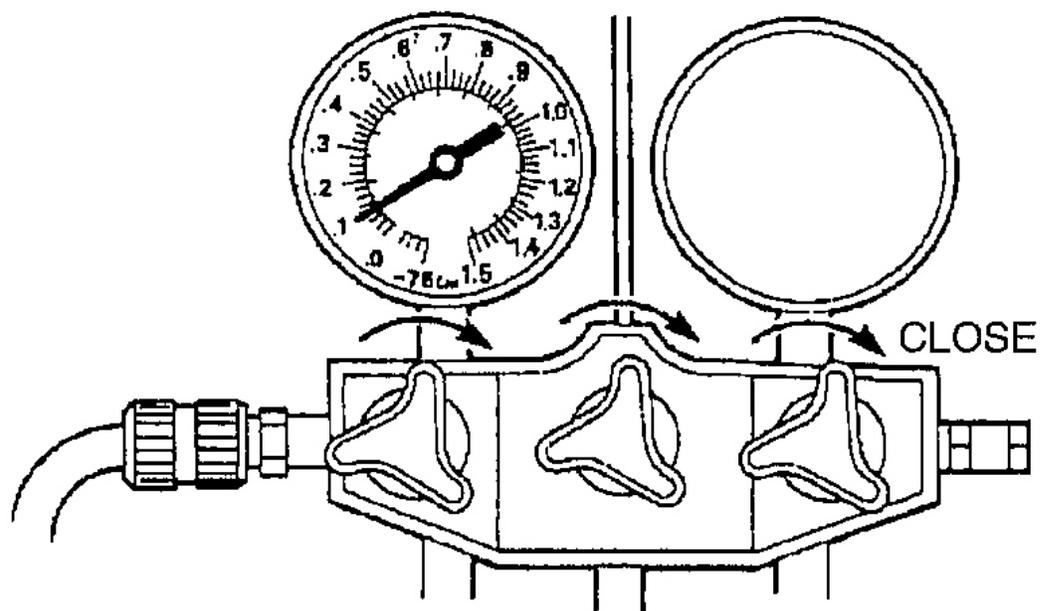
14. Open the low-pressure side valve of the manifold gauge.



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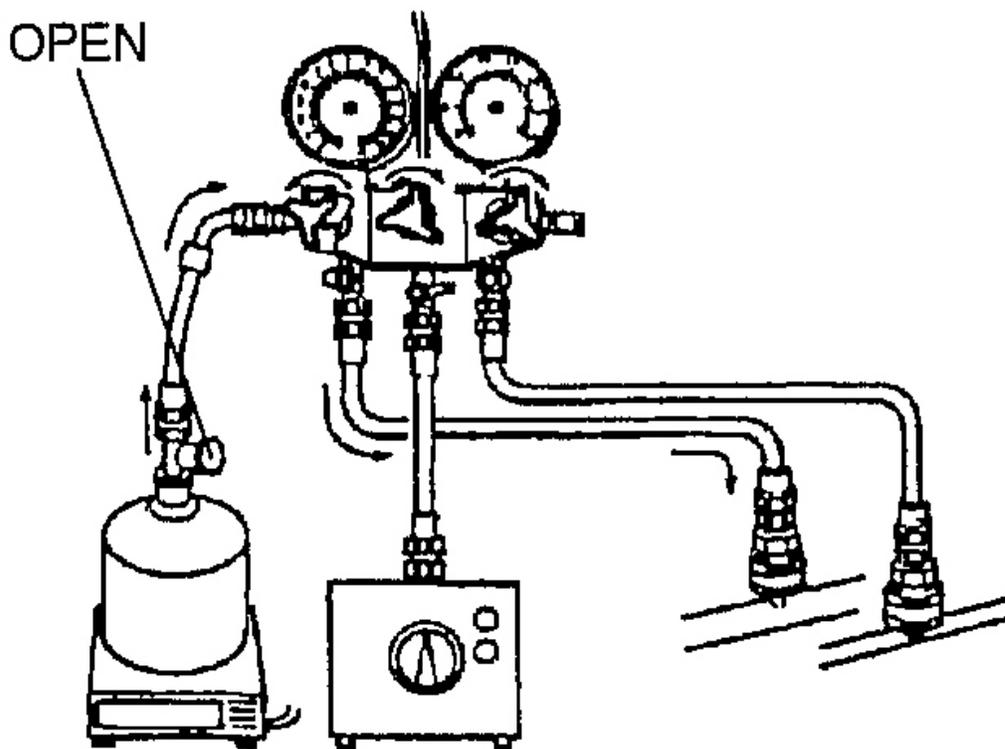
Fig. 9: Opening Low-Pressure Side Valve Of Manifold Gauge
Courtesy of MAZDA MOTORS CORP.

15. When the low-pressure side reading increases to **0.1 MPa {1 kgf/cm²,14 psi}** , close the low-pressure side valve of the manifold gauge.
16. Inspect for leaks from the cooler pipe/hose connections using a gas leak tester.
 - If there are no leaks, go to next step.
 - If a leak is found at a loose joint, tighten the joint and check for leaks again.
 - If there is still a leak at the same joint, discharge the refrigerant and then repair the joint. Repeat the charging procedure from Step 7.
 - If there are no leaks after tightening the joint, go to next step.
17. Open the low-pressure side valve of the manifold gauge and charge with refrigerant until the weight of the refrigerant tank has decreased **200 g {7.0 oz}** from the amount in Step 13.



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



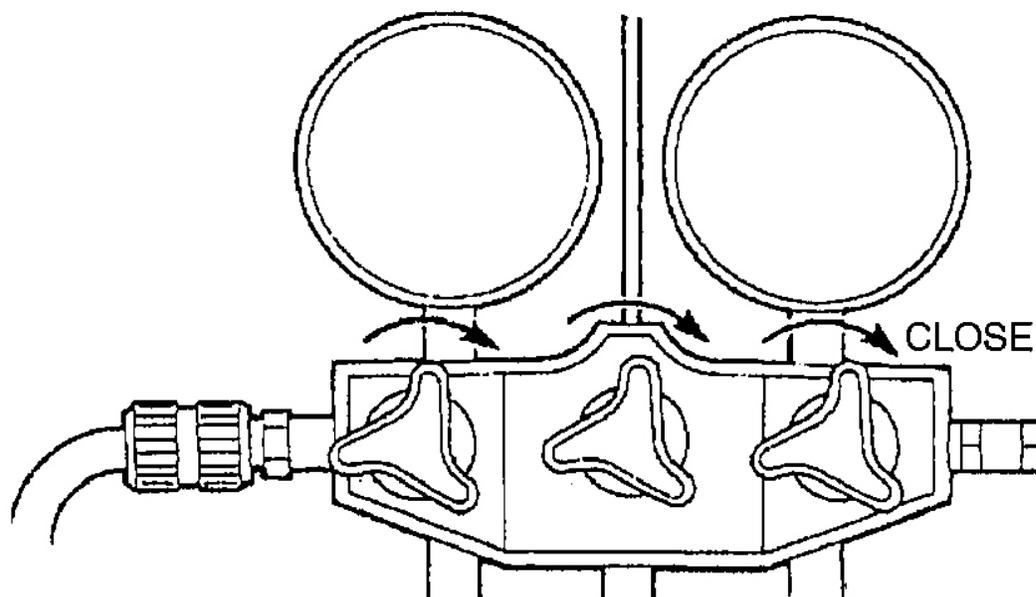
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Fig. 11: Opening Low-Pressure Side Valve Of Manifold Gauge
Courtesy of MAZDA MOTORS CORP.

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

WARNING:

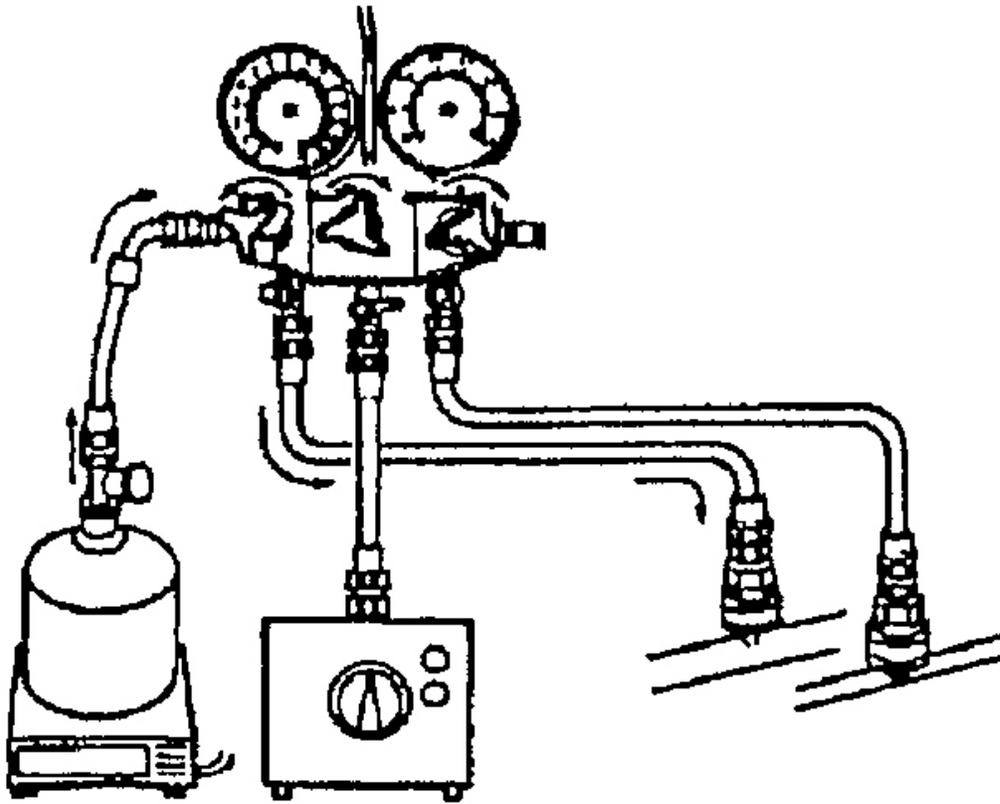
- Running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans will increase and the cans could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is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



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Fig. 12: Closing Low-Pressure Side Valve Of Manifold Gauge
Courtesy of MAZDA MOTORS CORP.

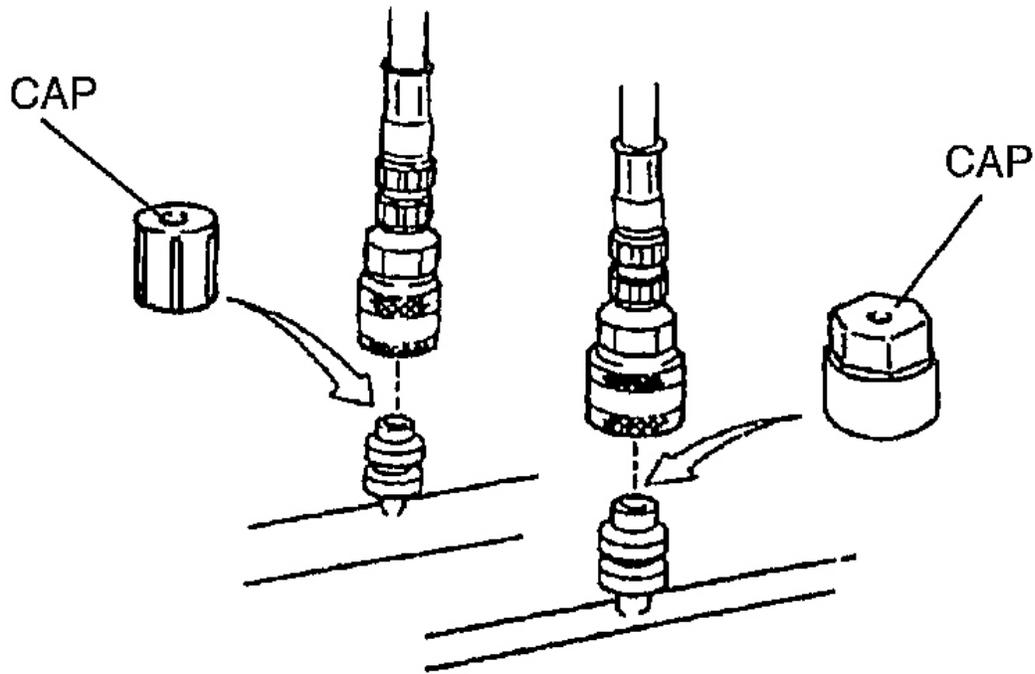
19. Start the engine and actuate the A/C compressor.
20. Open the low-pressure side valve of the manifold gauge and charge with refrigerant until the weight of the refrigerant tank has decreased **400 g {14.1 oz}** from the amount in Step 13.
21. Close the low-pressure side valve of the manifold gauge.
22. Stop the engine and A/C compressor.
23. Inspect for leaks using a gas leak tester.
 - If there are no leaks, go to next step.
 - If a leak is found at a loose joint, tighten the joint and check for leaks again.
 - If there is still a leak at the same joint, discharge the refrigerant and then repair the joint. Repeat the charging procedure from Step 7.
 - If there are no leaks after tightening the joint, go to next step.



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Fig. 13: Opening Low-Pressure Side Valve
Courtesy of MAZDA MOTORS CORP.

24. Disconnect the high- and low-pressure side quick couplers from the charging valves.
25. Install the caps to the charging valves.



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Fig. 14: Installing Caps To Charging Valves
Courtesy of MAZDA MOTORS CORP.